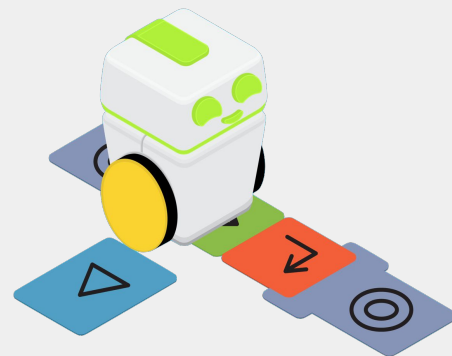




Technical Concepts Pt. 1

Agenda

1. Buzzwords
2. Data Structures
3. Algorithms
4. Big O Notation
5. How to Approach Technical Questions





“

“For a PM you need to **learn how to communicate with engineers.** You have to be respected by engineers and when they bring up an issue **have the ability to understand what the issue is.** You should know enough to know that you can’t provide the estimates as well. Ideally with some experience you can then start to roughly estimate and understand why it’s working the way it is. And for that you **need to learn at least some basics on writing code.**” - Medium

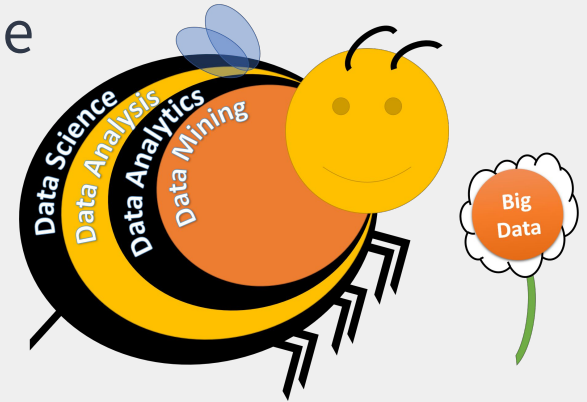
1.

Buzzwords

Debunking Buzzwords

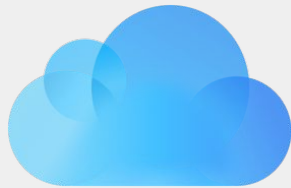
What are Buzzwords in the Tech Industry?

1. **Buzzwords** are words that are frequently used within the technology industry
 - a. They are used throughout many companies and employers typically expect employees to already know the meaning of these terms
2. **Buzzwords** can serve as a convenient shorthand for complex ideas



The Cloud

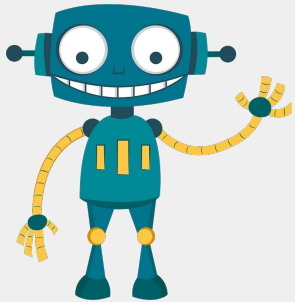
Definition: The cloud refers to software and services that **run on the Internet**, instead of locally on your computer. Most cloud services can be accessed through a Web browser like Firefox or Google Chrome, and some companies offer dedicated mobile apps.



Artificial Intelligence (AI) and Machine Learning (ML)

Definition: Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider “smart”. Essentially, machines carrying out human-like activities.

- **Machine Learning** is a current application of AI based around the idea that we should really just be able to give machines access to data and let them learn for themselves.



Blockchain/Cryptocurrency

Definition: **Blockchain** is the technology that enables the existence of cryptocurrency (among other things). A **cryptocurrency** is a medium of exchange, such as the US dollar, but is digital and uses encryption techniques to control the creation of monetary units and to verify the transfer of funds.



Fifth-Generation Wireless (5G)

Definition: 5G is the 5th generation mobile network. It is a **new global wireless standard** after 1G, 2G, 3G, and 4G networks. 5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices.



Internet of Things (IoT)

Definition: The Internet of Things, or IoT, refers to the billions of **physical devices around the world that are now connected to the internet**, all collecting and sharing data.



Big Data

Definition: The term “big data” refers to **data that is so large, fast or complex** that it’s difficult or impossible to process using traditional methods. Big data can be analyzed for insights that lead to better decisions and strategic business moves.



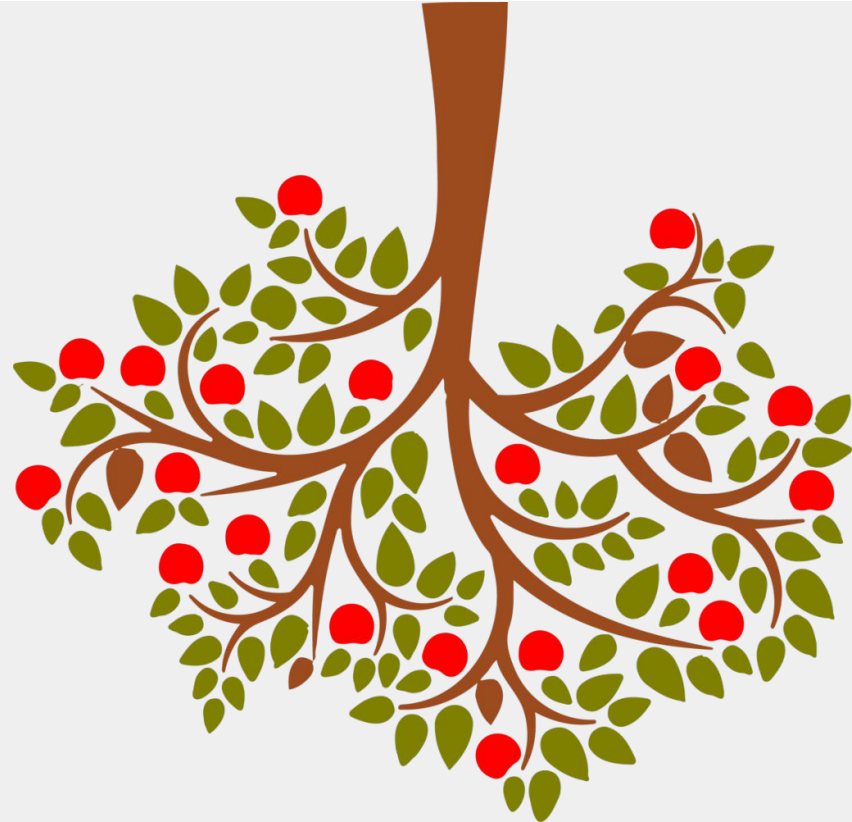
2.

Data Structures

Key Data Structures to Remember

What are Data Structures?

A **data structure** is a particular way of organizing data in a computer so that it can be used effectively.



Examples of Data Structures



Arrays

A way to hold a set of objects. It stores items in a simple list of objects.



Hashmaps

Allows you to map a “key” to a “value”. Sometimes called a dictionary or hashtable.



Graphs and Trees

A graph is a set of nodes which are connected through edges. A tree is a type of graph in which any two nodes are connected through one and only one path.



Linked Lists

Data structure composed of nodes, where each node has a pointer to other nodes.



Stacks

Defines a precise order for how elements must be inserted and removed. It is a Last-in-first-out (LIFO) data structure.



Queues

The opposite of a Stack. Follows First-in-first-out (FIFO), like a regular queue in real life.

3.

Algorithms

Key Algorithms to Remember

What are Sorting Algorithms?

A **sorting algorithm** is used to rearrange a given array or list elements according to a comparison operator on the elements.



Sorting Algorithms

Merge Sort

Merge Sort is a Divide and Conquer algorithm. It **divides input array in two halves**, calls itself for the two halves and **then merges the two sorted halves**.

Quick Sort

QuickSort is a Divide and Conquer algorithm. It **picks an element as pivot** and partitions the given array around the picked pivot.

Bubble Sort

Bubble Sort is the simplest sorting algorithm that works by **repeatedly swapping the adjacent elements** if they are in wrong order.

Insertion Sort

The array is virtually **split into a sorted and an unsorted part**. Values from the unsorted part are picked and placed at the correct position in the sorted part.

[Sorting Algorithms Visualization](#)

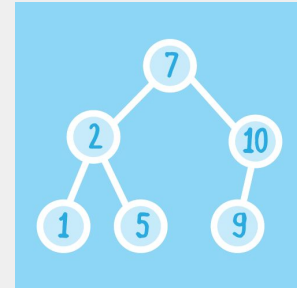
What are Searching Algorithms?

Searching Algorithms are designed to check for an element or retrieve an element from any data structure where it is stored.



Binary Search

Method: Search a sorted array by repeatedly **dividing the search interval in half**. Begin with an interval covering the whole array. If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half. Otherwise narrow it to the upper half. Repeatedly check until the value is found or the interval is empty.



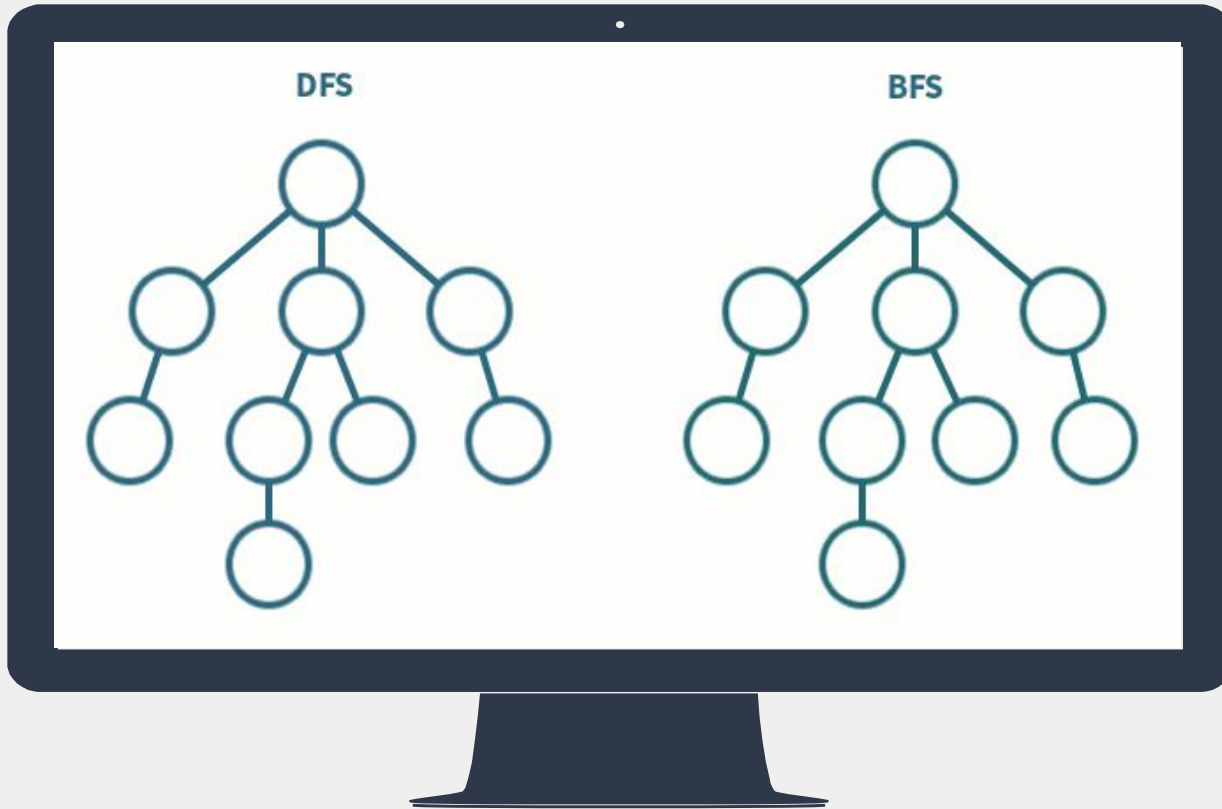
Graph Searches

Depth-First Search

The Depth First Search (DFS) is an algorithm for traversing or searching tree or graph data structures which uses the idea of **backtracking**. It explores all the nodes by going forward if possible or uses backtracking.

Breadth-First Search

The Breadth First Search (BFS) is an algorithm for traversing or searching tree or graph data structures. It **explores all the nodes at the present depth** before moving on to the nodes at the next depth level.



Visualization of Depth-First Search vs. Breadth-First Search

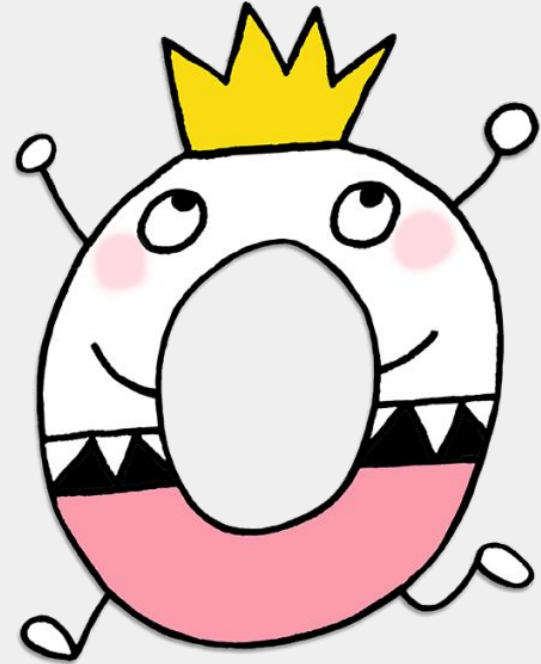
4.

Big O Notation

Brief Overview of Big O

What is Big O Notation?

Big O Notation is a way to express the efficiency of an algorithm.



Big O Notation	Name	Example(s)
$O(1)$	Constant	# Odd or Even number, # Look-up table (on average)
$O(\log n)$	Logarithmic	# Finding element on sorted array with binary search
$O(n)$	Linear	# Find max element in unsorted array, # Duplicate elements in array with Hash Map
$O(n \log n)$	Linearithmic	# Sorting elements in array with merge sort
$O(n^2)$	Quadratic	# Duplicate elements in array **(naïve)** , # Sorting array with bubble sort
$O(n^3)$	Cubic	# 3 variables equation solver
$O(2^n)$	Exponential	# Find all subsets
$O(n!)$	Factorial	# Find all permutations of a given set/string

5.

How to Approach

How to Approach Technical Questions

How to Approach Technical Questions

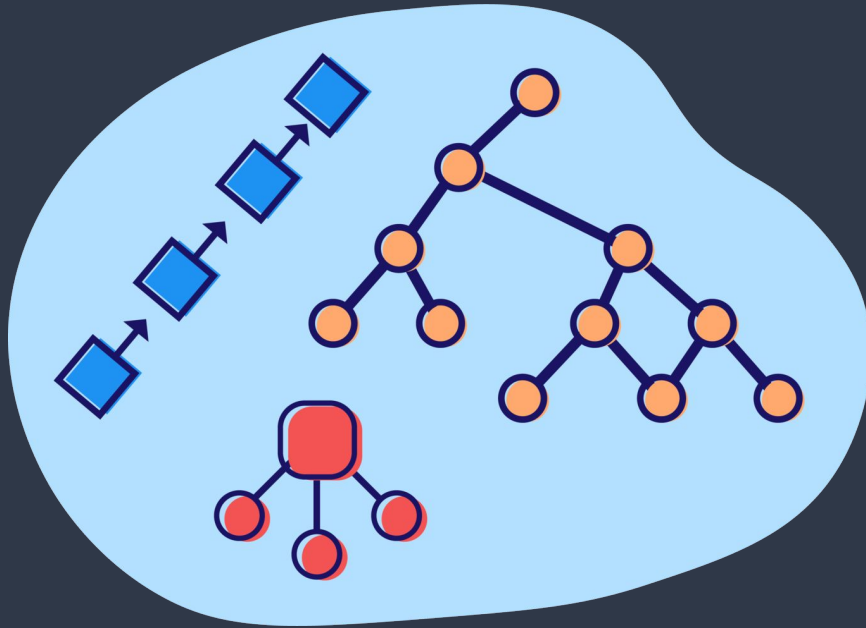
First: Clarify the Problem

**Second: Go to the
Whiteboard (i.e., write
it down)**

Third: Talk out Loud

**Fourth: Code, Slowly
and Methodically**

Fifth: Test and Fix



**Class Activity:
Technical Concepts
Practice with
Kahoot**