Experiment - 1

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Aim: To develop Java programs to analyze strings, perform matrix operations, and implement basic banking system functionality.

Easy-level Problem

Aim: To write a Java program to analyze a string input by the user. The program should: Count the number of vowels, consonants, digits and special characters in the string.

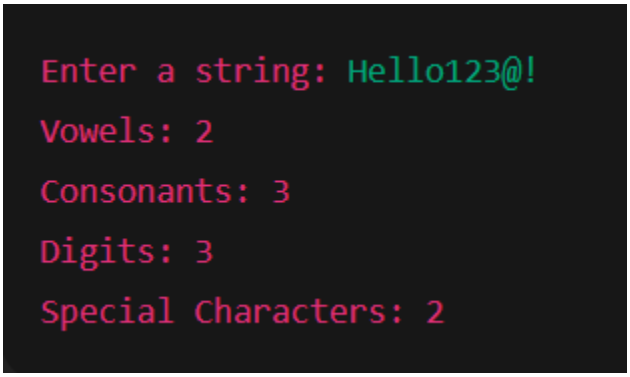
Objective: To understand string manipulation in Java using concepts like java basic input and string handling.

Code -

```
import java.util.Scanner;

public class easy {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter a string: "); String str
= sc.nextLine();
int vowels = 0, consonants = 0, digits = 0, special = 0; str =
str.toLowerCase();
for (int i = 0; i < str.length(); i++) {
char ch = str.charAt(i);
if (ch >= 'a' && ch <= 'z') {
if ("aeiou".indexOf(ch) != -1) { vowels++;
} else {
consonants++;
}
} else if (ch >= '0' && ch <= '9') { digits++;
} else if (ch != ' ') { special++;
}
}
System.out.println("Vowels: " + vowels);
System.out.println("Consonants: " + consonants);
System.out.println("Digits: " + digits); System.out.println("Special
Characters: " + special);
}
}
```

Output -


Enter a string: Hello123@!
Vowels: 2
Consonants: 3
Digits: 3
Special Characters: 2

Medium- Level Problem

Aim : To write a Java program to perform matrix operations(addition, subtraction, and multiplication) on two matrices provided by the user. The program need to check the dimensions of the matrices to ensure valid operations.

Code :

```
import java.util.Scanner;

public class medium {
public static void main(String[]
args) { Scanner sc = new
Scanner(System.in);

// Input dimensions
System.out.print("Enter rows and columns of first matrix: ");
int r1 = sc.nextInt();
int c1 = sc.nextInt();
System.out.print("Enter rows and columns of second matrix: ");
int r2 = sc.nextInt();
int c2 = sc.nextInt();

int[][] A = new int[r1][c1];
int[][] B = new int[r2][c2];

System.out.println("Enter elements of first matrix:");
for (int i = 0; i <
r1; i++) for (int j =
0;  j  <  c1;  j++)
A[i][j]             =
sc.nextInt();

System.out.println("Enter elements of second matrix:");
for (int i = 0; i <
r2; i++) for (int j =
0;  j  <  c2;  j++)
B[i][j]             =
sc.nextInt();

// Addition & Subtraction
if (r1 == r2 && c1 == c2)
{
System.out.println("Additi
on:"); for (int i = 0; i
< r1; i++) { for (int j =
0; j < c1; j++) {
System.out.print((A[i][j] + B[i][j]) + " ");
}
System.out.println();
}

System.out.println("Subtraction:");
for (int i = 0; i < r1; i++) {
```

```
for (int j = 0; j < c1; j++) {
System.out.print((A[i][j] - B[i][j]) +
" ");
}
System.out.println();
}
} else {
System.out.println("Addition/Subtraction not possible (dimension mismatch).");
}
```

```
// Multiplication
if (c1 == r2) {
System.out.println("Multiplication:");
int[][] result = new int[r1][c2];
for (int i = 0; i < r1; i++) {
for (int j = 0; j < c2; j++) {
for (int k = 0; k < c1; k++) {
result[i][j] += A[i][k] * B[k][j];
}
System.out.print(result[i][j] + " ");
}
System.out.println();
}
} else {
System.out.println("Multiplication not possible (dimension mismatch).");
}
}
}
```

Output:

```
Enter rows and columns of first matrix: 2 2
Enter rows and columns of second matrix: 2 3
Enter elements of first matrix:

3 4
5 6
Enter elements of second matrix:
5 6
1 2
6 5
Addition/Subtraction not possible (dimension mismatch).
Multiplication:
23 42 23
37 66 35
```

Hard -level Problem

Aim : To create a Java program to implement a basic banking system with the following features:
- Account creation(Name , Account number,).
- Deposit and withdrawal operations.
- Prevent overdraft by checking the balance before withdrawal.

Objective: Apply object-oriented programming concepts in a practical system using concepts like Java classes, objects and control structures.

Procedure:

1. Define a 'BankAccount' class with fields like name,account number , and balance.
2. Implement methods for:
   - deposit(double amount): Adds amount to balance.
   - withdraw(double amount): checks balance before subtracting.
3. In the main program, create a new account by taking user input.
4. Allow the user to perform deposit and withdrawal operations.
5. Display appropriate messages and updated balances.

Sample Input:
Create Account:
Name: John Doe
Account Number: 12345
Initial Balance: 1000
Deposit: 500
Withdraw: 2000

Sample Output:
Deposit successful! Current Balance: 1500
Error: Insufficient funds. Current Balance: 1500

Code :

```
package easy_level;
import java.util.Scanner;

class BankAccount {
String name;
int accountNumber;
double balance;

BankAccount(String name, int accountNumber, double initialBalance) {
this.name = name;
this.accountNumber = accountNumber;
this.balance = initialBalance;
}

void deposit(double amount) {
balance += amount;
System.out.println("Deposit successful! Current Balance: " + balance);
}

void withdraw(double amount) {
if (amount > balance) {
System.out.println("Error: Insufficient funds. Current Balance: " + balance);
} else {
balance -= amount;
System.out.println("Withdrawal successful! Current Balance: " + balance);
}
}
}

public class hard {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);

// Account creation
System.out.print("Enter Name: ");
String name = sc.nextLine();
System.out.print("Enter Account Number: ");
int accNo = sc.nextInt();
System.out.print("Enter Initial Balance: ");
double balance = sc.nextDouble();

BankAccount account = new BankAccount(name, accNo, balance);

while (true) {
System.out.println("\n1. Deposit\n2. Withdraw\n3. Exit");
System.out.print("Choose an option: ");
int choice = sc.nextInt();
```

```
switch (choice) {
case 1:
System.out.print("Enter deposit amount: ");
double dep = sc.nextDouble();
account.deposit(dep);
break;
case 2:
System.out.print("Enter withdrawal amount: ");
double wd = sc.nextDouble();
account.withdraw(wd);
break;
case 3:
System.out.println("Exiting... Thank you!");
return;
default:
System.out.println("Invalid choice.");
}
}
}
}
```

Output:

```
Enter Name: Alice
Enter Account Number: 101
Enter Initial Balance: 1000

1. Deposit
2. Withdraw
3. Exit
Choose an option: 1
Enter deposit amount: 500
Deposit successful! Current Balance: 1500.0
```