# Reverse a String

```
public class StringReversal {
    public static void main(String[] args) {
        String original = "automation";

        // Using StringBuilder
        String reversed = new
StringBuilder(original).reverse().toString();
        System.out.println("Reversed: " + reversed);
    }
}
```

This solution leverages StringBuilder's built-in reverse() method, which is more efficient than manual character manipulation for string reversal operations.

> The output of this code will be:
>
> ```
> Reversed: noitamotua
> ```

by Sreenidhi Rajakrishnan

# Palindrome Checker

## Problem

Check if the given string reads the same backward as forward.

## Technique

Compare original string with its reverse.

## Time Complexity

O(n) where n is the string length.

```
public class PalindromeCheck {
    public static void main(String[] args) {
        String str = "madam";
//if string contains caps and small letters, convert string lower or upper
case and then proceed
        boolean isPalindrome = true;

        for (int i = 0; i < str.length()/2; i++) {
            if (str.charAt(i) != str.charAt(str.length()-i-1)) {
                isPalindrome = false;
                break;
            }
        }
        System.out.println(str + " is palindrome: " + isPalindrome);
    }
}
```

Output:

```
madam is palindrome: true
```

by Sreenidhi Rajakrishnan

# Swap Two Numbers

```
public class SwapNumbers {
    public static void main(String[] args) {
        int a = 10;
        int b = 20;

        System.out.println("Before: a=" + a + ", b=" + b);

        // Method 1: Using arithmetic operations
        a = a + b;
        b = a - b;
        a = a - b;

        // Method 2: Using XOR (alternative)
        // a = a ^ b;
        // b = a ^ b;
        // a = a ^ b;

        System.out.println("After: a=" + a + ", b=" + b);
    }
}
```

Output:

```
Before: a=10, b=20
After: a=20, b=10
```

**by Sreenidhi Rajakrishnan**

# Finding the Largest Number

### Initialize

Set first element as the largest number.

### Compare

Loop through array and update max if larger number found.

### Return

Output the maximum value after full traversal.

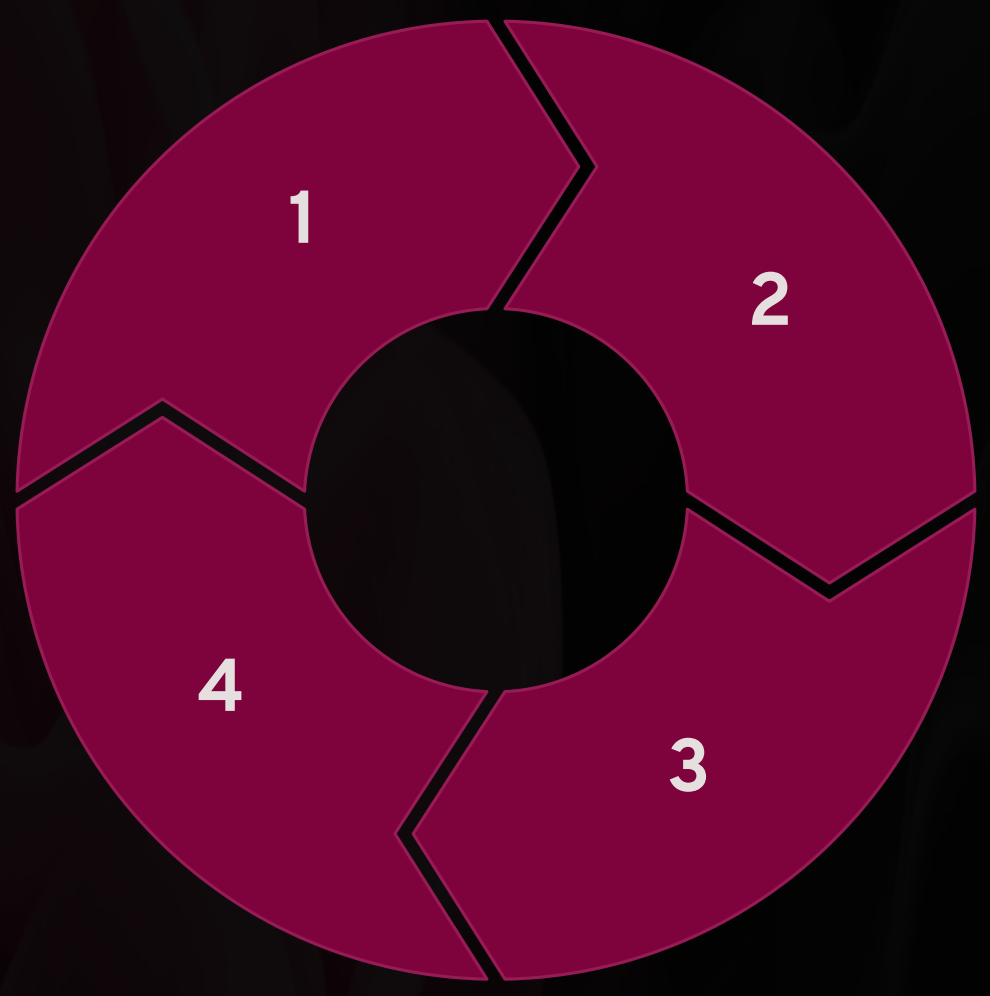
```
public class LargestInArray {
    public static void main(String[] args) {
        int[] numbers = {10, 5, 25, 8, 15, 3};
        int max = numbers[0];

        for (int i = 1; i < numbers.length; i++) {
            if (numbers[i] > max) {
                max = numbers[i];
            }
        }

        System.out.println("Largest number: " + max);
    }
}
```

Output:

```
Largest number: 25
```

**by Sreenidhi Rajakrishnan**

# Finding the Smallest Number




### 1 Initialize

Set first element as smallest.

### 2 Compare

Loop through array comparing values.

### 3 Update

Replace min if smaller found.

### 4 Output

Return the minimum value.

```
public class SmallestInArray {
    public static void main(String[] args) {
        int[] numbers = {10, 5, 25, 8, 15, 3};
        int min = numbers[0];

        for (int i = 1; i < numbers.length; i++) {
            if (numbers[i] < min) {
                min = numbers[i];
            }
        }

        System.out.println("Smallest number: " + min);
    }
}
```

Output:

```
Smallest number: 3
```

**by Sreenidhi Rajakrishnan**

# Counting Vowels and Consonants

### Input

Take a string input to analyze.

### Process

Check each character for vowel or consonant.

### Count

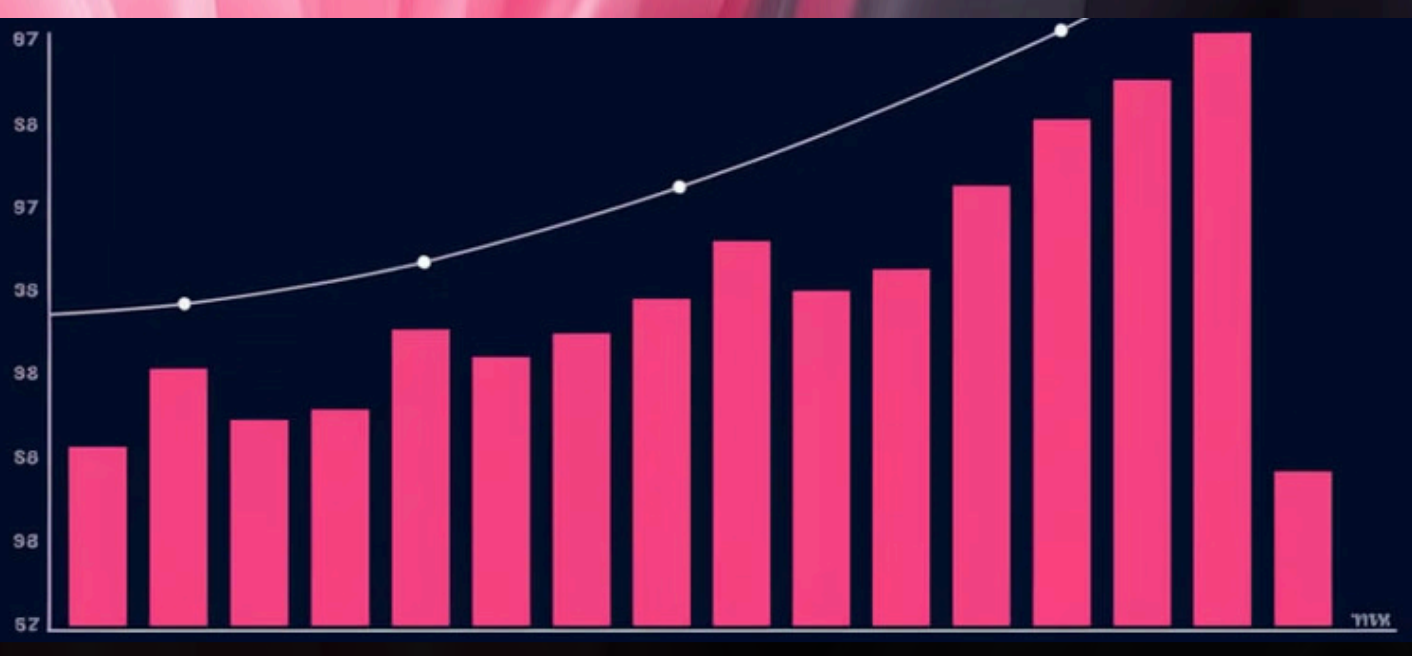
Maintain separate counters for each type.

```
public class VowelConsonantCounter {
    public static void main(String[] args) {
        String str = "Automation World";
        str = str.toLowerCase();
        int vowels = 0, consonants = 0;

        for (int i = 0; i < str.length(); i++) {
            char ch = str.charAt(i);
            if (ch >= 'a' && ch <= 'z') {
                if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u') {
                    vowels++;
                } else {
                    consonants++;
                }
            }
        }

        System.out.println("Vowels: " + vowels + ", Consonants: " +
consonants);
    }
}
```

Output:

```
Vowels: 6, Consonants: 10
```

by Sreenidhi Rajakrishnan



# Character Occurrence Counter

## HashMap Approach

Use HashMap to store each character and its count.

## Time Complexity

O(n) where n is string length.

## Application

Useful for text analysis and data processing.

```
import java.util.HashMap;

public class CharOccurrence {
    public static void main(String[] args) {
        String str = "automation";
        HashMap<Character, Integer> charCount = new HashMap<>();

        for (char ch : str.toCharArray()) {
            if (charCount.containsKey(ch)) {
                charCount.put(ch, charCount.get(ch) + 1);
            } else {
                charCount.put(ch, 1);
            }
        }

        System.out.println(charCount);
    }
}
```

Output:

```
{a=2, u=2, t=2, o=1, m=1, i=1, n=1}
```

**by Sreenidhi Rajakrishnan**

# Fibonacci Series

1

## Initialize

Start with 0 and 1.

2

## Calculate

Next number is sum of previous two.

3

## Print

Output each Fibonacci number.

4

## Continue

Repeat until reaching desired count.

```
public class Fibonacci {
    public static void main(String[] args) {
        int n = 10; // Number of Fibonacci numbers to print
        int a = 0, b = 1;

        System.out.print(a + " " + b + " ");

        for (int i = 2; i < n; i++) {
            int c = a + b;
            System.out.print(c + " ");
            a = b;
            b = c;
        }
    }
}
```

Output:

```
1 1 2 3 5 8 13 21 34 55
```

by Sreenidhi Rajakrishnan

# Factorial Calculation

1

## Loop Method

Use iteration to multiply numbers.

2

## Recursive Method

Function calls itself with decremented value.

3

## Base Case

Factorial of 0 or 1 is 1.

```
public class Factorial {
    public static void main(String[] args) {
        int num = 5;

        // Loop method
        int factorial1 = 1;
        for (int i = 1; i <= num; i++) {
            factorial1 *= i;
        }

        // Recursive method
        int factorial2 = factorialRecursive(num);

        System.out.println("Factorial of " + num + ": " + factorial1 + " (loop)");
        System.out.println("Factorial of " + num + ": " + factorial2 + "
(recursive)");
    }

    public static int factorialRecursive(int n) {
        if (n == 0 || n == 1) return 1;
        return n * factorialRecursive(n - 1);
    }
}
```

Output:

```
Factorial of 5: 120 (loop)
Factorial of 5: 120 (recursive)
```

**by Sreenidhi Rajakrishnan**

# Prime Number Check

## 2

### First Prime

Only even prime number.

## √n

### Check Limit

Only need to check divisors up to square root.

```
public class PrimeChecker {
    public static void main(String[] args) {
        int num = 17;
        boolean isPrime = true;

        if (num <= 1) {
            isPrime = false;
        } else {
            for (int i = 2; i <= Math.sqrt(num); i++) {
                if (num % i == 0) {
                    isPrime = false;
                    break;
                }
            }
        }

        System.out.println(num + " is prime: " + isPrime);
    }
}
```

Output:

```
17 is prime: true
```

**by Sreenidhi Rajakrishnan**

# Sum of Digits

### Extract

Get last digit using modulo.

### Remove

Remove last digit by dividing.

1 2 3 4

### Add

Add digit to running sum.

### Repeat

Continue until no digits remain.

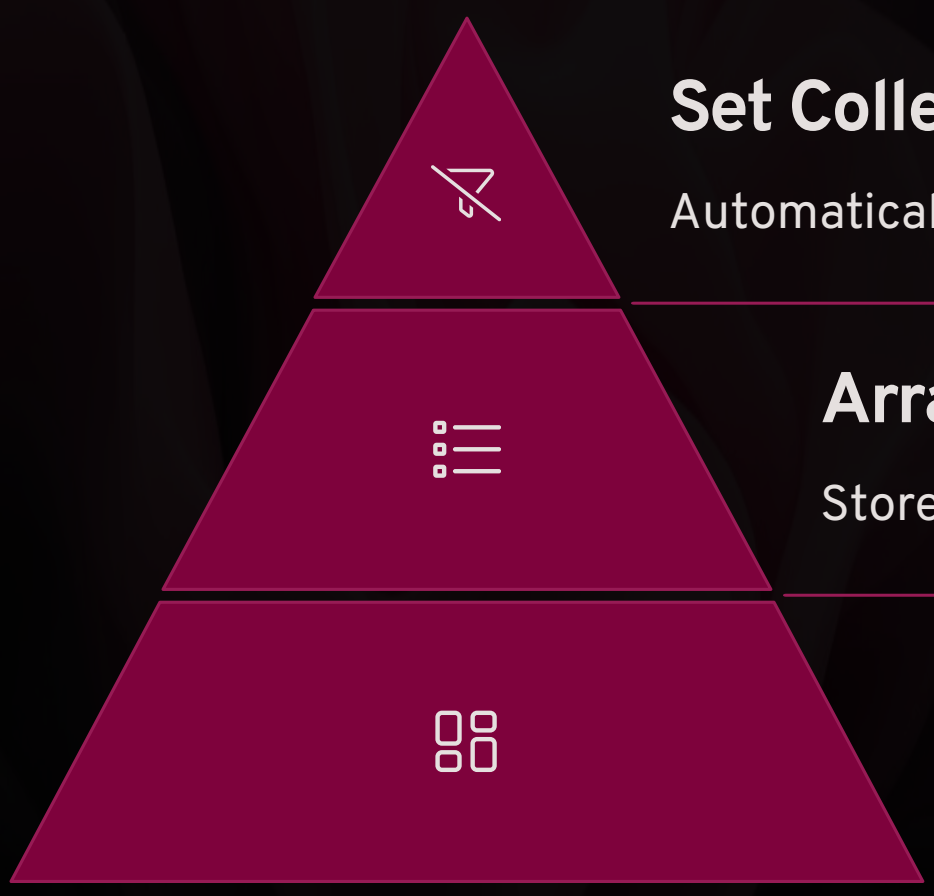
```
public class SumOfDigits {
    public static void main(String[] args) {
        int number = 12345;
        int sum = 0;

        while (number > 0) {
            sum += number % 10;  // Add last digit to sum
            number /= 10;        // Remove last digit
        }

        System.out.println("Sum of digits: " + sum);
    }
}
```

Output:

```
Sum of digits: 15
```

**by Sreenidhi Rajakrishnan**

# Remove Duplicates from Array



**Set Collection**

Automatically removes duplicates

**ArrayList**

Stores unique elements

**Original Array**

May contain duplicates

```
import java.util.HashSet;
import java.util.Set;
import java.util.Arrays;

public class RemoveDuplicates {
    public static void main(String[] args) {
        Integer[] numbers = {1, 2, 3, 2, 5, 1, 6, 3, 7};

        // Using HashSet
        Set<Integer> uniqueSet = new HashSet<>(Arrays.asList(numbers));
        Integer[] uniqueNumbers = uniqueSet.toArray(new Integer[0]);

        System.out.println("Original: " + Arrays.toString(numbers));
        System.out.println("Without duplicates: " +
Arrays.toString(uniqueNumbers));
    }
}
```

Output:

```
Original: [1, 2, 3, 2, 5, 1, 6, 3, 7]
Without duplicates: [1, 2, 3, 5, 6, 7]
```

**by Sreenidhi Rajakrishnan**

# Reverse Words in String

```
public class ReverseWords {
    public static void main(String[] args) {
        String sentence = "Java Coding Interview";
        String[] words = sentence.split(" ");
        StringBuilder result = new StringBuilder();

        for (String word : words) {
            StringBuilder reversedWord = new
StringBuilder(word).reverse();
            result.append(reversedWord).append(" ");
        }

        System.out.println("Original: " + sentence);
        System.out.println("Reversed words: " + result.toString().trim());
    }
}
```

Output:

```
Original: Java Coding Interview
Reversed words: avaJ gnidoC weivretnI
```

**by Sreenidhi Rajakrishnan**

# Find Even and Odd Numbers

| | |
|---|---|
| Input Array | [1, 2, 3, 4, 5, 6, 7, 8, 9] |
| Even Numbers | [2, 4, 6, 8] |
| Odd Numbers | [1, 3, 5, 7, 9] |
| Check Method | num % 2 == 0 (even) |

```
import java.util.ArrayList;

public class EvenOddFinder {
    public static void main(String[] args) {
        int[] numbers = {1, 2, 3, 4, 5, 6, 7, 8, 9};
        ArrayList even = new ArrayList<>();
        ArrayList odd = new ArrayList<>();

        for (int num : numbers) {
            if (num % 2 == 0) {
                even.add(num);
            } else {
                odd.add(num);
            }
        }

        System.out.println("Even numbers: " + even);
        System.out.println("Odd numbers: " + odd);
    }
}
```

Output:

```
Even numbers: [2, 4, 6, 8]
Odd numbers: [1, 3, 5, 7, 9]
```

**by Sreenidhi Rajakrishnan**

# String Length Without .length()

1

## Char Array Method

Convert string to character array and count elements.

2

## Index Method

Use exception handling to count characters until the end.

3

## Manual Count

Iterate through indices until StringIndexOutOfBoundsException.

```
public class StringLengthWithoutMethod {
    public static void main(String[] args) {
        String str = "automation";
        int length = 0;

        try {
            while (true) {
                str.charAt(length);
                length++;
            }
        } catch (StringIndexOutOfBoundsException e) {
            // End of string reached
        }

        System.out.println("Length of string: " + length);
    }
}
```

Output:

```
Length of string: 10
```

**by Sreenidhi Rajakrishnan**

# String to Integer Conversion

## String to Integer

```
String str = "123";
int num = Integer.parseInt(str);
// Or
int num2 = Integer.valueOf(str);
```

## Integer to String

```
int number = 123;
String str1 =
Integer.toString(number);
// Or
String str2 =
String.valueOf(number);
// Or
String str3 = "" + number;
```

```
public class StringIntConversion {
    public static void main(String[] args) {
        // String to Integer
        String numStr = "12345";
        int num = Integer.parseInt(numStr);
        System.out.println("String to Integer: " + num);

        // Integer to String
        int number = 12345;
        String str = Integer.toString(number);
        System.out.println("Integer to String: " + str);
    }
}
```

Output:

```
String to Integer: 12345
Integer to String: 12345
```

**by Sreenidhi Rajakrishnan**

# Print Elements at Even/Odd Indexes

1

### Understand Indexes

Array indexes start at 0 (even).

2

### Set Up Collections

Create separate lists for even and odd indexed elements.

3

### Iterate Array

Check index modulo 2 to determine even or odd.

4

### Display Results

Print both collections of elements.

```
public class EvenOddIndexElements {
    public static void main(String[] args) {
        String[] elements = {"Java", "Selenium", "TestNG", "Maven", "Jenkins",
"Docker"};

        System.out.print("Even index elements: ");
        for (int i = 0; i < elements.length; i += 2) {
            System.out.print(elements[i] + " ");
        }

        System.out.print("\nOdd index elements: ");
        for (int i = 1; i < elements.length; i += 2) {
            System.out.print(elements[i] + " ");
        }
    }
}
```

Output:

```
Even index elements: Java TestNG Jenkins
Odd index elements: Selenium Maven Docker
```

**by Sreenidhi Rajakrishnan**

# Array Reversal

## Reverse Elements

To reverse the array, create a new array and iterate from the end of the original array to the beginning, assigning elements to the new array in reverse order.

## Display Reversed Array

Print the reversed array after iterating through and reversing the elements.

```
import java.util.Arrays;

public class ArrayReversal {
    public static void main(String[] args) {
        int[] array = {1, 2, 3, 4, 5};

        System.out.println("Original: " + Arrays.toString(array));

        int start = 0;
        int end = array.length - 1;

        while (start < end) {
            // Swap elements
            int temp = array[start];
            array[start] = array[end];
            array[end] = temp;

            // Move pointers
            start++;
            end--;
        }

        System.out.println("Reversed: " + Arrays.toString(array));
    }
}
```

Output:

```
Original: [1, 2, 3, 4, 5]
Reversed: [5, 4, 3, 2, 1]
```

**by Sreenidhi Rajakrishnan**

# Check if Array is Sorted

To check if an array is sorted, loop through the array and compare each element with the next one in sequence. If any element is greater than the next, return false indicating the array is not sorted. Otherwise, return true if the loop completes without finding any unsorted pairs.

```
public class SortedArrayCheck {
    public static void main(String[] args) {
        int[] array = {1, 2, 4, 7, 9}; // Sorted array
        //int[] array = {1, 5, 3, 7, 9}; // Unsorted array
        boolean isSorted = true;

        for (int i = 0; i < array.length - 1; i++) {
            if (array[i] > array[i + 1]) {
                isSorted = false;
                break;
            }
        }

        System.out.println("Array is sorted: " + isSorted);
    }
}
```

Output:

```
Array is sorted: true
```

**by Sreenidhi Rajakrishnan**

# Case Conversion

## Using String Methods

```
String str = "Hello";
String upper =
str.toUpperCase();
String lower = str.toLowerCase();
```

## Manual Character Conversion

```
// ASCII value difference: 32
// 'A' (65) to 'a' (97)
char upper = 'a';
char lower = (char)(upper - 32);
```

```
public class CaseConversion {
    public static void main(String[] args) {
        String input = "Java Programming";
        StringBuilder result = new StringBuilder();

        for (char c : input.toCharArray()) {
            if (Character.isUpperCase(c)) {
                result.append(Character.toLowerCase(c));
            } else if (Character.isLowerCase(c)) {
                result.append(Character.toUpperCase(c));
            } else {
                result.append(c);
            }
        }

        System.out.println("Original: " + input);
        System.out.println("Case converted: " + result.toString());
    }
}
```

Output:

```
Original: Java Programming
Case converted: jAVA pROGRAMMING
```

**by Sreenidhi Rajakrishnan**

# Find Second Largest Number in an Array

### Sort array

One approach is to sort and find second-to-last element

### Track two variables

Better approach: single-pass with two variables

### Implement solution

Use a loop that tracks largest and second largest

```
public class SecondLargestFinder {
    public static int findSecondLargest(int[] arr) {
        int largest = Integer.MIN_VALUE;
        int secondLargest = Integer.MIN_VALUE;

        for (int num : arr) {
            if (num > largest) {
                secondLargest = largest;
                largest = num;
            } else if (num > secondLargest && num != largest) {
                secondLargest = num;
            }
        }
        return secondLargest;
    }

    public static void main(String[] args) {
        int[] numbers = {12, 35, 1, 10, 34, 1};
        System.out.println("Second largest number: " +
findSecondLargest(numbers));
    }
}
```

## Output

```
Second largest number: 34
```

by Sreenidhi Rajakrishnan

# Find Duplicate Elements in an Array

### Hash Set

Use HashSet to track seen elements

### Single Pass

Process array elements just once

### Store Duplicates

Add duplicates to result list

```
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;
import java.util.Set;

public class DuplicateFinder {
    public static List<Integer> findDuplicates(int[] arr) {
        Set<Integer> seen = new HashSet<>();
        List<Integer> duplicates = new ArrayList<>();

        for (int num : arr) {
            if (!seen.add(num)) { // add() returns false if element already exists
                duplicates.add(num);
            }
        }
        return duplicates;
    }

    public static void main(String[] args) {
        int[] numbers = {1, 2, 3, 4, 2, 7, 8, 8, 3};
        System.out.println("Duplicate elements: " + findDuplicates(numbers));
    }
}
```

## Output

```
Duplicate elements: [2, 3, 8]
```

by Sreenidhi Rajakrishnan

# Check if Two Strings are Anagrams

## What are anagrams?

Two strings containing same characters with same frequency but different order.

Examples: "listen" and "silent", "triangle" and "integral"

## Solution approaches

1. Sort both strings and compare
2. Count character frequencies
3. Use character array for counting

```
public class AnagramChecker {
    public static boolean areAnagrams(String str1, String str2) {
        // Remove spaces and convert to lowercase
        str1 = str1.replaceAll("\\s", "").toLowerCase();
        str2 = str2.replaceAll("\\s", "").toLowerCase();

        // Check if lengths are different
        if (str1.length() != str2.length()) {
            return false;
        }

        // Convert to char arrays and sort
        char[] charArray1 = str1.toCharArray();
        char[] charArray2 = str2.toCharArray();
        java.util.Arrays.sort(charArray1);
        java.util.Arrays.sort(charArray2);

        // Compare sorted arrays
        return java.util.Arrays.equals(charArray1, charArray2);
    }

    public static void main(String[] args) {
        String s1 = "Listen";
        String s2 = "Silent";
        System.out.println("\"" + s1 + "\" and \"" + s2 + "\" are anagrams: "
                           + areAnagrams(s1, s2));
    }
}
```

## Output

```
"Listen" and "Silent" are anagrams: true
```

by Sreenidhi Rajakrishnan

# Find the Missing Number in a Sequence

## 1

### Start

Begin with sequence 1 to N

## N

### End

Expected to have all numbers

## N-1

### Given

Array contains all except one number

## ?

### Find

Identify the missing number

```
public class MissingNumberFinder {
    public static int findMissingNumber(int[] arr, int n) {
        // Expected sum of numbers from 1 to n
        int expectedSum = n * (n + 1) / 2;

        // Calculate actual sum of array
        int actualSum = 0;
        for (int num : arr) {
            actualSum += num;
        }

        // Missing number is the difference
        return expectedSum - actualSum;
    }

    public static void main(String[] args) {
        int[] numbers = {1, 2, 4, 6, 3, 7, 8};
        int n = 8; // Range is 1 to 8
        System.out.println("Missing number: " +
findMissingNumber(numbers, n));
    }
}
```

### Output

```
Missing number: 5
```

by Sreenidhi Rajakrishnan

# Sort an Array Without Using Arrays.sort()

### Choose a Sorting Algorithm

We'll implement Bubble Sort as a simple example.

### Implement the Algorithm

Create nested loops to compare and swap elements.

### Test with Sample Data

Verify the array is correctly sorted.

```
public class BubbleSort {
    public static void bubbleSort(int[] arr) {
        int n = arr.length;
        boolean swapped;

    for (int i = 0; i < n - 1; i++) {
        swapped = false;

        for (int j = 0; j < n - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                // Swap arr[j] and arr[j+1]
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
                swapped = true;
            }
        }

        // If no swapping occurred in this pass, array is sorted
        if (!swapped) {
            break;
        }
    }
    }

    public static void main(String[] args) {
        int[] arr = {64, 34, 25, 12, 22, 11, 90};

        System.out.println("Original array: " + java.util.Arrays.toString(arr));
        bubbleSort(arr);
        System.out.println("Sorted array: " + java.util.Arrays.toString(arr));
    }
}
```

### Output

```
Original array: [64, 34, 25, 12, 22, 11, 90]
Sorted array: [11, 12, 22, 25, 34, 64, 90]
```

by Sreenidhi Rajakrishnan

# Find the First Non-Repeated Character in a String

### Character Frequency Map

Use HashMap to track character counts in the string.

### Two-Pass Approach

First count occurrences. Then find first character with count of 1.

### Time Complexity

O(n) where n is the length of the string.

```
import java.util.HashMap;
import java.util.Map;

public class FirstNonRepeatedChar {
    public static char findFirstNonRepeatedChar(String str) {
        Map<Character, Integer> charCounts = new HashMap<>();

        // Count occurrences of each character
        for (char c : str.toCharArray()) {
            charCounts.put(c, charCounts.getOrDefault(c, 0) + 1);
        }

        // Find first character with count 1
        for (char c : str.toCharArray()) {
            if (charCounts.get(c) == 1) {
                return c;
            }
        }

        // If no non-repeated character found
        return '\0';
    }

    public static void main(String[] args) {
        String str = "programming";
        char result = findFirstNonRepeatedChar(str);

        if (result != '\0') {
            System.out.println("First non-repeated character: " + result);
        } else {
            System.out.println("No non-repeated character found");
        }
    }
}
```

### Output

```
First non-repeated character: p
```

by Sreenidhi Rajakrishnan

# Find Common Elements in Two Arrays

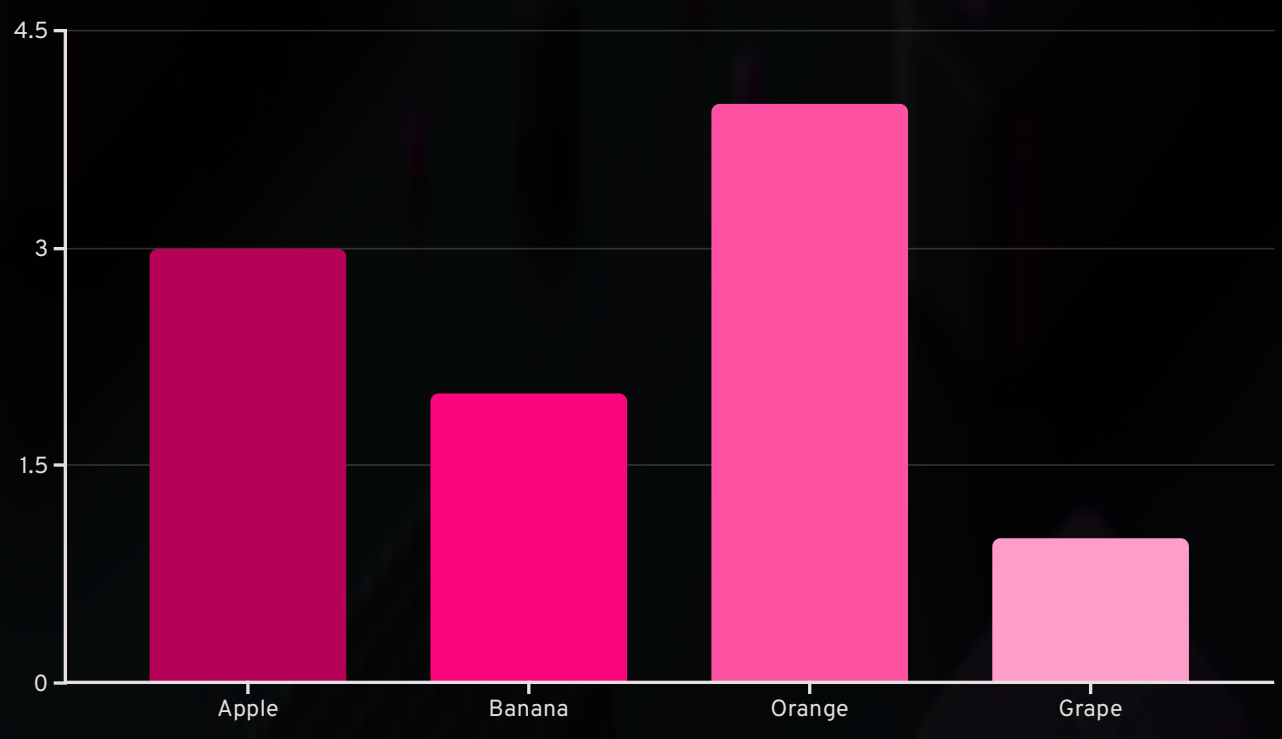
```
import java.util.HashSet;
import java.util.Set;
import java.util.Arrays;

public class CommonElementsFinder {
    public static Integer[] findCommonElements(Integer[] arr1, Integer[]
arr2) {
        Set<Integer> set1 = new HashSet<>(Arrays.asList(arr1));
        Set<Integer> commonElements = new HashSet<>();

        for (Integer num : arr2) {
            if (set1.contains(num)) {
                commonElements.add(num);
            }
        }

        return commonElements.toArray(new Integer[0]);
    }

    public static void main(String[] args) {
        Integer[] array1 = {1, 2, 3, 4, 5};
        Integer[] array2 = {3, 4, 5, 6, 7};

        Integer[] common = findCommonElements(array1, array2);
        System.out.println("Common elements: " + Arrays.toString(common));
    }
}
```

## Output

```
Common elements: [3, 4, 5]
```

by Sreenidhi Rajakrishnan

# Count Frequency of Elements Using HashMap




```
import java.util.HashMap;
import java.util.Map;

public class FrequencyCounter {
    public static Map<String, Integer> countFrequency(String[] array) {
        Map<String, Integer> frequencyMap = new HashMap<>();

        for (String item : array) {
            // If key exists, increment count; otherwise, set count to 1
            frequencyMap.put(item, frequencyMap.getOrDefault(item, 0) + 1);
        }
        return frequencyMap;
    }

    public static void main(String[] args) {
        String[] fruits = {"Apple", "Banana", "Apple", "Orange", "Banana",
                           "Orange", "Orange", "Apple", "Orange", "Grape"};

        Map<String, Integer> frequency = countFrequency(fruits);

        System.out.println("Frequency of elements:");
        for (Map.Entry<String, Integer> entry : frequency.entrySet()) {
            System.out.println(entry.getKey() + ": " + entry.getValue());
        }
    }
}
```

## Output

```
Frequency of elements:
Apple: 3
Grape: 1
Orange: 4
Banana: 2
```

by Sreenidhi Rajakrishnan

# Reverse Words in a Sentence

### Split sentence into words

Use string split method

### Reverse word order

Iterate from end to start

### Join words back together

Use space as delimiter

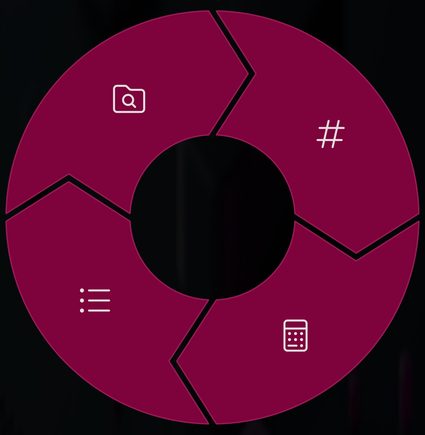
```
public class WordReverser {
    public static String reverseWords(String sentence) {
        // Split the sentence into words
        String[] words = sentence.split("\\s+");
        StringBuilder reversed = new StringBuilder();

        // Add words in reverse order
        for (int i = words.length - 1; i >= 0; i--) {
            reversed.append(words[i]);
            if (i > 0) {
                reversed.append(" ");
            }
        }

        return reversed.toString();
    }

    public static void main(String[] args) {
        String sentence = "Java is a programming language";
        System.out.println("Original: " + sentence);
        System.out.println("Reversed: " + reverseWords(sentence));
    }
}
```

## Output

```
Original: Java is a programming language
Reversed: language programming a is Java
```

by Sreenidhi Rajakrishnan

# Find Pairs in Array Whose Sum Equals a Target



### Define Problem

Find all pairs (a,b) where a+b equals target sum

### Use Hash Set

Store visited numbers for O(n) lookup

### Check Complement

For each number, look for (target-number)

### Collect Pairs

Add matching pairs to result list

```
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;
import java.util.Set;

public class PairSumFinder {
    public static List<int[]> findPairsWithSum(int[] arr, int targetSum) {
        List<int[]> pairs = new ArrayList<>();
        Set<Integer> visitedNumbers = new HashSet<>();

        for (int num : arr) {
            int complement = targetSum - num;

            if (visitedNumbers.contains(complement)) {
                pairs.add(new int[]{complement, num});
            }

            visitedNumbers.add(num);
        }

        return pairs;
    }

    public static void main(String[] args) {
        int[] numbers = {2, 4, 3, 5, 6, -2, 8, 7, 1};
        int target = 6;

        List<int[]> pairs = findPairsWithSum(numbers, target);

        System.out.println("Pairs with sum " + target + ":");
        for (int[] pair : pairs) {
            System.out.println("(" + pair[0] + ", " + pair[1] + ")");
        }
    }
}
```

## Output

```
Pairs with sum 6:
(2, 4)
(-2, 8)
(5, 1)
```

by Sreenidhi Rajakrishnan

# Merge Two Sorted Arrays

### Start with two sorted arrays

Arrays are already in order

### Use merge method

Similar to merge sort's merge step

### Create merged array

Result maintains sorted order

```
public class MergeSortedArrays {
    public static int[] merge(int[] arr1, int[] arr2) {
        int n1 = arr1.length;
        int n2 = arr2.length;
        int[] result = new int[n1 + n2];

        int i = 0, j = 0, k = 0;

        // Compare elements from both arrays and add smaller one to result
        while (i < n1 && j < n2) {
            if (arr1[i] <= arr2[j]) {
                result[k++] = arr1[i++];
            } else {
                result[k++] = arr2[j++];
            }
        }

        // Copy remaining elements from arr1, if any
        while (i < n1) {
            result[k++] = arr1[i++];
        }

        // Copy remaining elements from arr2, if any
        while (j < n2) {
            result[k++] = arr2[j++];
        }

        return result;
    }

    public static void main(String[] args) {
        int[] arr1 = {1, 3, 5, 7};
        int[] arr2 = {2, 4, 6, 8, 10};

        int[] merged = merge(arr1, arr2);

        System.out.println("Merged array: " +
java.util.Arrays.toString(merged));
    }
}
```

## Output

```
Merged array: [1, 2, 3, 4, 5, 6, 7, 8, 10]
```

by Sreenidhi Rajakrishnan

# Convert a List to Set and Vice Versa

## List to Set Conversion

Pass List to Set constructor to remove duplicates

## Set to List Conversion

Pass Set to List constructor to allow duplicates and indexing

## Use Cases

Remove duplicates or restore original order

## Key Differences

List allows duplicates and maintains order; Set has unique elements

```
import java.util.*;

public class CollectionConverter {
    public static void main(String[] args) {
        // Create List with duplicates
        List<String> namesList = new ArrayList<>();
        namesList.add("Alice");
        namesList.add("Bob");
        namesList.add("Alice");  // Duplicate
        namesList.add("Charlie");

        System.out.println("Original List: " + namesList);

        // Convert List to Set (removes duplicates)
        Set<String> namesSet = new HashSet<>(namesList);
        System.out.println("After List to Set conversion: " + namesSet);

        // Convert Set back to List
        List<String> uniqueNamesList = new ArrayList<>(namesSet);
        System.out.println("After Set to List conversion: " + uniqueNamesList);
    }
}
```

## Output

```
Original List: [Alice, Bob, Alice, Charlie]
After List to Set conversion: [Bob, Alice, Charlie]
After Set to List conversion: [Bob, Alice, Charlie]
```

by Sreenidhi Rajakrishnan

# Use of ArrayList, HashSet, and HashMap in Code

```
import java.util.*;
public class CollectionsDemo {
    public static void main(String[] args) {
        // ArrayList demo
        ArrayList<String> fruits = new ArrayList<>();
        fruits.add("Apple");
        fruits.add("Banana");
        fruits.add("Apple");  // Allows duplicates
        System.out.println("ArrayList: " + fruits);

        // HashSet demo
        HashSet<String> uniqueFruits = new HashSet<>();
        uniqueFruits.add("Apple");
        uniqueFruits.add("Banana");
        uniqueFruits.add("Apple");  // Duplicate not added
        System.out.println("HashSet: " + uniqueFruits);

        // HashMap demo
        HashMap<String, Integer> fruitCounts = new HashMap<>();
        fruitCounts.put("Apple", 5);
        fruitCounts.put("Banana", 3);
        fruitCounts.put("Orange", 2);
        System.out.println("HashMap: " + fruitCounts);
        System.out.println("Apple count: " + fruitCounts.get("Apple"));
    }
}
```

## Output

```
ArrayList: [Apple, Banana, Apple]
HashSet: [Apple, Banana]
HashMap: {Apple=5, Orange=2, Banana=3}
Apple count: 5
```

by Sreenidhi Rajakrishnan

# Remove All White Spaces from a String

| Input | Output |
| --- | --- |
| "Hello World" | "HelloWorld" |
| " Java Programming " | "JavaProgramming" |
| "No Spaces Here" | "NoSpacesHere" |

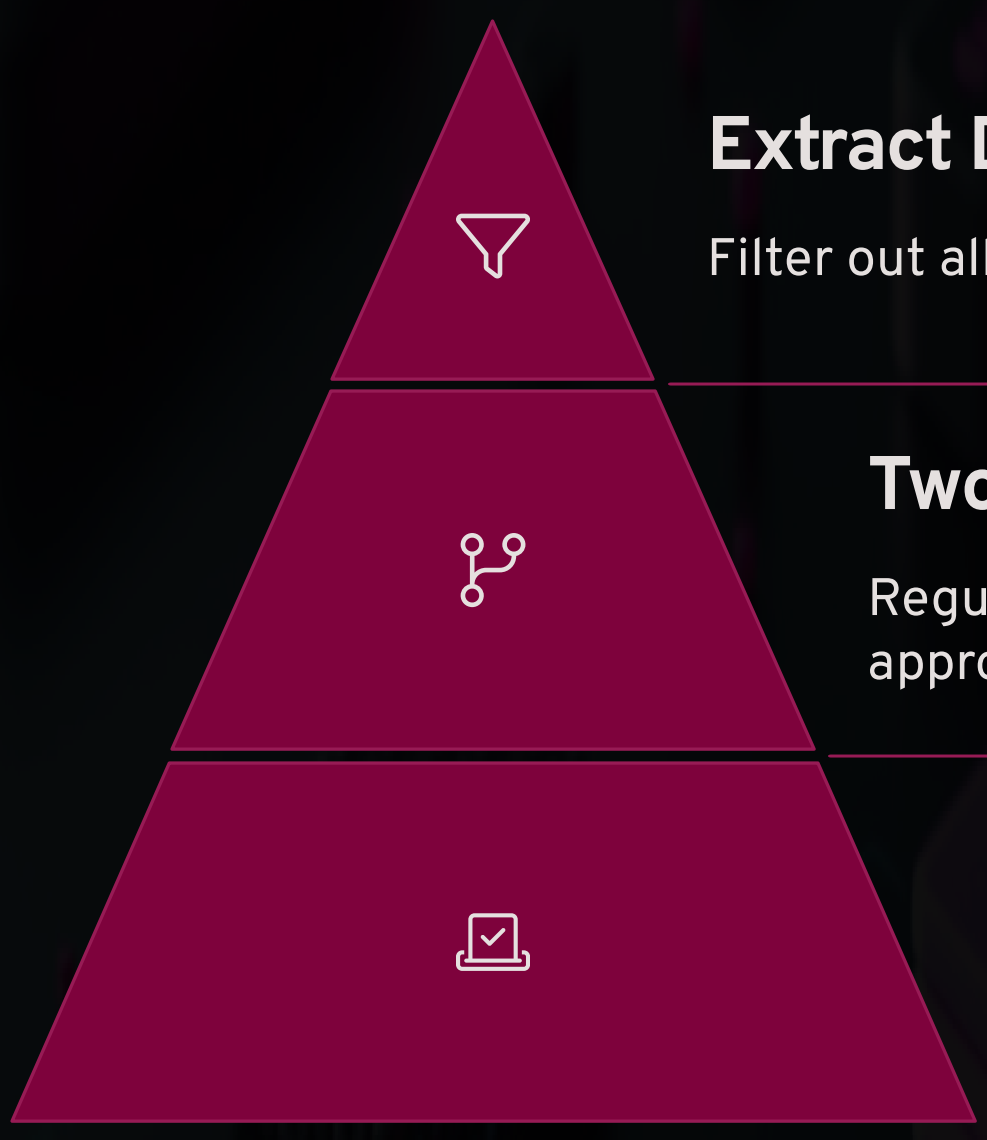
```
public class WhiteSpaceRemover {
    // Method 1: Using replace() with regular expression
    public static String removeWhiteSpacesRegex(String input) {
        return input.replaceAll("\\s+", "");
    }

    // Method 2: Manual approach with StringBuilder
    public static String removeWhiteSpacesManual(String input) {
        StringBuilder result = new StringBuilder();

        for (char c : input.toCharArray()) {
            if (!Character.isWhitespace(c)) {
                result.append(c);
            }
        }

        return result.toString();
    }

    public static void main(String[] args) {
        String text = "  Java   Programming  is   fun  ";

        System.out.println("Original string: \"" + text + "\"");
        System.out.println("After removing spaces (regex): \"" +
                           removeWhiteSpacesRegex(text) + "\"");
        System.out.println("After removing spaces (manual): \"" +
                           removeWhiteSpacesManual(text) + "\"");
        System.out.println("Using String Replace "+text.replace(" ", ""));
    }
}
```

## Output

```
Original string: "  Java   Programming  is   fun  "
After removing spaces (regex): "JavaProgrammingisfun"
After removing spaces (manual): "JavaProgrammingisfun"
Using String Replace: "JavaProgrammingisfun"
```

by Sreenidhi Rajakrishnan

# Extract Only Digits from an Alphanumeric String



## Extract Digits

Filter out all non-digit characters

## Two Implementation Methods

Regular expression and character checking approach

## Validate Solutions

Test with various alphanumeric inputs

```
public class DigitExtractor {
    // Method 1: Using regular expressions
    public static String extractDigitsRegex(String input) {
        return input.replaceAll("[^0-9]", "");
    }

    // Method 2: Using Character.isDigit()
    public static String extractDigitsManual(String input) {
        StringBuilder result = new StringBuilder();

        for (char c : input.toCharArray()) {
            if (Character.isDigit(c)) {
                result.append(c);
            }
        }
        return result.toString();
    }

    public static void main(String[] args) {
        String alphanumeric = "abc123def456ghi789";

        System.out.println("Original string: " + alphanumeric);
        System.out.println("Extracted digits (regex): " +
                           extractDigitsRegex(alphanumeric));
        System.out.println("Extracted digits (manual): " +
                           extractDigitsManual(alphanumeric));
    }
}
```

## Output

```
Original string: abc123def456ghi789
Extracted digits (regex): 123456789
Extracted digits (manual): 123456789
```

by Sreenidhi Rajakrishnan

# Read Data from Excel Using Apache POI

## Dependencies

Add Apache POI libraries to your project.

- poi-5.2.3.jar
- poi-ooxml-5.2.3.jar
- commons-io-2.11.0.jar

## Core Classes

- XSSFWorkbook: For XLSX files
- HSSFWorkbook: For XLS files
- Sheet, Row, Cell: For data access

```
import java.io.File;
import java.io.FileInputStream;
import org.apache.poi.ss.usermodel.*;
import org.apache.poi.xssf.usermodel.XSSFWorkbook;

public class ExcelReader {
    public static void main(String[] args) {
        try {
            FileInputStream file = new FileInputStream(new File("data.xlsx"));

            // Create Workbook instance for XLSX file
            Workbook workbook = new XSSFWorkbook(file);

            // Get first sheet
            Sheet sheet = workbook.getSheetAt(0);

            // Iterate through rows
            for (Row row : sheet) {
                // Iterate through cells in row
                for (Cell cell : row) {
                    switch (cell.getCellType()) {
                        case STRING:
                            System.out.print(cell.getStringCellValue() + "\t");
                            break;
                        case NUMERIC:
                            System.out.print(cell.getNumericCellValue() + "\t");
                            break;
                        case BOOLEAN:
                            System.out.print(cell.getBooleanCellValue() + "\t");
                            break;
                        default:
                            System.out.print("\t");
                    }
                }
                System.out.println();
            }

            file.close();
            workbook.close();

        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

## Output

```
Name    Age     Department
John    30.0    Engineering
Alice   25.0    Marketing
Bob     35.0    Finance
```

by Sreenidhi Rajakrishnan

# Capture a Screenshot in Selenium Using Java

### Set up WebDriver instance

Initialize and configure Chrome/Firefox driver

### Navigate to target webpage

Load the page you want to capture

### Take screenshot using TakesScreenshot

Cast WebDriver to TakesScreenshot interface

### Save captured image to disk

Use FileUtils to write image to file

```
import java.io.File;
import org.apache.commons.io.FileUtils;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class ScreenshotCapture {
    public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");

        // Initialize WebDriver
        WebDriver driver = new ChromeDriver();

        try {
            // Navigate to website
            driver.get("https://www.example.com");

            // Take screenshot
            TakesScreenshot scrShot = (TakesScreenshot) driver;
            File srcFile = scrShot.getScreenshotAs(OutputType.FILE);

            // Save screenshot
            File destFile = new File("screenshot.png");
            FileUtils.copyFile(srcFile, destFile);

            System.out.println("Screenshot captured and saved to: " +
                               destFile.getAbsolutePath());

        } catch (Exception e) {
            e.printStackTrace();
        } finally {
            // Close browser
            driver.quit();
        }
    }
}
```

## Output

```
Screenshot captured and saved to: C:\path\to\project\screenshot.png
```

by Sreenidhi Rajakrishnan

# Implement Implicit, Explicit, and Fluent Waits

## Implicit Wait

Global timeout for all elements. Polls DOM until element found or timeout.

## Explicit Wait

Waits for specific condition. More precise than implicit wait.

## Fluent Wait

Advanced wait with custom polling interval and exception ignoring.

```
import org.openqa.selenium.By;
import org.openqa.selenium.NoSuchElementException;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.support.ui.ExpectedConditions;
import org.openqa.selenium.support.ui.FluentWait;
import org.openqa.selenium.support.ui.Wait;
import org.openqa.selenium.support.ui.WebDriverWait;

import java.time.Duration;
import java.util.function.Function;

public class SeleniumWaits {
    public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");

        // Initialize WebDriver
        WebDriver driver = new ChromeDriver();

        try {
            // 1. Implicit Wait
            driver.manage().timeouts().implicitlyWait(Duration.ofSeconds(10));

            driver.get("https://www.example.com");
            // Element will be searched for up to 10 seconds
            WebElement implicitElement = driver.findElement(By.id("someId"));

            // 2. Explicit Wait
            WebDriverWait explicitWait = new WebDriverWait(driver,
Duration.ofSeconds(20));
            WebElement explicitElement = explicitWait.until(

ExpectedConditions.visibilityOfElementLocated(By.id("loadingElement"))
            );

            // 3. Fluent Wait
            Wait<WebDriver> fluentWait = new FluentWait<WebDriver>(driver)
                .withTimeout(Duration.ofSeconds(30))
                .pollingEvery(Duration.ofMillis(500))
                .ignoring(NoSuchElementException.class);

            WebElement fluentElement = fluentWait.until(new
Function<WebDriver, WebElement>() {
                public WebElement apply(WebDriver driver) {
                    return driver.findElement(By.id("dynamicElement"));
                }
            });

            System.out.println("All wait examples executed successfully");

        } catch (Exception e) {
            e.printStackTrace();
        } finally {
            driver.quit();
        }
    }
}
```

## Output

```
All wait examples executed successfully
```

by Sreenidhi Rajakrishnan

# Find All Broken Links on a Webpage

### Collect all links

Find elements with 'a' tag and get href attributes

### Send HTTP requests

Use HttpURLConnection to check each URL

### Identify broken links

Response codes 400+ indicate broken links

### 4 Report results

Compile and display list of broken links

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

import java.net.HttpURLConnection;
import java.net.URL;
import java.util.List;

public class BrokenLinkFinder {
    public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");

        // Initialize WebDriver
        WebDriver driver = new ChromeDriver();

        try {
            // Navigate to website
            driver.get("https://www.example.com");

            // Find all links on the page
            List<WebElement> links = driver.findElements(By.tagName("a"));
            System.out.println("Total links found: " + links.size());

            int brokenLinks = 0;

            // Check each link
            for (WebElement link : links) {
                String url = link.getAttribute("href");

                if (url == null || url.isEmpty()) {
                    System.out.println("URL is empty or null");
                    continue;
                }

                // Skip non-HTTP URLs
                if (!url.startsWith("http")) {
                    System.out.println("URL is not HTTP: " + url);
                    continue;
                }

                try {
                    // Create connection
                    HttpURLConnection connection = (HttpURLConnection) new
URL(url).openConnection();
                    connection.setRequestMethod("HEAD");
                    connection.connect();

                    int responseCode = connection.getResponseCode();

                    if (responseCode >= 400) {
                        System.out.println("Broken link: " + url + " - Response code: "
+ responseCode);
                        brokenLinks++;
                    } else {
                        System.out.println("Valid link: " + url);
                    }
                } catch (Exception e) {
                    System.out.println("Exception checking link: " + url + " - " +
e.getMessage());
                    brokenLinks++;
                }
            }

            System.out.println("Total broken links found: " + brokenLinks);

        } catch (Exception e) {
            e.printStackTrace();
        } finally {
            driver.quit();
        }
    }
}
```

## Output

```
Total links found: 14
Valid link: https://www.example.com/about
Valid link: https://www.example.com/contact
Broken link: https://www.example.com/old-page - Response code: 404
Valid link: https://www.example.com/products
Valid link: https://www.example.com/services
...
Total broken links found: 3
```

by Sreenidhi Rajakrishnan

# Count Web Elements on a Webpage

Selenium WebDriver can easily count various elements on a webpage. The code below finds and counts all links, images, and buttons.

## Initialize WebDriver

Create a Chrome WebDriver instance to control the browser.

## Navigate to Website

Open the target webpage using the get() method.

## Find Elements

Use findElements() with appropriate tag selectors to locate elements.

## Count and Report

Get the size() of each collection and display the results.

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class CountWebElements {
    public static void main(String[] args) {
        WebDriver driver = new ChromeDriver();
        try {
            driver.get("https://www.example.com");

            // Count different elements
            int linkCount = driver.findElements(By.tagName("a")).size();
            int imageCount = driver.findElements(By.tagName("img")).size();
            int buttonCount = driver.findElements(By.tagName("button")).size();

            // Print results
            System.out.println("Number of links: " + linkCount);
            System.out.println("Number of images: " + imageCount);
            System.out.println("Number of buttons: " + buttonCount);
            System.out.println("Total elements counted: " + (linkCount +
imageCount + buttonCount));

        } finally {
            driver.quit();
        }
    }
}
```

## Output

```
Number of links: 24
Number of images: 15
Number of buttons: 8
Total elements counted: 47
```

by Sreenidhi Rajakrishnan

# Sort an Array Without Using Arrays.sort()

### Choose a Sorting Algorithm

We'll implement Bubble Sort as a simple example.

### Implement the Algorithm

Create nested loops to compare and swap elements.

### Test with Sample Data

Verify the array is correctly sorted.

**by Sreenidhi Rajakrishnan**

```
public class BubbleSort {
    public static void bubbleSort(int[] arr) {
        int n = arr.length;
        boolean swapped;

        for (int i = 0; i < n - 1; i++) {
            swapped = false;

            for (int j = 0; j < n - i - 1; j++) {
                if (arr[j] > arr[j + 1]) {
                    // Swap arr[j] and arr[j+1]
                    int temp = arr[j];
                    arr[j] = arr[j + 1];
                    arr[j + 1] = temp;
                    swapped = true;
                }
            }
```

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```
            // If no swapping occurred in this pass, array is
sorted
            if (!swapped) {
                break;
            }
        }
    }

    public static void main(String[] args) {
        int[] arr = {64, 34, 25, 12, 22, 11, 90};

        System.out.println("Original array: " +
java.util.Arrays.toString(arr));
        bubbleSort(arr);
        System.out.println("Sorted array: " +
java.util.Arrays.toString(arr));
    }
}
```

## Output

```
Original array: [64, 34, 25, 12, 22, 11, 90]
Sorted array: [11, 12, 22, 25, 34, 64, 90]
```

**by Sreenidhi Rajakrishnan**

# Find Second Largest Number in an Array

```
public class SecondLargestFinder {
    public static int findSecondLargest(int[] arr) {
        int largest = Integer.MIN_VALUE;
        int secondLargest = Integer.MIN_VALUE;

        for (int num : arr) {
            if (num > largest) {
                secondLargest = largest;
                largest = num;
            } else if (num > secondLargest && num != largest) {
                secondLargest = num;
            }
        }
        return secondLargest;
    }
 public static void main(String[] args) {
        int[] numbers = {12, 35, 1, 10, 34, 1};
        System.out.println("Second largest number: " +
findSecondLargest(numbers));
    }
}
```

## Output

```
Second largest number: 34
```

by Sreenidhi Rajakrishnan

# Find Duplicate Elements in an Array

## Hash Set

Use HashSet to track seen elements

## Single Pass

Process array elements just once

## Store Duplicates

Add duplicates to result list

**by Sreenidhi Rajakrishnan**

```
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;
import java.util.Set;

public class DuplicateFinder {
    public static List<Integer> findDuplicates(int[] arr) {
        Set<Integer> seen = new HashSet<>();
        List<Integer> duplicates = new ArrayList<>();

        for (int num : arr) {
            if (!seen.add(num)) { // add() returns false if element already exists
                duplicates.add(num);
            }
        }
```

```
    return duplicates;
}

public static void main(String[] args) {
    int[] numbers = {1, 2, 3, 4, 2, 7, 8, 8, 3};
    System.out.println("Duplicate elements: "
+ findDuplicates(numbers));
  }
}
```

## Output

```
Duplicate elements: [2, 3, 8]
```

by Sreenidhi Rajakrishnan

# Check if Two Strings are Anagrams

## What are anagrams?

Two strings containing same characters with same frequency but different order.

Examples: "listen" and "silent", "triangle" and "integral"

## Solution approaches

1. Sort both strings and compare
2. Count character frequencies
3. Use character array for counting

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```
public class AnagramChecker {
    public static boolean areAnagrams(String str1, String str2) {
        // Remove spaces and convert to lowercase
        str1 = str1.replaceAll("\\s", "").toLowerCase();
        str2 = str2.replaceAll("\\s", "").toLowerCase();

        // Check if lengths are different
        if (str1.length() != str2.length()) {
            return false;
        }

        // Convert to char arrays and sort
        char[] charArray1 = str1.toCharArray();
        char[] charArray2 = str2.toCharArray();
        java.util.Arrays.sort(charArray1);
        java.util.Arrays.sort(charArray2);

        // Compare sorted arrays
        return java.util.Arrays.equals(charArray1, charArray2);
    }
```

```
public static void main(String[] args) {
    String s1 = "Listen";
    String s2 = "Silent";
    System.out.println("\"" + s1 + "\" and \"" +
s2 + "\" are anagrams: "
                    + areAnagrams(s1, s2));
  }
}
```

## Output

```
"Listen" and "Silent" are anagrams: true
```

by Sreenidhi Rajakrishnan

# Find the Missing Number in a Sequence

```
public class MissingNumberFinder {
    public static int findMissingNumber(int[] arr, int n) {
        // Expected sum of numbers from 1 to n
        int expectedSum = n * (n + 1) / 2;

        // Calculate actual sum of array
        int actualSum = 0;
        for (int num : arr) {
            actualSum += num;
        }

        // Missing number is the difference
        return expectedSum - actualSum;
    }

    public static void main(String[] args) {
        int[] numbers = {1, 2, 4, 6, 3, 7, 8};
        int n = 8; // Range is 1 to 8
        System.out.println("Missing number: " +
findMissingNumber(numbers, n));
    }
}
```

## Output

```
Missing number: 5
```

by Sreenidhi Rajakrishnan

# Find the First Non-Repeated Character in a String

## Character Frequency Map

Use HashMap to track character counts in the string.

## Two-Pass Approach

First count occurrences. Then find first character with count of 1.

## Time Complexity

O(n) where n is the length of the string.

**by Sreenidhi Rajakrishnan**

```
import java.util.HashMap;
import java.util.Map;

public class FirstNonRepeatedChar {
    public static char findFirstNonRepeatedChar(String str) {
        Map<Character, Integer> charCounts = new HashMap<>();

        // Count occurrences of each character
        for (char c : str.toCharArray()) {
            charCounts.put(c, charCounts.getOrDefault(c, 0) + 1);
        }
```

```
// Find first character with count 1
for (char c : str.toCharArray()) {
    if (charCounts.get(c) == 1) {
        return c;
    }
}
        // If no non-repeated character found
        return '\0';
    }

    public static void main(String[] args) {
        String str = "programming";
        char result = findFirstNonRepeatedChar(str);

        if (result != '\0') {
            System.out.println("First non-repeated character: " + result);
        } else {
            System.out.println("No non-repeated character found");
        }
    }
}
```

## Output

```
First non-repeated character: p
```

**by Sreenidhi Rajakrishnan**

# Find Common Elements in Two Arrays

by Sreenidhi Rajakrishnan

```
import java.util.HashSet;
import java.util.Set;
import java.util.Arrays;

public class CommonElementsFinder {
    public static Integer[] findCommonElements(Integer[] arr1,
Integer[] arr2) {
        Set<Integer> set1 = new HashSet<>(Arrays.asList(arr1));
        Set<Integer> commonElements = new HashSet<>();

        for (Integer num : arr2) {
            if (set1.contains(num)) {
                commonElements.add(num);
            }
        }

        return commonElements.toArray(new Integer[0]);
    }
```

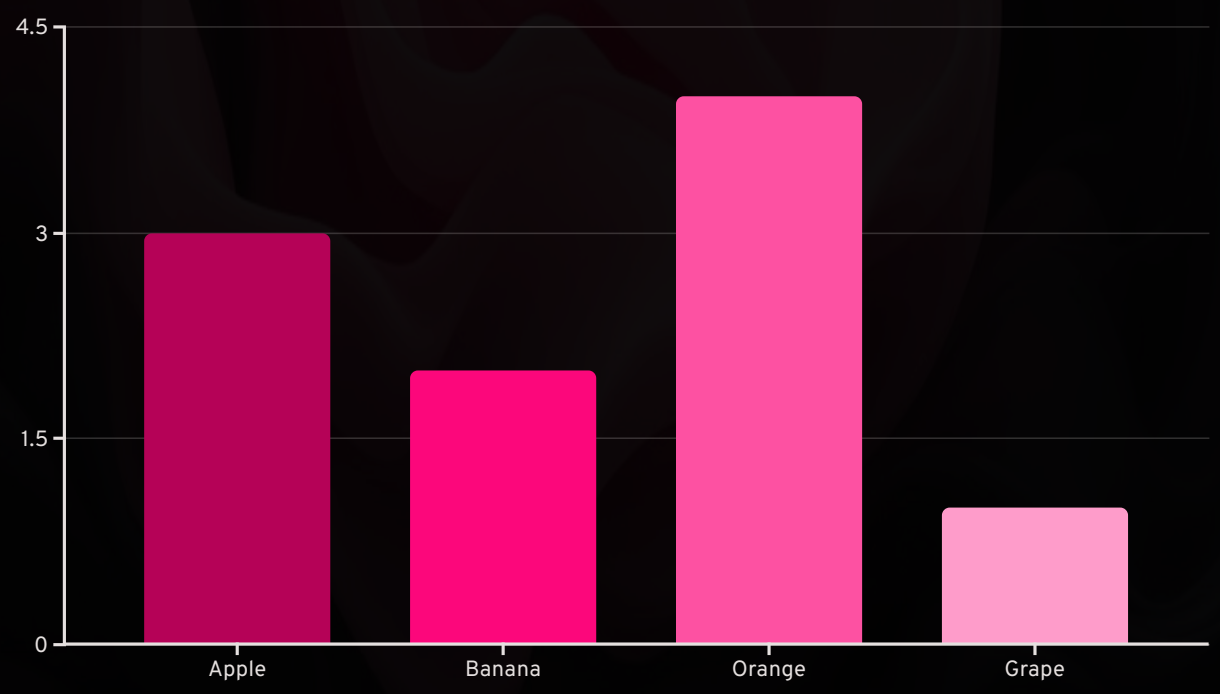
```
public static void main(String[] args) {
    Integer[] array1 = {1, 2, 3, 4, 5};
    Integer[] array2 = {3, 4, 5, 6, 7};

        Integer[] common =
findCommonElements(array1, array2);
        System.out.println("Common elements: " +
Arrays.toString(common));
    }
}
```

## Output

```
Common elements: [3, 4, 5]
```

**by Sreenidhi Rajakrishnan**

# Count Frequency of Elements Using HashMap




**by Sreenidhi Rajakrishnan**

```
import java.util.HashMap;
import java.util.Map;

public class FrequencyCounter {
    public static Map<String, Integer> countFrequency(String[] array) {
        Map<String, Integer> frequencyMap = new HashMap<>();

        for (String item : array) {
            // If key exists, increment count; otherwise, set count to 1
            frequencyMap.put(item, frequencyMap.getOrDefault(item, 0) + 1);
        }

        return frequencyMap;
    }
```

```
    public static void main(String[] args) {
        String[] fruits = {"Apple", "Banana", "Apple", "Orange",
"Banana",
                           "Orange", "Orange", "Apple", "Orange", "Grape"};

        Map<String, Integer> frequency = countFrequency(fruits);

        System.out.println("Frequency of elements:");
        for (Map.Entry<String, Integer> entry : frequency.entrySet())
{
            System.out.println(entry.getKey() + ": " +
entry.getValue());
        }
    }
}
```

## Output

```
Frequency of elements:
Apple: 3
Grape: 1
Orange: 4
Banana: 2
```

**by Sreenidhi Rajakrishnan**

# Reverse Words in a Sentence

## Split sentence into words

Use string split method

## Reverse word order

Iterate from end to start

## Join words back together

Use space as delimiter

**by Sreenidhi Rajakrishnan**

```
public class WordReverser {
    public static String reverseWords(String sentence) {
        // Split the sentence into words
        String[] words = sentence.split("\\s+");
        StringBuilder reversed = new StringBuilder();

        // Add words in reverse order
        for (int i = words.length - 1; i >= 0; i--) {
            reversed.append(words[i]);
            if (i > 0) {
                reversed.append(" ");
            }
        }

        return reversed.toString();
    }
```

```
    public static void main(String[] args) {
        String sentence = "Java is a programming
language";
        System.out.println("Original: " + sentence);
        System.out.println("Reversed: " +
reverseWords(sentence));
    }
}
```

## Output

```
Original: Java is a programming language
Reversed: language programming a is Java
```

by Sreenidhi Rajakrishnan

# Find Pairs in Array Whose Sum Equals a Target

## Define Problem

Find all pairs (a,b) where a+b equals target sum

## Use Hash Set

Store visited numbers for O(n) lookup

## Check Complement

For each number, look for (target-number)

## Collect Pairs

Add matching pairs to result list

by Sreenidhi Rajakrishnan

## by Sreenidhi Rajakrishnan

```
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;
import java.util.Set;

public class PairSumFinder {
    public static List<int[]> findPairsWithSum(int[] arr, int targetSum) {
        List<int[]> pairs = new ArrayList<>();
        Set<Integer> visitedNumbers = new HashSet<>();

        for (int num : arr) {
            int complement = targetSum - num;

            if (visitedNumbers.contains(complement)) {
                pairs.add(new int[]{complement, num});
            }

            visitedNumbers.add(num);
        }

        return pairs;
    }

    public static void main(String[] args) {
        int[] numbers = {2, 4, 3, 5, 6, -2, 8, 7, 1};
        int target = 6;

        List<int[]> pairs = findPairsWithSum(numbers, target);

        System.out.println("Pairs with sum " + target + ":");
        for (int[] pair : pairs) {
            System.out.println("(" + pair[0] + ", " + pair[1] + ")");
        }
    }
}
```

## Output

```
Pairs with sum 6:
(2, 4)
(-2, 8)
(5, 1)
```

by Sreenidhi Rajakrishnan

# Merge Two Sorted Arrays

### Start with two sorted arrays

Arrays are already in order

### Use merge method

Similar to merge sort's merge step

### Create merged array

Result maintains sorted order

**by Sreenidhi Rajakrishnan**

```
public class MergeSortedArrays {
    public static int[] merge(int[] arr1, int[] arr2) {
        int n1 = arr1.length;
        int n2 = arr2.length;
        int[] result = new int[n1 + n2];

        int i = 0, j = 0, k = 0;

        // Compare elements from both arrays and add smaller one to result
        while (i < n1 && j < n2) {
            if (arr1[i] <= arr2[j]) {
                result[k++] = arr1[i++];
            } else {
                result[k++] = arr2[j++];
            }
        }
```

```
// Copy remaining elements from arr1, if any
while (i < n1) {
    result[k++] = arr1[i++];
}

// Copy remaining elements from arr2, if any
while (j < n2) {
    result[k++] = arr2[j++];
        }

        return result;
    }

    public static void main(String[] args) {
        int[] arr1 = {1, 3, 5, 7};
        int[] arr2 = {2, 4, 6, 8, 10};

        int[] merged = merge(arr1, arr2);

        System.out.println("Merged array: " +
java.util.Arrays.toString(merged));
    }
}
```

## Output

```
Merged array: [1, 2, 3, 4, 5, 6, 7, 8, 10]
```

**by Sreenidhi Rajakrishnan**

# Convert a List to Set and Vice Versa

## List to Set Conversion

Pass List to Set constructor to remove duplicates

## Set to List Conversion

Pass Set to List constructor to allow duplicates and indexing

## Use Cases

Remove duplicates or restore original order

## Key Differences

List allows duplicates and maintains order; Set has unique elements

**by Sreenidhi Rajakrishnan**

```
import java.util.*;

public class CollectionConverter {
    public static void main(String[] args) {
        // Create List with duplicates
        List<String> namesList = new ArrayList<>();
        namesList.add("Alice");
        namesList.add("Bob");
        namesList.add("Alice");  // Duplicate
        namesList.add("Charlie");

        System.out.println("Original List: " + namesList);
```

```
        // Convert List to Set (removes duplicates)
        Set<String> namesSet = new HashSet<>(namesList);
        System.out.println("After List to Set conversion: " +
namesSet);

        // Convert Set back to List
        List<String> uniqueNamesList = new ArrayList<>
(namesSet);
        System.out.println("After Set to List conversion: " +
uniqueNamesList);
    }
}
```

## Output

```
Original List: [Alice, Bob, Alice, Charlie]
After List to Set conversion: [Bob, Alice, Charlie]
After Set to List conversion: [Bob, Alice, Charlie]
```

**by Sreenidhi Rajakrishnan**

# Use of ArrayList, HashSet, and HashMap in Code

by Sreenidhi Rajakrishnan

```
import java.util.*;

public class CollectionsDemo {
    public static void main(String[] args) {
        // ArrayList demo
        ArrayList<String> fruits = new ArrayList<>();
        fruits.add("Apple");
        fruits.add("Banana");
        fruits.add("Apple");  // Allows duplicates
        System.out.println("ArrayList: " + fruits);

        // HashSet demo
        HashSet<String> uniqueFruits = new HashSet<>();
        uniqueFruits.add("Apple");
        uniqueFruits.add("Banana");
        uniqueFruits.add("Apple");  // Duplicate not added
        System.out.println("HashSet: " + uniqueFruits);

        // HashMap demo
        HashMap<String, Integer> fruitCounts = new HashMap<>();
        fruitCounts.put("Apple", 5);
        fruitCounts.put("Banana", 3);
        fruitCounts.put("Orange", 2);
        System.out.println("HashMap: " + fruitCounts);
        System.out.println("Apple count: " + fruitCounts.get("Apple"));
    }
}
```

## Output

```
ArrayList: [Apple, Banana, Apple]
HashSet: [Apple, Banana]
HashMap: {Apple=5, Orange=2, Banana=3}
Apple count: 5
```

by Sreenidhi Rajakrishnan

# Remove All White Spaces from a String

| Input | Output |
| --- | --- |
| "Hello World" | "HelloWorld" |
| " Java Programming " | "JavaProgramming" |
| "No Spaces Here" | "NoSpacesHere" |

**by Sreenidhi Rajakrishnan**

```
public class WhiteSpaceRemover {
    // Method 1: Using replace() with regular expression
    public static String removeWhiteSpacesRegex(String input) {
        return input.replaceAll("\\s+", "");
    }

    // Method 2: Manual approach with StringBuilder
    public static String removeWhiteSpacesManual(String input) {
        StringBuilder result = new StringBuilder();

        for (char c : input.toCharArray()) {
            if (!Character.isWhitespace(c)) {
                result.append(c);
            }
        }

        return result.toString();
    }
```

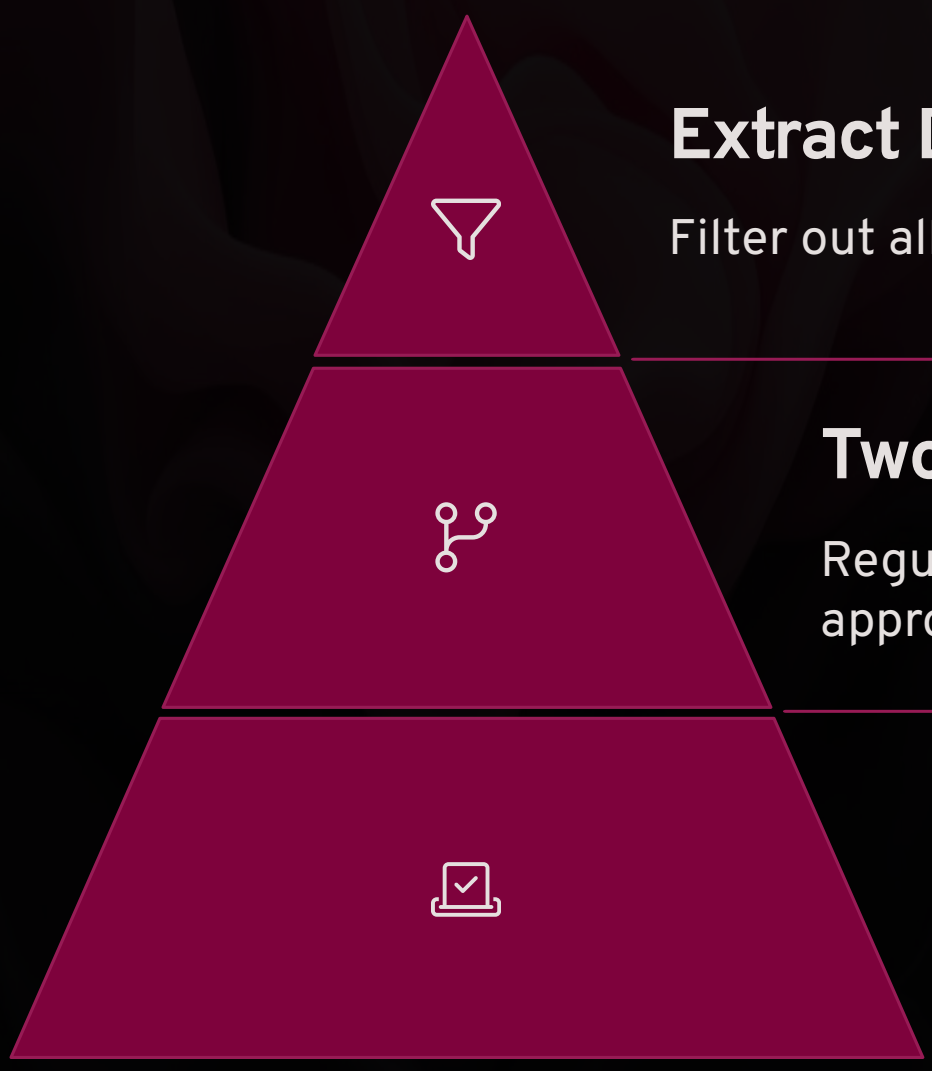
```
public static void main(String[] args) {
    String text = "  Java   Programming  is   fun  ";

    System.out.println("Original string: \"" + text + "\"");
        System.out.println("After removing spaces (regex): \"" +
                removeWhiteSpacesRegex(text) + "\"");
        System.out.println("After removing spaces (manual): \"" +
                removeWhiteSpacesManual(text) + "\"");
        System.out.println("Using String Replace "+text.replace(" ", ""));
    }
}
```

## Output

```
Original string: "  Java   Programming  is   fun  "
After removing spaces (regex): "JavaProgrammingisfun"
After removing spaces (manual): "JavaProgrammingisfun"
Using String Replace: "JavaProgrammingisfun"
```

**by Sreenidhi Rajakrishnan**

# Extract Only Digits from an Alphanumeric String



## Extract Digits

Filter out all non-digit characters

## Two Implementation Methods

Regular expression and character checking approach

## Validate Solutions

Test with various alphanumeric inputs

by Sreenidhi Rajakrishnan

```
public class DigitExtractor {
    // Method 1: Using regular expressions
    public static String extractDigitsRegex(String input) {
        return input.replaceAll("[^0-9]", "");
    }

    // Method 2: Using Character.isDigit()
    public static String extractDigitsManual(String input) {
        StringBuilder result = new StringBuilder();
```

```
for (char c : input.toCharArray()) {
    if (Character.isDigit(c)) {
        result.append(c);
    }
}


return result.toString();
    }

    public static void main(String[] args) {
        String alphanumeric = "abc123def456ghi789";

        System.out.println("Original string: " + alphanumeric);
        System.out.println("Extracted digits (regex): " +
                           extractDigitsRegex(alphanumeric));
        System.out.println("Extracted digits (manual): " +
                           extractDigitsManual(alphanumeric));
    }
}
```

## Output

```
Original string: abc123def456ghi789
Extracted digits (regex): 123456789
Extracted digits (manual): 123456789
```

**by Sreenidhi Rajakrishnan**

# Read Data from Excel Using Apache POI

## Dependencies

Add Apache POI libraries to your project.

- poi-5.2.3.jar
- poi-ooxml-5.2.3.jar
- commons-io-2.11.0.jar

## Core Classes

- XSSFWorkbook: For XLSX files
- HSSFWorkbook: For XLS files
- Sheet, Row, Cell: For data access

**by Sreenidhi Rajakrishnan**

```
import java.io.File;
import java.io.FileInputStream;
import org.apache.poi.ss.usermodel.*;
import org.apache.poi.xssf.usermodel.XSSFWorkbook;

public class ExcelReader {
public static void main(String[] args) {
    try {
        FileInputStream file = new FileInputStream(new File("data.xlsx"));

        // Create Workbook instance for XLSX file
        Workbook workbook = new XSSFWorkbook(file);

        // Get first sheet
        Sheet sheet = workbook.getSheetAt(0);
```

```
// Iterate through rows
for (Row row : sheet) {
    // Iterate through cells in row
    for (Cell cell : row) {
        switch (cell.getCellType()) {
            case STRING:
                System.out.print(cell.getStringCellValue() + "\t");
                break;
            case NUMERIC:
                System.out.print(cell.getNumericCellValue() + "\t");
                break;
            case BOOLEAN:
                System.out.print(cell.getBooleanCellValue() + "\t");
                break;
            default:
                System.out.print("\t");
        }
    }
    System.out.println();
}

file.close();
workbook.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

by Sreenidhi Rajakrishnan

## Output

```
  Name    Age     Department
John    30.0    Engineering
Alice   25.0    Marketing
Bob     35.0    Finance
```

by Sreenidhi Rajakrishnan

# Capture a Screenshot in Selenium Using Java

## Set up WebDriver instance

Initialize and configure Chrome/Firefox driver

## Navigate to target webpage

Load the page you want to capture

## Take screenshot using TakesScreenshot

Cast WebDriver to TakesScreenshot interface

## Save captured image to disk

Use FileUtils to write image to file

```
import java.io.File;
import org.apache.commons.io.FileUtils;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class ScreenshotCapture {
    public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");
```

by Sreenidhi Rajakrishnan

```
// Initialize WebDriver
WebDriver driver = new ChromeDriver();

try {
    // Navigate to website
    driver.get("https://www.example.com");

    // Take screenshot
    TakesScreenshot scrShot = (TakesScreenshot) driver;
    File srcFile = scrShot.getScreenshotAs(OutputType.FILE);

    // Save screenshot
    File destFile = new File("screenshot.png");
    FileUtils.copyFile(srcFile, destFile);

    System.out.println("Screenshot captured and saved to: " +
                       destFile.getAbsolutePath());

  } catch (Exception e) {
    e.printStackTrace();
  } finally {
    // Close browser
    driver.quit();
  }
 }
}
```

## Output

```
Screenshot captured and saved to: C:\path\to\project\screenshot.png
```

**by Sreenidhi Rajakrishnan**

# Implement Implicit, Explicit, and Fluent Waits

## Implicit Wait

Global timeout for all elements. Polls DOM until element found or timeout.

## Explicit Wait

Waits for specific condition. More precise than implicit wait.

## Fluent Wait

Advanced wait with custom polling interval and exception ignoring.

**by Sreenidhi Rajakrishnan**

```
import org.openqa.selenium.By;
import org.openqa.selenium.NoSuchElementException;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.support.ui.ExpectedConditions;
import org.openqa.selenium.support.ui.FluentWait;
import org.openqa.selenium.support.ui.Wait;
import org.openqa.selenium.support.ui.WebDriverWait;

import java.time.Duration;
import java.util.function.Function;
```

```
public class SeleniumWaits {
    public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");

        // Initialize WebDriver
        WebDriver driver = new ChromeDriver();

        try {
            // 1. Implicit Wait

driver.manage().timeouts().implicitlyWait(Duration.ofSeconds(10));

            driver.get("https://www.example.com");
            // Element will be searched for up to 10 seconds
            WebElement implicitElement =
driver.findElement(By.id("someId"));

            // 2. Explicit Wait
            WebDriverWait explicitWait = new WebDriverWait(driver,
Duration.ofSeconds(20));
            WebElement explicitElement = explicitWait.until(

ExpectedConditions.visibilityOfElementLocated(By.id("loadingElemen
t"))
            );
```

```
// 3. Fluent Wait
Wait<WebDriver> fluentWait = new FluentWait<WebDriver>(driver)
    .withTimeout(Duration.ofSeconds(30))
    .pollingEvery(Duration.ofMillis(500))
    .ignoring(NoSuchElementException.class);

WebElement fluentElement = fluentWait.until(new
Function<WebDriver, WebElement>() {
            public WebElement apply(WebDriver driver) {
                return driver.findElement(By.id("dynamicElement"));
            }
        });

        System.out.println("All wait examples executed successfully");

    } catch (Exception e) {
        e.printStackTrace();
    } finally {
        driver.quit();
    }
  }
}
```

## Output

```
All wait examples executed successfully
```

**by Sreenidhi Rajakrishnan**

# Find All Broken Links on a Webpage

## Collect all links

Find elements with 'a' tag and get href attributes

## Send HTTP requests

Use HttpURLConnection to check each URL

## Identify broken links

Response codes 400+ indicate broken links

4

## Report results

Compile and display list of broken links

by Sreenidhi Rajakrishnan

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

import java.net.HttpURLConnection;
import java.net.URL;
import java.util.List;

public class BrokenLinkFinder {
```

```
        public static void main(String[] args) {
        // Set path to ChromeDriver
        System.setProperty("webdriver.chrome.driver",
"path/to/chromedriver");
        // Initialize WebDriver
        WebDriver driver = new ChromeDriver();

        try {
// Navigate to website
driver.get("https://www.example.com");

// Find all links on the page
List<WebElement> links = driver.findElements(By.tagName("a"));
System.out.println("Total links found: " + links.size());

int brokenLinks = 0;

// Check each link
for (WebElement link : links) {
    String url = link.getAttribute("href");

    if (url == null || url.isEmpty()) {
        System.out.println("URL is empty or null");
        continue;
    }

    // Skip non-HTTP URLs
    if (!url.startsWith("http")) {
        System.out.println("URL is not HTTP: " + url);
        continue;
    }
```

```
                try {
                // Create connection
                HttpURLConnection connection = (HttpURLConnection) new
URL(url).openConnection();
                connection.setRequestMethod("HEAD");
                connection.connect();


                int responseCode = connection.getResponseCode();

                if (responseCode >= 400) {
                    System.out.println("Broken link: " + url + " - Response code: "
+ responseCode);
                    brokenLinks++;
                } else {
                    System.out.println("Valid link: " + url);
                }
            } catch (Exception e) {
                System.out.println("Exception checking link: " + url + " - " +
e.getMessage());
                brokenLinks++;
            }
        }

        System.out.println("Total broken links found: " + brokenLinks);

        } catch (Exception e) {
            e.printStackTrace();
        } finally {
            driver.quit();
        }
    }
}
```

by Sreenidhi Rajakrishnan

# Output

```
Total links found: 14
Valid link: https://www.example.com/about
Valid link:
https://www.example.com/contact
Broken link: https://www.example.com/old-
page - Response code: 404
Valid link:
https://www.example.com/products
Valid link:
https://www.example.com/services
...
Total broken links found: 3
```

by Sreenidhi Rajakrishnan

# Count Web Elements on a Webpage

Selenium WebDriver can easily count various elements on a webpage. The code below finds and counts all links, images, and buttons.

## Initialize WebDriver

Create a Chrome WebDriver instance to control the browser.

## Navigate to Website

Open the target webpage using the get() method.

## Find Elements

Use findElements() with appropriate tag selectors to locate elements.

## Count and Report

Get the size() of each collection and display the results.

by Sreenidhi Rajakrishnan

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class CountWebElements {
    public static void main(String[] args) {
        WebDriver driver = new ChromeDriver();
```

```
try {
  driver.get("https://www.example.com");

  // Count different elements
  int linkCount = driver.findElements(By.tagName("a")).size();
  int imageCount = driver.findElements(By.tagName("img")).size();
  int buttonCount = driver.findElements(By.tagName("button")).size();

          // Print results
          System.out.println("Number of links: " + linkCount);
          System.out.println("Number of images: " + imageCount);
          System.out.println("Number of buttons: " + buttonCount);
          System.out.println("Total elements counted: " + (linkCount +
imageCount + buttonCount));

      } finally {
          driver.quit();
      }
  }
}
```

## Output

```
Number of links: 24
Number of images: 15
Number of buttons: 8
Total elements counted: 47
```

**by Sreenidhi Rajakrishnan**