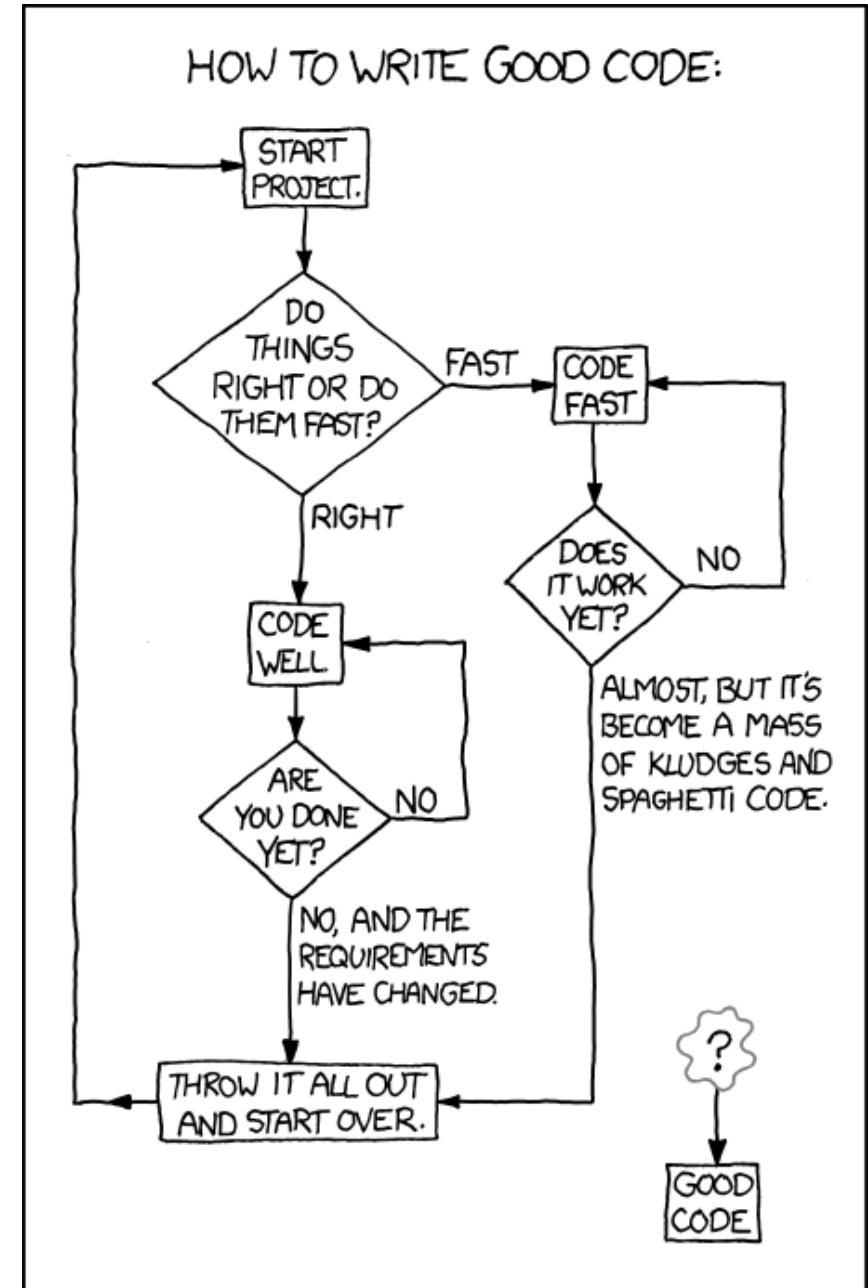


Testing I

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Administrivia

- Attendance: <http://tinyurl.com/uwigem/18sp/attendance/>
- Spec meetings
 - Adjust spec based on feedback
 - Go implement!
 - Have until next week, since the deadline was extended

Aside: When will we work on a real project?

- Start low-risk
- Experience we gain from practice/“toy projects”
 - Code collaboration
 - Teamwork
 - Software

We will start working as a team after Pacman and the EE lab has been completed 😊

Agenda

- How to get good code
- Unit Testing
- Project Meeting

How to avoid bugs?

Use a language with types (like Java)

Test your code

Ask other people to look at your code

These 3 things prevent
>90% of all bugs

How to write a simple test?

Call a method with one set of input

```
result = o.mapOnto(input);  
if(result != expected){  
    print("mapOnto() failed with "+result);  
}
```

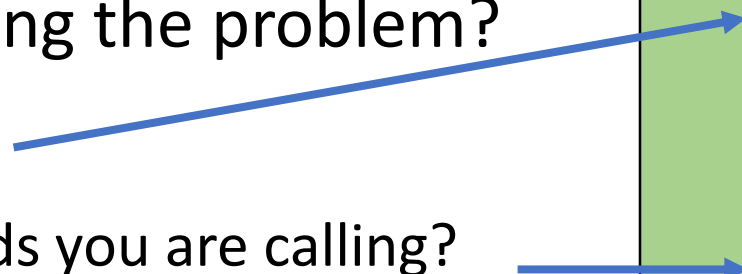
What happens when a test fails?

- You go look inside the code, but your method calls several other methods

- What is causing the problem?

- Your code?

- The methods you are calling?



```
void mapOnto(int[] input){  
    for(int i : input){  
        input += i;  
    }  
    this.updateFields();  
}
```

Unit test

- Fix this by making sure that every single method has its own test
- Unit tests build on top of each other
- When every method called inside another method is tested, we know where the problem is

Unit Tests

```
void mapOnto(int[] input){  
    for(int i : input){  
        input += i;  
    }  
    this.updateFields();  
}
```

```
void tests(){  
    testUpdateFields();  
    //^^This passes  
    testMapOnto();  
    //^^This fails  
    /*Which part of mapOnto  
    is causing a problem?*/  
}
```

How to test an entire system?

- Testing a video game?
- Testing a utility, like Word?

Write internal tests that chain together multiple methods?

Have a person try to use the software?

Integration test

- Multiple method calls one after another
- Then verify that the state is as expected

System Testing

- Have a human use the system
- Write down if anything weird happens
- Often called “play testing” in video game development