Worked out Example

3a. Develop a java program for performing various string operations with different string handling functions directed as follows

String Creation and Basic Operations, Length and Character Access, String Comparison, String Searching, Substring Operations , String Modification, Whitespace Handling, String Concatenation, String Splitting, StringBuilder Demo, String Formatting , Validate Email with contains( ) and startsWith() and endsWith()

```
package String_Functions;
public class StringHandlingDemo {
    public static void main(String[] args) {
        // Basic String Creation
        System.out.println("=== String Creation and Basic Operations ===");
        String str1 = "Hello, World!";
        String str2 = new String("Java Programming");
        System.out.println("Original strings:");
        System.out.println("str1: " + str1);
        System.out.println("str2: " + str2);

        // Length and Character Access
        System.out.println("\n=== Length and Character Access ===");
        System.out.println("Length of str1: " + str1.length());
        System.out.println("Character at index 4 in str1: " + str1.charAt(4));

        // String Comparison
        System.out.println("\n=== String Comparison ===");
        String str3 = "hello, world!";
        System.out.println("str1 equals str3: " + str1.equals(str3));
        System.out.println("str1 equals str3 (ignore case): " + str1.equalsIgnoreCase(str3));
        System.out.println("str1 compareTo str3: " + str1.compareTo(str3));

        // Searching in Strings
        System.out.println("\n=== String Searching ===");
        System.out.println("Index of 'World' in str1: " + str1.indexOf("World"));
        System.out.println("Last index of 'o' in str1: " + str1.lastIndexOf('o'));
        System.out.println("str1 contains 'Hello': " + str1.contains("Hello"));

        // Substring Operations
        System.out.println("\n=== Substring Operations ===");
        System.out.println("Substring of str1 (7 to end): " + str1.substring(7));
        System.out.println("Substring of str1 (0 to 5): " + str1.substring(0, 5));

        // String Modification
        System.out.println("\n=== String Modification ===");
        System.out.println("Uppercase: " + str1.toUpperCase());
        System.out.println("Lowercase: " + str1.toLowerCase());
        System.out.println("Replace 'World' with 'Java': " + str1.replace("World", "Java"));
```

```
// Whitespace Handling
System.out.println("\n=== Whitespace Handling ===");
String spacedString = "   Trimming Example   ";
System.out.println("Original: '" + spacedString + "'");
System.out.println("After trim: '" + spacedString.trim() + "'");

// String Concatenation
System.out.println("\n=== String Concatenation ===");
String concat1 = "Hello";
String concat2 = "World";
System.out.println("Using + operator: " + concat1 + " " + concat2);
System.out.println("Using concat(): " + concat1.concat(" ").concat(concat2));

// String Splitting
System.out.println("\n=== String Splitting ===");
String csvText = "Java,Python,C++,JavaScript";
System.out.println("Original CSV: " + csvText);
String[] languages = csvText.split(",");
System.out.println("After splitting:");
for (int i = 0; i < languages.length; i++) {
    System.out.println("Language " + (i + 1) + ": " + languages[i]);
}

// String Building with StringBuilder
System.out.println("\n=== StringBuilder Demo ===");
StringBuilder builder = new StringBuilder();
builder.append("Learning ");
builder.append("Java ");
builder.append("Programming");
System.out.println("StringBuilder result: " + builder.toString());
builder.insert(9, "Core ");
System.out.println("After insert: " + builder.toString());
builder.reverse();
System.out.println("After reverse: " + builder.toString());

// String Formatting
System.out.println("\n=== String Formatting ===");
String formatted = String.format("Name: %s, Age: %d, Height: %.2f", "John", 25, 1.75);
System.out.println("Formatted string: " + formatted);

// Checking String Properties
System.out.println("\n=== String Properties ===");
String testString = "Java123";
System.out.println("Is empty: " + testString.isEmpty());
System.out.println("Starts with 'Ja': " + testString.startsWith("Ja"));
System.out.println("Ends with '123': " + testString.endsWith("123"));

// Practical Example: Email Validation
System.out.println("\n=== Practical Example: Email Validation ===");
```

```
        String email = "user@example.com";
        boolean isValidEmail = validateEmail(email);
        System.out.println("Email: " + email);
        System.out.println("Is valid: " + isValidEmail);
    }

    // Helper method for email validation
    private static boolean validateEmail(String email) {
        // Basic email validation
        return email != null &&
               email.contains("@") &&
               email.contains(".") &&
               email.indexOf("@") < email.lastIndexOf(".") &&
               !email.startsWith("@") &&
               !email.endsWith(".") &&
               email.length() >= 5;
    }
}
```

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```
=== String Creation and Basic Operations ===
Original strings:
str1: Hello, World!
str2: Java Programming

=== Length and Character Access ===
Length of str1: 13
Character at index 4 in str1: o

=== String Comparison ===
str1 equals str3: false
str1 equals str3 (ignore case): true
str1 compareTo str3: -32

=== String Searching ===
Index of 'World' in str1: 7
Last index of 'o' in str1: 8
str1 contains 'Hello': true

=== Substring Operations ===
Substring of str1 (7 to end): World!
Substring of str1 (0 to 5): Hello

=== String Modification ===
Uppercase: HELLO, WORLD!
Lowercase: hello, world!
```

Replace 'World' with 'Java': Hello, Java!

=== Whitespace Handling ===
Original: '   Trimming Example   '
After trim: 'Trimming Example'

=== String Concatenation ===
Using + operator: Hello World
Using concat(): Hello World

=== String Splitting ===
Original CSV: Java,Python,C++,JavaScript
After splitting:
Language 1: Java
Language 2: Python
Language 3: C++
Language 4: JavaScript

=== StringBuilder Demo ===
StringBuilder result: Learning Java Programming
After insert: Learning Core Java Programming
After reverse: gnimmargorP avaJ eroC gninraeL

=== String Formatting ===
Formatted string: Name: John, Age: 25, Height: 1.75

=== String Properties ===
Is empty: false
Starts with 'Ja': true
Ends with '123': true

=== Practical Example: Email Validation ===
Email: user@example.com
Is valid: true

Exercise progams

Q1. Write a Java Program for Checking if a given string is null or contains only whitespace using user defined function isNullOrEmpty().

Q2. Write a Java Program for Counting how many times a substring appears in a main string using user defined function countOccurrences()

Q3. Write a Java Program for Reversing the characters in a string using user defined function reverseString().

Q4. Write a Java Program for Checking if a string reads the same backward as forward (ignoring case and punctuation) using user defined function isPalindrome():

Q5. Write a Java Program for Eliminating all whitespace characters from a string using user defined function removeWhitespace()

Q6. Write a Java Program for Capitalizing the first letter of each word. using user defined function capitalizeWords()

Q7. Write a Java Program for Shortening a string to a specified length and adds an ellipsis using user defined function truncate()

Q8. Write a Java Program for Verifying if a string contains only numeric characters using user defined function isNumeric()

Q9. Write a Java Program for Creating a random string of a specified length using user defined function generateRandomString()

Q10. Write a Java Program for Counting the number of words in a string using user defined function countWords()