



ALGORITHMS OF PROGRAMS

Practical File Algorithms

Abstract

This practical file contains a collection of algorithmic implementations covering fundamental. Each algorithm is well-structured, providing step-by-step explanations, and optimized approaches where applicable

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Algorithm for the Given Java Code

Start the program

1. Define the print method

- Accepts a String (str) and a char (ch) as input.
- If ch is 'l', prints str with a newline (System.out.println).
- Otherwise, prints str without a newline (System.out.print).

2. Define the stringInput method

- Creates a Scanner object to take user input.
- Prompts the user to enter a string.
- Reads and stores the input string.
- Closes the scanner.
- Returns the input string.

3. Main Method Execution

- Calls stringInput() to get the user input string and stores it in str.
- Calls print() with different checks and transformations:
 - Prints the entered string.
 - Checks if the first character is a digit (Character.isDigit(str.charAt(0))).
 - Checks if the first character is a letter (Character.isLetter(str.charAt(0))).
 - Checks if the first character is lowercase (Character.isLowerCase(str.charAt(0))).
 - Checks if the first character is uppercase (Character.isUpperCase(str.charAt(0))).
 - Converts and prints the string in lowercase (str.toLowerCase()).
 - Converts and prints the string in uppercase (str.toUpperCase()).

4. End the program

```
1. import java.util.*;
2.
3. public class CharacterOperation {
4.
5.     static void print(String str, char ch) {
6.         if (ch == 'l') {
7.             System.out.println(str);
8.         } else {
9.             System.out.print(str);
10.        }
11.    }
12.
13.    static String stringInput() {
14.        Scanner scanner = new Scanner(System.in);
15.        System.out.print("Enter a string: ");
16.        String input = scanner.nextLine();
17.        scanner.close();
18.        return input;
19.    }
20.
21.    public static void main(String[] args) {
22.        String str = stringInput();
23.
24.        print("Entered String is: " + str, 'l');
25.        print("Entered string is a Digit: " +
Character.isDigit(str.charAt(0)), 'l');
26.        print("Entered string is a Letter: " +
Character.isLetter(str.charAt(0)), 'l');
27.        print("Entered string is a Lowercase: " +
Character.isLowerCase(str.charAt(0)), 'l');
28.        print("Entered string is a Uppercase: " +
Character.isUpperCase(str.charAt(0)), 'l');
29.        print("Entered string to a Lowercase: " +
str.toLowerCase(), 'l');
30.        print("Entered string to a Uppercase: " +
str.toUpperCase(), 'l');
31.
32.    }
33.}
```

Algorithm for the Given Java Code

Start the program

1. **Start the program** and import the required package (java.util.Scanner).
2. **Take user input:**
 - o Prompt the user to enter the size of the **n x n** 2D array.
 - o Declare a **2D array** of size $n \times n$.
3. **Input elements:**
 - o Use **nested loops** to read the elements of the array from the user.
4. **Display the original array:**
 - o Iterate over the 2D array and print each element.
5. **Sort each row of the array using Bubble Sort:**
 - o Use **three nested loops**:
 - The **outer loop** iterates over rows.
 - The **middle loop** iterates over columns.
 - The **inner loop** performs **Bubble Sort** on each row, comparing adjacent elements and swapping if needed.
6. **Display the sorted array:**
 - o Print the modified array after sorting.
7. **End the program.**

```
1. import java.util.*;
2.
3. public class D2ArraySorting {
4.     public static void main() {
5.         Scanner sc = new Scanner(System.in);
6.         System.out.print("Enter the Size of array: ");
7.         int n = sc.nextInt();
8.
9.         int[][] arr = new int[n][n];
10.        System.out.print("Enter the elements of array: ");
11.        for (int i = 0; i < n; i++) {
12.            for (int j = 0; j < n; j++) {
13.                arr[i][j] = sc.nextInt();
14.            }
15.        }
16.        System.out.print("The original array is: ");
17.        for (int i = 0; i < n; i++) {
18.            for (int j = 0; j < n; j++) {
19.                System.out.print(arr[i][j] + " ");
20.            }
21.            System.out.print("\n");
22.        }
23.        System.out.print("The sorted array is: ");
24.        for (int i = 0; i < n; i++) {
25.            for (int j = 0; j < n; j++) {
26.                for (int k = 0; k < n - 1; k++) {
27.                    if (arr[i][k] > arr[i][k + 1]) {
28.                        int temp = arr[i][k];
29.                        arr[i][k] = arr[i][k + 1];
30.                        arr[i][k + 1] = temp;
31.                    }
32.                }
33.            }
34.        }
35.        sc.close();
36.    }
37. }
```

Algorithm for String Operations

1. **Start the program** and import the required package (java.util.Scanner).
2. **Define a method print(String str, char ch):**
 - o If ch == 'l', print the string with a newline (System.out.println).
 - o Otherwise, print the string without a newline (System.out.print).
3. **Define a method printEachCharacter(String str):**
 - o Iterate over the string using a loop.
 - o Print each character along with its position using the print method.
4. **Define a method stringInput():**
 - o Create a Scanner object.
 - o Prompt the user to enter a string.
 - o Read the string from user input.
 - o Close the Scanner and return the string.
5. **In the main method:**
 - o Call stringInput() to read a string from the user.
 - o Print the entered string.
 - o Calculate and print the **length** of the string.
 - o Call printEachCharacter(str) to print each character separately with its position.
6. **End the program.**

```
1. import java.util.Scanner;
2.
3. public class StringOperation {
4.
5.     static void print(String str, char ch) {
6.         if (ch == 'l') {
7.             System.out.println(str);
8.         } else {
9.             System.out.print(str);
10.        }
11.    }
12.
13.    static void printEachCharacter(String str) {
14.        for (int i = 0; i < str.length(); i++) {
15.            print((i + 1) + " character of the string is: "
+ str.charAt(i), 'l');
16.        }
17.    }
18.
19.    static String stringInput() {
20.        Scanner scanner = new Scanner(System.in);
21.        System.out.print("Enter a string: ");
22.        String input = scanner.nextLine();
23.        scanner.close();
24.        return input;
25.    }
26.
27.    public static void main(String[] args) {
28.        String str = stringInput();
29.
30.        print("Entered String is: " + str, 'l');
31.        print("Length of the string is: " + str.length(),
'1');
32.        printEachCharacter(str);
33.    }
34.}
```