

# Competitive Coding with C++



# Are you all already into Competitive Coding?

- Open "[www.menti.com](http://www.menti.com)"
- use code:



## What is Competitive Coding?



## Why should we do Competitive Coding?



## Where do we do Competitive Coding?





Which language should we use?



How to practice and hone our skills?



What to know about Competitive Coding  
before starting?



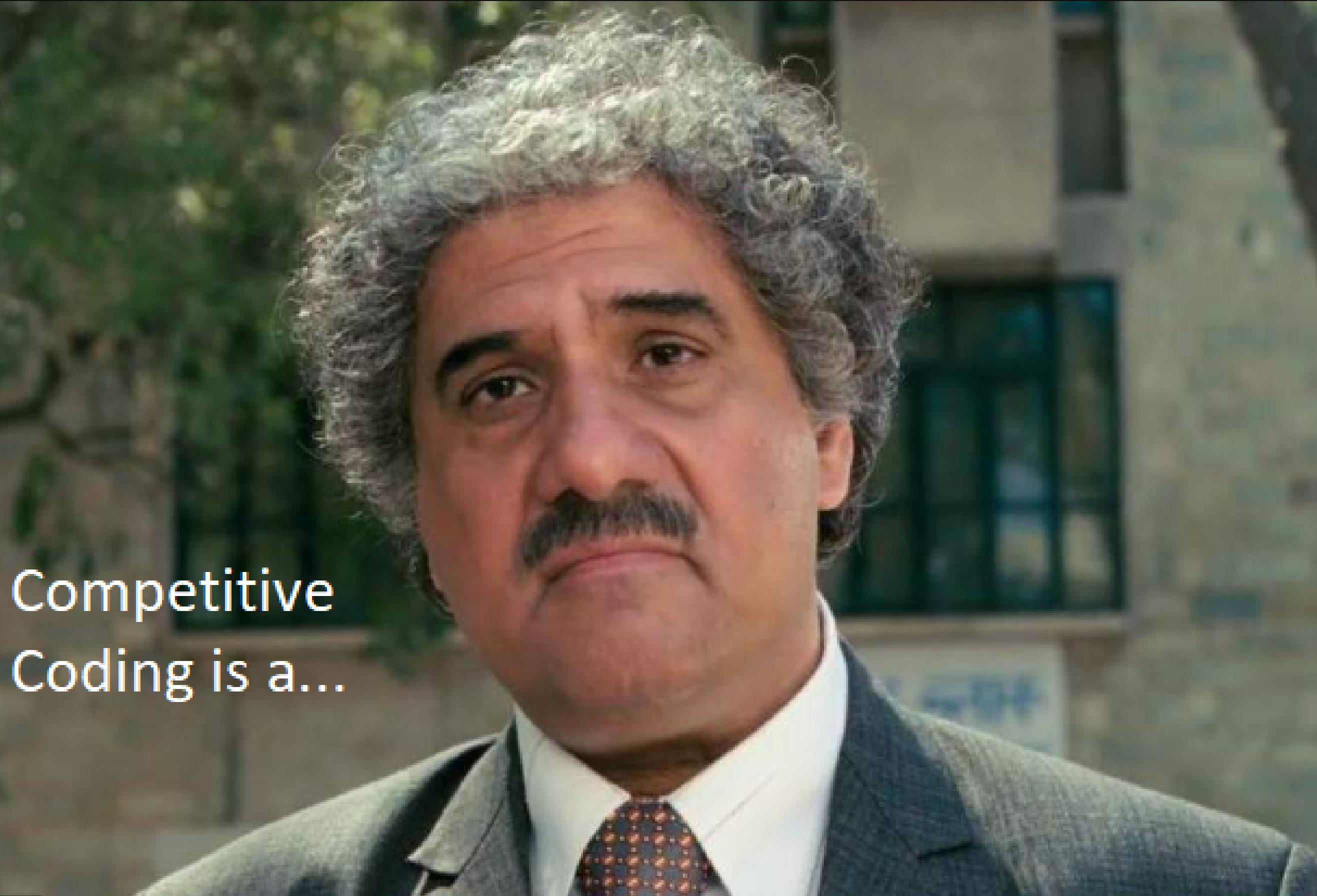
- **Contest at the End of the Session.**
- The Participants will have a chance to win exciting **Prizes**.

1.

# What is Competitive Coding?



- Art of Thinking
- Logic-Based Creativity



Competitive  
Coding is a...

# More Technical



**Execution Time**



**Memory Limit**



**Program Size**



**Output**

2.

Why should we do  
Competitive Coding?

“To prepare a programmer such that  
his/her logical ability increases and  
he/she is able to write code for  
challenging problems.”



01

## Think Faster



02

**Improve our knowledge about the programming language of our choice**



03

**Understand the Time and Space complexity of any given code**



04

**Learn the art of problem-solving**

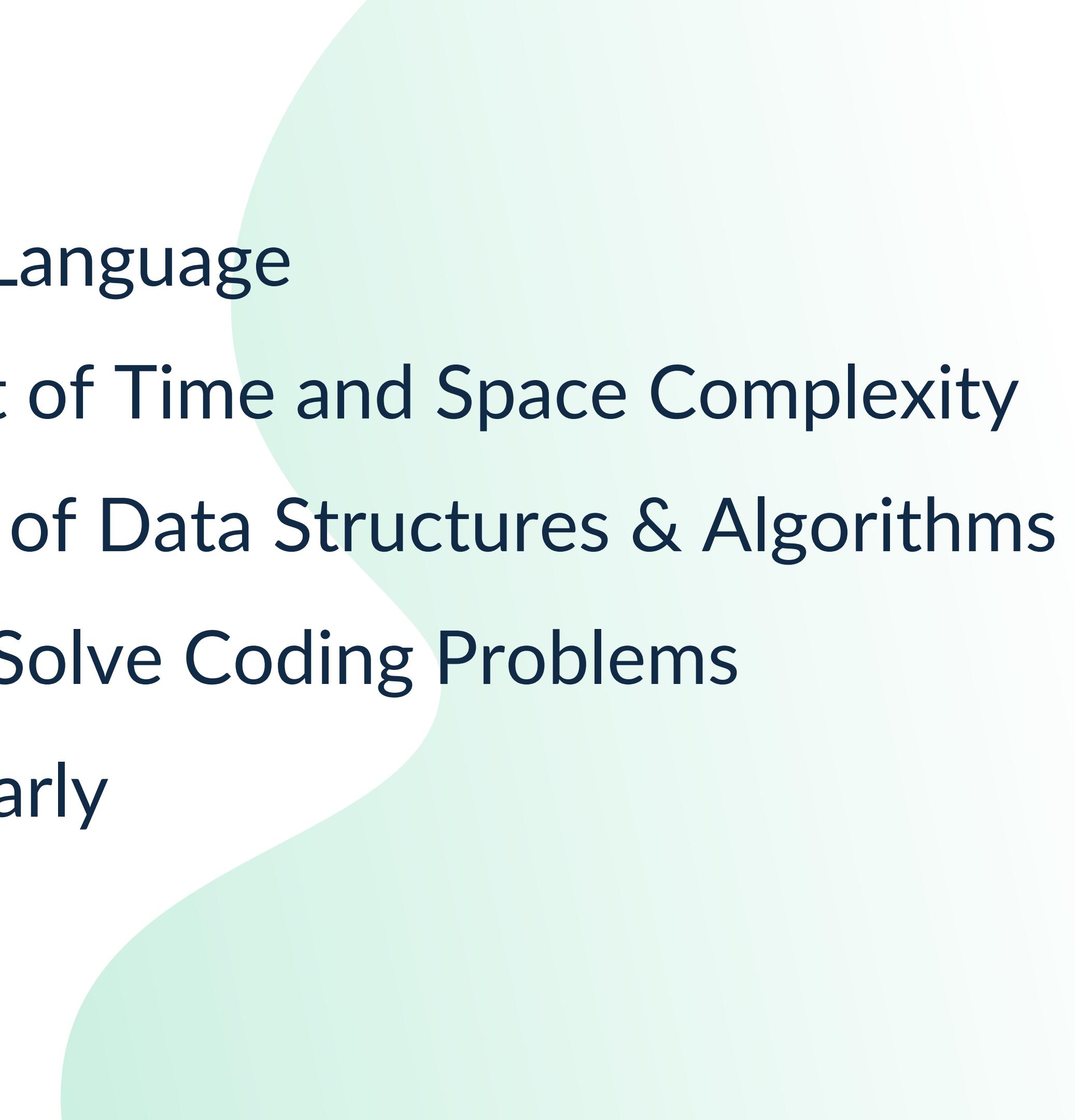


yahoo!

**3.**

**How to practice and  
hone our skills?**



- 
1. Choose a Programming Language
  2. Understand the Concept of Time and Space Complexity
  3. Learn the Fundamentals of Data Structures & Algorithms
  4. Take the Challenge and Solve Coding Problems
  5. Practice and Do it Regularly

**4.**

**Which language should  
we use?**



# Which language should we use?

- Open "www.menti.com"
- use code:

- Any language
- C/C++

5.

Where do we do  
Competitive Coding?



# HackerRank



6.

What to know about Competitive  
Coding before starting?

# Pointers:

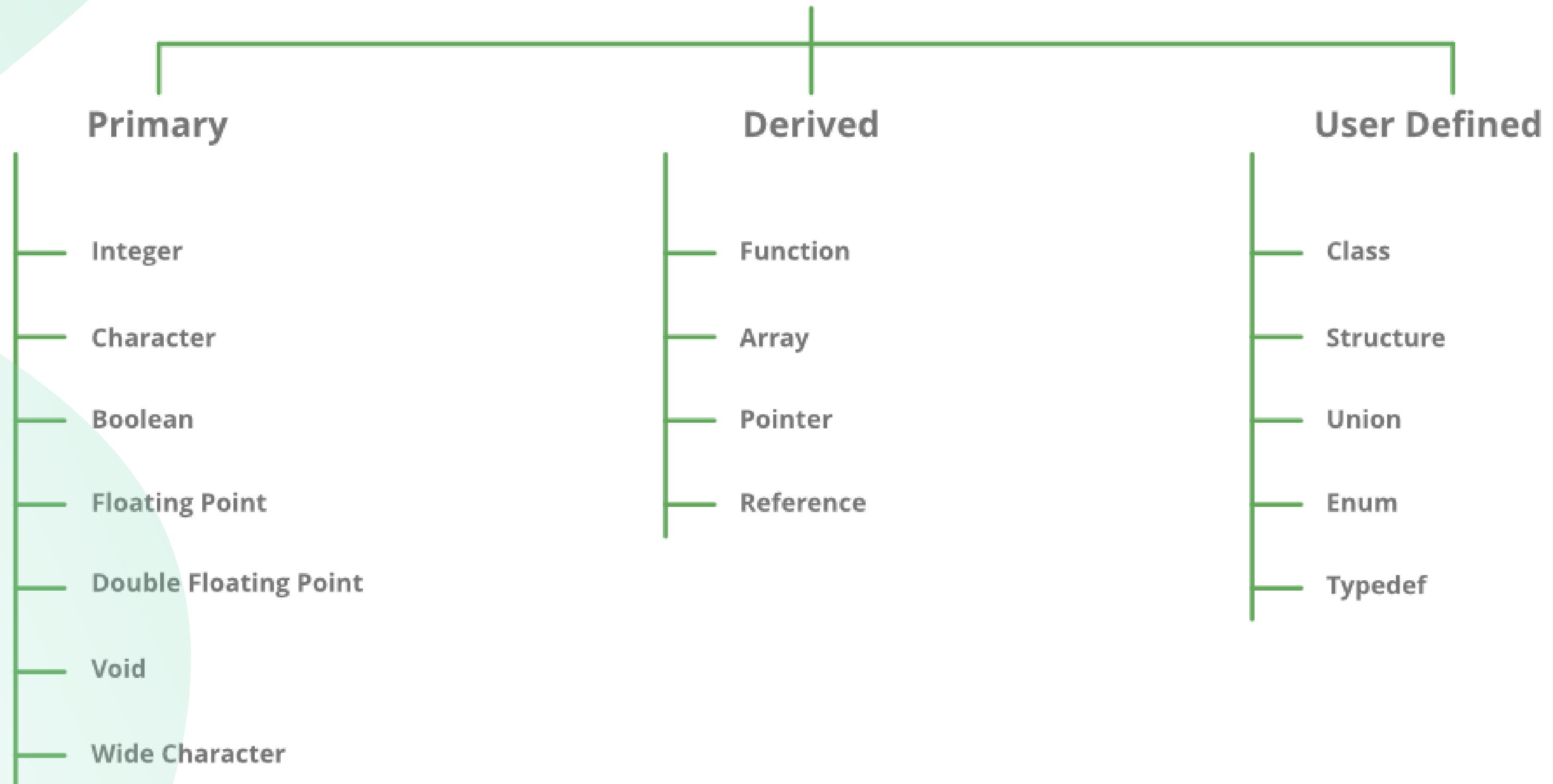
- Basic input/output
- Operators & data types
- Control statements
- Arrays
- Algorithms
- Space-time complexity
- STL - Standard Template Library

# BASIC INPUT/OUTPUT

- **Interactive Console**
  1. IDEs
  2. Command Prompt
- **Text I/O**
  1. STDIN
  2. STDOUT
  3. STDERR

# DATATYPES

## DataTypes in C / C++



# Example

## Constraints

$$\begin{aligned}1 &\leq T \leq 10^6 \\1 &\leq n, k \leq 10^{15}\end{aligned}$$

### Option A

```
unsigned int T, n, k;
```

### Option B

```
unsigned int T;  
unsigned long long n, k;
```

# Which option is correct?

- Open "www.menti.com"
- use code:

# Example

## Constraints

$$\begin{aligned}1 &\leq T \leq 10^6 \\1 &\leq n, k \leq 10^{15}\end{aligned}$$

### Option A

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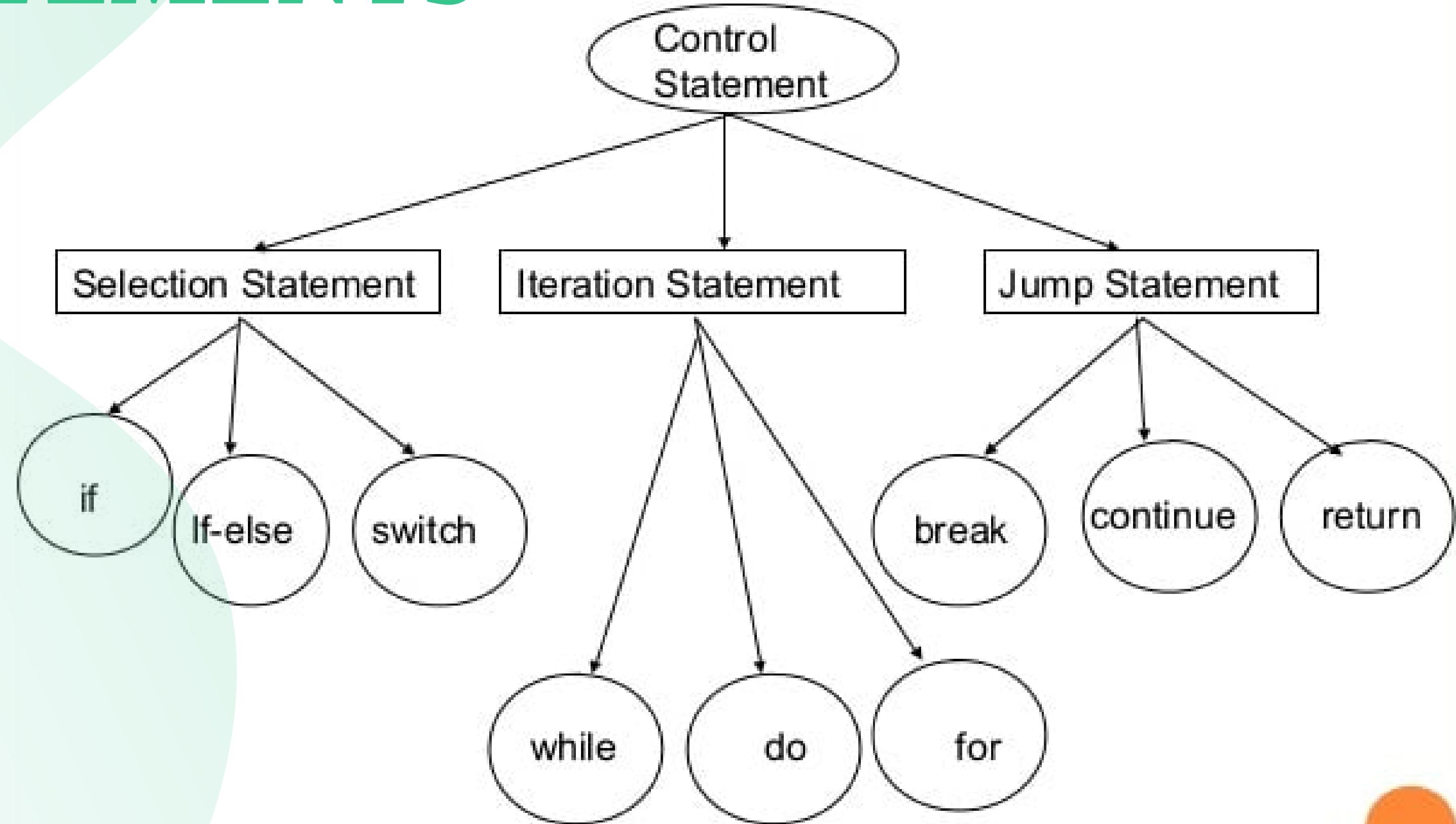
# OPERATORS

Performs specific operation

# OPERATORS

1. Arithmetic
2. Assignment
3. Relational
4. Logical
5. Bitwise
6. Other

# CONTROL STATEMENTS





# Can we use If-Else and Switch- Case alternatively?



- Not always
- If-Else can evaluate int, float, char, etc.
- Switch Case can evaluate only char and int

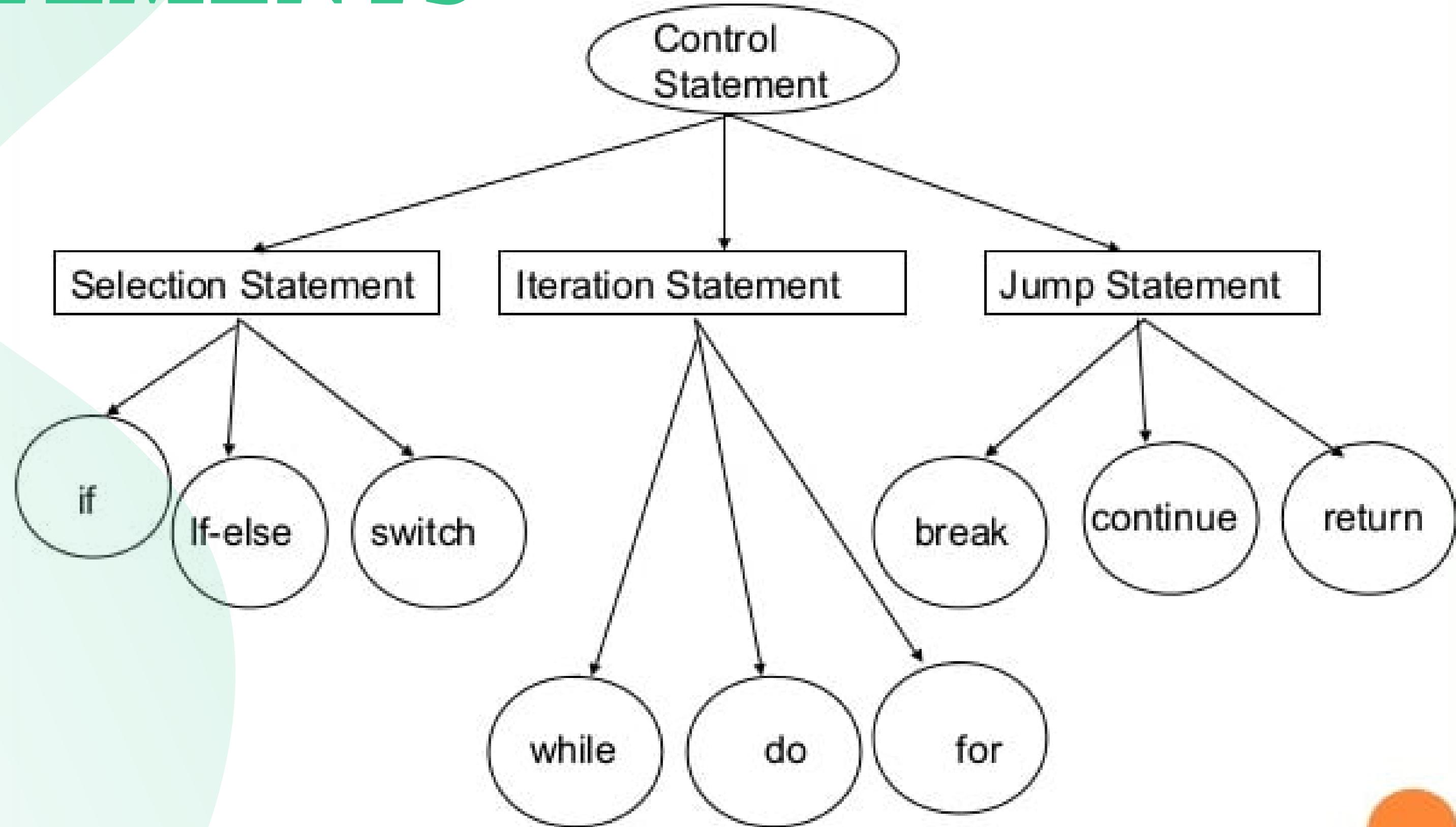


# When to use If-Else and when to use Switch-Case?



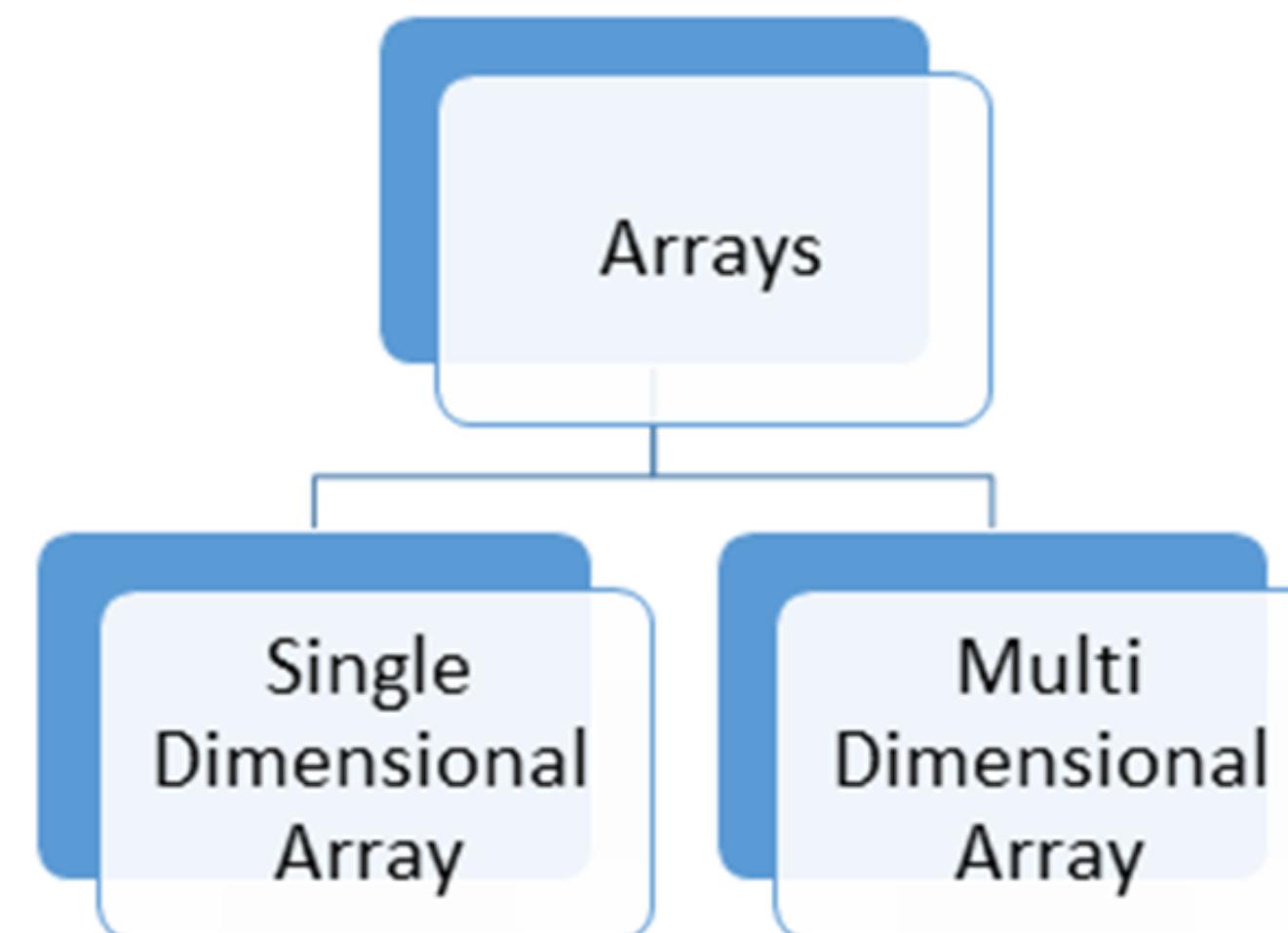
- Working on a single variable
- Check equality
- use switch case

# CONTROL STATEMENTS



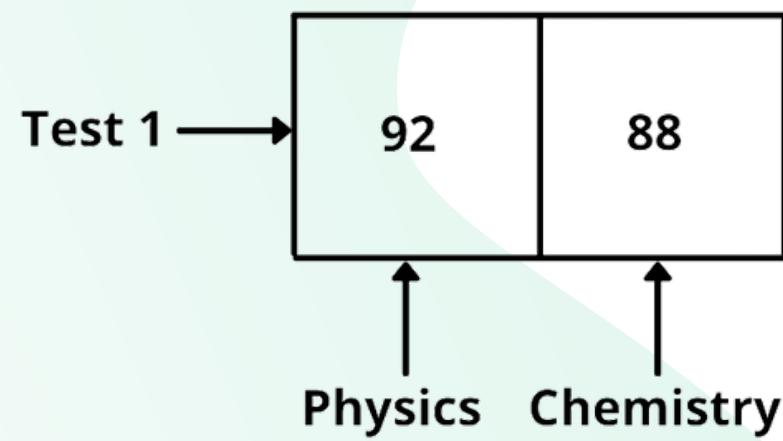
# ARRAYS

Arrays are derived data types which store a collection of similar data at contiguous memory locations under the same variable name.

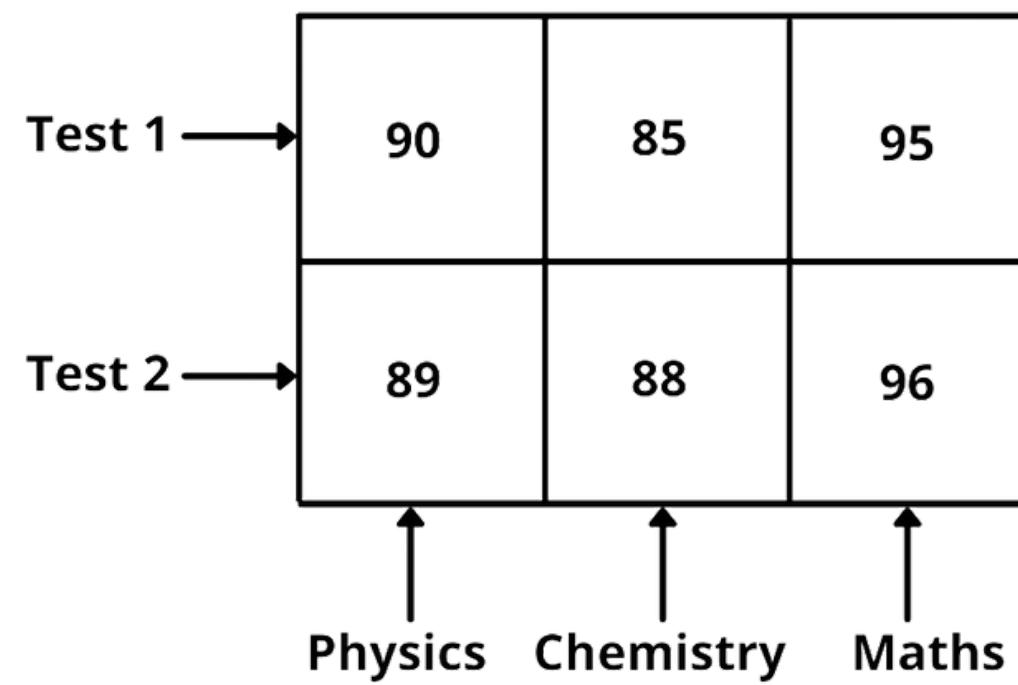


# Dimensions of Array with Example

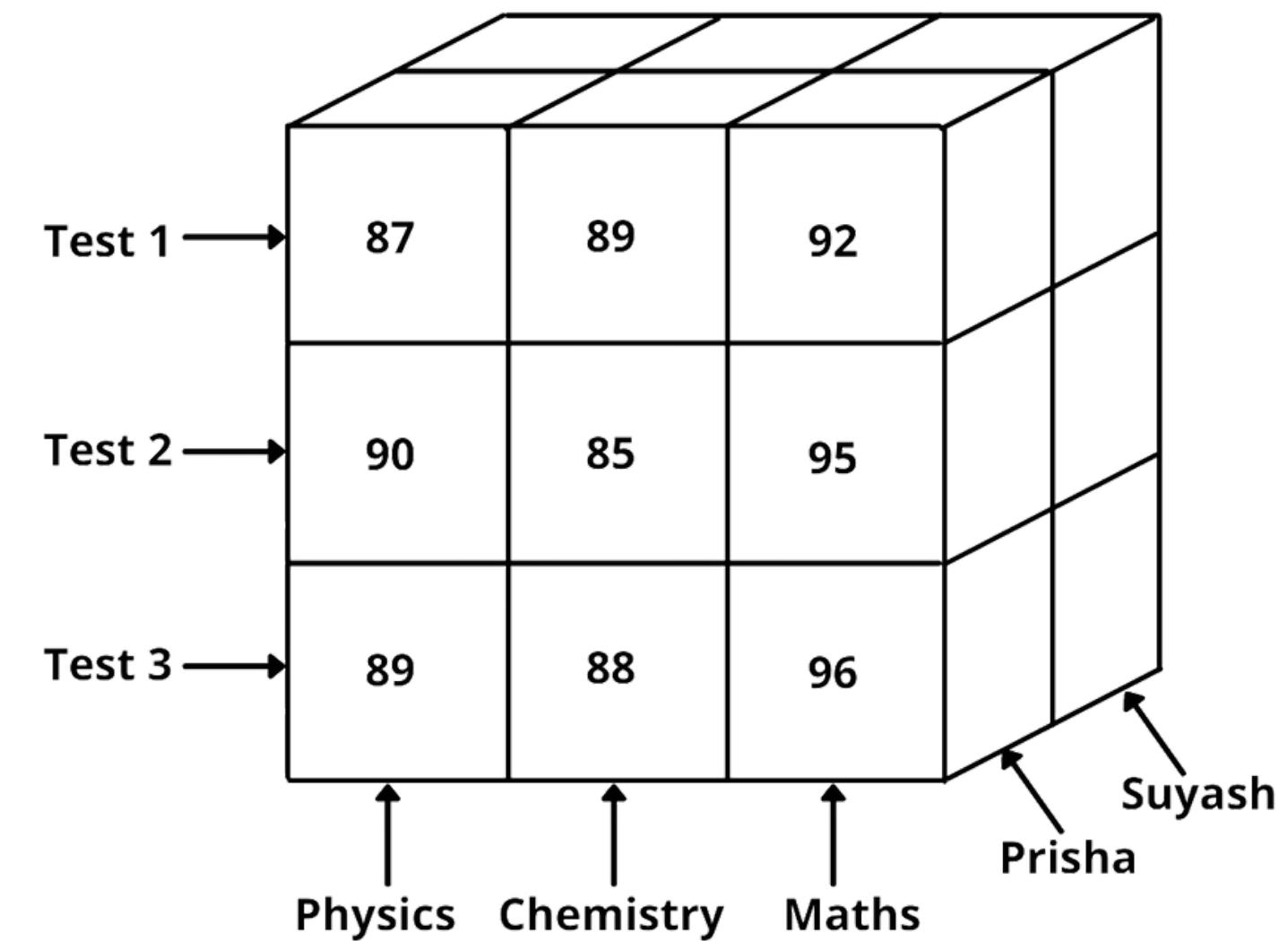
1-D



2-D



3-D





# Any Queries?

# SPACE - TIME COMPLEXITY

- Space take/memory occupied by a program
- Time take to complete a program
- Both are the function of input
- Measure of efficiency
- O-Notation

# Example

## CODE 1

```
| int a = 0, b = 0;
| for (int i = 0; i < n; ++i) {
|   for (int j = 0; j < m; ++j) {
|     a = a + j;
|   }
| }
| for (int k = 0; k < m; ++k) {
|   b = b + k;
| }
```

## CODE 2

```
| int a = 0, b = 0;
| for (int i = 0; i < n+m; ++i) {
|   a += i;
| }
| for (int j = 0; j < m; ++j) {
|   b = b + j;
| }
```

# Which code is correct?

- Open "www.menti.com"
- use code:

# Example

## CODE 1

```
int a = 0, b = 0;
for (int i = 0; i < n; ++i) {
    for (int j = 0; j < m; ++j) {
        a = a + j;
    }
}
for (int k = 0; k < m; ++k) {
    b = b + k;
}
```

## CODE 2

```
int a = 0, b = 0;
for (int i = 0; i < n+m; ++i) {
    a += i;
}
for (int j = 0; j < m; ++j) {
    b = b + j;
}
```

# ALGORITHM

- Flow of steps
  - Step by step instructions
  - Multiple ways of solving one problem
- 
- Sorting: Bubble Sort, Quick Sort, Selection Sort, etc.
  - Searching: Linear Search, Binary Search

# BUBBLE SORT



Initial

5	3	8	4	6
---	---	---	---	---

Step 1

5	3	8	4	6
---	---	---	---	---

Step 2

3	5	8	4	6
---	---	---	---	---

Step 3

3	5	8	4	6
---	---	---	---	---

Step 4

3	5	4	8	6
---	---	---	---	---

Step 5

3	5	4	6	8
---	---	---	---	---

Initial Unsorted array

Compare 1<sup>st</sup> and 2<sup>nd</sup>  
(Swap)

Compare 2<sup>nd</sup> and 3<sup>rd</sup>  
(Do not Swap)

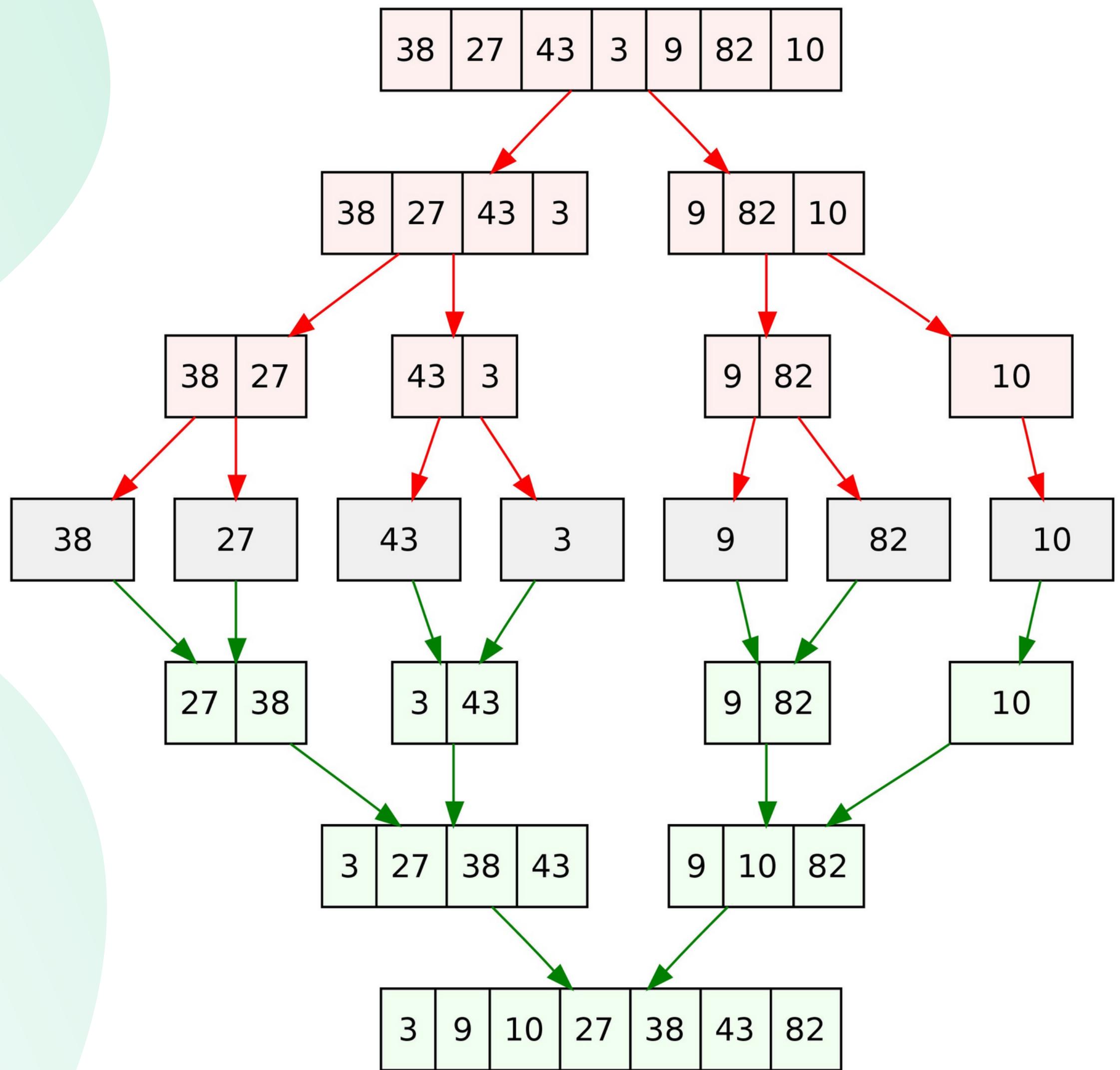
Compare 3<sup>rd</sup> and 4<sup>th</sup>  
(Swap)

Compare 4<sup>th</sup> and 5<sup>th</sup>  
(Swap)

Repeat Step 1-5 until  
no more swaps required

# QUICK SORT





# STL - Standard Template Library -

- Used in C++
- Pre-coded
- Set of pre-defined template classes

# STL - Standard Template Library -

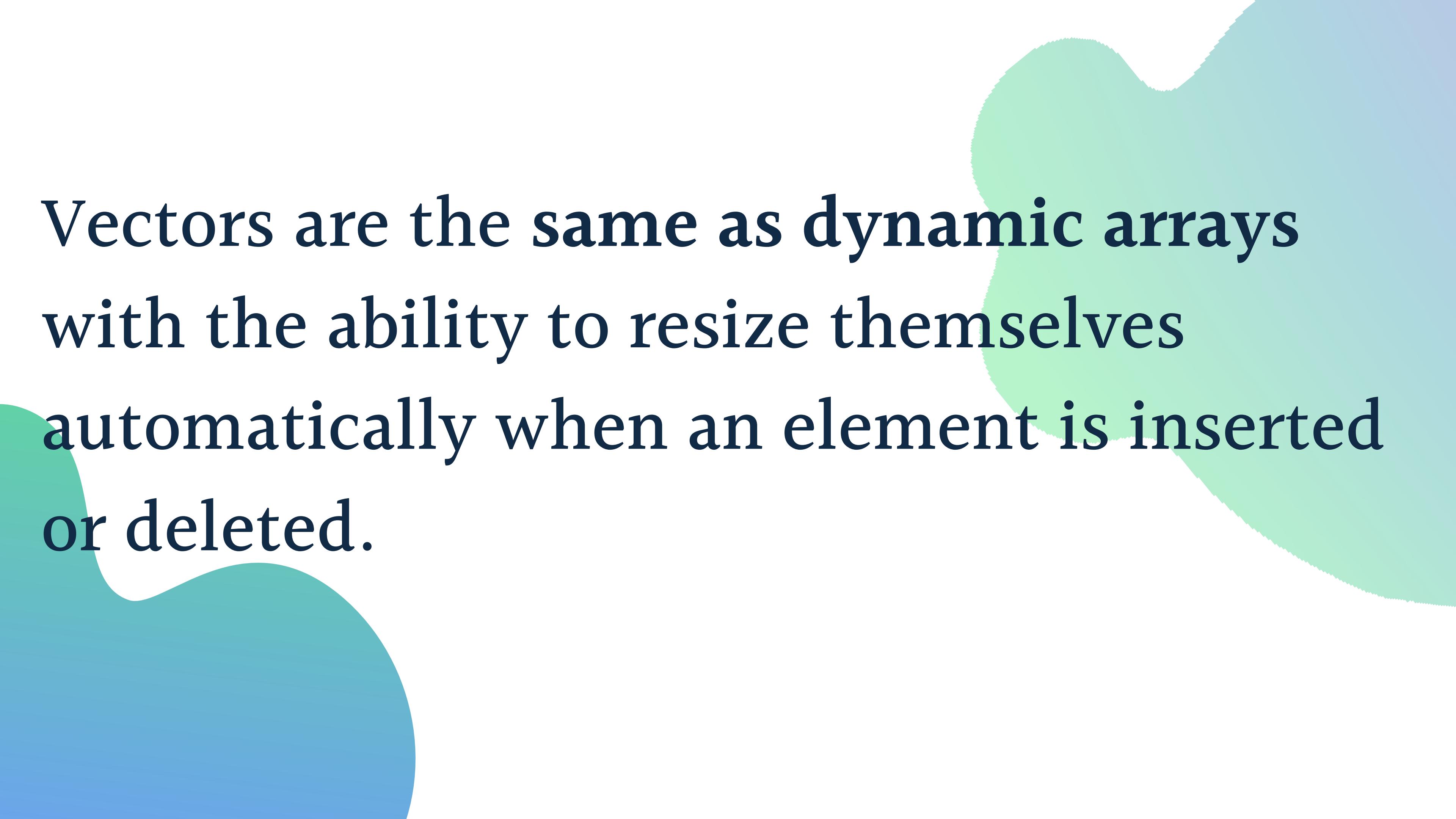
- Composed of:
  - Containers: contains data
  - Iterators: helps to traverse in containers
  - Algorithms: implemented upon any of the container with the help of iterators

- VECTORS
- ARRAYS
- STACK & QUEUE
- MAPS



1.

# VECTORS



Vectors are the same as dynamic arrays  
with the ability to resize themselves  
automatically when an element is inserted  
or deleted.

```
//creating an empty vector  
vector<int> v;
```

```
//Creating a vector of size 5 with all the values as 15  
vector<int> v1(5, 15);
```

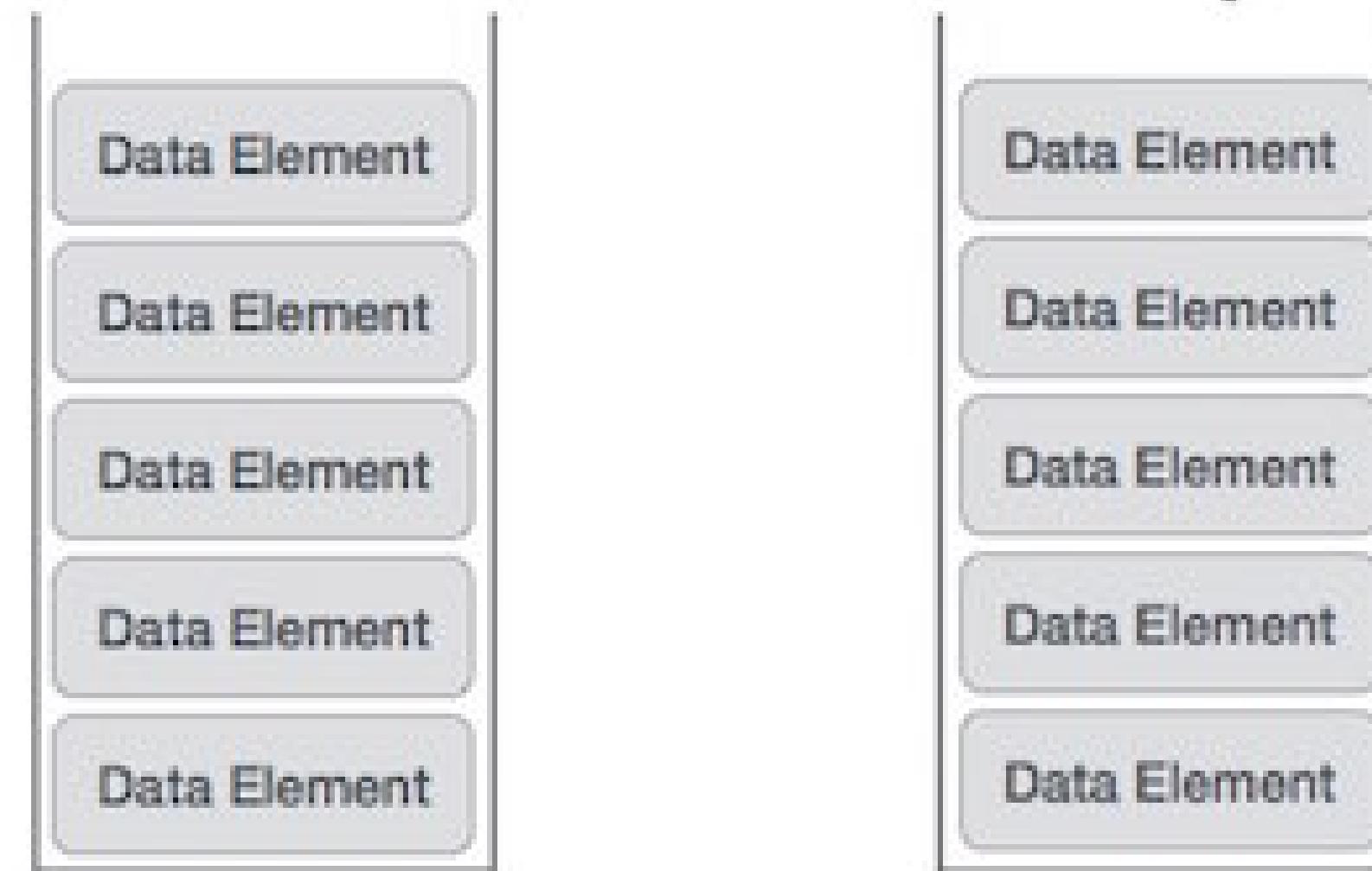
```
//Creating a vector like an array with pre-defined values  
vector<int> v2{ 10, 20, 30 };
```

```
//Creating a vector with all values as 0  
vector<int> v3(0);
```



2.

**STACK**



Stack

Stack



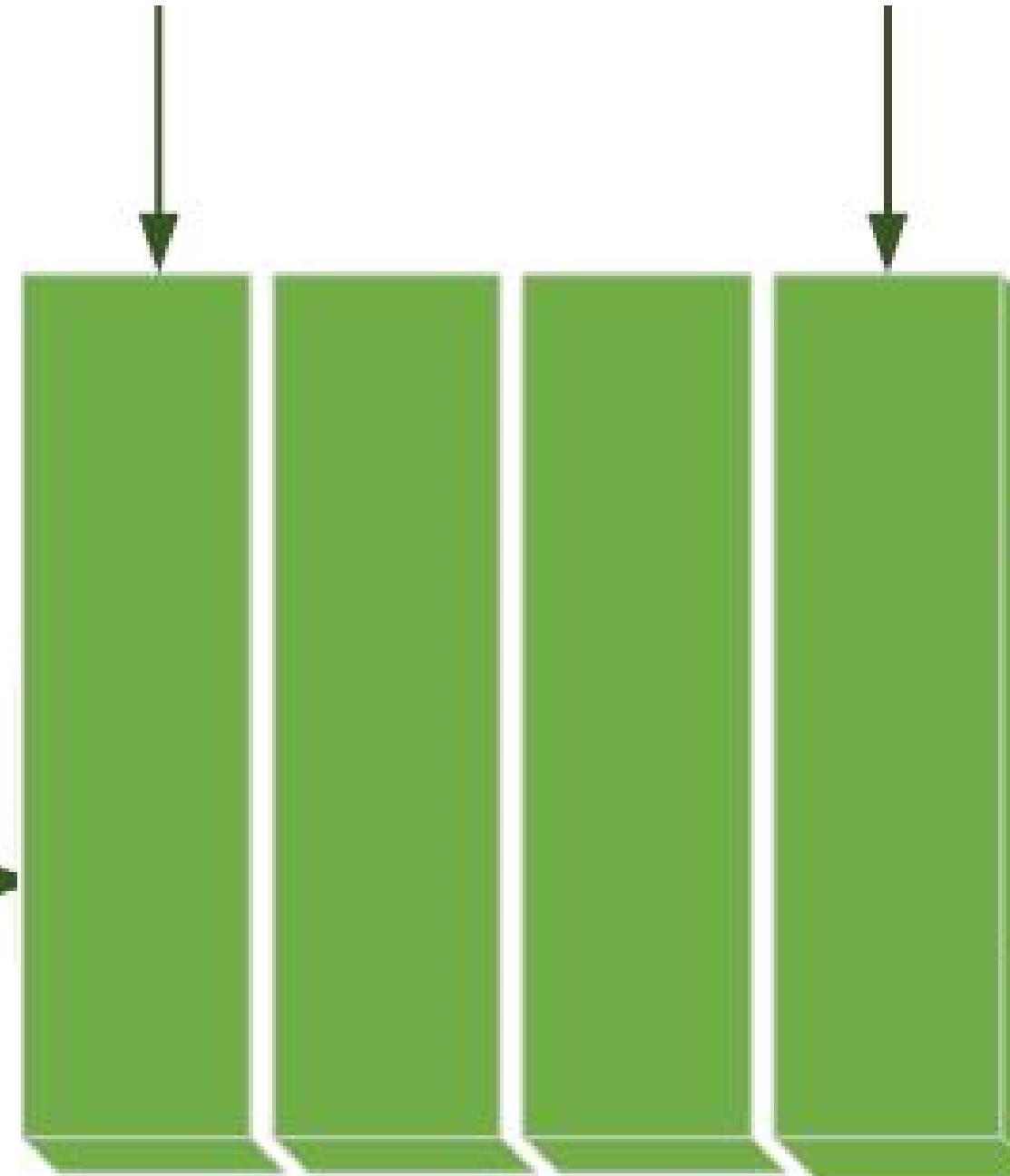
2.

## QUEUE



**Enqueue()**

**Last plate in,  
Last plate out**



**First plate in,  
First plate out**

**Dequeue()**





# Any Queries?

**LET US CREATE  
OUR PROFILE ON**

**HackerRank** 

# CONTEST TIME!!

[www.hackerrank.com/sts-cpc](https://www.hackerrank.com/sts-cpc)

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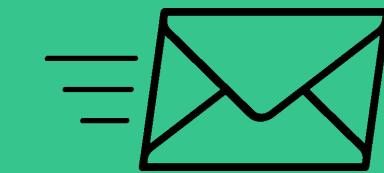
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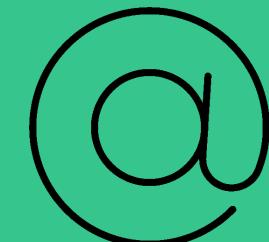
Convener:

Dr. AAQUIL BUNGLOWALA  
Associate Dean, STME, NMIMS Indore

# Need help? Contact us.



NM.TECHSERIES@nmims.edu.in



[www.nmimsindore.org](http://www.nmimsindore.org)



**Prof. Gaurav Paliwal**  
+91 99702-06604