Lab File

Object Oriented Programming Lab

Session: Jan - May 2025

Programme: BTech. CS - Data Science

Sem: 4
Batch: 5

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Submitted To:
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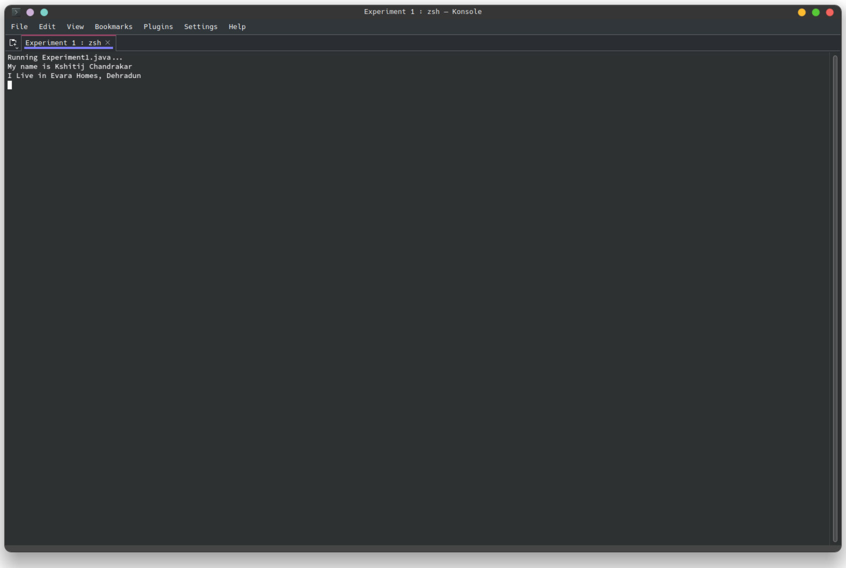
# ./Experiment 1

./Experiment 1/Experiment1.java

Code

```
class Experiment1{
  public static void main (String[] args){
      System.out.println("My name is Kshitij Chandrakar");
      System.out.println("I Live in Evara Homes, Dehradun");
  }
}
```


Experiment 1 : zsh — Konsole
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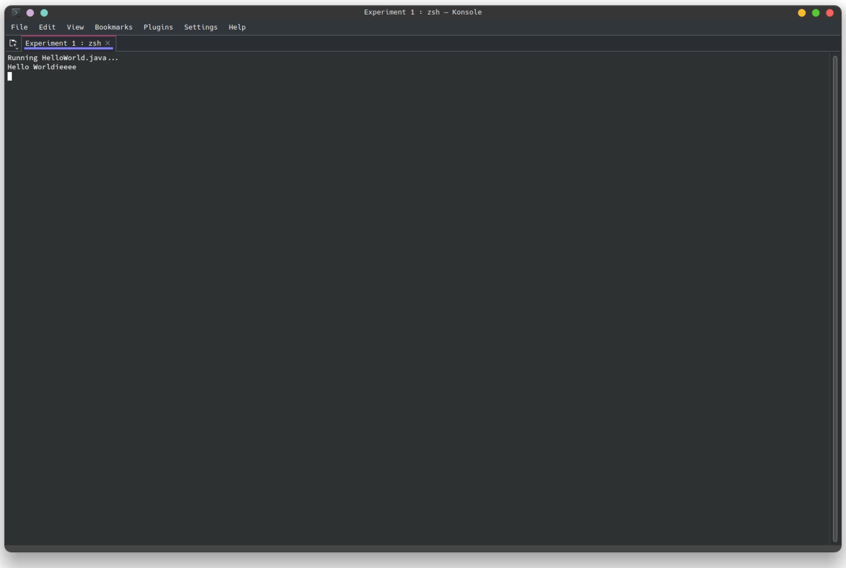
Experiment 1 : zsh

```
Running Experiment1.java...
My name is Kshitij Chandrakar
I Live in Evara Homes, Dehradun
```

Output

### ./Experiment 1/HelloWorld.java #### Code

```
class test{
public static void main (String[] args){
System.out.println("Hello Worldieeee");
}
}
```


Experiment 1 : zsh — Konsole
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Experiment 1 : zsh

```
Running HelloWorld.java...
Hello Worldieeee
```

Output

## ./Experiment 10 ### ./Experiment 10/Employee.java #### Code

```java
import java.util.ArrayList;
import java.util.Iterator;

class Employee {
  private String name;
  private int id;
  private double salary;

  // Constructor
  public Employee(String name, int id, double salary) {
    this.name = name;
    this.id = id;
    this.salary = salary;
  }

  // Getters and Setters
  public String getName() {
    return name;
  }

  public int getId() {
    return id;
  }

  public double getSalary() {
    return salary;
  }

  public void setSalary(double salary) {
    this.salary = salary;
  }

  @Override
  public String toString() {
    return "Employee [Name: " + name + ", ID: " + id + ", Salary: $" + salary + "]";
  }
}

public class EmployeeManagement {
  public static void main(String[] args) {
    // Create ArrayList to store employees
    ArrayList<Employee> employees = new ArrayList<>();

    // Add three employees
    employees.add(new Employee("John Doe", 101, 50000.0));
    employees.add(new Employee("Jane Smith", 102, 60000.0));
    employees.add(new Employee("Bob Johnson", 103, 55000.0));

    System.out.println("Initial Employee List:");
    printEmployees(employees);

    // Update Jane's salary (ID 102)
    for (Employee emp : employees) {
      if (emp.getId() == 102) {
        emp.setSalary(65000.0);
        System.out.println("\nUpdated salary for Jane Smith (ID 102)");
        break;
      }
    }

    // Remove employee with ID 101 (John Doe)
    Iterator<Employee> iterator = employees.iterator();
    while (iterator.hasNext()) {
      Employee emp = iterator.next();
      if (emp.getId() == 101) {
        iterator.remove();
        System.out.println("Removed employee with ID 101");
        break;
      }
    }
    System.out.println("\nFinal Employee List:");
    printEmployees(employees);
  }

  // Helper method to print all employees
  private static void printEmployees(ArrayList<Employee> employees) {
    if (employees.isEmpty()) {
      System.out.println("No employees in the list");
      return;
    }

    for (Employee emp : employees) {
      System.out.println(emp);
    }
  }
}
```

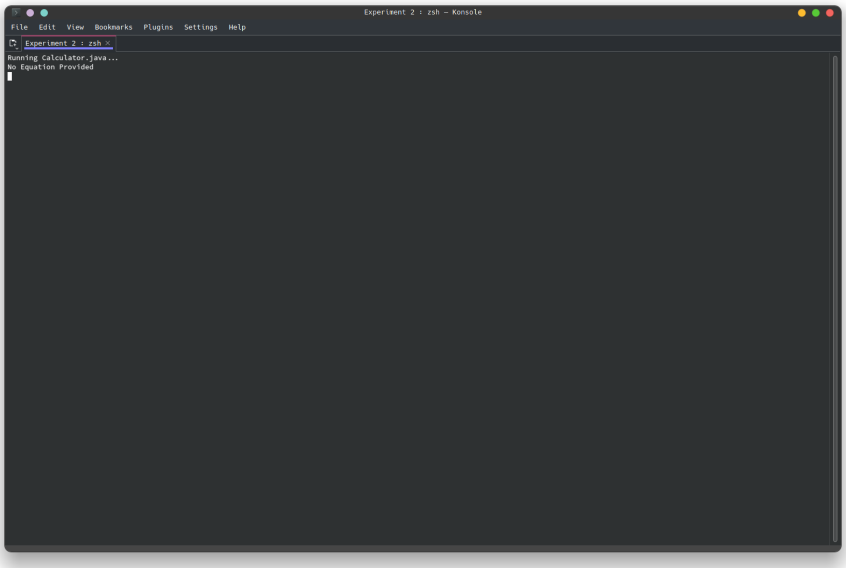
Output ./Experiment 10/Employee.java ### ./Experiment 10/PrimeNumberChecker.java #### Code

```
import java.util.ArrayList;

public class PrimeNumberChecker {
  public static void main(String[] args) {
    ArrayList<Integer> numbers = new ArrayList<>();
    numbers.add(2);
    numbers.add(3);
    numbers.add(4);
    numbers.add(5);
    numbers.add(6);
    numbers.add(7);
    numbers.add(8);
    numbers.add(9);
    numbers.add(10);
    numbers.add(11);
    numbers.add(12);
    numbers.add(13);

    for (Integer num : numbers) {
      int n = num; // Unboxing
      boolean isPrime = isPrimeNumber(n);
      System.out.println(n + " is " + (isPrime ? "prime" : "not prime"));
    }
  }

  private static boolean isPrimeNumber(int number) {
    if (number <= 1) {
      return false;
    }
    if (number == 2) {
      return true;
    }
    if (number % 2 == 0) {
      return false;
    }
    for (int i = 3; i * i <= number; i += 2) {
      if (number % i == 0) {
        return false;
      }
    }
    return true;
  }
}
```

Output ./Experiment 10/PrimeNumberChecker.java ## ./Experiment 2 ### ./Experiment 2/Calculator.java #### Code

```
class Calculator {
    public static void main(String[] args) {
        // Check if length of args array is greater than 0
        if (args.length <= 0) {
            System.out.println("No Equation Provided");
        } else {
            String equation = String.join("", args);
            float result = 0;
            String operand = "";
            char lastOperator = '+';
            for (int i = 0; i < equation.length(); i++) {
                char ch = equation.charAt(i);
                if (Character.isDigit(ch) || ch == '.') {
                    operand = operand + ch;
                } else {
                    if (!operand.isEmpty()) {
                        float num = Float.parseFloat(operand);
                        switch (lastOperator) {
                            case '+':
                                result += num;
                                break;
                            case '-':
                                result -= num;
                                break;
                            case '*':
```

```java
                                result *= num;
                                break;
                            case '/':
                                result /= num;
                                break;
                        }
                    }
                    operand = "";
                    lastOperator = ch;
                }
            }
            if (!operand.isEmpty()) {
                float num = Float.parseFloat(operand);
                switch (lastOperator) {
                    case '+':
                        result += num;
                        break;
                    case '-':
                        result -= num;
                        break;
                    case '*':
                        result *= num;
                        break;
                    case '/':
                        result /= num;
                        break;
                }
            }

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

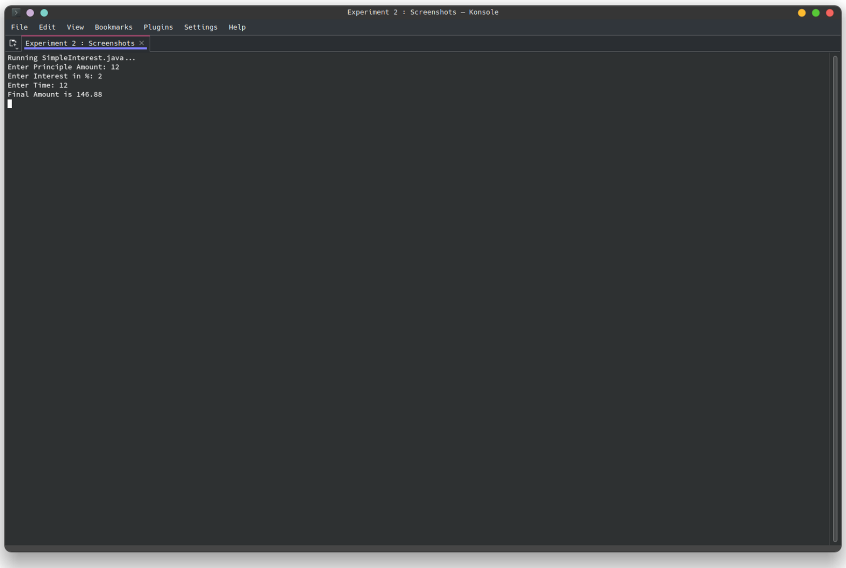


```
Running Calculator.java...
No Equation Provided
```

Output

### ./Experiment 2/SimpleInterest.java #### Code

```java
import java.util.Scanner;  // Import the Scanner class

class SimpleInterest{
  public static void main (String[] args){
    Scanner in = new Scanner(System.in);  // Create a Scanner object
      System.out.print("Enter Principle Amount: ");
      float Principle = in.nextFloat();
      System.out.print("Enter Interest in %: ");
      float Interest = in.nextFloat();
      Interest += 100;
      System.out.print("Enter Time: ");
      float Time = in.nextFloat();
      float Amount = Interest * Time * Principle / 100;
      System.out.println("Final Amount is " + Amount);
  }
}
```


Experiment 2 : Screenshots — Konsole
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Experiment 2 : Screenshots

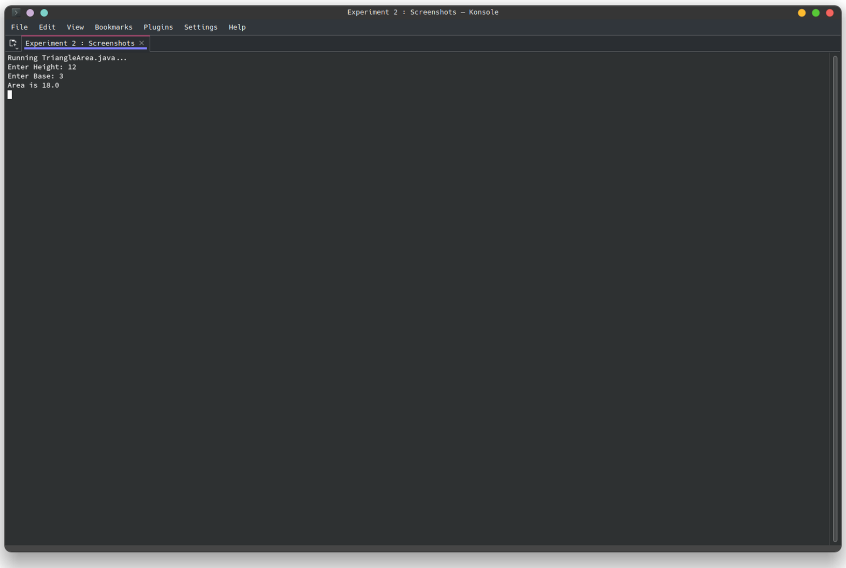
```
Running SimpleInterest.java...
Enter Principle Amount: 12
Enter Interest in %: 2
Enter Time: 12
Final Amount is 146.88
```

Output

### ./Experiment 2/TriangleArea.java #### Code

```java
import java.util.Scanner;  // Import the Scanner class

class TriangleArea{
  public static void main (String[] args){
    Scanner in = new Scanner(System.in);  // Create a Scanner object
      System.out.print("Enter Height: ");
      float Height = in.nextFloat();
      System.out.print("Enter Base: ");
      float Base = in.nextFloat();
      float Area = Height * Base * 1 / 2;
      System.out.println("Area is " + Area);
  }
}
```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Experiment 2 : Screenshots

```
Running TriangleArea.java...
Enter Height: 12
Enter Base: 3
Area is 18.0
```

Output

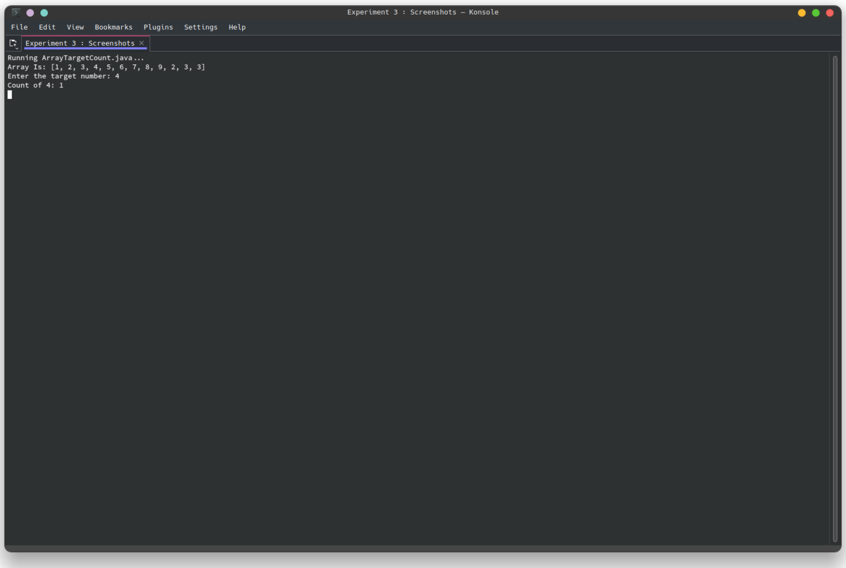
## ./Experiment 3 ### ./Experiment 3/ArrayTargetCount.java #### Code

```java
import java.util.Scanner;
import java.util.Arrays;
public class ArrayTargetCount {
    public static void main(String[] args) {
        int[] numbers = {1,2,3,4,5,6,7,8,9, 2, 3,3}; // Example array
        System.out.print("Array Is: ");
        System.out.println(Arrays.toString(numbers));
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the target number: ");
        int target = scanner.nextInt();
        scanner.close();

        int count = 0;
        for (int num : numbers) {
            if (num == target) {
                count++;
            }
        }

        System.out.println("Count of " + target + ": " + count);
    }
}
```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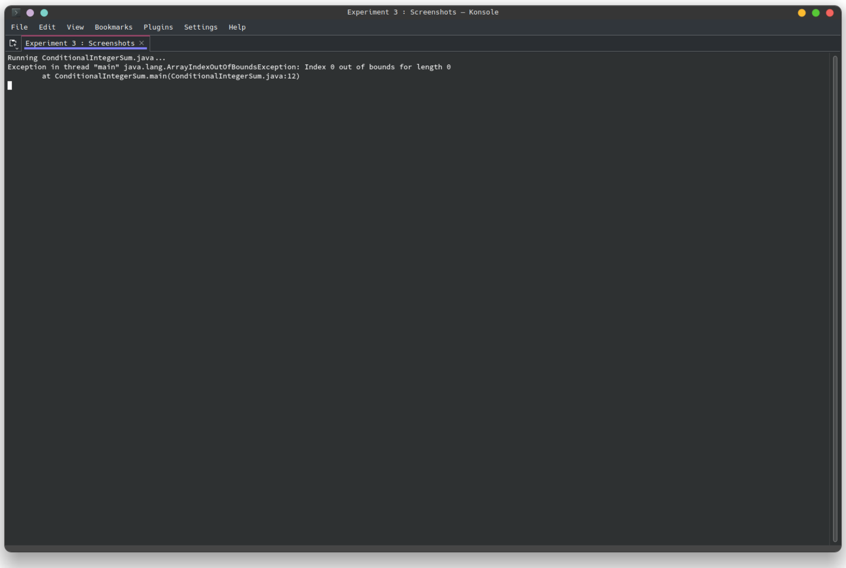
```
Running ArrayTargetCount.java...
Array Is: [1, 2, 3, 4, 5, 6, 7, 8, 9, 2, 3, 3]
Enter the target number: 4
Count of 4: 1
```

Output
### ./Experiment 3/ConditionalIntegerSum.java #### Code

```
class ConditionalIntegerSum{
  static int[] dividend = {6, 9};

  public static boolean Divisible(int num) {
  for (int i : dividend) {
    if (num % i == 0) return true;
  }
  return false;
}

  public static void main (String[] args){
    int startingValue = Integer.parseInt(args[0]);
    int endValue = Integer.parseInt(args[1]);
    int total = 0;
    for (int i = startingValue; i <= endValue ; i++ ) {
      if (Divisible(i)) total += i;
    }
    System.out.print("Total Is: ");
    System.out.println(total);
  }
}
```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```
Running ConditionalIntegerSum.java...
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0
        at ConditionalIntegerSum.main(ConditionalIntegerSum.java:12)
```

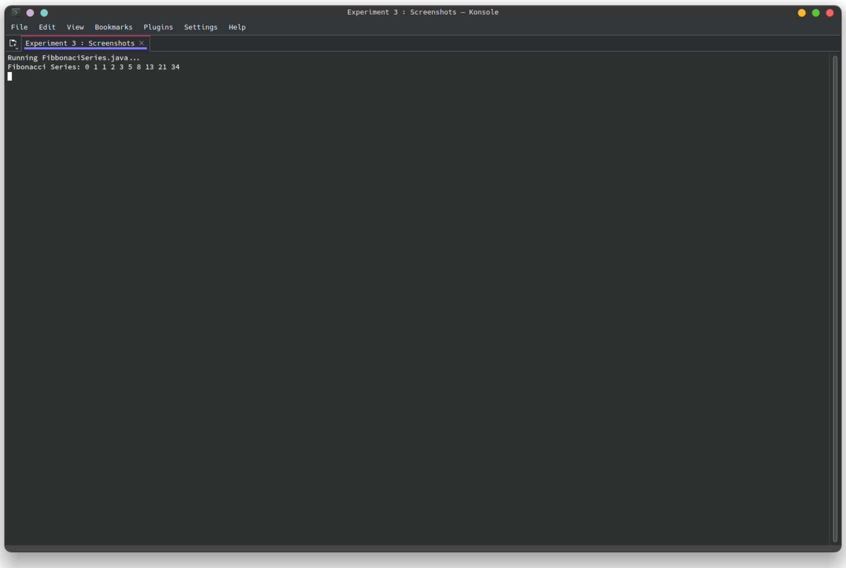
Output

### ./Experiment 3/FibbonaciSeries.java #### Code

```java
class FibonacciSeries {
    public static void main(String[] args) {
        int n = 10; // Number of terms
        int first = 0, second = 1;

        System.out.print("Fibonacci Series: " + first + " " + second);

        for (int i = 2; i < n; i++) {
            int next = first + second;
            System.out.print(" " + next);
            first = second;
            second = next;
        }
        System.out.println("");
    }
}
```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```
Running FibbonaciSeries.java...
Fibonacci Series: 0 1 1 2 3 5 8 13 21 34
```

Output

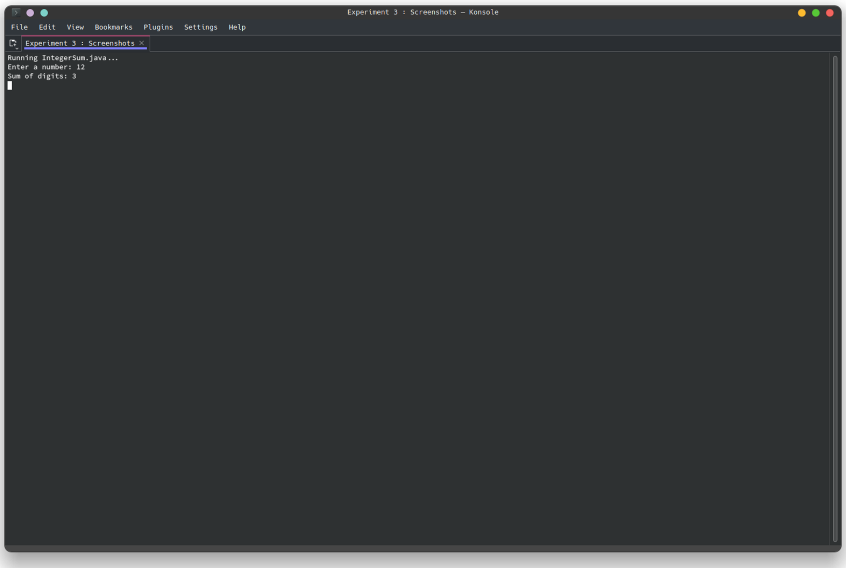
### ./Experiment 3/IntegerSum.java #### Code

```java
import java.util.Scanner;

public class IntegerSum {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scanner.nextInt();
        scanner.close();

        int sum = 0;
        while (num > 0) {
            sum += num % 10;
            num /= 10;
        }

        System.out.println("Sum of digits: " + sum);
    }
}
```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Experiment 3 : Screenshots

```
Running IntegerSum.java...
Enter a number: 12
Sum of digits: 3
```

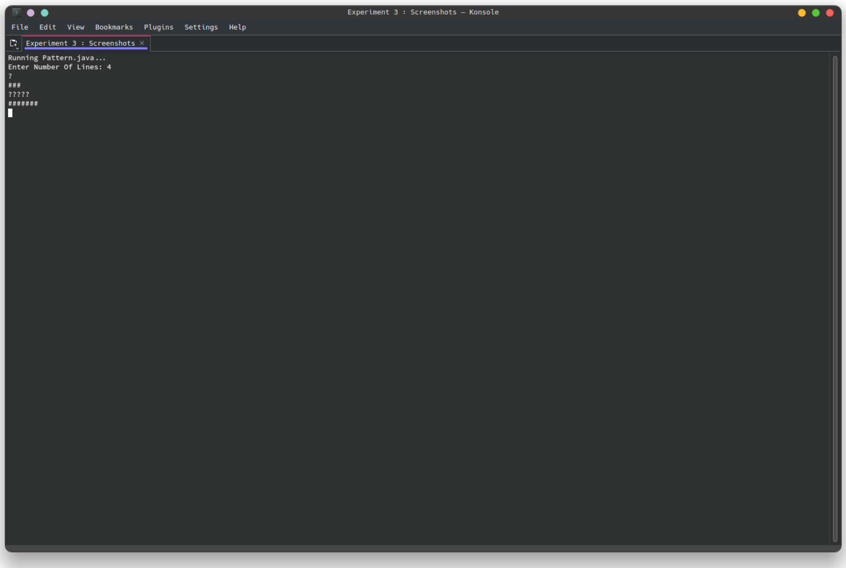
Output

### ./Experiment 3/Pattern.java #### Code

```
/*
?
###
?????
#######
?????????
*/
import java.util.Scanner;

public class Pattern {

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter Number Of Lines: ");
        int lines = scanner.nextInt();
        scanner.close();
        String[] str = {"?","#"};
        for (int i = 0; i < lines; i++) {
          System.out.println(str[i % str.length].repeat(2 * i + 1));
        }
    }
}
```


Experiment 3 : Screenshots — Konsole
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Experiment 3 : Screenshots

```
Running Pattern.java...
Enter Number Of Lines: 4
?
###
?????
#######
```

Output

### ./Experiment 3/PrimeCount.java #### Code

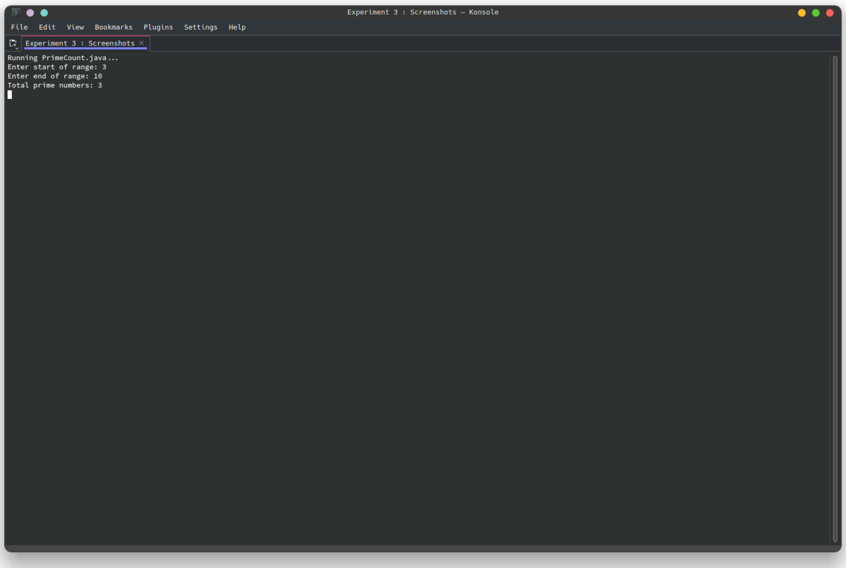
```java
import java.util.Scanner;

public class PrimeCount {
    static boolean isPrime(int num) {
        if (num < 2) return false;
        for (int i = 2; i * i <= num; i++) {
            if (num % i == 0) return false;
        }
        return true;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter start of range: ");
        int start = scanner.nextInt();
        System.out.print("Enter end of range: ");
        int end = scanner.nextInt();
        scanner.close();

        int count = 0;
        for (int i = start; i <= end; i++) {
            if (isPrime(i)) count++;
        }

        System.out.println("Total prime numbers: " + count);
    }
}
```


Experiment 3 : Screenshots — Konsole
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Experiment 3 : Screenshots

```
Running PrimeCount.java...
Enter start of range: 3
Enter end of range: 10
Total prime numbers: 3
```

Output
### ./Experiment 3/SecondLargetElement.java #### Code

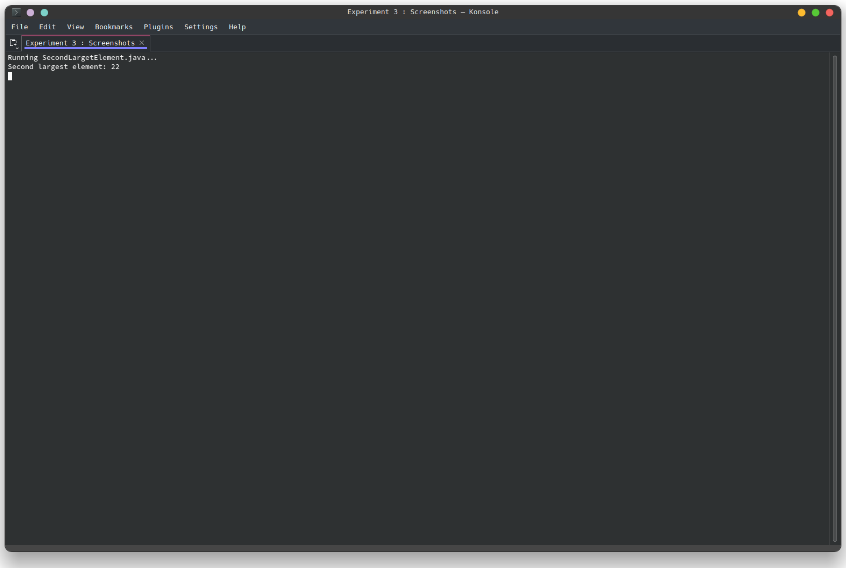
```java
public class SecondLargetElement {
    public static void main(String[] args) {
        int[] arr = {10, 20, 5, 8, 25, 22};

        if (arr.length < 2) {
            System.out.println("Array must have at least two elements.");
            return;
        }

        int first = Integer.MIN_VALUE, second = Integer.MIN_VALUE;

        for (int num : arr) {
            if (num > first) {
                second = first;
                first = num;
            } else if (num > second && num != first) {
                second = num;
            }
        }

        System.out.println("Second largest element: " + (second == Integer.MIN_VALUE ? "No s
    }
}
```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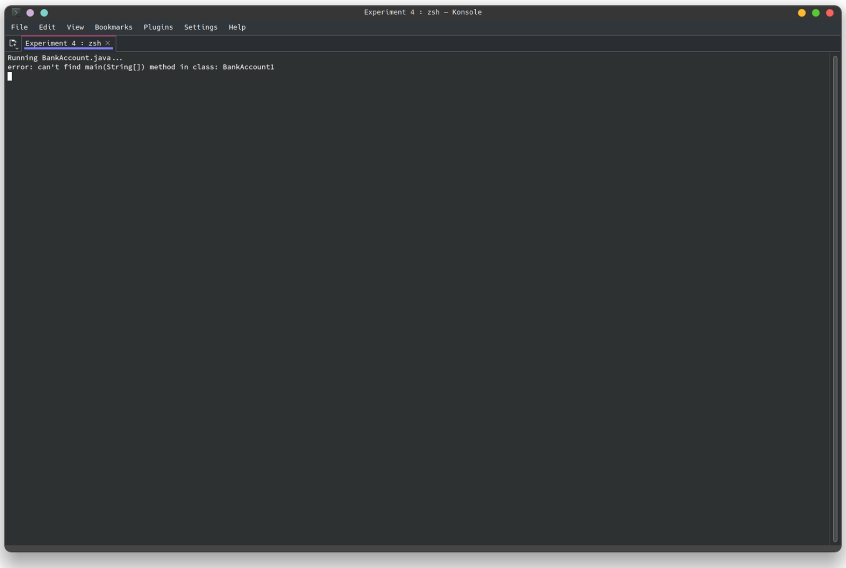
Experiment 3 : Screenshots

```
Running SecondLargetElement.java...
Second largest element: 22
```

Output

## ./Experiment 4 ### ./Experiment 4/BankAccount.java #### Code

```java
// Create a BankAccount1 class with a private variable balance to store the account balance
// Implement a public method deposit(double amount) to add funds, a protected method
// withdraw(double amount) to deduct funds, and a default-access method checkBalance() to
// display the current balance. Create an object of the class and demonstrate which methods
// and variables can be accessed both inside and outside the class
class BankAccount1 {
    private double balance;
    public BankAccount1(double initialBalance) {
        this.balance = initialBalance;
    }

    public void deposit(double amount) {
        if (amount > 0) {
            balance += amount;
            System.out.println("Deposited: " + amount);
        } else {
            System.out.println("Invalid deposit amount!");
        }
    }

    protected void withdraw(double amount) {
        if (amount > 0 && amount <= balance) {
            balance -= amount;
            System.out.println("Withdrawn: " + amount);
        } else {
            System.out.println("Insufficient funds or invalid amount!");
        }
    }

    void checkBalance() {
        System.out.println("Current Balance: " + balance);
    }
}

public class BankAccount {
    public static void main(String[] args) {

      BankAccount1 myAccount = new BankAccount1(1000);

      myAccount.deposit(500);

      myAccount.checkBalance();

      myAccount.withdraw(300);

      myAccount.checkBalance();

      // System.out.println(myAccount.balance); // No

    }
}
```


Experiment 4 : zsh — Konsole
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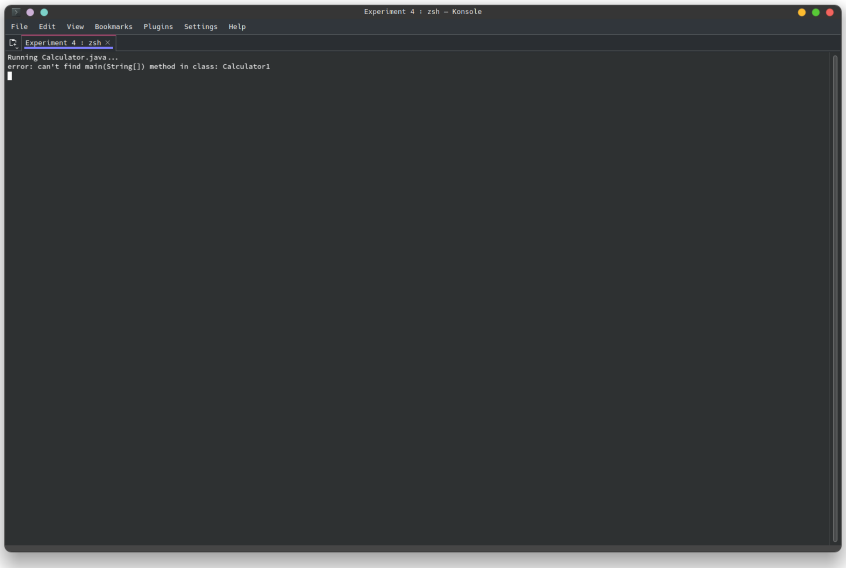
Experiment 4 : zsh

```
Running BankAccount.java...
error: can't find main(String[]) method in class: BankAccount1
```

Output

### ./Experiment 4/Calculator.java #### Code

```java
// Create a Calculator class that contains a method add() to perform addition. Overload the
// add() method to handle different types and numbers of parameters, such as adding two
// integers, two doubles, and three integers. Create an object of the class and demonstrate
// method variations.
// Define the Calculator class
class Calculator1 {

    // Method 1: Add two integers
    public int add(int a, int b) {
        return a + b;
    }

    // Method 2: Add two doubles
    public double add(double a, double b) {
        return a + b;
    }

    // Method 3: Add three integers
    public int add(int a, int b, int c) {
        return a + b + c;
    }
}

// Main class to test the Calculator
public class Calculator {
    public static void main(String[] args) {
        // Create an object of Calculator
        Calculator1 calc = new Calculator1();

        // Demonstrating overloaded methods
        System.out.println("Sum of two integers: " + calc.add(5, 10));
        System.out.println("Sum of two doubles: " + calc.add(5.5, 10.2));
        System.out.println("Sum of three integers: " + calc.add(5, 10, 15));
    }
}
```

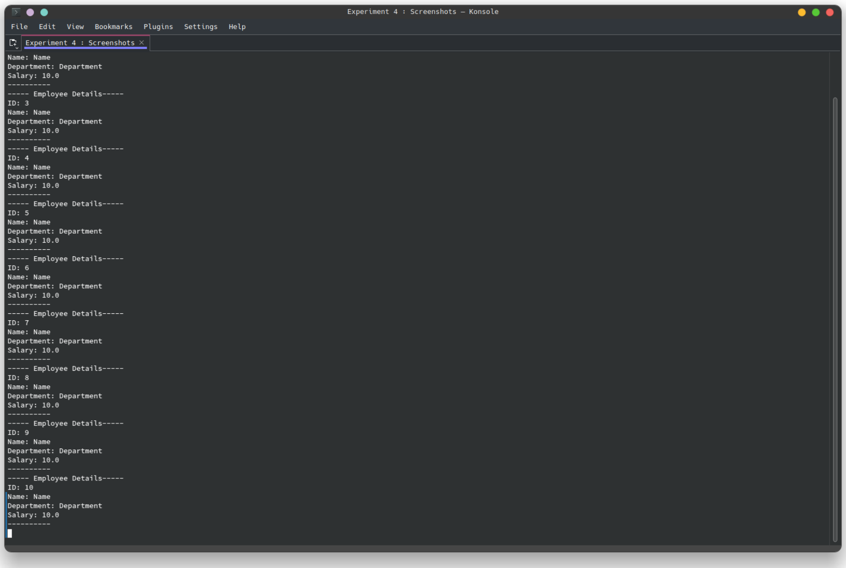

Experiment 4 : zsh — Konsole
File Edit View Bookmarks Plugins Settings Help
Experiment 4 : zsh

```
Running Calculator.java...
error: can't find main(String[]) method in class: Calculator1
```

Output

### ./Experiment 4/Company.java #### Code

```java
// A company wants to develop an Employee Management System to track employee details
// such as name, department, salary, and employee ID. The system should also calculate the
// total salary expenditure and keep a record of the total number of employees. Implement a
// Java program by creating an Employee class that includes instance variables for employee
// ID, name, department, and salary. The class should have a default constructor that
// initializes employee details with default values and a parameterized constructor that se
// employee details based on user input. Use a static variable totalEmployees to track the
// number of employees and implement a static method to display this count. Additionally,
// define a method calculateSalary() that returns the salary of the employee and another
// method displayEmployeeInfo() to display all employee details. To ensure data
// encapsulation, mark the salary variable as private and provide a public method to access
// Declare the totalEmployees variable as static so that it is shared among all instances.
// main method, create multiple Employee objects using both default and parameterized
// constructors. Use the this keyword in the constructors to distinguish between class
// variables and constructor parameters. Finally, display the total number of employees and
// the salary details for each employee. The program should successfully demonstrate the
// behavior of static and non-static members, the initialization of objects using constructo
// and the role of access modifiers in an employee management scenari


// Main Company Class
public class Company {
  static final int Employee_Count = 10;
  static private Employee[] Employees = new Employee[Employee_Count];



  // Main
  public static void main(String[] args) {
    Employees[0] = new Employee();
    for (int i = 1; i < Employees.length ; i++) {
      Employees[i] = new Employee("Name", "Department", 10);
    }
    System.out.println("Total Number Of Employees: " + Employee.TotalEmployees());
    TotalSalary();
    for (int i = 1; i < Employees.length ; i++) {
      Employees[i].DisplayEmployeeInfo();
    }
  }

  // Total Salary
  public static double TotalSalary(){
    double total = 0;
    for (Employee Emp : Employees) {
      total += Emp.calculateSalary();
    }
    System.out.println("Total Expenditure: " + total);
    return total;
  }
}


// Employee Class
class Employee{
  static int totalEmployees;
  int ID;
  String name;
  String department;
  private double salary;
  Employee(){
    this.ID = totalEmployees + 1;
    this.name = "Default Name";
    this.department = "Default Department";
    this.salary = 0;
    totalEmployees += 1;
  }
  Employee(String name, String department, double salary){
    this.ID = totalEmployees + 1;
    this.name = name;
    this.department = department;
    this.salary = salary;
    totalEmployees += 1;
  }

  public double calculateSalary(){
    // System.out.println("Salary for ID " + ID + " is " + this.salary);
    return salary;
  }
  public static int TotalEmployees(){
    return totalEmployees;
  }

  public void DisplayEmployeeInfo(){
    System.out.println("----- Employee Details-----");
    System.out.println("ID: " + ID);
    System.out.println("Name: " + name);
    System.out.println("Department: " + department);
    System.out.println("Salary: " + salary);
    System.out.println("----------");
  }
}
```


Experiment 4 : Screenshots — Konsole
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Experiment 4 : Screenshots

```
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 3
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 4
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 5
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 6
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 7
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 8
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 9
Name: Name
Department: Department
Salary: 10.0
----------
----- Employee Details-----
ID: 10
Name: Name
Department: Department
Salary: 10.0
----------
```

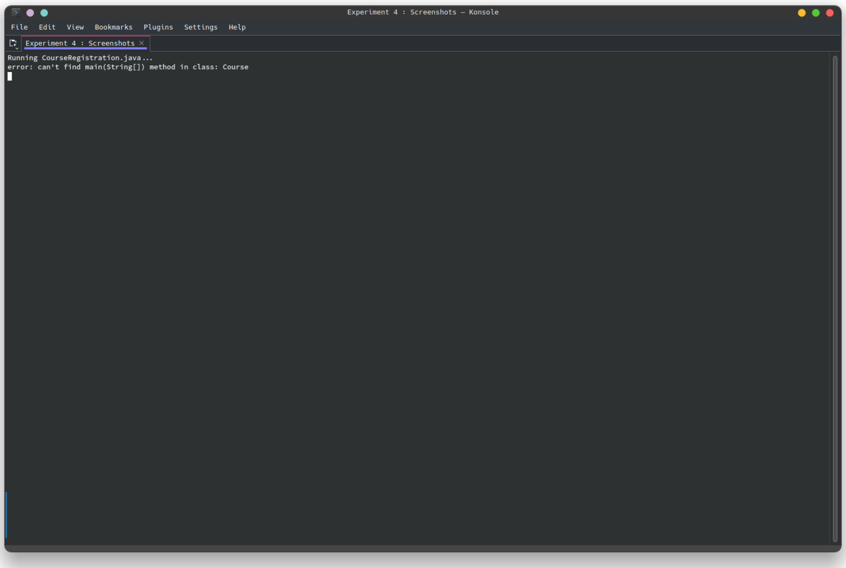
Output

### ./Experiment 4/CourseRegistration.java #### Code

```java
// A student is developing a course registration system that allows students to enroll in
// courses. Each course has a course name and a course code. Implement a Course class with
// appropriate attributes and use the "this" keyword to differentiate between class attribu
// and constructor parameters during initialization. Create an object of the Course class a
// display the course details
class Course{
  public String CourseName;
  public String CourseCode;

  public Course(String CourseName, String CourseCode){
    this.CourseName = CourseName;
    this.CourseCode = CourseCode;
  }

  public void displayDetails(){
    System.out.println("Course Name: " + this.CourseName);
    System.out.println("Course Code: " + this.CourseCode);
  }
}
class CourseRegistration{
  public static void main(String[] args) {
    Course Maths = new Course("Maths", "Math100");
    Course CompSci = new Course("CompSci", "CompSci100");
    Maths.displayDetails();
    CompSci.displayDetails();
  }
}
```


Experiment 4 : Screenshots — Konsole
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Experiment 4 : Screenshots

```
Running CourseRegistration.java...
error: can't find main(String[]) method in class: Course
```

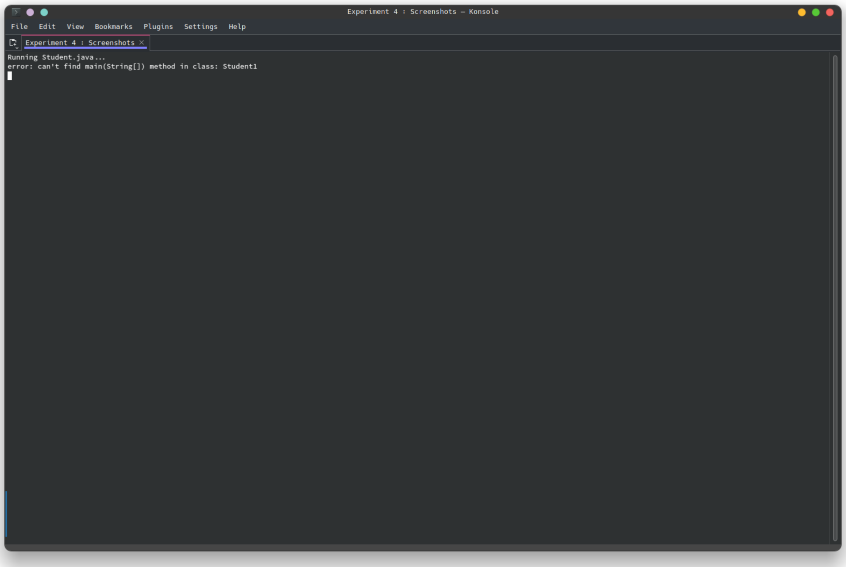
Output

### ./Experiment 4/Student.java #### Code

```java
// Create a Student class with attributes for name and age. Implement a default constructor
// assign default values and a parameterized constructor to initialize the attributes with 
// defined values. Create objects using both constructors and display their details.
class Student1 {
    String Name;
    int Age;
    Student1(String  Name, int Age){
      this.Name = Name;
      this.Age = Age;
      System.out.print("Name: " + this.Name + "\n" + ("Age: " + this.Age + "\n"));
    }
    Student1(){
      this.Name = "Default Name";
      this.Age = 0;
      System.out.print("Name: " + this.Name + "\n" + ("Age: " + this.Age + "\n"));
    }
}
public class Student{
  public static void main(String[] args) {
    System.out.println("Default Student");
    Student1 DefaultStudent1 = new Student1();
    System.out.println("Named Student");
```

```
        Student1 NamedStudent1 = new Student1("Named Student1", 12);

    }
}
```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Experiment 4 : Screenshots

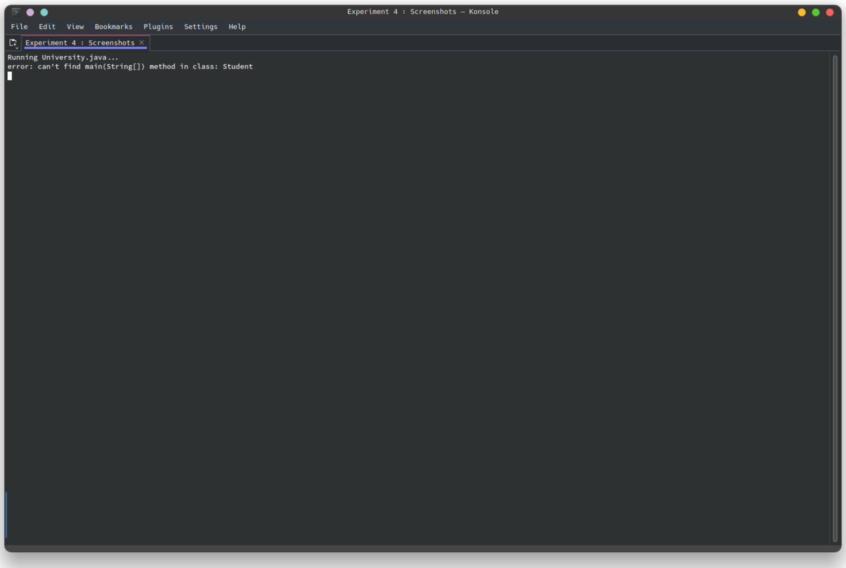
```
Running Student.java...
error: can't find main(String[]) method in class: Student1
```

Output

### ./Experiment 4/University.java #### Code

```
// Create a Student class that has a static variable universityName and a non-static variab
// studentName. Include a static method to display the university name. Then, create multip
// student objects to demonstrate how the static variable is shared among all instances, wh
// the non-static variable holds unique values for each object
class Student {
    static String universityName = "Super Cool University"; // Static
    String studentName; // Non Static

    public Student(String studentName) {
        this.studentName = studentName;
    }

    static void displayUniversity() {
        System.out.println("University: " + universityName);
    }

    void displayStudent() {
        System.out.println("Student: " + studentName + "\nUniversity: " + universityName);
    }
}
```

```java
public class University {
    public static void main(String[] args) {

        System.out.println("----- Initial Name -----");
        Student.displayUniversity();

        Student student1 = new Student("Student 1");
        Student student2 = new Student("Student 2");

        student1.displayStudent();
        student2.displayStudent();


        System.out.println("----- Changed Name -----");

        Student.universityName = "University 2";

        Student.displayUniversity();

        student1.displayStudent();
        student2.displayStudent();
    }
}
```


Experiment 4 : Screenshots — Konsole
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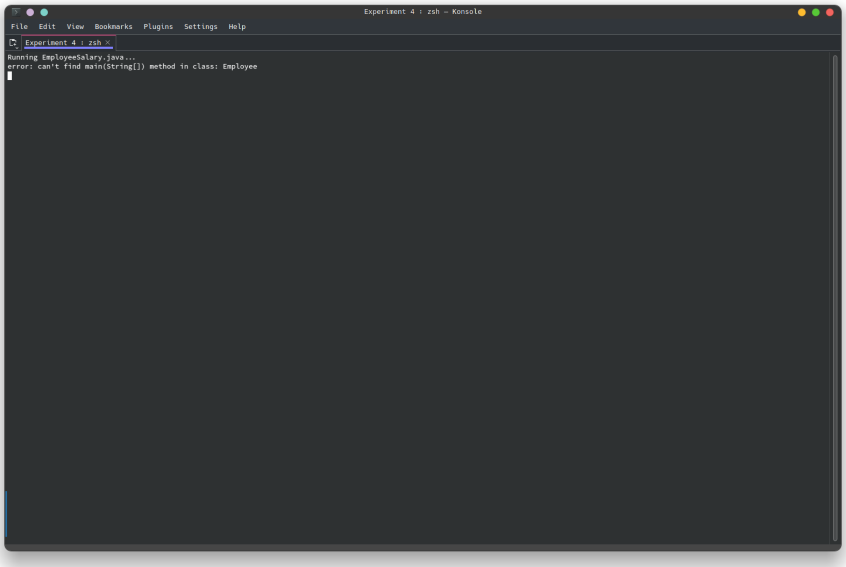
Experiment 4 : Screenshots

```
Running University.java...
error: can't find main(String[]) method in class: Student
```

Output

## ./Experiment 5 ### ./Experiment 5/EmployeeSalary.java #### Code

```java
class Employee {
    protected String name;
    protected int empid;
    protected double salary;

    public Employee() {
        this.name = "Default Name";
        this.empid = 0;
        this.salary = 0.0;
    }

    public Employee(String name, int empid, double salary) {
        this.name = name;
        this.empid = empid;
        this.salary = salary;
    }

    public String getName() {
        System.out.println("Name is " + name);
        return name;
    }

    public double getSalary() {
        System.out.println("Salary of " + name + " is " + salary);
        return salary;
    }

    public void increaseSalary(double percentage) {
        salary += salary * (percentage / 100);
        System.out.println("New Salary: " + salary);
    }
}

class Manager extends Employee {
    private String department;

    public Manager(String name, int empid, double salary, String department) {
        super(name, empid, salary);
        this.department = department;
    }

    public String getDepartment() {
        return department;
    }

    @Override
    public String getName() {
        System.out.println(name + " (Manager of " + department + ")");
        return name + " (Manager of " + department + ")";
    }
}

public class EmployeeSalary {
    public static void main(String[] args) {
        Employee emp1 = new Employee("Caterpillar", 101, 50000);
        emp1.getName();
        emp1.getSalary();
        emp1.increaseSalary(10);

        System.out.println("---------------");

        Manager emp2 = new Manager("Butterfly", 201, 70000, "IT");
        emp2.getName();
        emp2.getSalary();
        emp2.increaseSalary(15);
    }
}
```


Experiment 4 : zsh — Konsole
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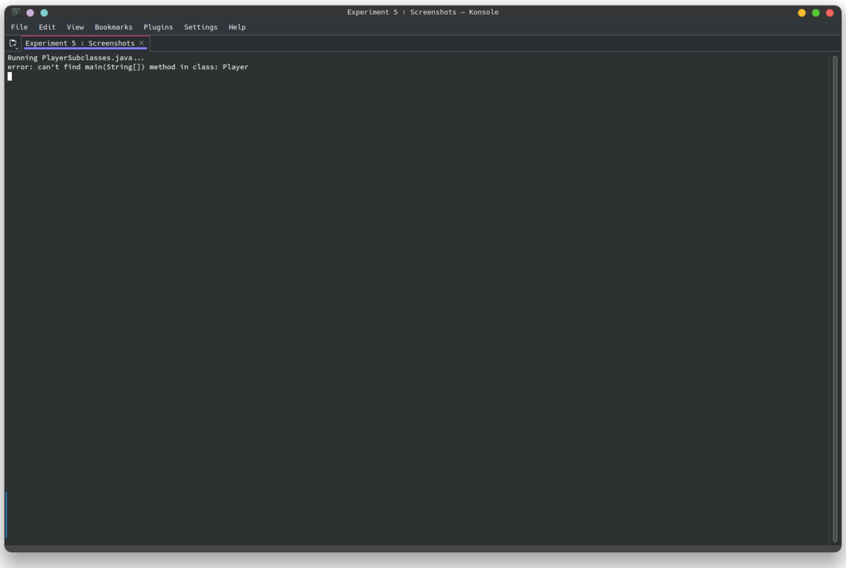
Experiment 4 : zsh

```
Running EmployeeSalary.java...
error: can't find main(String[]) method in class: Employee
```

Output

### ./Experiment 5/PlayerSubclasses.java #### Code

```java
class Player {
    protected String name;
    protected int age;
    protected String position;

    public Player(String name, int age, String position) {
        this.name = name;
        this.age = age;
        this.position = position;
    }

    public void play() {
        System.out.println(name + " is playing as a " + position);
    }

    public void train() {
        System.out.println("training" + name);
    }
}

class Cricket_Player extends Player {
    public Cricket_Player(String name, int age, String position) {
        super(name, age, position);
    }

    @Override
    public void play() {
        System.out.println(name + " is playing cricket as a " + position);
    }

    @Override
    public void train() {
        System.out.println(name + " is practicing cricket.");
    }
}

class Football_Player extends Player {
    public Football_Player(String name, int age, String position) {
        super(name, age, position);
    }

    @Override
    public void play() {
        System.out.println(name + " is playing football as a " + position);
    }

    @Override
    public void train() {
        System.out.println(name + " is practicing football.");
    }
}

class Hockey_Player extends Player {
    public Hockey_Player(String name, int age, String position) {
        super(name, age, position);
    }

    @Override
    public void play() {
        System.out.println(name + " is playing hockey as a " + position);
    }

    @Override
    public void train() {
        System.out.println(name + " is practicing Hockey.");
    }
}

public class PlayerSubclasses {
  public static void main(String[] args) {
        Cricket_Player cricketer = new Cricket_Player("Virat Kohli", 35, "Batsman");
        Football_Player footballer = new Football_Player("Lionel Messi", 37, "Forward");
        Hockey_Player hockeyPlayer = new Hockey_Player("Manpreet Singh", 32, "Midfielder");

        System.out.println("Cricket Player");
        cricketer.play();
        cricketer.train();

        System.out.println("Football Player");
        footballer.play();
        footballer.train();

        System.out.println("Hockey Player");
        hockeyPlayer.play();
        hockeyPlayer.train();

    }
}
```


Experiment 5 : Screenshots — Konsole
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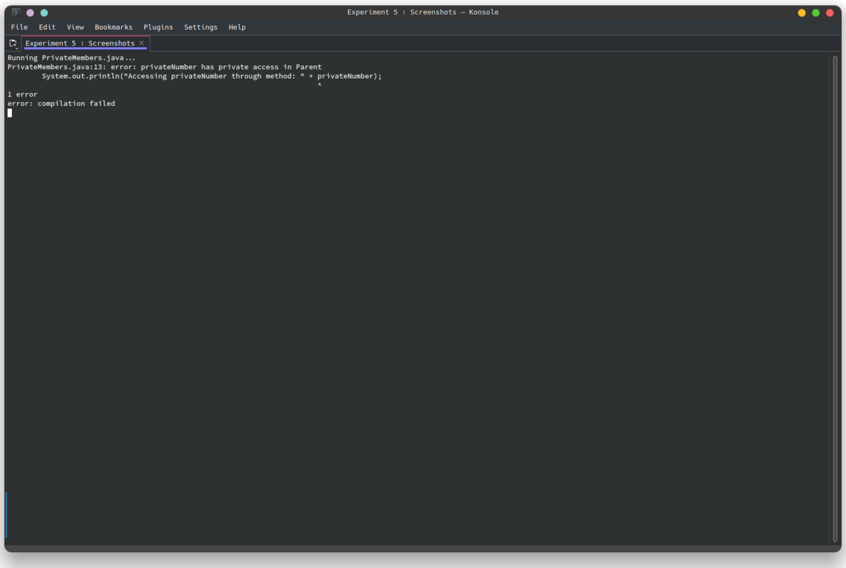
```
Running PlayerSubclasses.java...
error: can't find main(String[]) method in class: Player
```

Output

### ./Experiment 5/PrivateMembers.java #### Code

```java
// Write a Java program to demonstrate that a private member of a superclass cannot be acce
class Parent {
    private int privateNumber = 42;
    public int getPrivateNumber() {
        return privateNumber;
    }
}
class Child extends Parent {
    public void display() {
        System.out.println("Accessing privateNumber through method: " + getPrivateNumber())
    }
    public void access() {
        System.out.println("Accessing privateNumber through method: " + privateNumber);
    }
}
public class PrivateMembers {
    public static void main(String[] args) {
        Child obj = new Child();
        obj.display();
        // obj.access(); // Access Error
    }
}
```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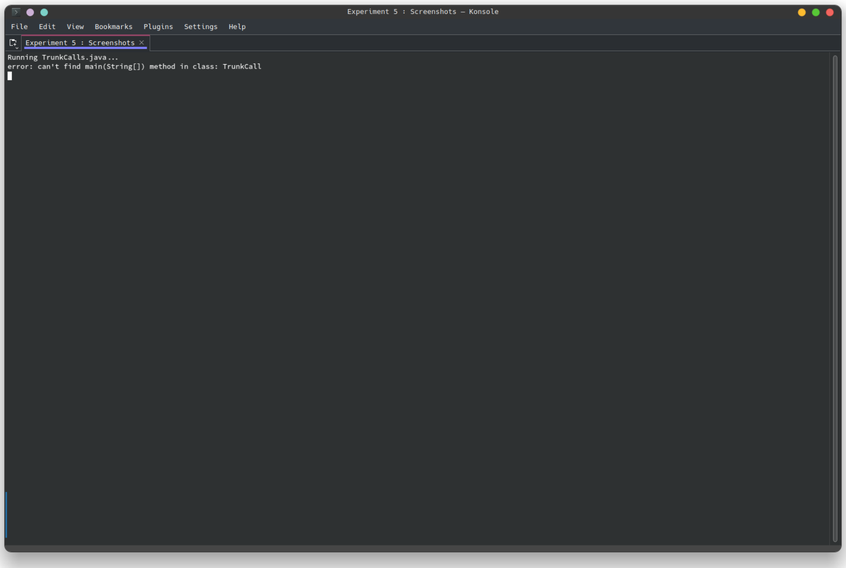
```
Running PrivateMembers.java...
PrivateMembers.java:13: error: privateNumber has private access in Parent
        System.out.println("Accessing privateNumber through method: " + privateNumber);
                                                                         ^
1 error
error: compilation failed
```

Output

### ./Experiment 5/TrunkCalls.java #### Code

```java
import java.util.Scanner;

class TrunkCall {
    protected double rate;

    public double computeCharge(int duration) {
        return duration * rate;
    }
}

class OrdinaryCall extends TrunkCall {
    public OrdinaryCall() {
        this.rate = 1.5;
    }
}

class UrgentCall extends TrunkCall {
    public UrgentCall() {
        this.rate = 2.5;
    }
}

class LightningCall extends TrunkCall {
    public LightningCall() {
        this.rate = 4.0;
    }
}


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

        System.out.print("Enter call duration (in minutes): ");
        int duration = scanner.nextInt();

        System.out.println("Select Call Type:");
        System.out.println("1. Ordinary");
        System.out.println("2. Urgent");
        System.out.println("3. Lightning");
        System.out.print("Enter choice (1-3): ");
        int choice = scanner.nextInt();

        TrunkCall call;

        switch (choice) {
            case 1:
                call = new OrdinaryCall();
                break;
            case 2:
                call = new UrgentCall();
                break;
            case 3:
                call = new LightningCall();
                break;
            default:
                System.out.println("Invalid choice! Defaulting to Ordinary call.");
                call = new OrdinaryCall();
        }

        double totalCharge = call.computeCharge(duration);
        System.out.println("Total Trunk Call Charge: $" + totalCharge);

        scanner.close();
    }
}
```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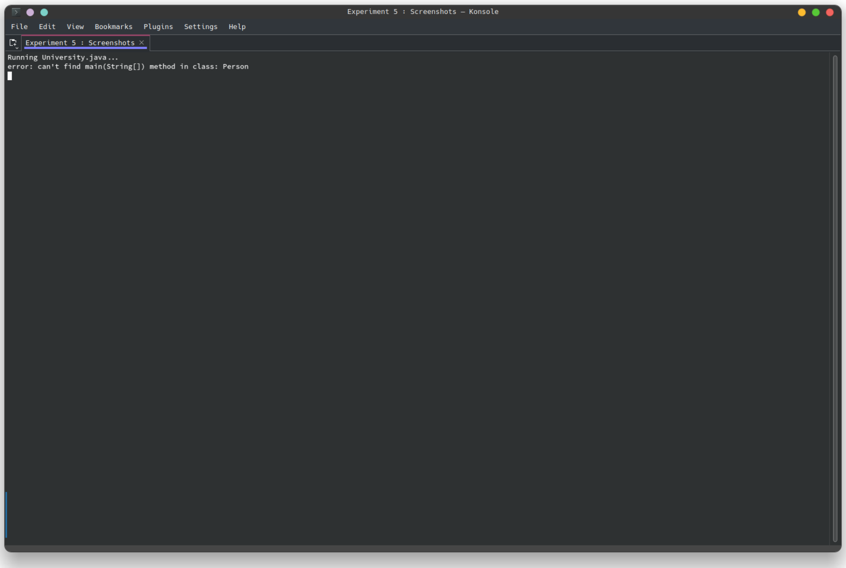
```
Running TrunkCalls.java...
error: can't find main(String[]) method in class: TrunkCall
```

Output

### ./Experiment 5/University.java #### Code

```java
class Person {
    private String name;
    private int age;
    private String address;

    public Person(String name, int age, String address) {
        this.name = name;
        this.age = age;
        this.address = address;
    }

    public void displayDetails() {
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Address: " + address);
    }
}


class Staff extends Person {
    private String staffId;
    private String department;

    public Staff(String name, int age, String address, String staffId, String department) {
        super(name, age, address);
        this.staffId = staffId;
        this.department = department;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Staff ID: " + staffId);
        System.out.println("Department: " + department);
    }
}

class Professor extends Staff {
    private String specialization;

    public Professor(String name, int age, String address, String staffId, String department
        super(name, age, address, staffId, department);
        this.specialization = specialization;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Specialization: " + specialization);
    }

    public void conductLecture() {
        System.out.println("Professor " + getName() + " is conducting a lecture on " + speci
    }

    private String getName() {
        return "Professor";
    }
}

class Student extends Person {
    private String studentId;
    private String course;

    public Student(String name, int age, String address, String studentId, String course) {
        super(name, age, address);
        this.studentId = studentId;
        this.course = course;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Student ID: " + studentId);
        System.out.println("Course: " + course);
    }
}

class GraduateStudent extends Student {
    private String researchTopic;

    public GraduateStudent(String name, int age, String address, String studentId, String co
        super(name, age, address, studentId, course);
        this.researchTopic = researchTopic;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Research Topic: " + researchTopic);
    }

    public void submitThesis() {
        System.out.println("Graduate student " + getName() + " has submitted their thesis or
    }

    private String getName() {
        return "Graduate Student";
    }
}

public class University{
    public static void main(String[] args) {
        Professor professor = new Professor("Dr. Doctor", 45, "Some Address", "S123", "Compu

        GraduateStudent gradStudent = new GraduateStudent("Graduate Idiot", 25, "Somewhereee

        Person[] people = new Person[2];
        people[0] = professor;
        people[1] = gradStudent;

        for (Person person : people) {
            person.displayDetails();
            System.out.println();

            if (person instanceof Professor) {
                ((Professor) person).conductLecture();
            } else if (person instanceof GraduateStudent) {
                ((GraduateStudent) person).submitThesis();
            }
            System.out.println("--------------------------");
        }
    }
}
```


Experiment 5 : Screenshots — Konsole
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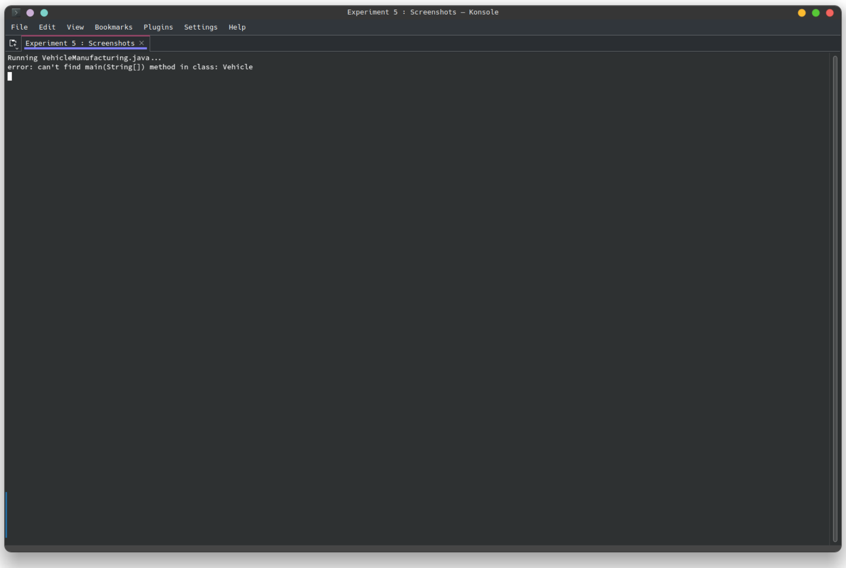
Experiment 5 : Screenshots

```
Running University.java...
error: can't find main(String[]) method in class: Person
```

Output
### ./Experiment 5/VehicleManufacturing.java #### Code

```
class Vehicle {
    private String brand;
    private String model;
    private double price;

    public Vehicle(String brand, String model, double price) {
        this.brand = brand;
        this.model = model;
        this.price = price;
    }

    public void displayDetails() {
        System.out.println("Brand: " + brand);
        System.out.println("Model: " + model);
        System.out.println("Price: " + price);
    }
}
```

```java
class Car extends Vehicle {
    private int seatingCapacity;
    private String fuelType;

    public Car(String brand, String model, double price, int seatingCapacity, String fuelTyp
        super(brand, model, price);
        this.seatingCapacity = seatingCapacity;
        this.fuelType = fuelType;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Seating Capacity: " + seatingCapacity);
        System.out.println("Fuel Type: " + fuelType);
    }
}

class ElectricCar extends Car {
    private double batteryCapacity;
    private double chargingTime;

    public ElectricCar(String brand, String model, double price, int seatingCapacity, String
        super(brand, model, price, seatingCapacity, fuelType);
        this.batteryCapacity = batteryCapacity;
        this.chargingTime = chargingTime;
    }

    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Battery Capacity: " + batteryCapacity);
        System.out.println("Charging Time: " + chargingTime);
    }
}

class Motorcycle extends Vehicle {
    private double engineCapacity;
    private String type;

    public Motorcycle(String brand, String model, double price, double engineCapacity, Strin
        super(brand, model, price);
        this.engineCapacity = engineCapacity;
        this.type = type;
    }
    @Override
    public void displayDetails() {
        super.displayDetails();
        System.out.println("Engine Capacity: " + engineCapacity);
        System.out.println("Type: " + type);
    }
}

public class VehicleManufacturing {
    public static void main(String[] args) {
        Vehicle vehicle = new Vehicle("Generic", "V1", 10000);
        Car car = new Car("Toyota", "Corolla", 20000, 5, "Petrol");

        ElectricCar electricCar = new ElectricCar("Tesla", "Model S", 80000, 5, "Electric",

        Motorcycle motorcycle = new Motorcycle("Harley-Davidson", "Sportster", 15000, 1200,

        System.out.println("Vehicle Details:");
        vehicle.displayDetails();
        System.out.println("-------------");

        System.out.println("Car Details:");
        car.displayDetails();
        System.out.println("-------------");

        System.out.println("Electric Car Details:");
        electricCar.displayDetails();
        System.out.println("-------------");

        System.out.println("Motorcycle Details:");
        motorcycle.displayDetails();
        System.out.println("-------------");
    }
}
```


Experiment 5 : Screenshots — Konsole
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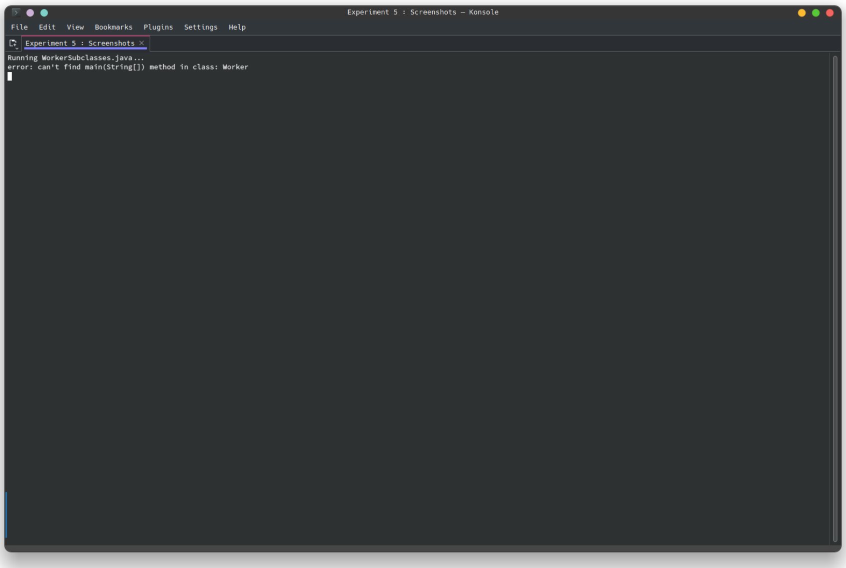
Experiment 5 : Screenshots

```
Running VehicleManufacturing.java...
error: can't find main(String[]) method in class: Vehicle
```

Output

### ./Experiment 5/WorkerSubclasses.java #### Code

```java
//
// A company wants to develop an Employee Management System to track employee details
// such as name, department, salary, and employee ID. The system should also calculate the
// total salary expenditure and keep a record of the total number of employees. Implement a
// Java program by creating an Employee class that includes instance variables for employee
// ID, name, department, and salary. The class should have a default constructor that
// initializes employee details with default values and a parameterized constructor that se
// employee details based on user input. Use a static variable totalEmployees to track the 
// number of employees and implement a static method to display this count. Additionally,
// define a method calculateSalary() that returns the salary of the employee and another
// method displayEmployeeInfo() to display all employee details. To ensure data
// encapsulation, mark the salary variable as private and provide a public method to access
// Declare the totalEmployees variable as static so that it is shared among all instances. 
// main method, create multiple Employee objects using both default and parameterized
// constructors. Use the this keyword in the constructors to distinguish between class
// variables and constructor parameters. Finally, display the total number of employees and
// the salary details for each employee. The program should successfully demonstrate the
// behavior of static and non-static members, the initialization of objects using construct
// and the role of access modifiers in an employee management scenario.
class Worker {
    protected String name;
    protected double salaryRate;

    public Worker(String name, double salaryRate) {
        this.name = name;
        this.salaryRate = salaryRate;
    }

    public double computePay(int hours) {
        return salaryRate * hours;
    }
}

class DailyWorker extends Worker {
    public DailyWorker(String name, double salaryRate) {
        super(name, salaryRate);
    }

    @Override
    public double computePay(int daysWorked) {
        return daysWorked * 8 * salaryRate;
    }
}

class SalariedWorker extends Worker {
    public SalariedWorker(String name, double salaryRate) {
        super(name, salaryRate);
    }

    @Override
    public double computePay(int hours) {
        return 40 * salaryRate;
    }
}

public class WorkerSubclasses {
    public static void main(String[] args) {
        Worker dailyWorker = new DailyWorker("Daily Worker", 15.5);
        Worker salariedWorker = new SalariedWorker("Salaried Worker", 20.0);

        System.out.println(dailyWorker.name + "'s Weekly Pay: " + dailyWorker.computePay(5)
        System.out.println(salariedWorker.name + "'s Weekly Pay: " + salariedWorker.compute
    }
}
```


Experiment 5 : Screenshots — Konsole
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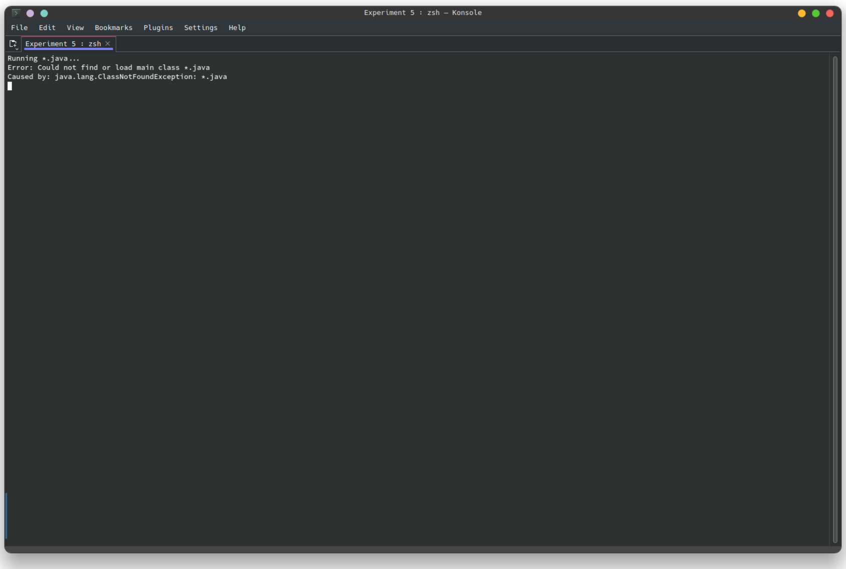
Experiment 5 : Screenshots

```
Running WorkerSubclasses.java...
error: can't find main(String[]) method in class: Worker
```

Output
## ./Experiment 6 ### ./Experiment 6/*.java #### Code


Experiment 5 : zsh — Konsole
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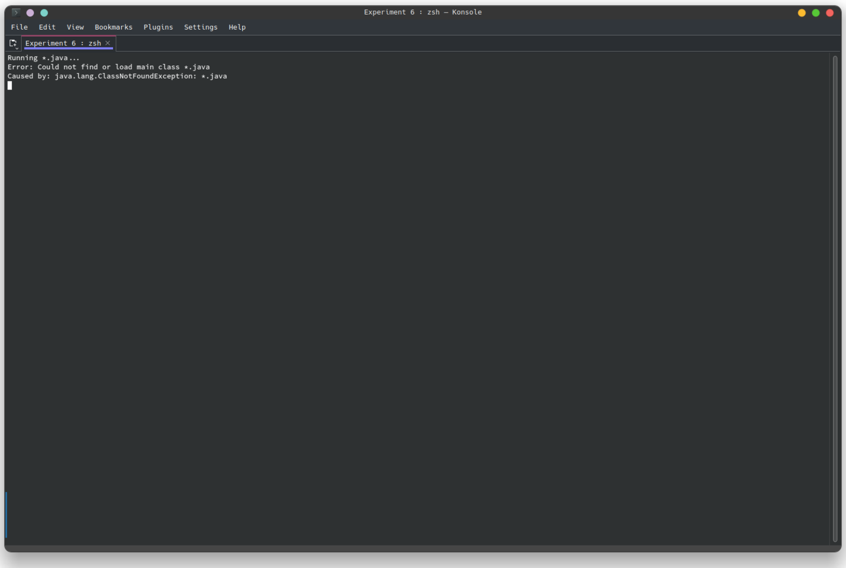
Experiment 5 : zsh

```
Running *.java...
Error: Could not find or load main class *.java
Caused by: java.lang.ClassNotFoundException: *.java
```

Output
## ./Experiment 7 ### ./Experiment 7/*.java #### Code


Experiment 6 : zsh — Konsole
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Experiment 6 : zsh

```
Running *.java...
Error: Could not find or load main class *.java
Caused by: java.lang.ClassNotFoundException: *.java
```

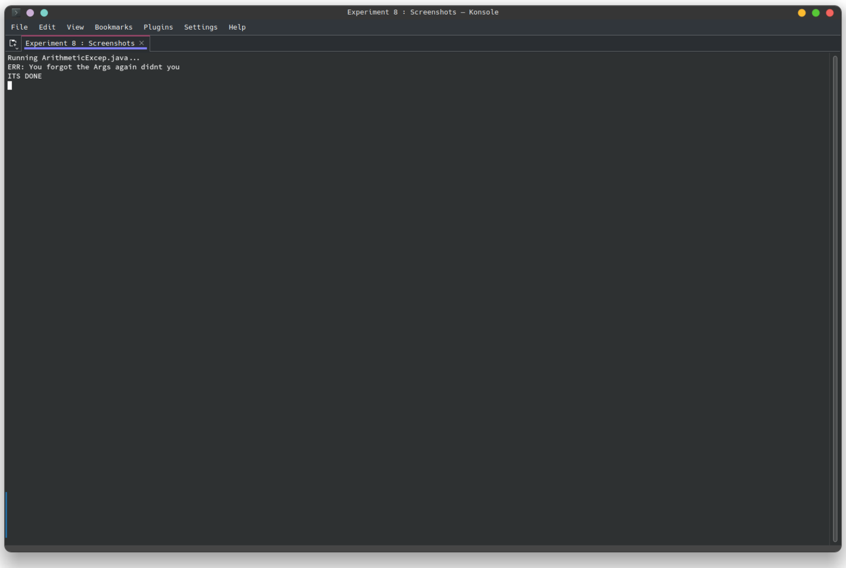
Output

## ./Experiment 8 ### ./Experiment 8/ArithmeticExcep.java #### Code

```java
// Write a Java program that takes two integers as input from the user and
// performs division.
// Handle the ArithmeticException that occurs if the denominator is zero. Use a
// try-catch block
// to catch the exception and display an appropriate error message.
// Additionally, use a finally
// block to print "Operation completed" regardless of whether an exception
// occurs or not.
class ArithmeticExcep {
  public static void main(String[] args) {
    try {

      if (Integer.parseInt(args[1]) == 0) {
        throw new ArithmeticException("Division by zero!");
      }

      System.out.println(args[0] + "/" + args[1] + "=" + Float.parseFloat(args[0]) / Float.p
    } catch (ArrayIndexOutOfBoundsException e) {
      System.out.println("ERR: You forgot the Args again didnt you");
    } catch (ArithmeticException e) {
      System.out.println("ERR: Oh crap its an infinity again");
    } finally {
      System.out.println("ITS DONE");
    }
  }
}
```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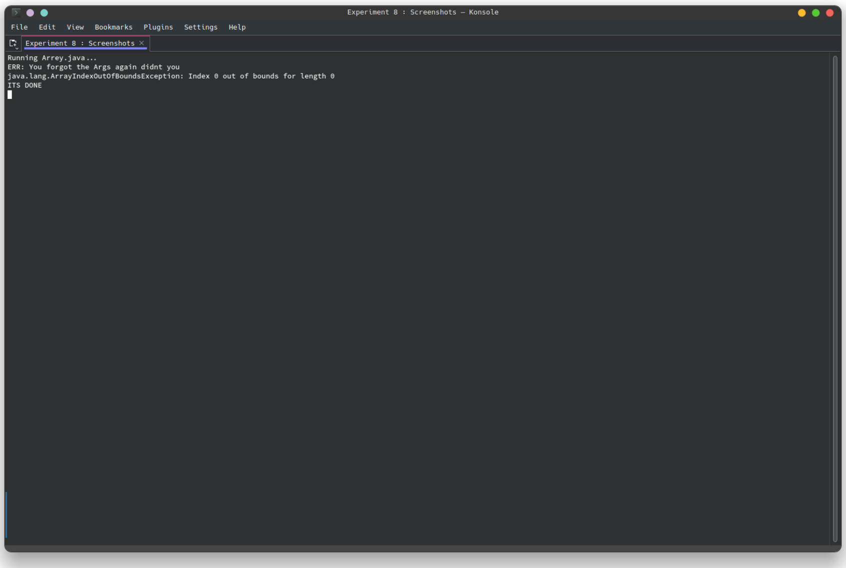
```
Running ArithmeticExcep.java...
ERR: You forgot the Args again didnt you
ITS DONE
```

Output
### ./Experiment 8/Arrey.java #### Code

```java
// Write a Java program that creates an array of 5 integers and asks the user to
// enter an index to
// access the array element. Handle the ArrayIndexOutOfBoundsException if the
// user enters an
// invalid index. Use a try-catch block to catch the exception and display an
// appropriate error
// message. Use the finally block to print "Array access attempted."
class Arrey {
  public static void main(String[] args) {
    int[] arr = { 2, 3, 5, 7, 11 }; // Array literal
    try {
      System.out.println("Element is: " + arr[Integer.parseInt(args[0])]);
    } catch (ArrayIndexOutOfBoundsException e) {
      System.out.println("ERR: You forgot the Args again didnt you\n" + e);
    } finally {
      System.out.println("ITS DONE");
    }
  }
}
```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```
Running Arrey.java...
ERR: You forgot the Args again didnt you
java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0
ITS DONE
```

Output

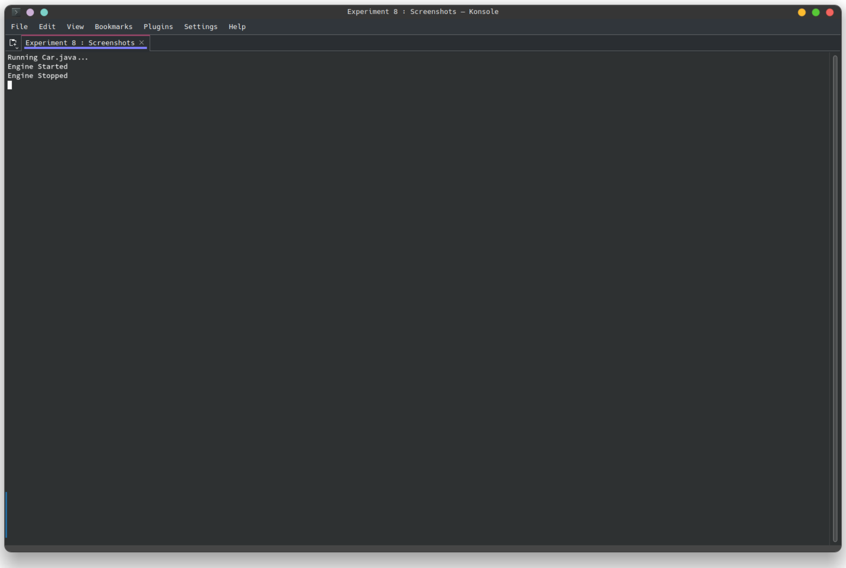
### ./Experiment 8/Car.java #### Code

```java
// Create an outer class Car with an inner class Engine. The Engine class should
// have a method
// start() that prints "Engine started" and a method stop() that prints "Engine
// stopped". The Car
// class should have a method drive() that creates an instance of the Engine
// class and calls its
// start() and stop() methods
class Car {
  static void drive() {
    Engine e = new Engine();
    e.Start();
    e.Stop();
  }

  static class Engine {
    void Start() {
      System.out.println("Engine Started");
    }

    void Stop() {
      System.out.println("Engine Stopped");
    }
  }

  public static void main(String[] args) {
    drive();
  }
}
```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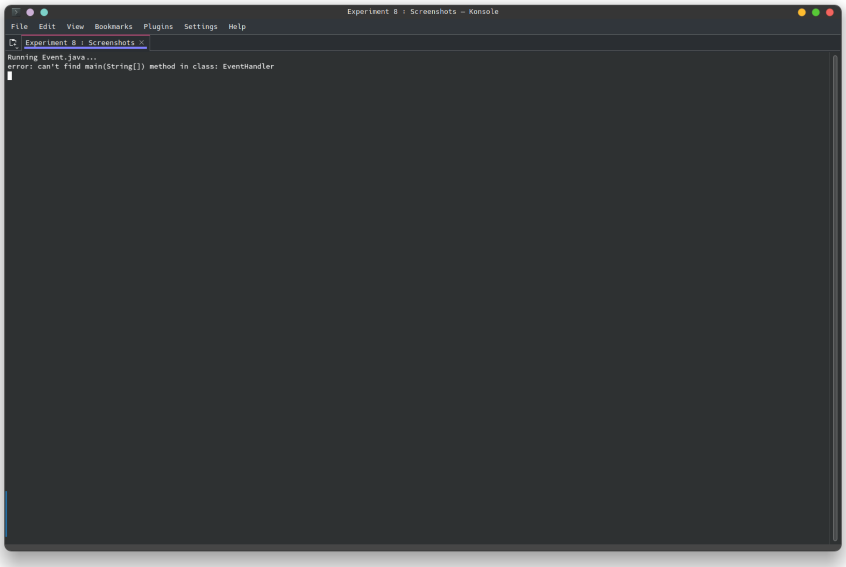
```
Running Car.java...
Engine Started
Engine Stopped
```

Output

### ./Experiment 8/Event.java #### Code

```
// Create an interface EventHandler with a method handleEvent(). In the main
// method, demonstrate the use of:
// a. A local inner class inside a method registerEvent() that implements
// EventHandler and prints "Event handled by local inner class".
// b. An anonymous inner class that implements EventHandler and prints "Event
// handled by anonymous inner class".

interface EventHandler {
  public void handleEvent();

}

class Event {

  public static void registerEvent() {
    class LocalInner implements EventHandler {
      @Override
      public void handleEvent() {
        System.out.println("Handled by Local Inner Class");
      }
    }
```

```java
    LocalInner l = new LocalInner();
    l.handleEvent();
  }

  public static void main(String[] args) {
    // A
    registerEvent();
    // B
    EventHandler anonymousHandler = new EventHandler() {
      @Override
      public void handleEvent() {
        System.out.println("Event handled by anonymous inner class");
      }
    };
    anonymousHandler.handleEvent();
  }
}
```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```
Running Event.java...
error: can't find main(String[]) method in class: EventHandler
```

Output
### ./Experiment 8/FileName.java #### Code

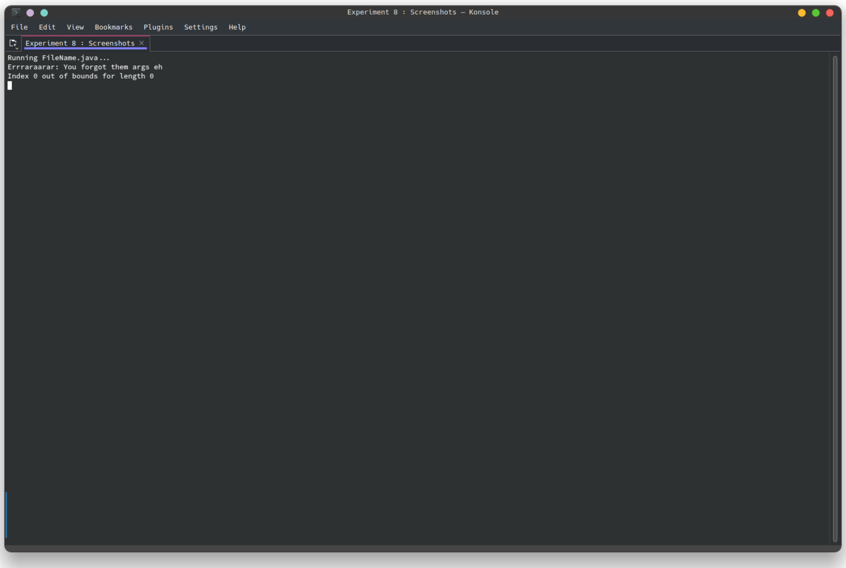
```java
// Write a Java program that reads a file name from the user and attempts to
// open and read the
// file. Define a method readFile() that throws a FileNotFoundException using
// the throws
// keyword. In the main method, call this method and handle the exception using
// a try-catch
// block. Display an appropriate message if the file is not found. Use a finally
// block to ensure a
// message like "File operation attempted" is printed.

import java.io.File;
import java.io.FileNotFoundException;

class FileName {

  public static Boolean checkFileExists(String filePath) throws FileNotFoundException {
    File file = new File(filePath);
    if (!file.exists()) {
      throw new FileNotFoundException("File not found: " + filePath);
    } else {
      return true;
    }
  }

  public static void main(String[] args) {
    try {
      System.out.println(checkFileExists(args[0]) ? "YAY FOUND IT!!!! IT EXISTS CONGRATULATI
          : "nothing matters it doesnt exist");
    } catch (IndexOutOfBoundsException e) {
      System.err.println("Errraraarar: You forgot them args eh \n" + e.getMessage());
    } catch (FileNotFoundException e) {
      System.err.println("Erawr: " + e.getMessage());
    }
  }
}
```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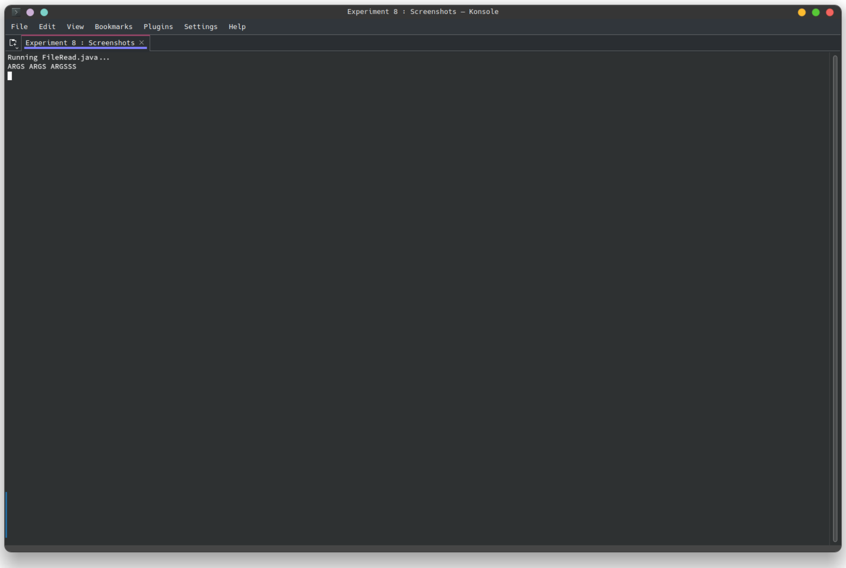
```
Running FileName.java...
Errraraarar: You forgot them args eh
Index 0 out of bounds for length 0
```

Output

### ./Experiment 8/FileRead.java #### Code

```java
// Write a Java program that reads the contents of a file named student.txt
// using FileReader and
// displays the data on the console. Handle FileNotFoundException if the file
// does not exist and
// display an appropriate error message. Use a try-catch block for exception
// handling.
import java.io.*;

class FileRead {
  public static void main(String[] args) throws IOException {

    // Reading File name
    String path;
    try {
      path = args[0];

      FileReader fr = new FileReader(path);

      int i;

      while ((i = fr.read()) != -1)
        System.out.print((char) i);
    } catch (IndexOutOfBoundsException e) {
      System.out.println("ARGS ARGS ARGSSS");
    }
  }
}
```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```
Running FileRead.java...
ARGS ARGS ARGSSS
```

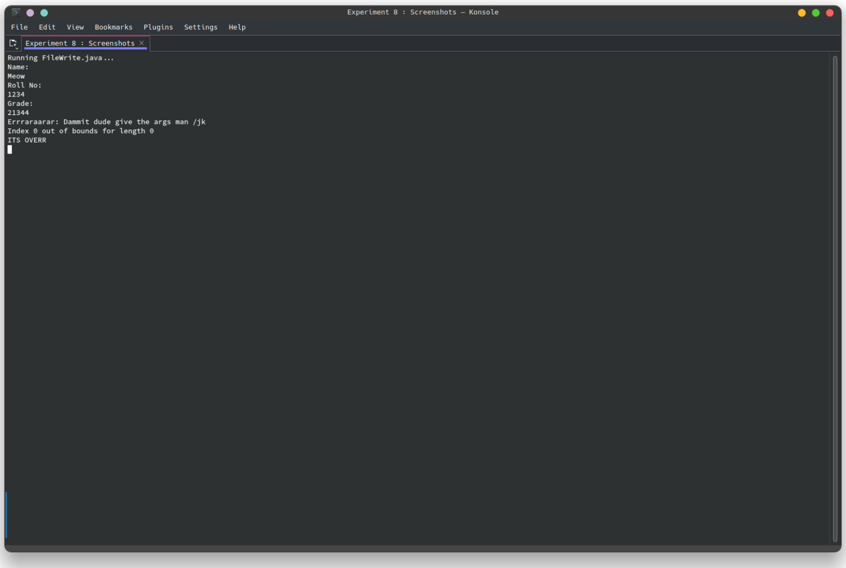
Output
### ./Experiment 8/FileWrite.java #### Code

```
// Write a Java program that takes user input for a student's name, roll number,
// and grade, and
// writes this information to a file named student.txt using FileWriter. Ensure
// the program
// appends the data to the file if it already exists. Handle any exceptions
// using try-catch and
// display an appropriate message if an error occurs.
// Sample File Content:
// Name: Aman, Roll Number: 120112, Grade: A
// Name: Parul, Roll Number: 120131, Grade: B
import java.io.File;
import java.io.FileWriter;
import java.io.FileNotFoundException;
import java.io.IOException;
import java.io.BufferedWriter;
import java.io.FileInputStream;
import java.util.Scanner;

class FileWrite {
  public static void fileAppend(String filename, String[] args) throws IOException {
    FileWriter fw = new FileWriter(filename, true);
    BufferedWriter bw = new BufferedWriter(fw);
    bw.write("Name: " + args[0] + " Roll No: " + args[1] + " Grade: " + args[2]);
    bw.newLine();
    bw.close();
  }

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

    System.out.println("Name:");
    String num1 = scanner.nextLine();
    System.out.println("Roll No:");
    String num2 = scanner.nextLine();
    System.out.println("Grade:");
    String num3 = scanner.nextLine();
    String s[] = { num1, num2, num3 };
    try {
      fileAppend(args[0], s);
    } catch (IndexOutOfBoundsException e) {
      System.err.println("Errraraarar: Dammit dude give the args man /jk \n" + e.getMessage
    } catch (IOException e) {
      System.err.println(e.getMessage());
    } finally {
      scanner.close();
      System.out.println("ITS OVERR");
    }
  }
}
```


Experiment 8 : Screenshots — Konsole
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```
Running FileWrite.java...
Name:
Meow
Roll No:
1234
Grade:
21344
Errraraarar: Dammit dude give the args man /jk
Index 0 out of bounds for length 0
ITS OVERR
```

Output

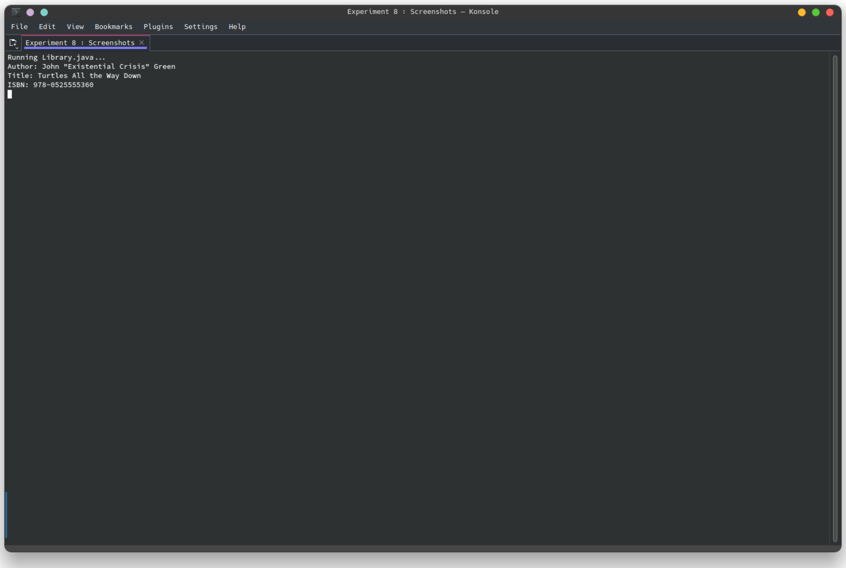
### ./Experiment 8/Library.java #### Code

```java
// Create an outer class Library with a static nested class Book. The Book class should hav
// attributes like title, author, and ISBN, and a method displayDetails() to print these de
// the main method, create an instance of the Book class and call displayDetails() to show 
// book information.
class Library {
  static class Book {
    String Author;
    String Title;
    String ISBN;

    Book(String Author, String Title, String ISBN) {
      this.Author = Author;
      this.Title = Title;
      this.ISBN = ISBN;
    }

    public void displayDetails() {
      System.out.println("Author: " + Author + "\nTitle: " + Title + "\nISBN: " + ISBN);
    }
  }

  public static void main(String[] args) {
    Book b = new Book("John \"Existential Crisis\" Green", "Turtles All the Way Down", "978
    b.displayDetails();
  }
}
```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```
Running Library.java...
Author: John "Existential Crisis" Green
Title: Turtles All the Way Down
ISBN: 978-0525555360
```

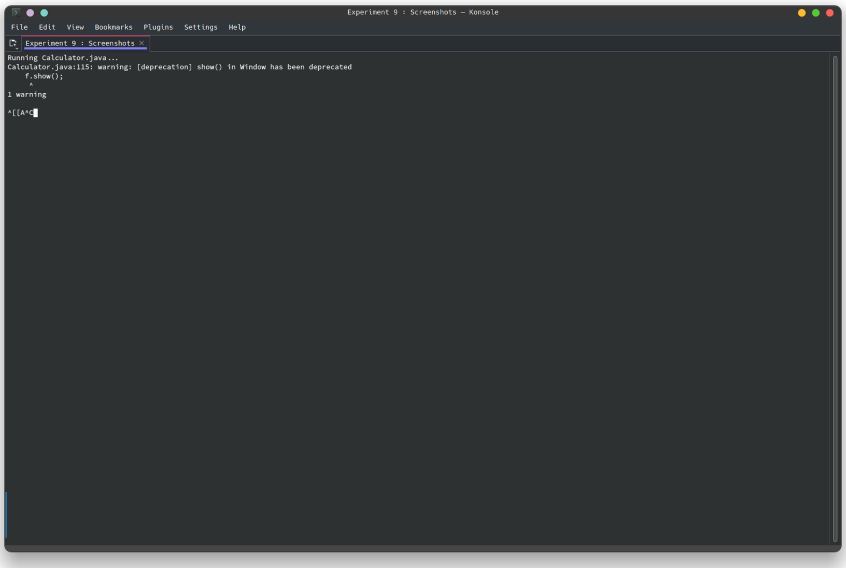
Output
## ./Experiment 9 ### ./Experiment 9/Calculator.java #### Code

```java
// Java program to create a simple calculator
// with basic +, -, /, * using java swing elements

import java.awt.event.*;
import javax.swing.*;
import java.awt.*;

class calculator extends JFrame implements ActionListener {
  // create a frame
  static JFrame f;

  // create a textfield
  static JTextField l;

  // store operator and operands
  String s0, s1, s2;

  calculator() {
    s0 = s1 = s2 = "";
  }

  public static void main(String args[]) {
```

```
f = new JFrame("calculator");

try {
  UIManager.setLookAndFeel(UIManager.getSystemLookAndFeelClassName());
} catch (Exception e) {
  System.err.println(e.getMessage());
}

calculator c = new calculator();

l = new JTextField(16);

l.setEditable(false);

// create number buttons and some operators
JButton b0, b1, b2, b3, b4, b5, b6, b7, b8, b9, ba, bs, bd, bm, be, beq, beq1;

// create number buttons
b0 = new JButton("0");
b1 = new JButton("1");
b2 = new JButton("2");
b3 = new JButton("3");
b4 = new JButton("4");
b5 = new JButton("5");
b6 = new JButton("6");
b7 = new JButton("7");
b8 = new JButton("8");
b9 = new JButton("9");

// equals button
beq1 = new JButton("=");

// create operator buttons
ba = new JButton("+");
bs = new JButton("-");
bd = new JButton("/");
bm = new JButton("*");
beq = new JButton("C");

// create . button
be = new JButton(".");

// create a panel
JPanel p = new JPanel();

// add action listeners
```

```
bm.addActionListener(c);
bd.addActionListener(c);
bs.addActionListener(c);
ba.addActionListener(c);
b9.addActionListener(c);
b8.addActionListener(c);
b7.addActionListener(c);
b6.addActionListener(c);
b5.addActionListener(c);
b4.addActionListener(c);
b3.addActionListener(c);
b2.addActionListener(c);
b1.addActionListener(c);
b0.addActionListener(c);
be.addActionListener(c);
beq.addActionListener(c);
beq1.addActionListener(c);

// add elements to panel
p.add(l);
p.add(ba);
p.add(b1);
p.add(b2);
p.add(b3);
p.add(bs);
p.add(b4);
p.add(b5);
p.add(b6);
p.add(bm);
p.add(b7);
p.add(b8);
p.add(b9);
p.add(bd);
p.add(be);
p.add(b0);
p.add(beq);
p.add(beq1);

// set Background of panel
p.setBackground(Color.blue);

// add panel to frame
f.add(p);

f.setSize(200, 220);
f.show();
```

```java
}

public void actionPerformed(ActionEvent e) {
  String s = e.getActionCommand();

  // if the value is a number
  if ((s.charAt(0) >= '0' && s.charAt(0) <= '9') || s.charAt(0) == '.') {
    // if operand is present then add to second no
    if (!s1.equals(""))
      s2 = s2 + s;
    else
      s0 = s0 + s;

    // set the value of text
    l.setText(s0 + s1 + s2);
  } else if (s.charAt(0) == 'C') {
    // clear the one letter
    s0 = s1 = s2 = "";

    // set the value of text
    l.setText(s0 + s1 + s2);
  } else if (s.charAt(0) == '=') {

    double te;

    // store the value in 1st
    if (s1.equals("+"))
      te = (Double.parseDouble(s0) + Double.parseDouble(s2));
    else if (s1.equals("-"))
      te = (Double.parseDouble(s0) - Double.parseDouble(s2));
    else if (s1.equals("/"))
      te = (Double.parseDouble(s0) / Double.parseDouble(s2));
    else
      te = (Double.parseDouble(s0) * Double.parseDouble(s2));

    // set the value of text
    l.setText(s0 + s1 + s2 + "=" + te);

    // convert it to string
    s0 = Double.toString(te);

    s1 = s2 = "";
  } else {
    // if there was no operand
    if (s1.equals("") || s2.equals(""))
      s1 = s;
      // else evaluate
      else {
        double te;

        // store the value in 1st
        if (s1.equals("+"))
          te = (Double.parseDouble(s0) + Double.parseDouble(s2));
        else if (s1.equals("-"))
          te = (Double.parseDouble(s0) - Double.parseDouble(s2));
        else if (s1.equals("/"))
          te = (Double.parseDouble(s0) / Double.parseDouble(s2));
        else
          te = (Double.parseDouble(s0) * Double.parseDouble(s2));

        // convert it to string
        s0 = Double.toString(te);

        // place the operator
        s1 = s;

        // make the operand blank
        s2 = "";
      }

      // set the value of text
      l.setText(s0 + s1 + s2);
    }
  }
}
```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```
Running Calculator.java...
Calculator.java:115: warning: [deprecation] show() in Window has been deprecated
    f.show();
     ^
1 warning

^[[A^C
```

Output

### ./Experiment 9/LoginDemo.java #### Code

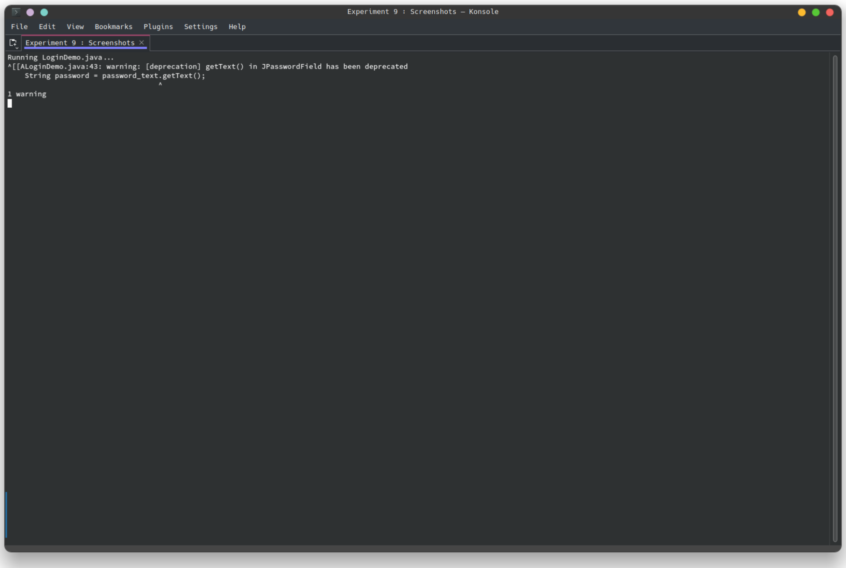
```java
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

class LoginDemo extends JFrame implements ActionListener {
  JPanel panel;
  JLabel user_label, password_label, message;
  JTextField userName_text;
  JPasswordField password_text;
  JButton submit, cancel;

  LoginDemo() {
    user_label = new JLabel();
    user_label.setText("User Name :");
    userName_text = new JTextField();
    password_label = new JLabel();
    password_label.setText("Password :");
    password_text = new JPasswordField();
    submit = new JButton("SUBMIT");
    panel = new JPanel(new GridLayout(3, 1));
    panel.add(user_label);
    panel.add(userName_text);
    panel.add(password_label);
    panel.add(password_text);
    message = new JLabel();
    panel.add(message);
    panel.add(submit);
    setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    submit.addActionListener(this);
    add(panel, BorderLayout.CENTER);
    setTitle("Please Login Here !");
    setSize(450, 350);
    setVisible(true);
  }

  public static void main(String[] args) {
    new LoginDemo();
  }

  @Override
  public void actionPerformed(ActionEvent ae) {
    String userName = userName_text.getText();
    String password = password_text.getText();
    if (userName.trim().equals("admin") && password.trim().equals("admin")) {
      message.setText(" Hello " + userName + "");
    } else {
      message.setText(" WRONG WRONG PASSWORD SHAME ON YOU.. ");
    }
  }
}
```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```
Running LoginDemo.java...
^[[ALoginDemo.java:43: warning: [deprecation] getText() in JPasswordField has been deprecated
    String password = password_text.getText();
                                           ^
1 warning
```

Output

### ./Experiment 9/ToDoList.java #### Code

```
import java.awt.Dimension;
import java.awt.Font;
import java.awt.GridLayout;
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;

import javax.swing.BorderFactory;
import javax.swing.Box;
import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.JTextField;
import javax.swing.border.Border;
import java.awt.Color;
import java.awt.BorderLayout;
import java.awt.Component;

class Task extends JPanel {

  JLabel index;
  JTextField taskName;
  JButton done;

  Color pink = new Color(255, 161, 161);
```

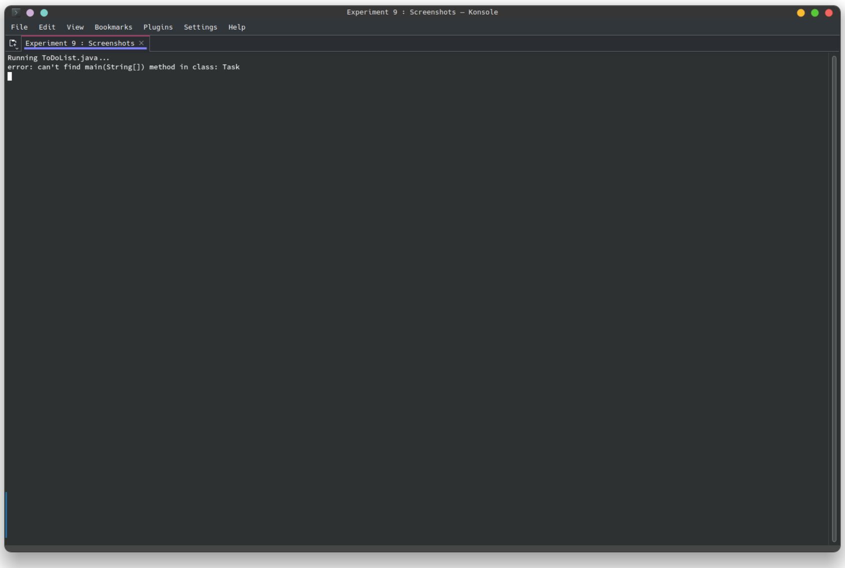
```java
Color green = new Color(188, 226, 158);
Color doneColor = new Color(233, 119, 119);

private boolean checked;

Task() {
  this.setPreferredSize(new Dimension(400, 20)); // set size of task
  this.setBackground(pink); // set background color of task

  this.setLayout(new BorderLayout()); // set layout of task

  checked = false;

  index = new JLabel(""); // create index label
  index.setPreferredSize(new Dimension(20, 20)); // set size of index label
  index.setHorizontalAlignment(JLabel.CENTER); // set alignment of index label
  this.add(index, BorderLayout.WEST); // add index label to task

  taskName = new JTextField("Write something.."); // create task name text field
  taskName.setBorder(BorderFactory.createEmptyBorder()); // remove border of text field
  taskName.setBackground(pink); // set background color of text field

  this.add(taskName, BorderLayout.CENTER);

  done = new JButton("Done");
  done.setPreferredSize(new Dimension(80, 20));
  done.setBorder(BorderFactory.createEmptyBorder());
  done.setBackground(doneColor);
  done.setFocusPainted(false);

  this.add(done, BorderLayout.EAST);

}

public void changeIndex(int num) {
  this.index.setText(num + ""); // num to String
  this.revalidate(); // refresh
}

public JButton getDone() {
  return done;
}

public boolean getState() {
  return checked;
}
```

```
  public void changeState() {
    this.setBackground(green);
    taskName.setBackground(green);
    checked = true;
    revalidate();
  }
}

class List extends JPanel {

  Color lightColor = new Color(252, 221, 176);

  List() {

    GridLayout layout = new GridLayout(10, 1);
    layout.setVgap(5); // Vertical gap

    this.setLayout(layout); // 10 tasks
    this.setPreferredSize(new Dimension(400, 560));
    this.setBackground(lightColor);
  }

  public void updateNumbers() {
    Component[] listItems = this.getComponents();

    for (int i = 0; i < listItems.length; i++) {
      if (listItems[i] instanceof Task) {
        ((Task) listItems[i]).changeIndex(i + 1);
      }
    }

  }

  public void removeCompletedTasks() {

    for (Component c : getComponents()) {
      if (c instanceof Task) {
        if (((Task) c).getState()) {
          remove(c); // remove the component
          updateNumbers(); // update the indexing of all items
        }
      }
    }

  }
```

```
}

class Footer extends JPanel {

  JButton addTask;
  JButton clear;

  Color orange = new Color(233, 133, 128);
  Color lightColor = new Color(252, 221, 176);
  Border emptyBorder = BorderFactory.createEmptyBorder();

  Footer() {
    this.setPreferredSize(new Dimension(400, 60));
    this.setBackground(lightColor);

    addTask = new JButton("Add Task"); // add task button
    addTask.setBorder(emptyBorder); // remove border
    addTask.setFont(new Font("Sans-serif", Font.ITALIC, 20)); // set font
    addTask.setVerticalAlignment(JButton.BOTTOM); // align text to bottom
    addTask.setBackground(orange); // set background color
    this.add(addTask); // add to footer

    this.add(Box.createHorizontalStrut(20)); // Space between buttons

    clear = new JButton("Clear finished tasks"); // clear button
    clear.setFont(new Font("Sans-serif", Font.ITALIC, 20)); // set font
    clear.setBorder(emptyBorder); // remove border
    clear.setBackground(orange); // set background color
    this.add(clear); // add to footer
  }

  public JButton getNewTask() {
    return addTask;
  }

  public JButton getClear() {
    return clear;
  }
}

class TitleBar extends JPanel {

  Color lightColor = new Color(252, 221, 176);

  TitleBar() {
    this.setPreferredSize(new Dimension(400, 80)); // Size of the title bar
    this.setBackground(lightColor); // Color of the title bar
    JLabel titleText = new JLabel("To Do List"); // Text of the title bar
    titleText.setPreferredSize(new Dimension(200, 60)); // Size of the text
    titleText.setFont(new Font("Sans-serif", Font.BOLD, 20)); // Font of the text
    titleText.setHorizontalAlignment(JLabel.CENTER); // Align the text to the center
    this.add(titleText); // Add the text to the title bar
  }
}

class AppFrame extends JFrame {

  private TitleBar title;
  private Footer footer;
  private List list;

  private JButton newTask;
  private JButton clear;

  AppFrame() {
    this.setSize(400, 600); // 400 width and 600 height
    this.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE); // Close on exit
    this.setVisible(true); // Make visible

    title = new TitleBar();
    footer = new Footer();
    list = new List();

    this.add(title, BorderLayout.NORTH); // Add title bar on top of the screen
    this.add(footer, BorderLayout.SOUTH); // Add footer on bottom of the screen
    this.add(list, BorderLayout.CENTER); // Add list in middle of footer and title

    newTask = footer.getNewTask();
    clear = footer.getClear();

    addListeners();
  }

  public void addListeners() {
    newTask.addMouseListener(new MouseAdapter() {
      @override
      public void mousePressed(MouseEvent e) {
        Task task = new Task();
        list.add(task); // Add new task to list
        list.updateNumbers(); // Updates the numbers of the tasks

        task.getDone().addMouseListener(new MouseAdapter() {
```

```
     @override
     public void mousePressed(MouseEvent e) {

      task.changeState(); // Change color of task
      list.updateNumbers(); // Updates the numbers of the tasks
      revalidate(); // Updates the frame

     }
    });
   }

  });

  clear.addMouseListener(new MouseAdapter() {
   @override
   public void mousePressed(MouseEvent e) {
    list.removeCompletedTasks(); // Removes all tasks that are done
    repaint(); // Repaints the list
   }
  });
 }

}

public class ToDoList {
 public static void main(String args[]) {
  AppFrame frame = new AppFrame(); // Create the frame
 }
}

@interface override {

}
```

Output


Experiment 9 : Screenshots — Konsole
File Edit View Bookmarks Plugins Settings Help
Experiment 9 : Screenshots

```
Running ToDoList.java...
error: can't find main(String[]) method in class: Task
```

Figure 1: ./Experiment 9/ToDoList.java