Data Structures & Programmatic Thinking

Introduction

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About

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Ask me anything

About

The Course

- 11 sync sessions

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- 11 sync sessions
- 3 async sessions

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- 11 sync sessions
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- 2 assignments (1 individual, 1 group)

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The Course

- 11 sync sessions
- 3 async sessions
- 2 assignments (1 individual, 1 group)
- 1 final exam

About

Grading

Criteria	Score %
Final Exam	20 %
Individual Work	40 %
Workgroups	20 %
Class Participation	20 %

About

Grading

The grading for this course will either be **Non Graded Satisfactory** or **Non Graded Unsatisfactory**.
If you get 50% or more in the overall score, you get **NGS**, and **NGU** otherwise.

About

Participation

Please, raise your hand at any point in class if you want to ask something, make an useful comment, or answer a question. (if remote, use Zoom's raise hand feature, so that it's easier to track it)

Learning Objectives

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- Learn What's programming
- Understand how computers execute programs
- Learn the basics of Python

Plan for this session

- Learn about software

Plan for this session

- Learn about software
- Understand what are algorithms and data structures

Plan for this session

- Learn about software
- Understand what are algorithms and data structures
- Install Anaconda

Language

Throughout this course we will use Python as our programming language, but there are many more!

Language

There are several ways for categorizing programming languages.

Language classification

Language	Paradigm	Execution	Purpose
Python	imperative	interpreted	general
Java	object oriented	compiled	general
Javascript	imperative	interpreted	general
Haskell	functional	compiled	general
SQL	declarative	interpreted	specific
HTML	declarative	interpreted	specific

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Language

Python

Python is one of the most used languages right now. Its applications range from Data Science to Web servers

How do we write code?

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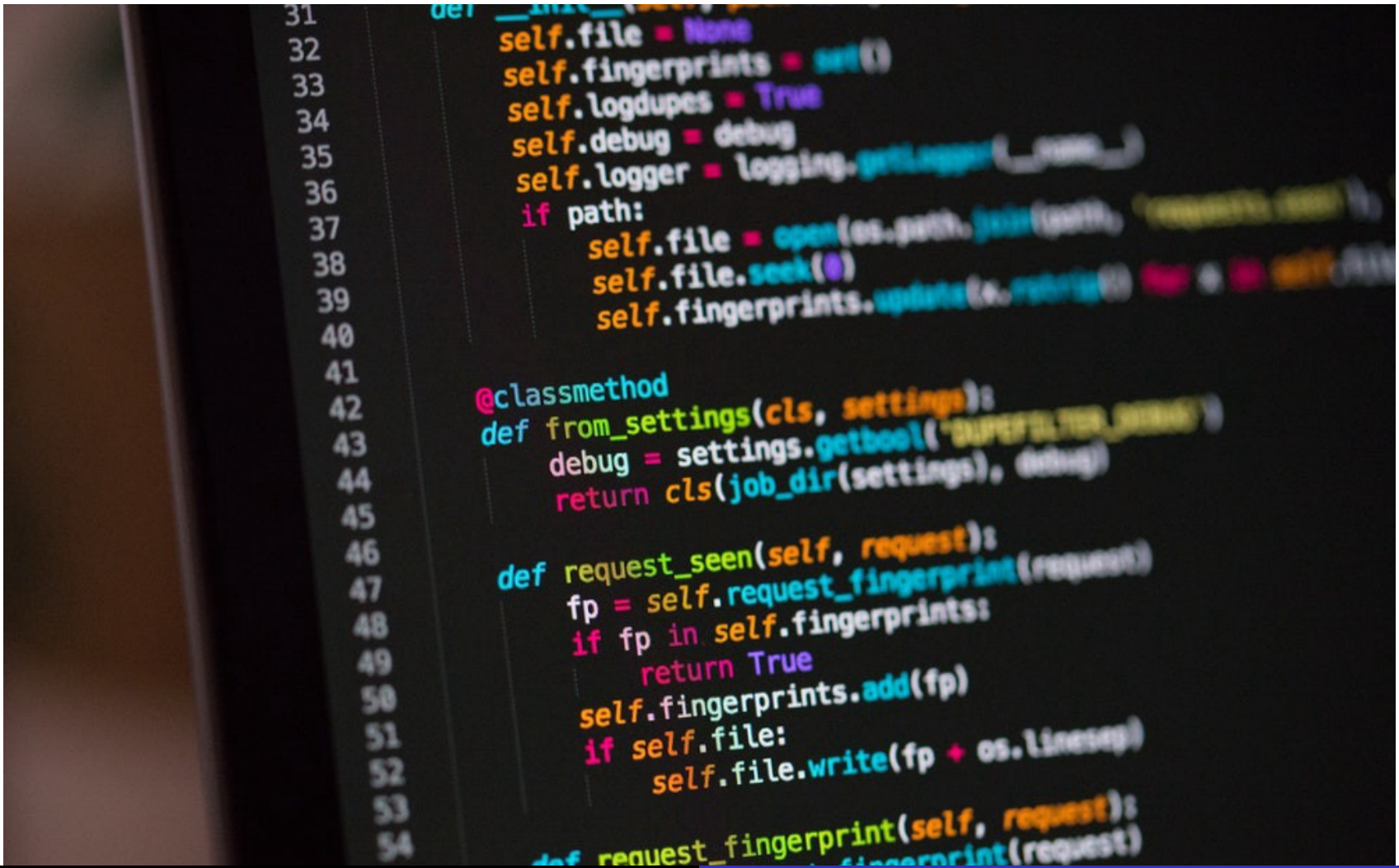
Coding is basically putting words together following a programming language specification.

How do we write code?

We can put these words directly in a text file and then execute it as a program.



How do we write code?

Or we can feed these words directly into the programming language console.

Demo

Python console

Let's see how do code looks in the console!

Install Anaconda platform

Now we will install the Anaconda platform in our computers.

1. go to https://www.anaconda.com/products/individual
2. Go to the bottom of the page, to the **Anaconda Installers** section, and download the graphical installer for the 3.7 version **for your operating system.**
3. In the installer, when you're given the option to install the PyCharm IDE, or Visual Studio Code, you can ignore it, we're not going to use it.

Checkpoint

Anybody is lost or has problems installing the software?

Programs

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What is a program?

A program is a piece of software with a specific task.

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This task can be something **big**, like handling a nuclear reactor, or something **small** like Ctrl-c/Ctrl-v.
There are two main components of programs, **algorithms** & **data structures.**

Algorithms

Algorithms

What is an algorithm?

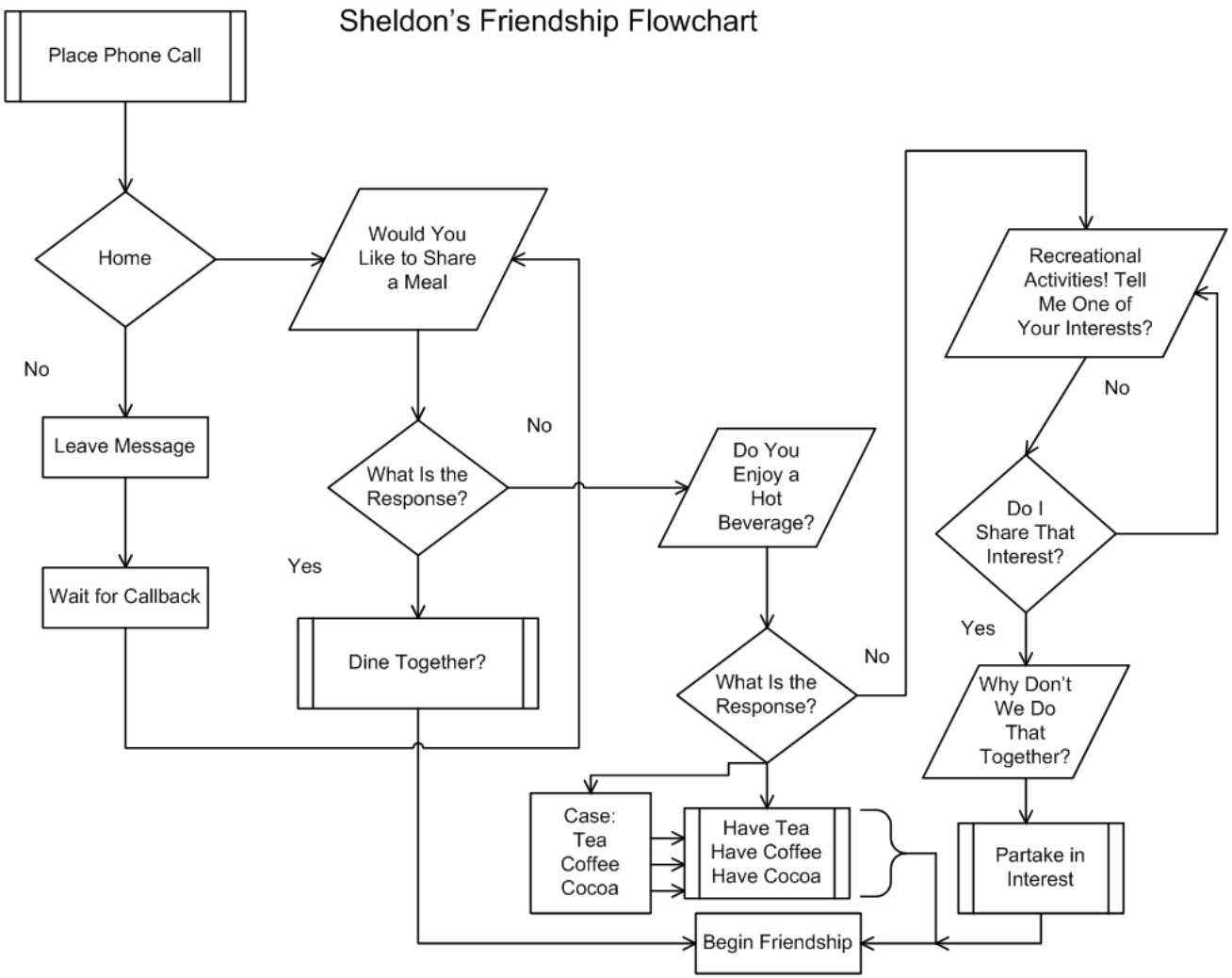
Algorithms

What is an algorithm?

An algorithm is a sequence of steps that guide the computer in how to solve a problem

Algorithms

link to the video



Algorithms

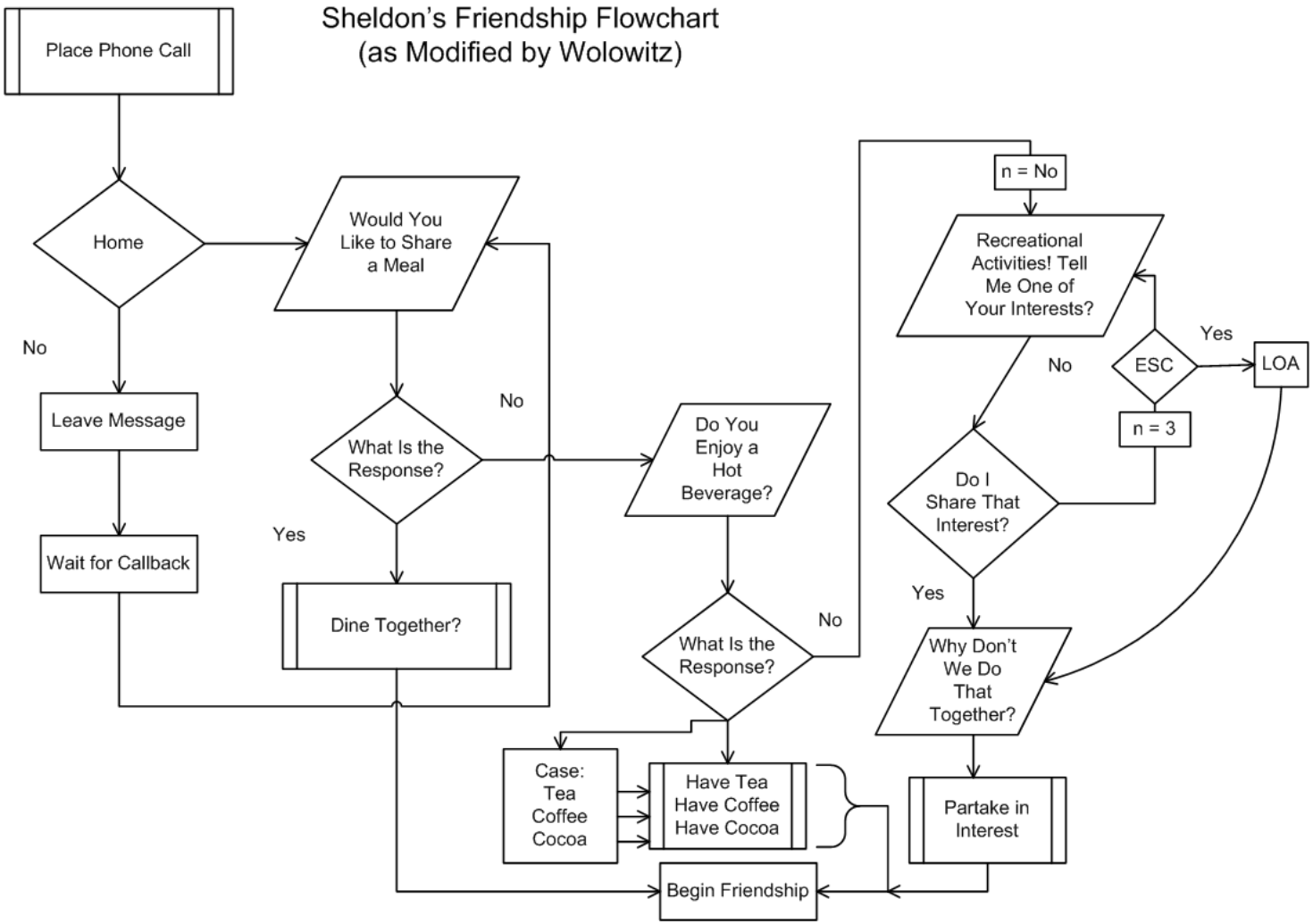
What's wrong with this algorithm? why did Wolowitz need to fix it?

Algorithms

What's wrong with this algorithm? why did Wolowitz need to fix it?

There was a **bug**, an infinite loop

Algorithms


Sheldon's Friendship Flowchart
(as Modified by Wolowitz)
Place Phone Call
Home
No
Leave Message
Wait for Callback
Would You Like to Share a Meal
What Is the Response?
No
Yes
Dine Together?
Do You Enjoy a Hot Beverage?
What Is the Response?
No
Case:
Tea
Coffee
Cocoa
Have Tea
Have Coffee
Have Cocoa
Begin Friendship
n = No
Recreational Activities! Tell Me One of Your Interests?
No
ESC
Yes
LOA
n = 3
Do I Share That Interest?
Yes
Why Don't We Do That Together?
Partake in Interest

Algorithms

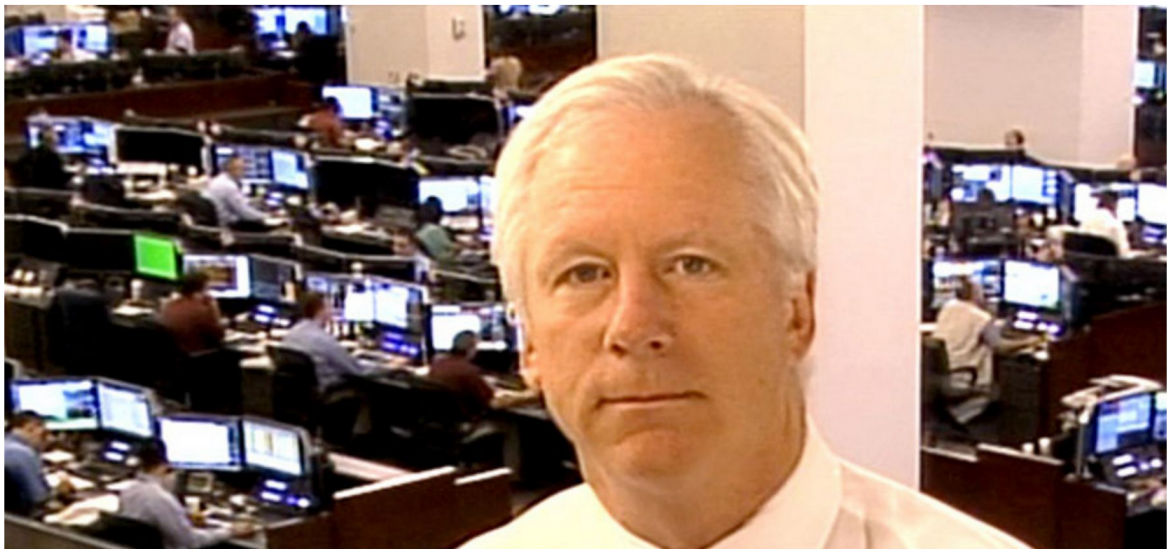
What other cases of bugs do we know?

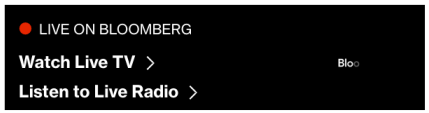
Algorithms

Business

Knight Shows How to Lose $440 Million in 30 Minutes

By Matthew Philips
August 2, 2012, 11:10 PM GMT+1





https://www.bloomberg.com/news/articles/2012-08-02/knight-shows-how-to-lose-440-million-in-30-minutes

Recap

Recap

- We'll use Python for learning programming in this course.

Recap

- We'll use Python for learning programming in this course.
- Algorithms, like cooking recipes, will guide our program to perform what we want.

Recommended reading

What Is Code is a great essay by Paul Ford. (it's a bit long, you don't need to read it for tomorrow)

https://www.bloomberg.com/graphics/2015-paul-ford-what-is-code/