What is a Data Structure?

Variables → data ko store kar rahe the.

int cecilia = 100;

100

cecilia

Store data in a particular fashion

Arrays

Linked List

Stack

Queue
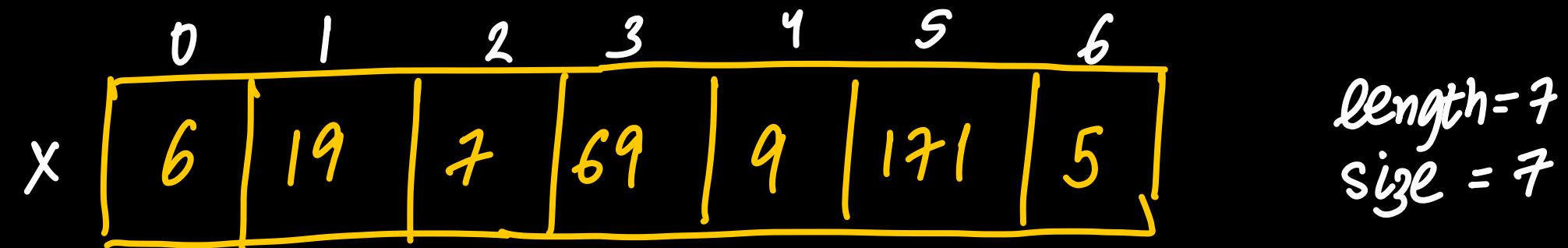
Tree

Graph

HashSets
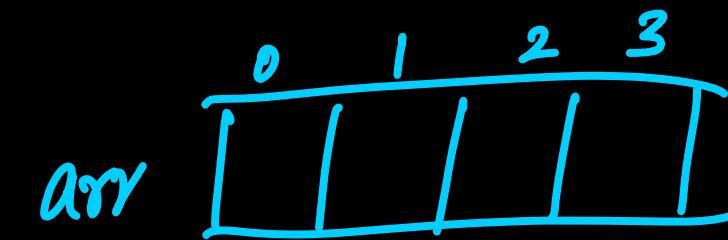
What is a Array?

Linear Data Structure.

Initialisation & Indexing

int[] arr = new int[4];

arr

0	1	2	3

Output & Input of Array using Loop

```
for(int i=0; i<arr.length; i++){
|   Sout(arr[i]);
|
}
```

```
for(int i=0; i<n; i++){
|   arr[i] = sc.nextInt();
}
```

Ques: Given an Array, print negative elements only

int arr[] = {   };

Default Values

Ques: Print sum of elements of the array.

```
int[] arr = {-6, 8, 14, -2, 23, 47};

int sum = 0;

for (        ) {

    sum += arr[i];

}

Sout (sum);
```

HW: Print product of elements of the array.

Ques: Print the Maximum element in the array [Largest element in Array]

i

$$\text{int[] arr} = \{-6, 8, 14, -2, 23, 47, 4, 3, 10\}$$

$$\text{int max} = \text{arr[0]};$$

```
for (int i=0; i<n; i++){
|    if (arr[i] > max)  max= arr[i];
3
sout(max);
```

max= -6 8 14 23 47

HW: Print the minimum element in the array

Array Index of out bound Exception

access, print, input le galat indices ko to error aata hai

$n \rightarrow 0$ to $n-1$

arr[-1] → error

Array of Other Data Types

```java
int[] arr = {10, 20, 30}

        or

int[] bar = new int[100];
```
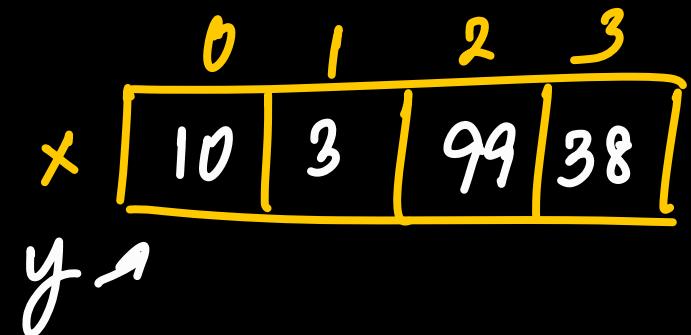
Passing Array to Methods

int[] x

Output

. 29
. 99

```java
public static void main(String[] args) {
    int x[] = {10,3,29,38};
    System.out.println(x[2]);
    change(x);
    System.out.println(x[2]);
}

public static void change(int[] y) {
    y[2] = 99;
}
```

```
       0    1    2    3
     ┌────┬────┬────┬────┐
  x  │ 10 │ 3  │ 99 │ 38 │
     └────┴────┴────┴────┘
  y ↗
```

HW : Multiply odd indexed elements by 2 and add 10 to even indexed elements

arr = { 10, 20, 30, 40, 50, 60 }

indices: 0 1 2 3 4 5

{ 20, 40, 40, 80, 60, 120 }

HW: Print product of elements of the array.

HW: Print the minimum element in the array

Ques: Multiply odd indexed elements by 2 and add 10 to even indexed elements

Ques: Search in Array

$arr = \{\, 1 \,, 5, 8, -3\}$ $target = 2$

```
for(int i=0; i<n; i++){
    for(int j=i+1; j<n; j++){
        if(arr[i] + arr[j] == target) —
    3
3
```

Ques: Two Sum

$$arr = \{\; \overset{0}{1}, \overset{1}{4}, \overset{2}{45}, \overset{3}{6}, \overset{4}{10}, \overset{5}{8} \}$$

$$tar = 16 \qquad\qquad n = 6$$

$$i \quad j$$

```
for(int i=0; i<n; i++){
    for(int j=i+1; j<n; j++){
        if(arr[i] + arr[j] == target) return true
    }
}
return false;
```

arr = { 4, 10, 10, 6, 3, 8 }   max = 10

Smax = 8

Approach : Find largest element (max)

Now find largest element except max

For Each Loop
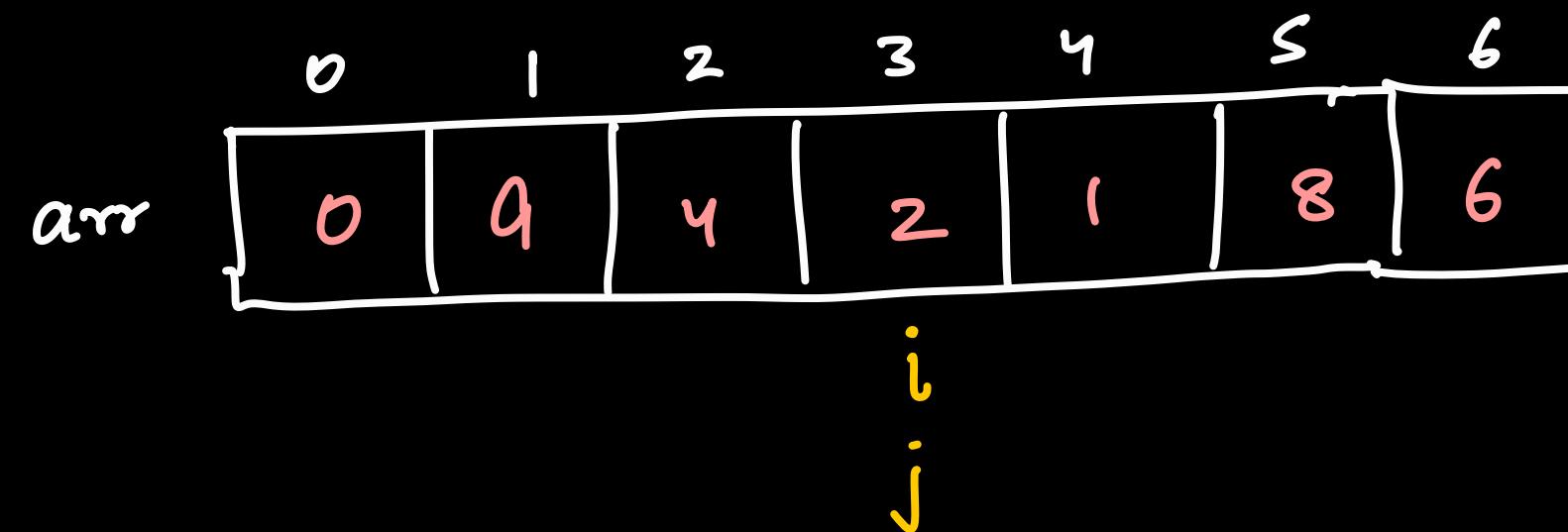
used to traverse data structures

cannot modify array elements

Ques: Reverse Array (2 variable/pointer technique)

arr =   { 6, 8, 1, 2, 4, 9, 0}

0	1	2	3	4	5	6
0	9	4	2	1	8	6

arr

i

j

```
while(i<j)
    Swap(arr[i], arr[j])
    i++;
    j--;
3
```

Ques: Rotate Array

$$arr = \begin{array}{ccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 8 & 1 & 2 & 4 & 9 & 0 \end{array} \qquad d=3$$

$0 \quad\quad \downarrow rev \quad d-1 \quad\quad d \quad\quad \downarrow rev \quad\quad n-1$

$$\begin{array}{ccccccc} 1 & 8 & 6 & 0 & 9 & 4 & 2 \end{array}$$

$0 \quad\quad\quad\quad \downarrow rev \quad\quad\quad\quad n-1$

$$\begin{array}{ccccccc} 2 & 4 & 9 & 0 & 6 & 8 & 1 \end{array}$$

$$arr = \quad 1 \quad 2 \quad 3 \quad 4$$

$$d = 6$$
$$\downarrow$$
$$d = 2$$

$$3 \quad 4 \quad 1 \quad 2$$

$$d = d \% n$$

Ques: Missing in Array

Ques: Segregate 0s and 1s