

# Introduction to Programming

Matt Luckcuck

8th of May 2017

# Outline

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- What is Programming?
- Programming Languages
- Programming Process
- Tea Break! (Example)

# What is Programming?

Has anyone done any programming before?

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What about...

- VCR?

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- Sky+ (or similar)?

# What is Programming?

Has anyone done any programming before?

What about...

- VCR?
- Sky+ (or similar)?
- Washing Machine?

# What is Programming?

Programming is the process of giving instructions to a computer.

# What is Programming?

Programming is the process of designing and writing instructions for a computer.



# What is Programming?

## Computers. . .

- Computers are **Stupid!**
  - But good with numbers and repetition
- We need to tell them *exactly* what to do
- This means giving precise instructions. . .
  - . . . in a language the computer can 'understand'
- Algorithm: a sequence of instructions that solve a problem, E.g. . .
  - Recipe, or
  - Directions

# Programming Languages

C Scratch C++  
Java  
Python Javascript  
PHP

# Programming Languages

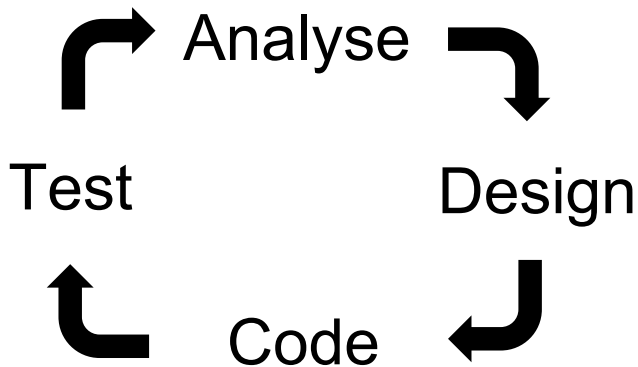
## Programming Languages

- Provide a set of instructions to tell computer what to do...
  - Expressions
  - Variables
  - Control Structures
- That we combine according to grammar rules to make a program

## 'Understanding'

- Computers only *understand* binary (0010)
- Programming languages are human-readable then translated into machine-readable

# Programming Process



# Programming Process

## Building a Program

- Start with a basic version of the problem, then add details
- Break down (decompose) the problem in to smaller parts
- Focus on the general details of the problem (abstraction)
  - Think of a bus route map
- Cycle of trial and error (debugging)
  - Often mainly error!

# Tea Anyone? – Basic Algorithm

- 1 Boil water
- 2 Add tea to the pot
- 3 Add boiled water to the pot
- 4 Brew tea
- 5 Pour tea into cup
- 6 Stir tea
- 7 Enjoy!

## Tea Anyone? – A Little More Detail...

- 1 Boil water
- 2 Add tea to the pot
- 3 Add boiled water to the pot
- 4 Brew Tea
- 5 **if** *sugar = true* **then**
- 6 | Add sugar
- 7 Pour tea into cup
- 8 **if** *milk = true* **then**
- 9 | Add milk
- 10 Stir tea
- 11 Enjoy!

# Tea Anyone? – Who Wants Tea?

- 1 Boil water
- 2 **foreach** *person* **do**
- 3 | Add 1 spoon of tea to the pot
- 4 Add boiled water to pot
- 5 Brew tea
- 6 **foreach** *person* **do**
- 7 | **if** *sugar = true* **then**
- 8 | | Add sugar
- 9 | Pour tea into cup
- 10 | **if** *milk = true* **then**
- 11 | | Add milk
- 12 | Stir tea
- 13 Enjoy!



# Tea Anyone?

## What does this show us?

- Start small and add detail
- Sequence, Branching, and Loops
- Variables for data that changes
- Abstracting away from the details of boiling, brewing, etc

# Summary

## Programming Summary

- Computers are **stupid**
- Programming: giving a computer instructions
- Decomposition of problems
- Modelling and solving problems in abstract terms
- Trial and Error (Trying, Failing, Fixing)