**Data Structures**

\*Numerical data types in Java  
(size and range)

A screenshot of a computer

Description automatically generated with medium confidence

- Each data type is stored in memory as 1s and 0s (Bits)

So Boolean (true or false) take 1 bit

Ex. “15” is 32bit stored as (00000000000000000000000000001111)

\* **Arrays**

array = [11, 22, 33, 44]

print("1st = ", array[0]) #11

print("last = ", array[3]) #44

print(array[4]) #error

- Multidimensional array

array = [["ammar", "ahmed", "medo"],

         ["belal", "omar", "dad"]]

print(array[0][0]) #ammar

print(array[1][2]) #dad

- Jagged array

Number of columns not fixed

- Resizable array

Can’t resize arrays in Java and C++

Unlike JavaScript and Ruby

- linear search in array

Text

Description automatically generated

- Big O notation

A screenshot of a computer

Description automatically generated with low confidence

A screenshot of a computer

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Diagram

Description automatically generated

\***Linked Lists**

Table

Description automatically generated

- use LinkedList in Java

import java.util.LinkedList;

public class MyClass {

public static void main(String args[]) {

//Add

LinkedList list = new LinkedList();

list.add("Ammar");

list.add("Mai");

list.add(1, "Belal");

System.out.println(list); //[Ammar, Belal, Mai]

//Access

System.out.println(list.get(2)); //Mai

System.out.println(list.getFirst()); //Ammar

//Delete

list.removeLast();

System.out.println(list); //[Ammar, Belal]

}

}

Diagram, waterfall chart

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* **Stack**

Diagram

Description automatically generated

* **Queue**

First In, First Out (FIFO)

Icon

Description automatically generated

queue = []

# Adding elements to the queue

queue.append('a')

queue.append('b')

queue.append('c')

print(queue)  # ['a', 'b', 'c']

# Removing elements from the queue

print(queue.pop(0)) # a

print(queue.pop(0)) # b

print(queue.pop(0)) # c

print(queue)  # []

# Uncommenting print(queue.pop(0))

# will raise and IndexError

# as the queue is now empty

* **Associative Array**

stores a collection of (key, value) pairs

Graphical user interface, text, application

Description automatically generated

secondName = {}

secondName["Ammar"] = "Yasser"

secondName["Mai"] = "Ahmed"

secondName["Saqr"] = "Naser"

print(secondName["Mai"]) #Ahmed

* **Set**

Graphical user interface, text, application

Description automatically generated

We care about membership

myColors = frozenset(["red" , "blue" , "green"])

color = "black"

if color.lower() in myColors:

    print(color+" in myColors")

else:

    print(color+" not in myColors")

Output

black not in myColors

* **Tree**

Graphical user interface, application

Description automatically generated