Design Patterns

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Design Patterns
Introduction Lite

Some guys got together and wrote down some *patterns* they've encountered over their careers in software development and slapped some names on them.

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That's it... really.

Design Patterns
Introduction Lite

Definition
Design Patterns are recurring architectural concepts in software development that have been used to solve specific problems.

Design Patterns
Introduction Lite

1. There are many named *patterns* in the wild.
2. You've already derived and used a couple patterns.

Design Patterns
Introduction Lite

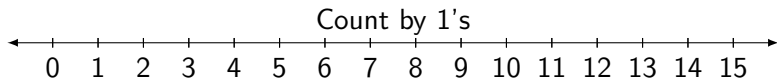You just did not know it was a *thing* that had a name.

Design Patterns
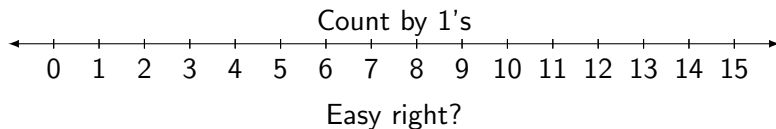
Introduction Lite

And they exist everywhere **else**...

Design Patterns

Learning how to count... again

Count by 1's

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Design Patterns
Learning how to count... again

Count by 1's

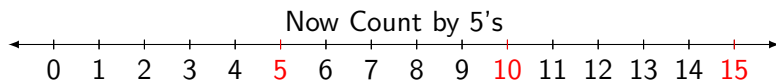0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Easy right?

Design Patterns
Learning how to count... again

What mathematical operation did you use?

Design Patterns

Learning how to count... again

Now Count by 5's

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Design Patterns
Think like a programmer

1. Create a function that calculates the *nth* multiple of 5.
2. Create a function that calculates the *next* multiple of 5.
3. What do all the multiples of 5 have in common?

Design Patterns
Think like a programmer

Definition
intrinsic state - sharable features of the defines something.

Design Patterns
Think like a programmer

Definition
intrinsic state - sharable features of the defines something.

Definition
extrinsic state - features/behavior created by a context of usage and therefore can not be shared.

Design Patterns

1. What is an **intrinsic state** of numbers that are multiples of 5?

Design Patterns
Think like a programmer

1. What is an **intrinsic state** of numbers that are multiples of 5?
2. Provide an **extrinsic state** for a multiple of 5.

Design Patterns

Think like a programmer

Task: Create a **NumberLine** class that represents the first 77 trillion multiples of 5 on the interval $(0, \infty)$

Conway's Game of Life

A Dive into Test Driven Development

Conway's Game of Life
Our Goal

- Learn how to work in a small team.
- Learn how to digest a problem with little guidance.
- Learn how to use testing to solve a problem.

Conway's Game of Life
Get the Files

https://github.com/jcockhren/gameoflife

Conway's Game of Life
The *How* and *What* of Testing

- What does a testing suite look like?
- What should you test?
- What things should one consider before writing your first test?
- How many asserts should you have per test?

Conway's Game of Life
The Rules

1. Any live cell with fewer than two live neighbours dies, as if caused by under-population.
2. Any live cell with two or three live neighbours lives on to the next generation.
3. Any live cell with more than three live neighbours dies, as if by overcrowding.
4. Any dead cell with exactly three live neighbours becomes a live cell, as if by reproduction.

Conway's Game of Life
Rules of Engagement

- Work in pairs
- You have 45 minutes per session
- Erase all your code at the end of each session and switch partners.
- no gems
- Internet solutions are a no-no

Conway's Game of Life
How to Win

- Implement Conway's rules
- Verify correctness using 2 Still Lifes and 2 Oscillators (i.e. passing tests).

Conway's Game of Life
Bootstrap

- ▶ Focus on how you want to store the data.
- ▶ How will you define a live cell?
- ▶ How will you define a 'world'?

A **flyweight** is a pattern where you can use a single shared object to represent many *items*.

Huh?!

You already know how to do this

Kanye's Conway's Game of Life

1. why couldn't we create an object for each cell in a *large* grid?
2. what was the **intrinsic state** of a cell?
3. what was the **extrinsic state** of a cell?

Task: Create an object or object instance that represents all live cells in a ∞-by-∞ sized grid.

Design Patterns

Flyweight

Ta-dah!