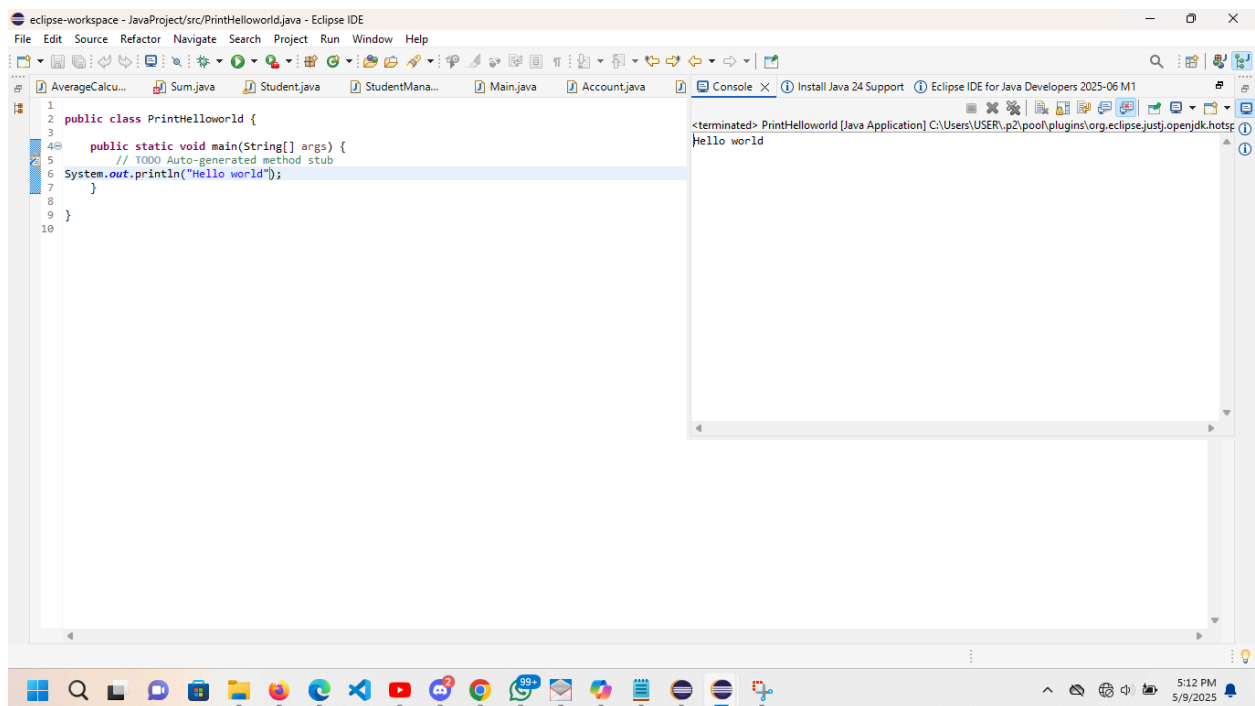


JavaAssignments

1)



2) Difference between == and .equals() in Java

In Java:

- == is used for reference comparison, meaning it checks if two variables point to the same memory location.
- .equals() is used for content comparison, meaning it checks if two objects have the same values.

3) What is the use of the main method in Java?

The main method is the entry point of any Java application. It allows the JVM (Java Virtual Machine) to start program execution.

The screenshot shows the Eclipse IDE with the file `AddNumbers.java` open. The code is as follows:

```
1 import java.util.Scanner;
2
3 public class AddNumbers {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7
8         Scanner scanner = new Scanner(System.in);
9
10        System.out.print("Enter first number: ");
11        int num1 = scanner.nextInt();
12
13        System.out.print("Enter second number: ");
14        int num2 = scanner.nextInt();
15
16        int sum = num1 + num2;
17
18        System.out.println("Sum: " + sum);
19
20        scanner.close();
21    }
22 }
23
24
25
```

The console output on the right shows the program's execution:

```
<terminated> AddNumbers [Java Application] C:\Users\USER\p2\pool\plugins\org.eclipse.justj.openjdk.hotspot
Enter first number: 12
Enter second number: 12
Sum: 24
```

5) Difference between int, Integer, and String in Java

- int: A primitive data type that stores numerical values (e.g., 5).
- Integer: A wrapper class for int, providing useful methods (e.g., `Integer.parseInt()`).
- String: A sequence of characters, used for text data (e.g., "Hello")

6) The program for checking if the a number is even or not

The screenshot shows the Eclipse IDE with the file `EvenOddCheck.java` open. The code is as follows:

```
1 import java.util.Scanner;
2
3 public class EvenOddCheck {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         Scanner scanner = new Scanner(System.in);
8
9         System.out.print("Enter a number: ");
10        int num = scanner.nextInt();
11
12        if (num % 2 == 0) {
13            System.out.println(num + " is even.");
14        } else {
15            System.out.println(num + " is odd.");
16        }
17
18        scanner.close();
19    }
20 }
21
22
23
24
25
```

The console output on the right shows the program's execution:

```
<terminated> EvenOddCheck [Java Application] C:\Users\USER\p2\pool\plugins\org.eclipse.justj.openjdk.hotsp
Enter a number: 12
12 is even.
```

7)the program to find the largest among three number

```
1 import java.util.Scanner;
2 public class LargestNumber {
3
4     public static void main(String[] args) {
5         // TODO Auto-generated method stub
6         Scanner scanner = new Scanner(System.in);
7
8         System.out.print("Enter first number: ");
9         int num1 = scanner.nextInt();
10
11        System.out.print("Enter second number: ");
12        int num2 = scanner.nextInt();
13
14        System.out.print("Enter third number: ");
15        int num3 = scanner.nextInt();
16
17        int largest;
18
19        if (num1 >= num2 && num1 >= num3) {
20            largest = num1;
21        } else if (num2 >= num1 && num2 >= num3) {
22            largest = num2;
23        } else {
24            largest = num3;
25        }
26
27        System.out.println("The largest number is: " + largest);
28
29        scanner.close();
30
31    }
32 }
33
34 }
35 }
```

```
<terminated> LargestNumber [Java Application] C:\Users\USER\p2\plugins\org.eclipse.justj.openjdk.hotsp
Enter first number: 12
Enter second number: 13
Enter third number: 14
The largest number is: 14
```

8) Difference between while, for, and do-while loops in Java

Loops help execute a block of code multiple times. Here's how they differ:

| Loop Type | Description | Example Usage |

| while loop | Runs while a condition is true. If the condition is false from the start, it won't execute. | Checking user input, infinite loops |

| for loop | Best for known number of iterations (e.g., counting, arrays). | Looping through arrays, fixed iterations |

| do-while loop | Always runs at least once, even if the condition is false. | Ensuring an action occurs at least once |

9) the code for the multiplication table of any number

The screenshot shows the Eclipse IDE interface. The main editor displays a Java file named `MultiplicationTable.java` with the following code:

```
1 import java.util.Scanner;
2 public class MultiplicationTable {
3
4     public static void main(String[] args) {
5         // TODO Auto-generated method stub
6         Scanner scanner = new Scanner(System.in);
7
8         System.out.print("Enter a number for multiplication table: ");
9         int num = scanner.nextInt();
10
11         System.out.println("Multiplication Table for " + num);
12         for (int i = 1; i <= 10; i++) {
13             System.out.print(num + " x " + i + " = " + (num * i));
14         }
15
16         scanner.close();
17     }
18 }
19
20 }
21 }
```

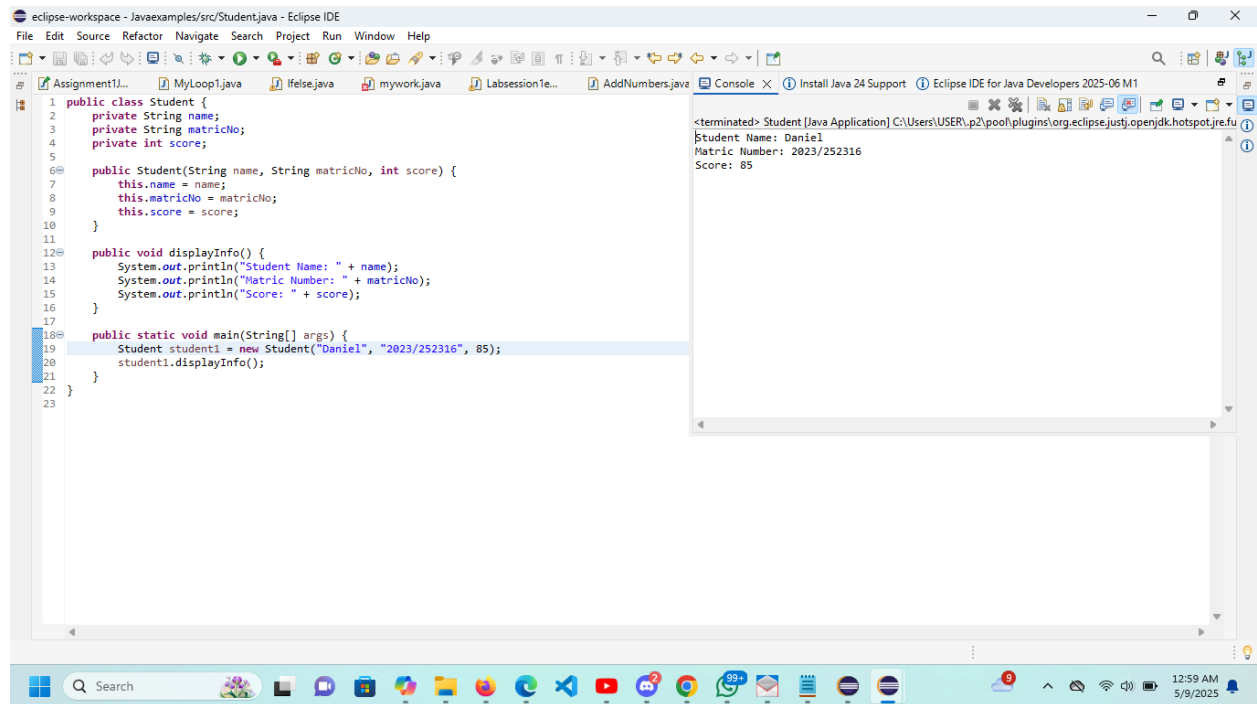
The console window on the right shows the program's execution output:

```
<terminated> MultiplicationTable [Java Application] C:\Users\USER\p2\pool\plugins\org.eclipse.justj.openjdk.k...
Enter a number for multiplication table: 3
Multiplication Table for 3
3 x 1 = 3
3 x 2 = 6
3 x 3 = 9
3 x 4 = 12
3 x 5 = 15
3 x 6 = 18
3 x 7 = 21
3 x 8 = 24
3 x 9 = 27
3 x 10 = 30
```

10. The Four Pillars of Object-Oriented Programming (OOP) in Java

- Encapsulation – Hiding the internal details of a class and exposing only the necessary functionalities through public methods.
- Inheritance – Allowing one class to derive properties and behaviors from another, enabling code reuse.
- Polymorphism – Enabling methods or objects to take multiple forms, such as method overloading or overriding.
- Abstraction – Hiding complex implementation details and providing a simplified interface.

11) the code for class of student with its properties name, matricNo, and score.

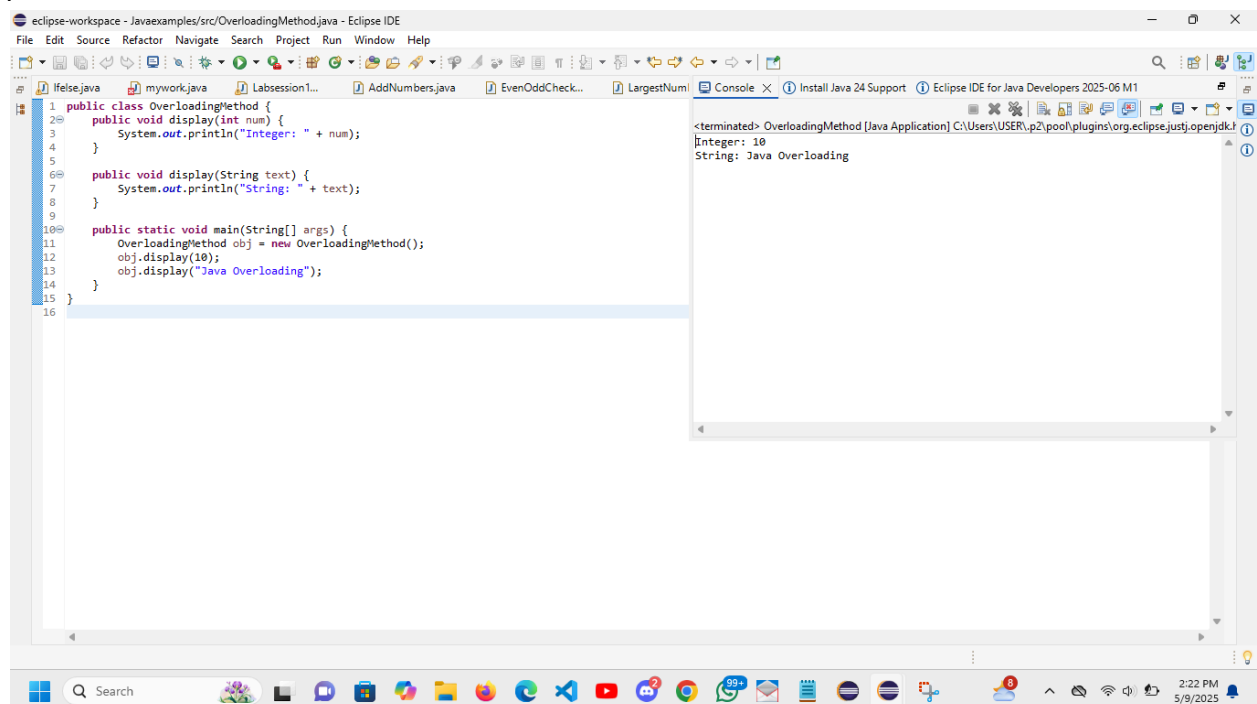


```
1 public class Student {
2     private String name;
3     private String matricNo;
4     private int score;
5
6     public Student(String name, String matricNo, int score) {
7         this.name = name;
8         this.matricNo = matricNo;
9         this.score = score;
10    }
11
12    public void displayInfo() {
13        System.out.println("Student Name: " + name);
14        System.out.println("Matric Number: " + matricNo);
15        System.out.println("Score: " + score);
16    }
17
18    public static void main(String[] args) {
19        Student student1 = new Student("Daniel", "2023/252316", 85);
20        student1.displayInfo();
21    }
22 }
23
```

<terminated> Student [Java Application] C:\Users\USER\p2\pool\plugins\org.eclipse.justi.openjdk.hotspot.jre.full\jre\bin\java.exe
Student Name: Daniel
Matric Number: 2023/252316
Score: 85

12. What is Method Overloading?

Method overloading allows multiple methods in a class to have the same name but different parameters.

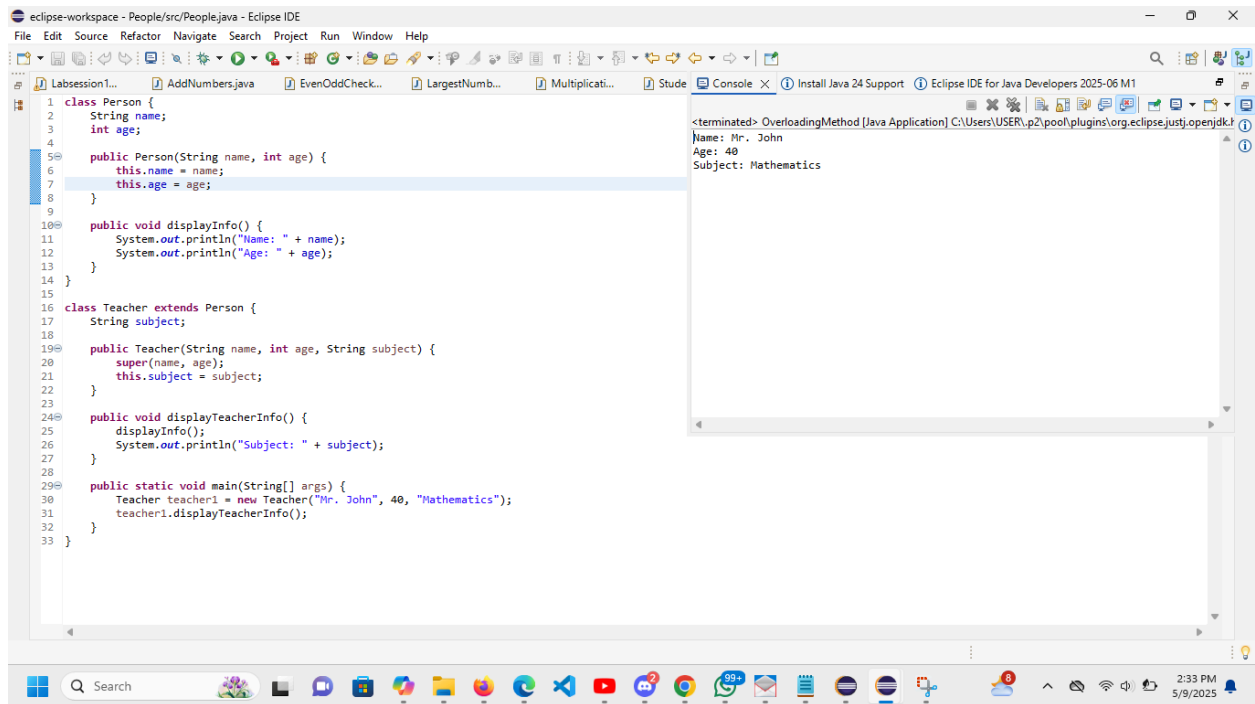


```
1 public class OverloadingMethod {
2     public void display(int num) {
3         System.out.println("Integer: " + num);
4     }
5
6     public void display(String text) {
7         System.out.println("String: " + text);
8     }
9
10    public static void main(String[] args) {
11        OverloadingMethod obj = new OverloadingMethod();
12        obj.display(10);
13        obj.display("Java Overloading");
14    }
15 }
16
```

<terminated> OverloadingMethod [Java Application] C:\Users\USER\p2\pool\plugins\org.eclipse.justi.openjdk.hotspot.jre.full\jre\bin\java.exe
Integer: 10
String: Java Overloading

13. What is Inheritance? (Base class Person and Subclass Teacher)

Inheritance allows a subclass to inherit attributes and methods from a superclass.



14. What Does It Mean to Write “Clean Code”?

Clean code makes software easier to read, maintain, and scale. Three key practices:

- Use meaningful variable & method names – Instead of `x = 5;`, write `studentAge = 5;`.
- Follow proper indentation & formatting – Code should be visually structured for easy readability.
- Write modular & reusable functions – Avoid duplicating code; use methods to improve maintainability.

15. Why Should You Avoid Writing Very Long Methods?

Long methods can:

- Reduce readability – Harder for other developers to understand the logic.
- Increase complexity – Debugging becomes challenging.
- Limit reusability – Difficult to reuse code blocks effectively.

16. Java Naming Conventions for Classes, Variables, and Methods

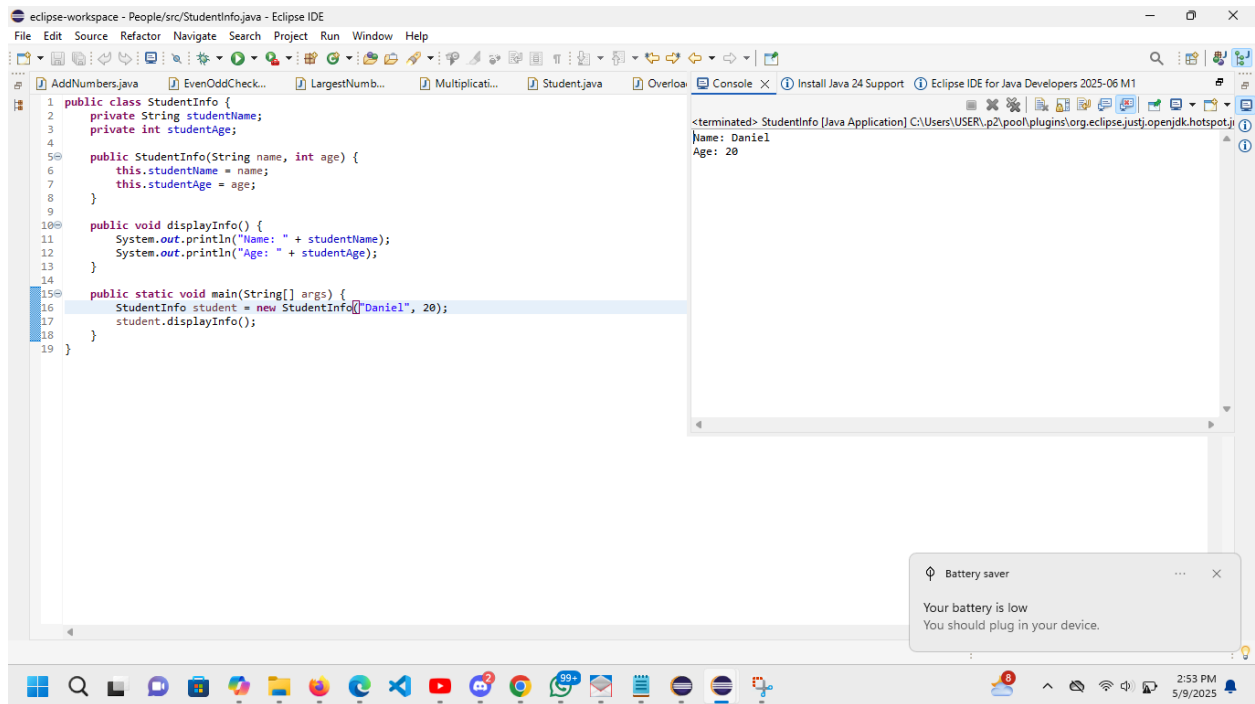
Following proper naming conventions improves readability and maintainability in Java.

| Element | Convention | Example |

| Classes | Capitalized first letter and use CamelCase. | `class StudentInfo {}` |

| Variables | Start with lowercase, use CamelCase. | `int studentAge = 20;` |

| Methods | Start with lowercase, use verbs to describe action. | `public void displayInfo() {}` |



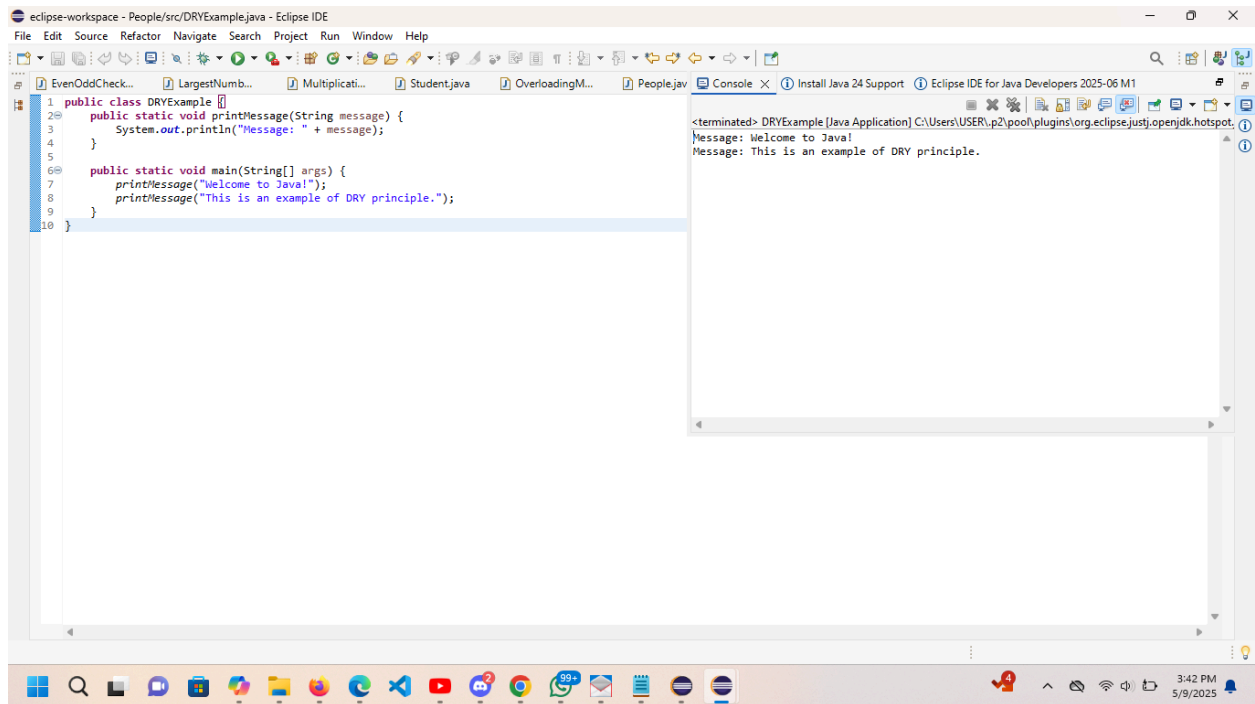
17. Why Break a Java Program into Methods?

Methods help:

- Improve readability – Code becomes easier to understand.
- Enhance reusability – Avoid duplicate code by calling methods multiple times.
- Simplify debugging – Errors are isolated within specific functions.
- Encourage modular programming – Each function handles a specific task.

18. DRY (Don't Repeat Yourself) in Java

The DRY principle ensures that logic isn't repeated in multiple places. Instead of duplicating code, use reusable methods.



19. Benefits of Using Classes and Objects

Using classes and objects instead of writing everything in the main method:

- Encapsulation – Keeps data private and controlled.
- Code reusability – Objects can be reused across multiple classes.
- Maintainability – Code is easier to update and modify.

20. Why is Testing Important?

Testing ensures:

- Bug-free functionality
- Expected performance
- Valid user input handling
- Security and stability

21. Types of Errors in Java

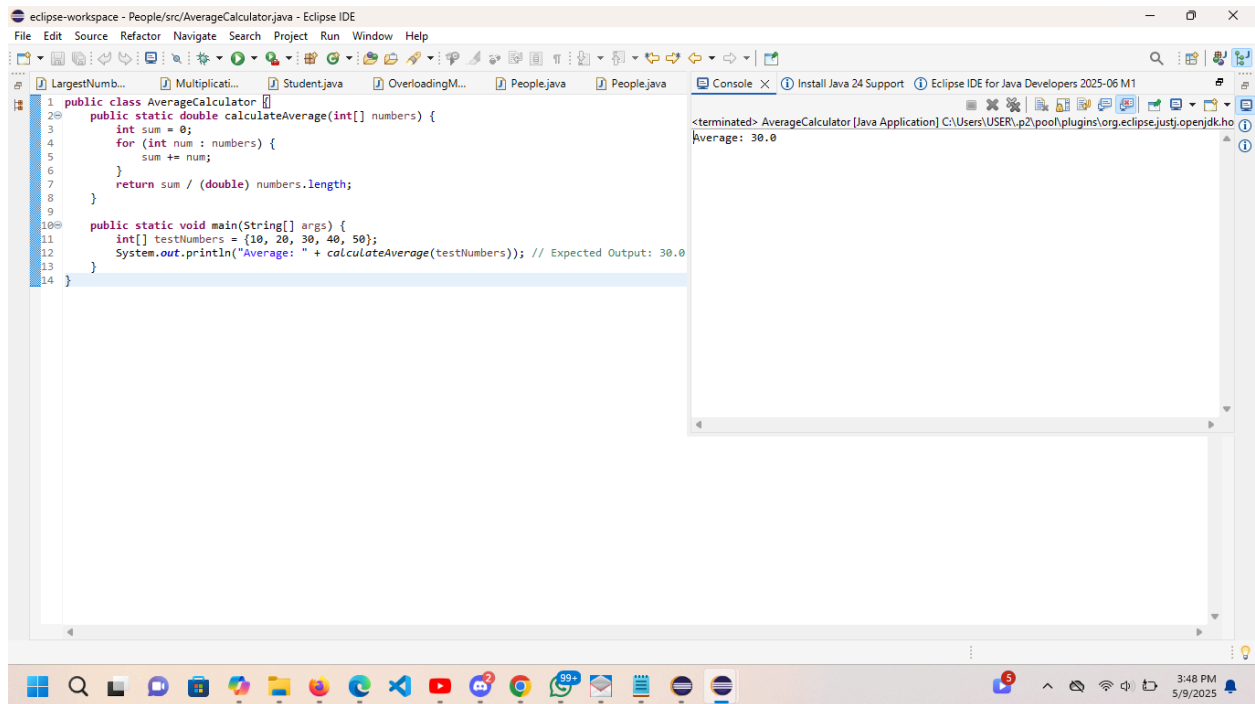
| Error Type | Description | Example |

| Syntax Error | Compiler detects invalid syntax. | Missing semicolon (int x = 10) |

| Runtime Error | Program crashes during execution. | Division by zero (int y = 10 / 0;) |

| Logic Error | Incorrect output but no crash. | Wrong calculation formula

22) Method that calculates the averages of five numbers



23. Why Write Comments in Java?

Comments help:

- Explain complex logic
- Guide future developers
- Simplify debugging

24. JavaDoc vs Regular Comments

Type	Description	Example
Single-line comment	Used for brief notes.	// This calculates sum
Multi-line comment	Used for longer explanations.	/* This method does XYZ */
JavaDoc	Used for automatic documentation.	/** This method returns student info */

25) /**

* Calculates the sum of two numbers.

* @param a First number

* @param b Second number

* @return Sum of a and b

*/

```

public int sum(int a, int b) {
    return a + b;
}

```

26. Version Control Importance

Version control helps teams:

- Track changes

- Collaborate effectively
- Manage rollbacks (undo changes)

Popular tools: Git, GitHub, Bitbucket

27. Explaining Code Refactoring

Refactoring improves existing code without changing its functionality. Example: simplifying a large method into smaller ones.

28. Java Collaboration Tools

Tools like:

- GitHub – Code versioning & repository hosting.
- JIRA – Project management.
- Slack – Team communication.

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- Collaborate effectively
- Manage rollbacks (undo changes)

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28. Java Collaboration Tools

Tools like:

- GitHub – Code versioning & repository hosting.
- JIRA – Project management.
- Slack – Team communication.

29. 5 Best Practices in Java

- Follow naming conventions
- Use proper indentation
- Write modular code
- Handle exceptions properly
- Optimize performance

30. Why Code Readability Matters More Than "Smart" Code

Readable code:

- Is easier to maintain
- Reduces debugging time
- Enhances teamwork

31)Mini Project – Student Grades Management System

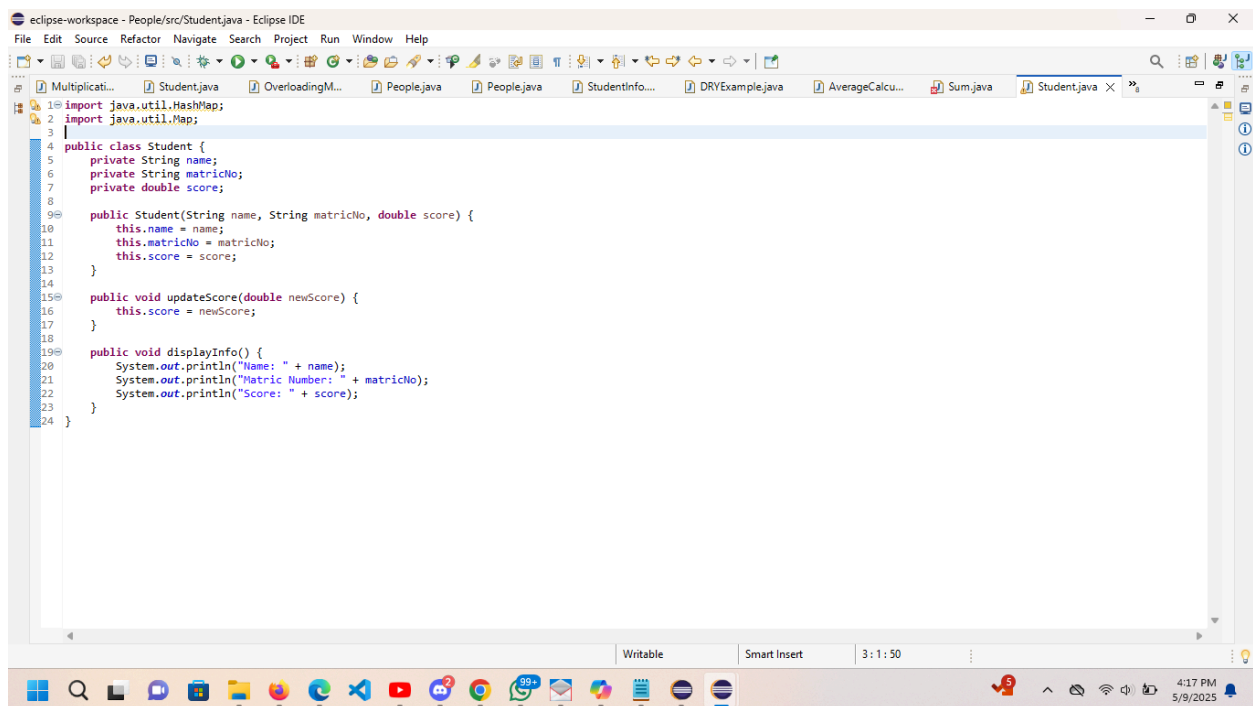
Objective:

A simple command-line program to:

- Add student grades
- Update existing records
- View student details

Code Structure:

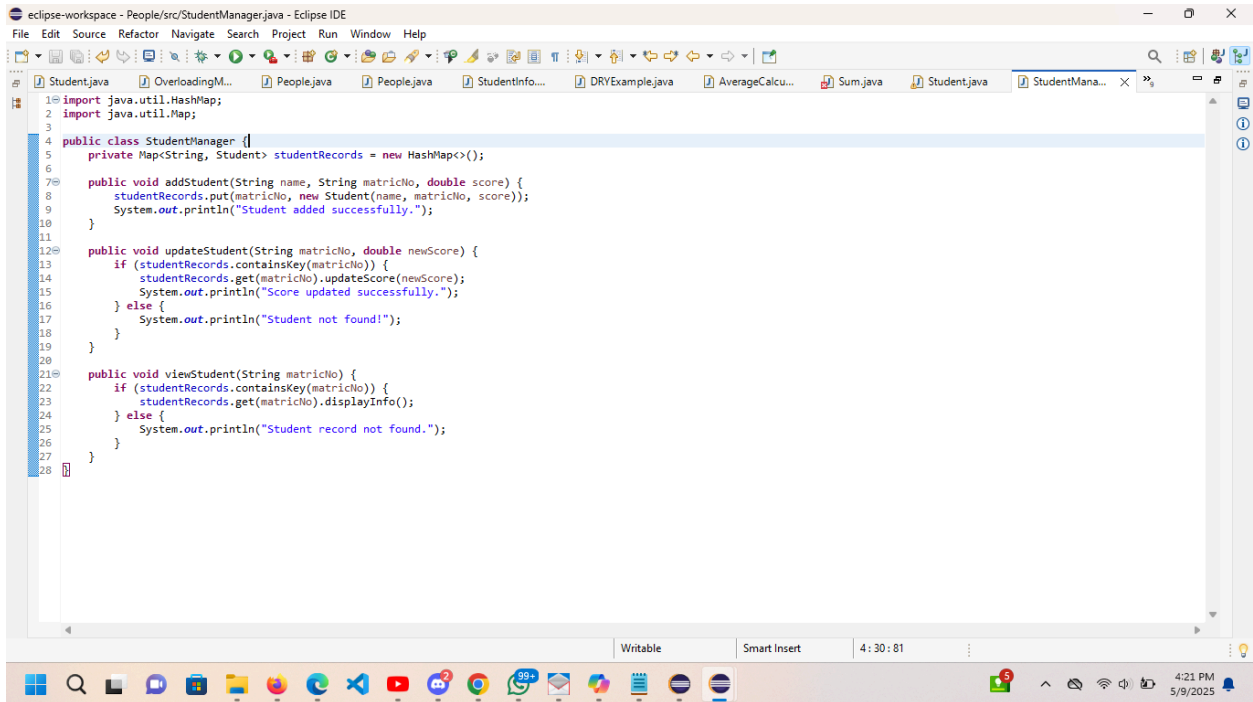
- A Student class to represent students



The screenshot shows the Eclipse IDE with the 'Student.java' file open. The code defines a 'Student' class with private attributes 'name', 'matricNo', and 'score'. It includes a constructor, an 'updateScore' method, and a 'displayInfo' method. The IDE interface includes a menu bar, a toolbar, a project explorer on the left, and a status bar at the bottom.

```
1 import java.util.HashMap;
2 import java.util.Map;
3
4 public class Student {
5     private String name;
6     private String matricNo;
7     private double score;
8
9     public Student(String name, String matricNo, double score) {
10         this.name = name;
11         this.matricNo = matricNo;
12         this.score = score;
13     }
14
15     public void updateScore(double newScore) {
16         this.score = newScore;
17     }
18
19     public void displayInfo() {
20         System.out.println("Name: " + name);
21         System.out.println("Matric Number: " + matricNo);
22         System.out.println("Score: " + score);
23     }
24 }
```

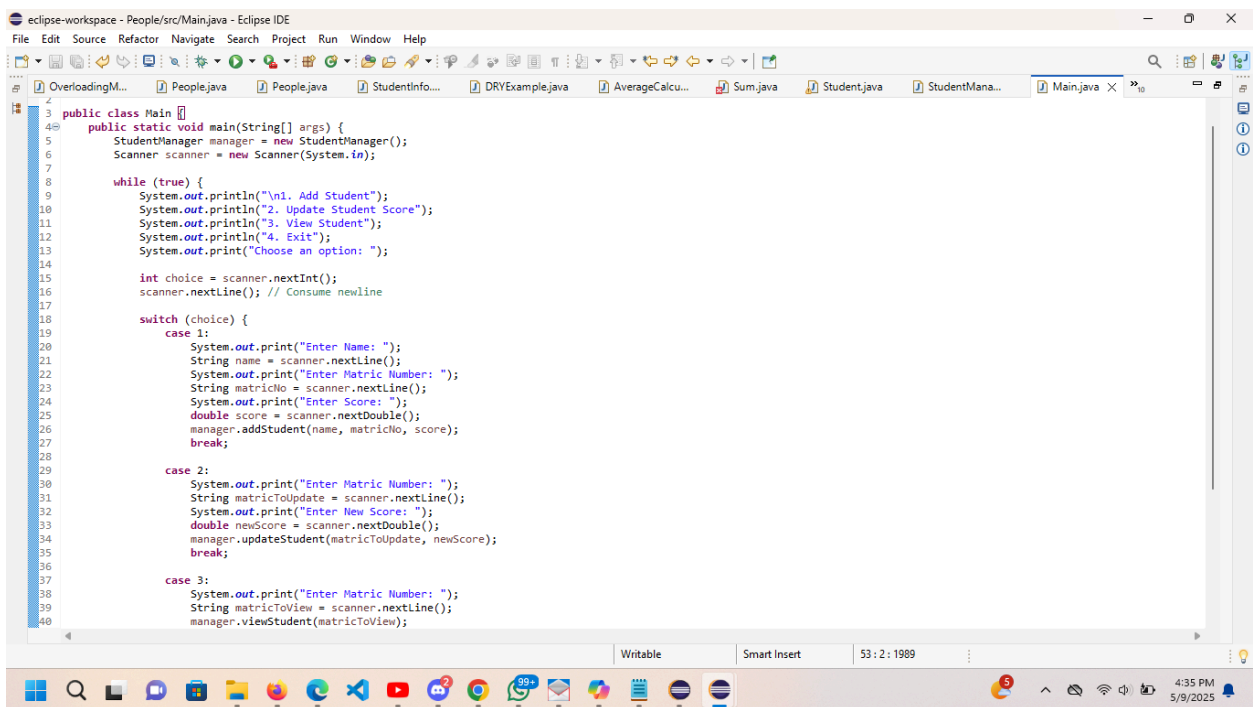
- A StudentManager class to handle records



The screenshot shows the Eclipse IDE with the file `StudentManager.java` open. The code defines a `StudentManager` class that uses a `HashMap` to store student records. It includes methods for adding, updating, and viewing student information.

```
1 import java.util.HashMap;
2 import java.util.Map;
3
4 public class StudentManager {
5     private Map<String, Student> studentRecords = new HashMap<>();
6
7     public void addStudent(String name, String matricNo, double score) {
8         studentRecords.put(matricNo, new Student(name, matricNo, score));
9         System.out.println("Student added successfully.");
10    }
11
12    public void updateStudent(String matricNo, double newScore) {
13        if (studentRecords.containsKey(matricNo)) {
14            studentRecords.get(matricNo).updateScore(newScore);
15            System.out.println("Score updated successfully.");
16        } else {
17            System.out.println("Student not found!");
18        }
19    }
20
21    public void viewStudent(String matricNo) {
22        if (studentRecords.containsKey(matricNo)) {
23            studentRecords.get(matricNo).displayInfo();
24        } else {
25            System.out.println("Student record not found.");
26        }
27    }
28 }
```

- A Main class to interact with users



The screenshot shows the Eclipse IDE with the file `Main.java` open. This class contains the `main` method, which serves as the entry point for the application. It uses a `Scanner` to read user input and a `switch` statement to handle different menu options.

```
1 public class Main {
2
3     public static void main(String[] args) {
4         StudentManager manager = new StudentManager();
5         Scanner scanner = new Scanner(System.in);
6
7         while (true) {
8             System.out.println("\n1. Add Student");
9             System.out.println("2. Update Student Score");
10            System.out.println("3. View Student");
11            System.out.println("4. Exit");
12            System.out.print("Choose an option: ");
13
14            int choice = scanner.nextInt();
15            scanner.nextLine(); // Consume newline
16
17            switch (choice) {
18                case 1:
19                    System.out.print("Enter Name: ");
20                    String name = scanner.nextLine();
21                    System.out.print("Enter Matric Number: ");
22                    String matricNo = scanner.nextLine();
23                    System.out.print("Enter Score: ");
24                    double score = scanner.nextDouble();
25                    manager.addStudent(name, matricNo, score);
26                    break;
27
28                case 2:
29                    System.out.print("Enter Matric Number: ");
30                    String matricToUpdate = scanner.nextLine();
31                    System.out.print("Enter New Score: ");
32                    double newScore = scanner.nextDouble();
33                    manager.updateStudent(matricToUpdate, newScore);
34                    break;
35
36                case 3:
37                    System.out.print("Enter Matric Number: ");
38                    String matricToView = scanner.nextLine();
39                    manager.viewStudent(matricToView);
40            }
41        }
42    }
43 }
```

```
1. Add Student
2. Update Student Score
3. View Student
4. Exit
Choose an option: 1
Enter Name: Daniel
Enter Matric Number: 2023/252316
```

```
Enter Score: 85
Student added successfully.
```

```
Choose an option: 3
Enter Matric Number: 2023/252316
Name: Daniel
Matric Number: 2023/252316
Score: 85
```

32) Mini Project – Basic ATM System

Objective:

A simple command-line ATM system that allows users to:

Check balance

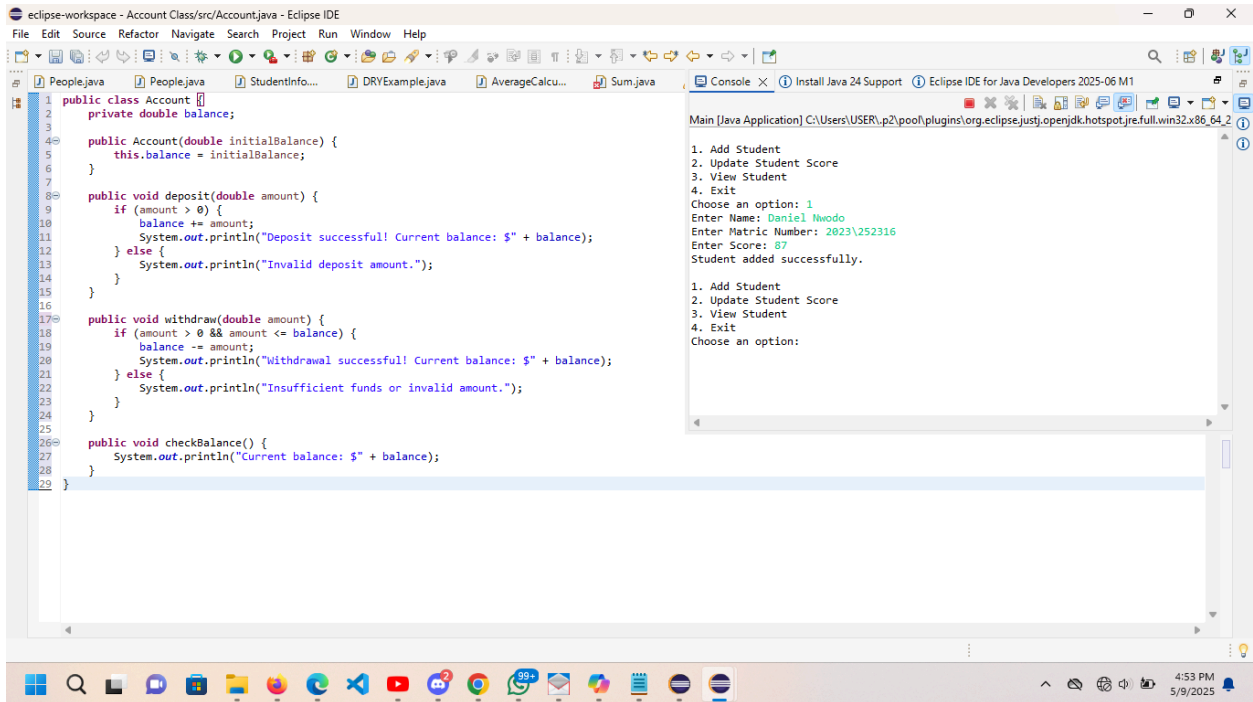
Deposit money

Withdraw money

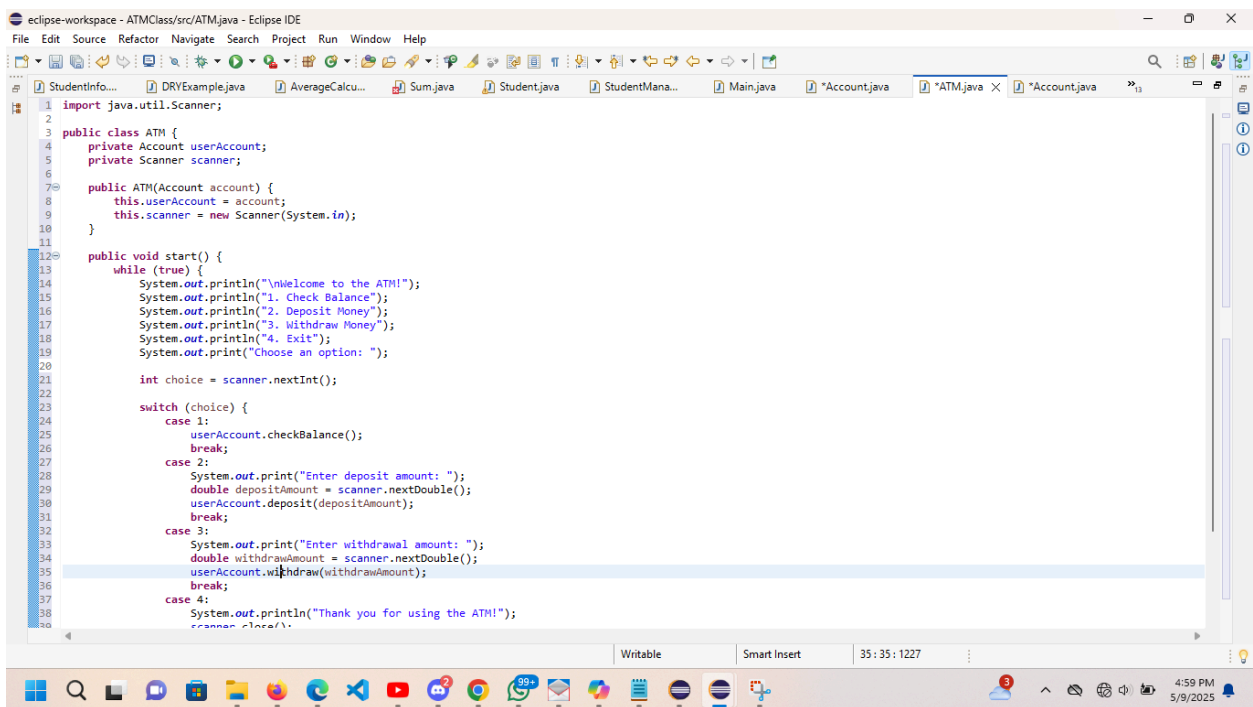
Code Structure:

We'll create:

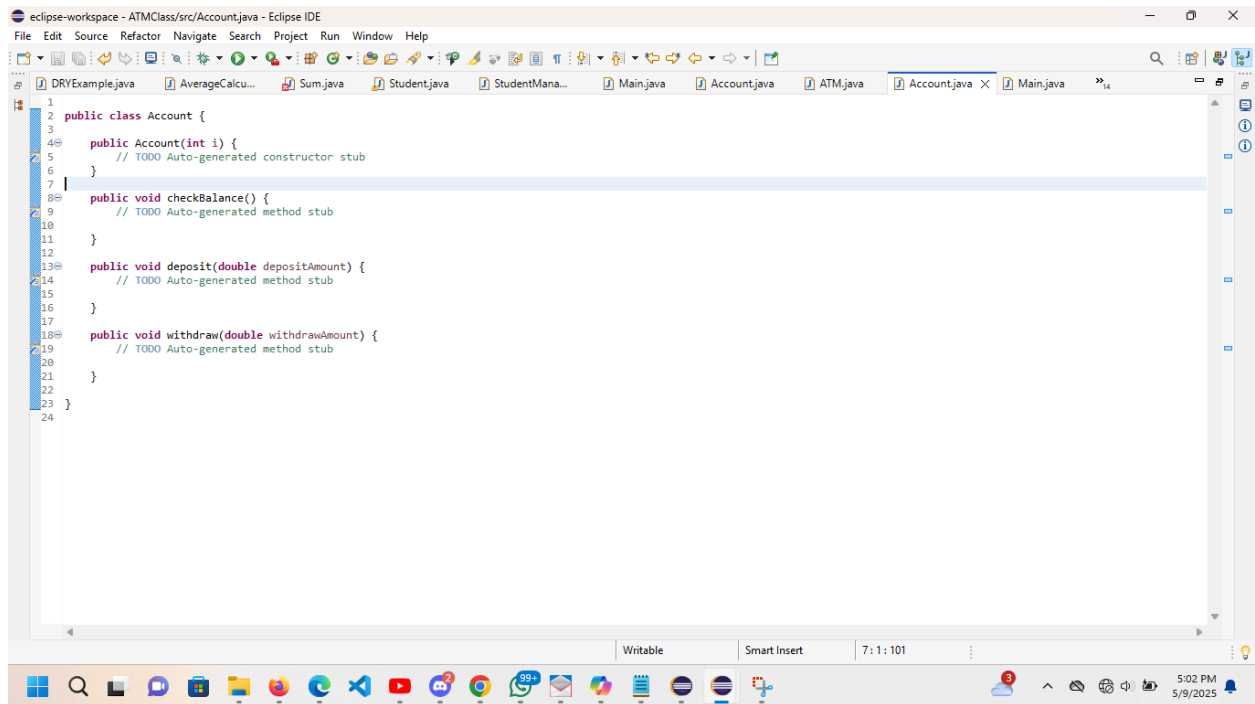
- An Account class to handle balance operations.



- An ATM class for the user interface.



- A Main class to run the program.



The screenshot shows the Eclipse IDE interface. The title bar reads "eclipse-workspace - ATMClass/src/Account.java - Eclipse IDE". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, and Help. The toolbar contains various icons for file operations, editing, and running. The project explorer on the left shows a package named "ATMClass" containing several Java files: DRYExample.java, AverageCalcu..., Sum.java, Student.java, StudentMana..., Main.java, Account.java, ATM.java, and Account.java X. The editor window displays the content of "Account.java", which is a Java class with the following code:

```
1 public class Account {
2
3
4     public Account(int i) {
5         // TODO Auto-generated constructor stub
6     }
7
8     public void checkBalance() {
9         // TODO Auto-generated method stub
10    }
11
12
13    public void deposit(double depositAmount) {
14        // TODO Auto-generated method stub
15    }
16
17
18    public void withdraw(double withdrawAmount) {
19        // TODO Auto-generated method stub
20    }
21
22
23 }
24
```

The status bar at the bottom indicates "Writable", "Smart Insert", and the cursor position "7: 1: 101". The Windows taskbar at the very bottom shows the time as 5:02 PM on 5/9/2025.

```
Welcome to the ATM!
1. Check Balance
2. Deposit Money
3. Withdraw Money
4. Exit
Choose an option: 1
Current balance: $1000

Choose an option: 2
Enter deposit amount: 500
Deposit successful! Current balance: $1500

Choose an option: 3
Enter withdrawal amount: 300
Withdrawal successful! Current balance: $1200
```