CmpSci 187: Programming with Data Structures
Spring 2015

Lecture #2

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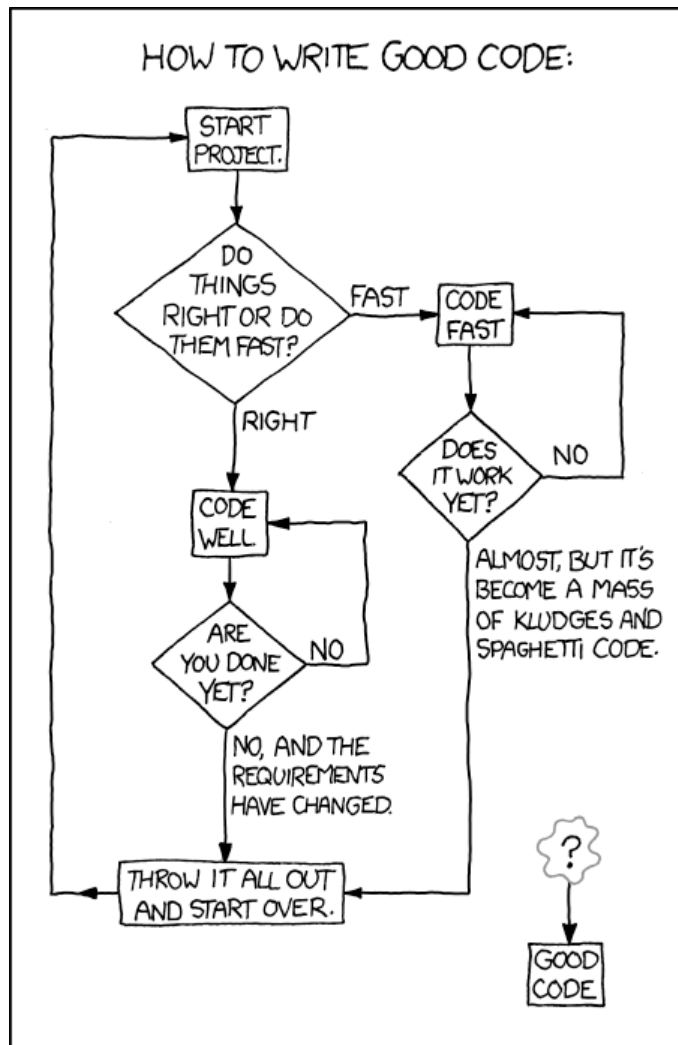
1 Administrivia

Administrivia

- Clickers
- Lecture shopping
- Exam schedule: February 19, March 25, April 23, evenings!

2 Last thoughts on Software Engineering

The Reality

HOW TO WRITE GOOD CODE:

From http://xkcd.com/844/

3 Java Review

Low-level Review

- von Neumann Machines: memory and processor
- Memory contains data, which includes instructions

- Really primitive types: bits

- Interpreted as addresses, integers, floating-points, booleans, ...

- Really primitive instructions: add, move, ...

Java

- A high-level language: compilers, interpreters, and memory management

- Primitive types: 4 kinds of integer (byte, short, int, long), 2 kinds of floating point (float and double), characters (char), booleans (boolean)

- Pseudo-primitive type: String

- Composed types: arrays and classes

- References

Primitive Type Operations Clicker Exercise

What output does the following snippet of Java code produce?

```
System.out.print(11/4 + " ");
System.out.println(3.0/4.0);
```

A. `2.5 0.75`

B. `2 0.75`

C. `5/2 3.0/4.0`

D. `3 0.75`

Classes and Objects

- Simula 67

- Encapsulation of state and behavior (attributes and methods)

- Inheritance and subclassing - is-always-a

- Methods and scope

- Packages and import

Casting Clicker Exercise

What does the following snippet of Java code print?

```java
public class Phone {
  void answerCall() {
    System.out.println("Hello"); } }
public class CellPhone extends Phone {
  void answerCall() {
    System.out.println("Can you hear me now?"); } }
...
Phone myPhone = new CellPhone();
myPhone.answerCall();
```

A. This code won't compile.

B. `"Hello"`

C. `"Can you hear me now?"`

D. A 'ClassCastException' at runtime.

Run-time Structure

- Call stack and exceptions

- Dynamic typing - distinguish type of value from type of variable

- Pass by value vs. pass by reference

- Aliasing

Aliasing Clicker Exercise

What is the value of `sum` after executing the following snippet of Java code?

```java
Dog cardie = new Dog();
Dog duncan = cardie;
cardie.setAge(6);
duncan.setAge(4);
int sum = cardie.getAge() + duncan.getAge();
```

A. 6

B. 8

C. 10

D. 12

E. `'cardiecardie'`

4 Data Structures

Collections

- A set of objects of the same class (imagine shipping containers)

- Operations: create, insert, remove, take "best"

Item arrangement

- Think in terms of, e.g., shipping containers

- Arrangement in a line: put down at one end, pick up from the other; a queue (a.k.a., FIFO).

- Arrangement in a pile: add to the top, take off from the top; a stack (a.k.a., LIFO).

- Other arrangements