Agenda

Intros:

- WWCode @ Alchemy Code Lab
- Link to slides: https://github.com/wwcodeportland/study-nights/tree/master/algorithms

Topic Summary:

- An Approach to Solving Algorithms

Lab Time:

- Pair Programming + 2 Algorithms

Algorithms Study Night

WOMEN WHO CODE®
PORTLAND

alchemy code lab

Leadership Team

Caterina
Director

Richa
Director

Sarah Joy
JavaScript Lead

Shiyuan
Design Lead

Tricia
DevOps Lead

Keeley
Open Source Lead

Alia
Algorithms Lead

Michelle
Networking Nights Team

Posey
Community Engagement Manager

{short} Code of Conduct

Women Who Code (WWCode) is dedicated to providing an empowering experience for everyone who participates in or supports our community, regardless of gender, gender identity and expression, sexual orientation, ability, physical appearance, body size, race, ethnicity, age, religion, socioeconomic status, caste, or creed. Our events are intended to inspire women to excel in technology careers, and anyone who is there for this purpose is welcome. Because we value the safety and security of our members and strive to have an inclusive community, we do not tolerate harassment of members or event participants in any form. Our **Code of Conduct** applies to all events run by Women Who Code, Inc. If you would like to report an incident or contact our leadership team, please submit an **incident report form**.

Upcoming Events - February

- DevOps Study Night @ Vevo
  - Wed, Feb 7th, 6:00 PM
- Ladies Computative Cupcakes & Consumption @ Rocking Frog Cafe
  - Sun, February 11th, 11:00 AM
- Networking Night @ Metal Toad
  - Thu, Feb 15th, 5:30 PM
- Design + Product Study Night -- WWC Website @ New Relic
  - Tue, Feb 20th, 5:30 PM
- Open Source Study Night: Git @ Needs Location
  - Thu, Feb 22th, 5:30 PM

Save the Date!!

Women Who Code PDX

IoT Hackathon 2018

March 23-25

Resources

WWCode @ Meetup.com

WWCode @ Slack

WWCode @ Github

Big-O CheatSheet

How to Approach Solving Algorithms

1. DON'T start with your computer !!!

2. Write down inputs/outputs.

   Make sure you know all of the information about the problem you are solving.

3. Try a single example by hand to see expected results.

4. Think about any possible edge cases.

5. High level solution - pseudocode. Optimize if you can

Continued...

6. Choose your data structure.

How often will you be accessing? How often will you be inserting/deleting? Data Structure complexity.

7. Code your solution

8. Discuss the algorithm complexity

9. Optimize if possible

Let’s try that together

Sample Problem

Write a function that tells whether or not a given number is part of a listing. Numbers in that listing are sorted.

Step-by step example

1. DON’T start with your computer !!!

Step-by step example

2. Write down inputs/outputs.

“Write a function that tells whether or not a given number is part of a listing of numbers. Numbers in that listing are sorted.”

Inputs: array of integers + integer

Output: boolean

Step-by step example

3. Try a single example by hand to see expected results.

If input is

1 4 6 17 46 78 79 178 77777 , 178

Output is

true

Step-by step example

4. Think about any possible edge case.

Main concerns depending on language:

- null/undefined inputs
- empty inputs
- overflow (ex: number getting higher than MAX_VALUE)
- if types are defined and don’t represent the meaning of the data:
  - String for integer
  - Object for Integer

Step-by step example

5. High level solution - pseudocode.

“Write a function that tells whether or not a given number is part of a listing of numbers. Numbers in that listing are sorted.”

Brute force:

```
    read each number in the array
        compare with the number you are trying to find
```

THERE IS NO TASK TOO SIMPLE,
FOR OUR STAFF TO OVER-COMPLICATE
memegenerator.net

Step-by step example

5. High level solution - pseudocode.

“Write a function that tells whether or not a given number is part of a listing of numbers. Numbers in that listing are sorted.”

Brute force:

```
    read each number in the array smaller than the number to find
            compare
```

Step-by step example

6. Choose your data structure.

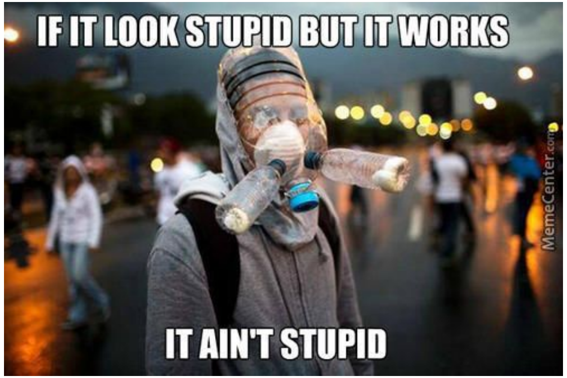
How often will you be accessing? How often will you be inserting/deleting? Data Structure complexity.

Pseudo-code :

```
read each number in the array smaller than the number to find
    compare
```

No need to manipulate the data here

Step-by step example



7. Code your solution

Pseudo-code:

```
    read each number in the array smaller than the number to find
        compare
```

name of function
name of input
name of variable
for or while loop ?

```
boolean findNumber(int[] listing, int number){
 for(int i=0; i<listing.length && listing[i]<=number; i++){
             if(listing[i] == number) return true;
  }
  return false;
 }
```

Step-by step example

8. Discuss the algorithm complexity   for loop => o(n)

9. Optimize if possible

What if instead of reading all the numbers we only looked at the first last and middle numbers ?

1 4 6 17 46 78 79 178 77777, 178

46 78 79 178 77777

79 178 77777

“Divide and conquer”
Big gain for big arrays. Here 3 iterations instead of 6

Step-by step example

6. Code your solution

```
Pseudo-code:
    at each iteration
        look at the middle and pick a side
```

Step-by step example

7. Code your solution

```
Pseudo-code:
    at each iteration
        look at the middle and pick a side
```

```
boolean findNumber(int[] l, int nb){
    if(l.length == 0) return false;
    int minInd = 0;
    int maxInd = l.length-1;
    if(nb==l[minInd] || nb==l[maxInd]) return true;
    while (minInd != maxInd){
        int midInd = minInd + maxInd-minInd/2;
        if(nb==l[midInd])return true;
        if(l[midInd] > nb) maxInd = midInd;
        else minInd = midInd;
    }
    return false;
}
```

Step-by step example

8. Discuss the algorithm complexity   for loop => o(log(n))

9. Optimize if possible

Practice

1 Advent of Code

- Day 1

2 Hackerrank

- Problem Statement

3 Other Sites

- LeetCode
- CodinGame
- Code Wars