Functional Programming

in Racket

Peter Campora

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July 17, 2019

What Things are Beautiful?

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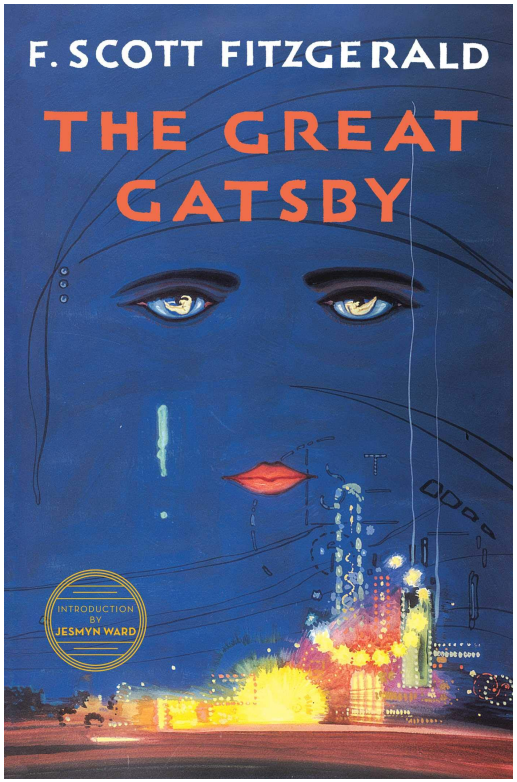

Can Code be Beautiful?

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```
public class SumSquares
{
   public static void main(final int[] nums)
   {
      int sum = 0;
      for (int i : nums)
        sum += i * i;
      System.out.println("The sum of the squares is: " +
↪   sum);
    }
}
```

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Don't worry about the meaning and syntax of the program, yet. Given time, the parens will become beautiful!

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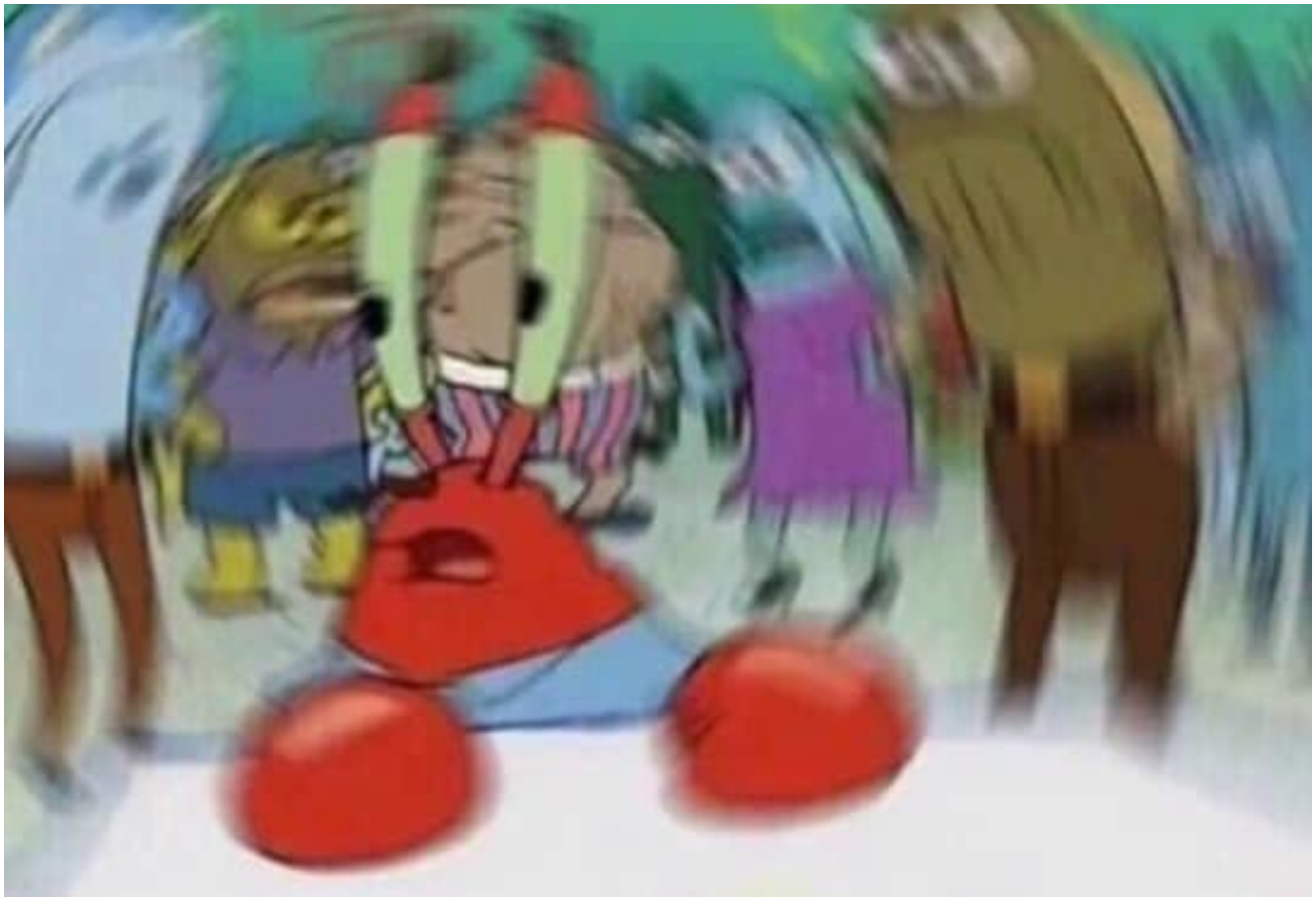
  - Programming languages provide a framework for creating beautiful programs according to the idioms of some paradigm (i.e. cubism in art)
  - Critique: Disconnected from the empirical or mathematical viewpoints we typically employ to measure the value of scientific contributions.

Looks Like We Don't Know



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- Computer Scientists are critical thinkers.

How do We Write Programs?

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Let's hear from you.

Is Programming Hard?

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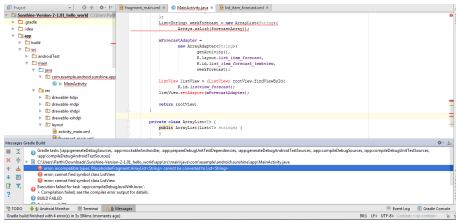

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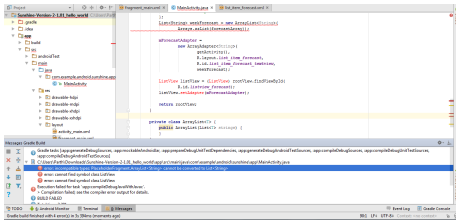

```
Temp.java
1  public class Temp {
2
3      public static void main(String[] args) {
4
5          foo(null);
6
7      }
8
9      public static void foo(String s) {
10         System.out.println(s.toLowerCase());
11     }
12 }
13
```

Problems Javadoc Declaration Console

```
<terminated> Temp [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_
Exception in thread "main" java.lang.NullPointerException
        at Temp.foo(Temp.java:10)
        at Temp.main(Temp.java:5)
```

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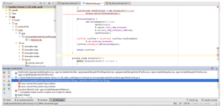

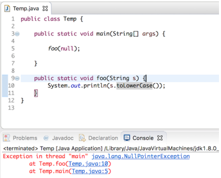

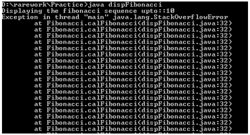

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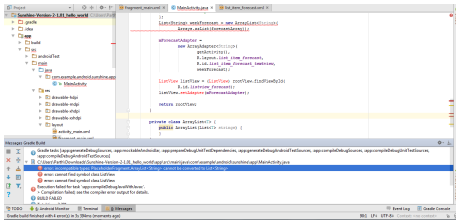

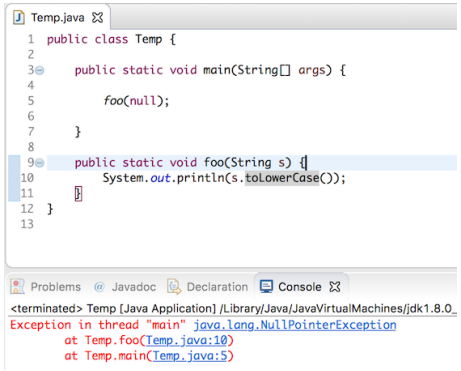

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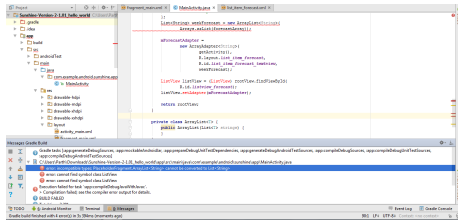

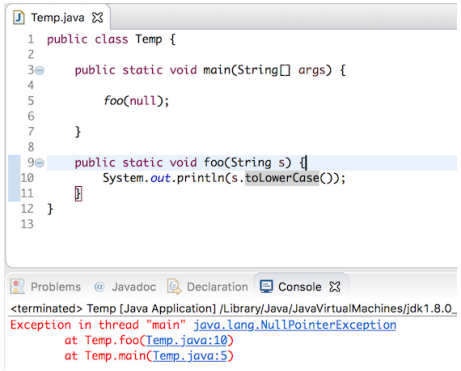

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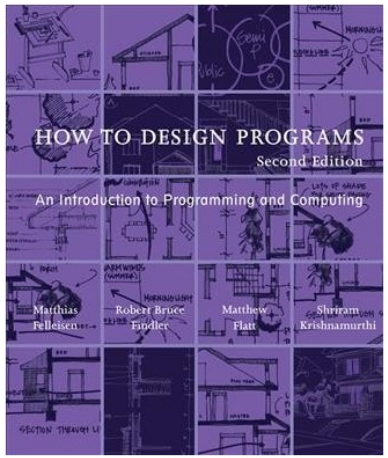
- Given enough examples, students begin to match problem descriptions to using features.
- From there, programming becomes gluing together recognized patterns.
- **There has to be a better way!**

The Better Way



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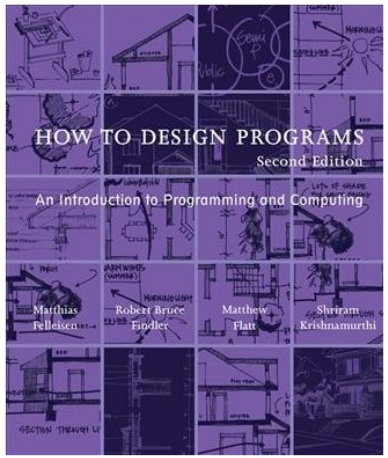

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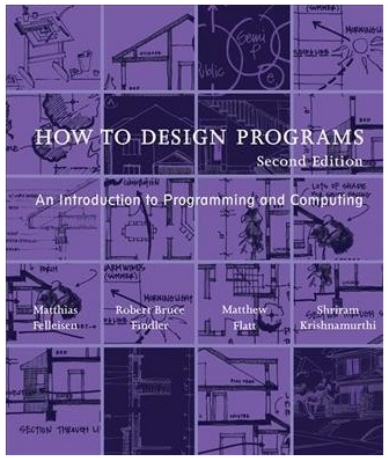

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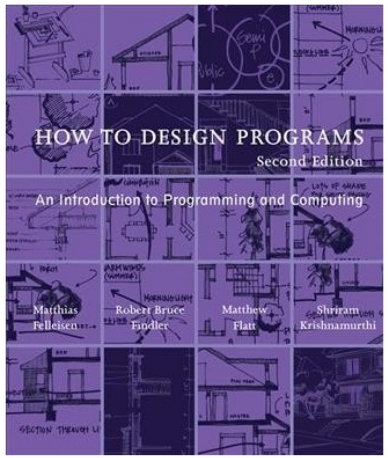

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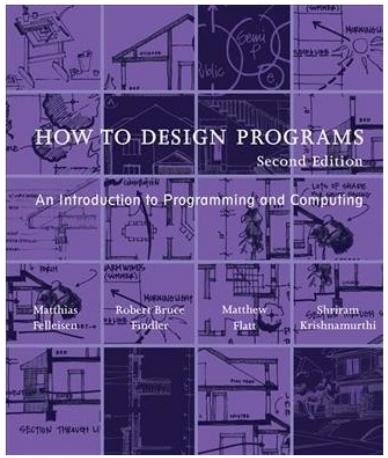

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- It presents recipes for designing two different types of programs.
  - Big bang (event driven) programs
  - Batch programs (effectful scripts)
- Isn't this a course on functional programming?

Learning Functional Programming from the Ground Up

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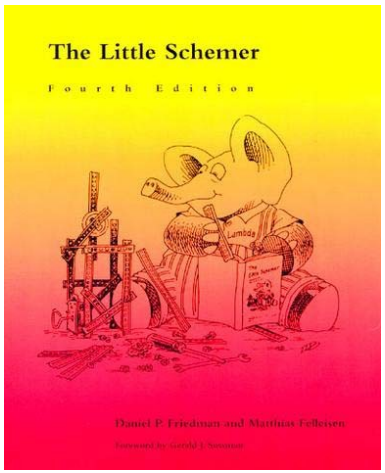
- 

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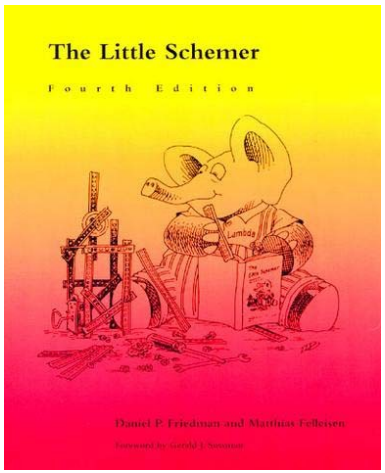
- 

- We will learn functional programming and systematic design

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- Other functional languages have additional complexity
- It's focused on being a good language for education

Course Structure

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- *Try not to stress about grades*

The Main Thing I Want