

### Inheritance

```
class Animal {
    void eat() {
        System.out.println("eat");
    }
}
class Dog extends Animal {
    void bark() {
        System.out.println("bark");
    }
}
```

### Interface

```
interface Animal {
    void sound();
}
class Dog implements Animal {
    public void sound() {
        System.out.println("bark");
    }
}
```

### Abstract

```
abstract class Animal {
    abstract void sound();
    void eat() {
        System.out.println("eat");
    }
}
class Dog extends Animal {
    void sound() {
        System.out.println("bark");
    }
}
```

### Exception

```
public class UsedCarException extends
    Exception {
    private static final long serialVersionUID =
        1L;
    public UsedCarException(String message) {
        super(message);
    }
}
```

### Working with Files

```
public class UsedCarApp {
    public static void writeToFile(
        ArrayList<UsedCar> cars,
        String fileName) {
        try {
            PrintWriter writer =
                new PrintWriter(
                    new FileWriter(
                        fileName));
            for (UsedCar car : cars) {
                writer.println(
                    car.toString());
            }
            writer.close();
            System.out.println(
                "\nSuccessfully saved
                valid cars to file.");
        } catch (IOException e) {
            System.out.println(
                "Error writing to file: " +
                e.getMessage());
        }
    }
    public static void readFromFile(
        String fileName) {
        try {
            Scanner fileInput =
                new Scanner(
                    new File(
                        fileName));
            System.out.println(
                "\nVIN and Price from
                file:");
            while (fileInput.hasNextLine()) {
                String line =
                    fileInput.nextLine();
                String[] parts =
                    line.split(",");
                if (parts.length == 4) {
                    String vin =
                        parts[0];
                    String price =
                        parts[3];
                    System.out.println(
                        "VIN: " + vin +
                        " | Price: " +
                        price);
                }
            }
            fileInput.close();
        } catch (FileNotFoundException e) {
            System.out.println(
                "Error reading file: " +
                e.getMessage());
        }
    }
    public static void main(
        String[] args) {
        Scanner input =
            new Scanner(
                System.in);
        ArrayList<UsedCar>
            validCars =
                new ArrayList<>();
    }
}
```

### Working with Files (cont)

```
final int NUMBER_OF_CARS = 3;
for (int i = 0; i < NUMBER_OF_CARS; i++) {
    try {
        System.out.println(
            "\nEnter information for
            car #" + (i + 1));
        System.out.print(
            "Enter VIN (4 digits): ");
        String vin =
            input.nextLine();
        System.out.print(
            "Enter make: ");
        String make =
            input.nextLine();
        System.out.print(
            "Enter year: ");
        int year =
            Integer.parseInt(
                input.nextLine());
        System.out.print(
            "Enter price: ");
        double price =
            Double.parseDouble(
                input.nextLine());
        UsedCar car =
            new UsedCar(
                vin, make,
                year, price);
        validCars.add(car);
        System.out.println(
            "Car created successfully.");
    } catch (UsedCarException e) {
        System.out.println(
            "UsedCarException: " +
            e.getMessage());
    } catch (Exception e) {
        System.out.println(
            "Exception: Invalid input.
            " + e.getMessage());
    }
}
String fileName =
    "UsedCars.txt";
writeToFile(
    validCars,
    fileName);
readFromFile(
    fileName);
input.close();
}
```

### JDBC

```
module-info.java >
module FinalTermPractice {
    requires java.sql;
}
```

sally sung

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### JDBC

```
import java.sql.*;
public class EmployeeDBApp {
    private static final String DB_FILE = "EmployeeDB.accdb";
    private static final String DB_URL = "jdbc:ucanaccess://" + DB_FILE;
    public static Connection getConnection()
    throws SQLException, ClassNotFoundException {
        Class.forName("net.ucanaccess.jdbc.UcanaccessDriver");
        return DriverManager.getConnection(DB_URL);
    }
    public static void insertEmployee(Scanner input) {
        Connection conn = null;
        Statement statement = null;
        try {
            conn = getConnection();
            statement = conn.createStatement();
            System.out.print("Enter employee name: ");
            String name = input.nextLine();
            System.out.print("Enter employee salary: ");
            double salary = Double.parseDouble(input.nextLine());
            String insertQ = "INSERT INTO Employee (Name, Salary) VALUES (" + name + ", " + salary + ")";
            statement.executeUpdate(insertQ);
            System.out.println("Employee inserted successfully.");
        } catch (ClassNotFoundException ex) {
            System.out.println("Driver error: " + ex.getMessage());
        } catch (SQLException ex) {
            System.out.println("Database error: " + ex.getMessage());
        } catch (Exception ex) {
            System.out.println("Input error: " + ex.getMessage());
        } finally {
            try {
                if (statement != null)
```

### JDBC (cont)

```
statement.close();
        if (conn != null)
            conn.close();
    } catch (SQLException ex) {
        System.out.println(ex.getMessage());
    }
}
public static void updateEmployeeSalary(Scanner input) {
    Connection conn = null;
    Statement statement = null;
    try {
        conn = getConnection();
        statement = conn.createStatement();
        System.out.print("Enter employee name to update: ");
        String name = input.nextLine();
        System.out.print("Enter new salary: ");
        double salary = Double.parseDouble(input.nextLine());
        String updateQ = "UPDATE Employee SET Salary = " + salary + " WHERE Name = " + name + """;
        int rows = statement.executeUpdate(updateQ);
        if (rows > 0) {
            System.out.println("Salary updated successfully.");
        } else {
            System.out.println("Employee not found.");
        }
    } catch (ClassNotFoundException ex) {
        System.out.println("Driver error: " + ex.getMessage());
    } catch (SQLException ex) {
        System.out.println("Database error: " + ex.getMessage());
    } catch (Exception ex) {
        System.out.println("Input error: " + ex.getMessage());
    } finally {
```

### JDBC (cont)

```
try {
        if (statement != null)
            statement.close();
        if (conn != null)
            conn.close();
    } catch (SQLException ex) {
        System.out.println(ex.getMessage());
    }
}
public static void deleteEmployee(Scanner input) {
    Connection conn = null;
    Statement statement = null;
    try {
        conn = getConnection();
        statement = conn.createStatement();
        System.out.print("Enter employee name to delete: ");
        String name = input.nextLine();
        String deleteQ = "DELETE FROM Employee WHERE Name = " + name + """;
        int rows = statement.executeUpdate(deleteQ);
        if (rows > 0) {
            System.out.println("Employee deleted successfully.");
        } else {
            System.out.println("Employee not found.");
        }
    } catch (ClassNotFoundException ex) {
        System.out.println("Driver error: " + ex.getMessage());
    } catch (SQLException ex) {
        System.out.println("Database error: " + ex.getMessage());
    } catch (Exception ex) {
        System.out.println("Input error: " + ex.getMessage());
    } finally {
        try {
            if (statement != null)
                statement.close();
```

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### JDBC (cont)

```

if (conn != null)
conn.close();
} catch (SQLException ex) {
System.out.println(ex.getMessage());
}
}
}

public static void displayAllEmployees() {
Connection conn = null;
Statement statement = null;
ResultSet rs = null;
ArrayList<Employee> employees = new
ArrayList<Employee>();
try {
conn = getConnection();
statement = conn.createStatement();
String query = "SELECT * FROM Employ-
ee";
rs = statement.executeQuery(query);
while (rs.next()) {
int id = rs.getInt("ID");
String name = rs.getString("Name");
double salary = rs.getDouble("Salary");
Employee emp = new Employee(id, name,
salary);
employees.add(emp);
}
if (employees.size() == 0) {
System.out.println("No employee records
found.");
} else {
System.out.println("\n--- All Employees ---");
for (Employee emp : employees) {
System.out.println("ID: " + emp.getId()
+ ", Name: " + emp.getName()
+ ", Salary: " + emp.getSalary());
}
}
} catch (ClassNotFoundException ex) {
System.out.println("Driver error: " + ex.get-
Message());
} catch (SQLException ex) {
System.out.println("Database error: " +
ex.getMessage());
} finally {

```

### JDBC (cont)

```

try {
if (rs != null)
rs.close();
if (statement != null)
statement.close();
if (conn != null)
conn.close();
} catch (SQLException ex) {
System.out.println(ex.getMessage());
}
}

public static void showMenu() {
System.out.println("\n===== Employee
Database Menu =====");
System.out.println("1. Insert Employee");
System.out.println("2. Update Employee
Salary");
System.out.println("3. Delete Employee");
System.out.println("4. Display All Employ-
ees");
System.out.println("5. Exit");
System.out.print("Enter your choice: ");
}

public static void main(String[] args) {
Scanner input = new Scanner(System.in);
int choice = 0;
do {
showMenu();
try {
choice = Integer.parseInt(input.nextLine());
switch (choice) {
case 1:
insertEmployee(input);
break;
case 2:
updateEmployeeSalary(input);
break;
case 3:
deleteEmployee(input);
break;
case 4:
displayAllEmployees();

```

### JDBC (cont)

```

break;
case 5:
System.out.println("Program terminated.");
break;
default:
System.out.println("Invalid choice. Please
enter a number from 1 to 5.");
}
} catch (Exception ex) {
System.out.println("Invalid input. Please
enter a valid number.");
}
} while (choice != 5);
input.close();
}
}

```