ЛАБОРАТОРНА РОБОТА №1.
СТВОРЕННЯ КЛАСІВ JAVA

Мета:

Створити програму, що забезпечить накопичення даних про бруси, формування довідника деревини та підрахунок сумарної накопиченої ваги накопичених брусів.

Створені класи:

Wood:

```java
package com.excore.java_lab_1.model;

public class Wood {
    private final int id;
    private final String name;
    private final float density;

    public Wood(int id, String name, float density) {
        this.id = id;
        this.name = name;
        this.density = density;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public float getDensity() {
        return density;
    }

    @Override
    public String toString() {
        return "Wood{" +
                "id=" + id +
                ", name='" + name + '\'' +
                ", density=" + density +
                '}';
    }
}
```

Timber:

```java
package com.excore.java_lab_1.model;

public class Timber {
    private final Wood wood;
    private final float length;
    private final float height;
    private final float width;

    public Timber(Wood wood, float length, float height, float width) {
        this.wood = wood;
        this.length = length;
        this.height = height;
        this.width = width;
    }

    public Wood getWood() {
        return wood;
    }

    public float getLength() {
        return length;
    }

    public float getHeight() {
        return height;
    }

    public float getWidth() {
        return width;
    }

    public float volume() {
        return length * height * width;
    }

    public float weight() {
        return volume() * wood.getDensity();
    }

    @Override
    public String toString() {
        return "Timber{" +
                "wood=" + wood.getName() +
                ", weight=" + weight() +
                '}';
    }
}
```

WoodDirectory:

```java
package com.excore.java_lab_1.store;

import com.excore.java_lab_1.model.Wood;

import java.util.Arrays;

public class WoodDirectory {
    private int count = 0;
    private Wood[] arr = new Wood[3];

    {
        arr[0] = new Wood(1, "Модрина", 1.1f);
        arr[1] = new Wood(2, "Ялина", 0.9f);
        arr[2] = new Wood(3, "Сосна", 0.7f);
        count = 3;
    }

    public Wood[] getArr() {
        return Arrays.copyOf(arr, count);
    }

    public Wood get(int id) {
        for (int i = 0; i < count; i++) {
            if (arr[i].getId() == id) {
                return arr[i];
            }
        }
        return null; // Not found
    }

    public boolean add(Wood newWood) {
        if (get(newWood.getId()) != null) {
            return false; // Id already present
        }

        if (arr.length == count) {
            arr = Arrays.copyOf(arr, count + count / 2);
        }
        arr[count++] = newWood;
        return true;
    }

    @Override
    public String toString() {
        StringBuilder sb = new StringBuilder("Каталог деревини:\n");

        for (int i = 0; i < count; i++) {
            sb.append(arr[i]).append('\n');
        }
        return sb.toString();
    }
}
```

ProductStore:

```java
package com.excore.java_lab_1.store;

import com.excore.java_lab_1.model.Timber;

import java.util.ArrayList;
import java.util.Arrays;

public class ProductStore {
    private int count = 0;
    private Timber[] arr = new Timber[3];

    public Timber[] getArr() {
        return Arrays.copyOf(arr, count);
    }

    public Timber get(int idx) {
        if (idx >= 0 && idx < count) {
            return arr[idx];
        }
        return null; // Out of range
    }

    public void add(Timber newTimber) {
        if (arr.length == count) {
            arr = Arrays.copyOf(arr, count + count / 2);
        }
        arr[count++] = newTimber;
    }

    @Override
    public String toString() {
        StringBuilder sb = new StringBuilder("Перелік брусів:\n");

        for (int i = 0; i < count; i++) {
            sb.append(arr[i]).append('\n');
        }
        return sb.toString();
    }
}
```

TestApp:

```java
package com.excore.java_lab_1.test;

import com.excore.java_lab_1.model.Timber;
import com.excore.java_lab_1.model.Wood;
import com.excore.java_lab_1.store.ProductStore;
import com.excore.java_lab_1.store.WoodDirectory;

public class TestApp {
    private WoodDirectory wd = new WoodDirectory();
    private ProductStore ps = new ProductStore();

    private float calcWeight() {
        float result = 0f;
        for (Timber t :
                ps.getArr()) {
            result += t.weight();
        }
        return result;
    }

    private void startApp() {
        ps.add(new Timber(wd.get(1), 5f, 0.5f, 0.4f));
        ps.add(new Timber(wd.get(2), 10f, 0.5f, 0.4f));

        System.out.println(wd);
        System.out.println(ps);

        System.out.printf("Загальна вага: %1.3f", calcWeight());
    }

    public static void main(String[] args) {
        TestApp app = new TestApp();
        app.startApp();
    }
}
```

TestByConsole:

```java
package com.excore.java_lab_1.test;

import com.excore.java_lab_1.model.Timber;
import com.excore.java_lab_1.model.Wood;
import com.excore.java_lab_1.store.ProductStore;
import com.excore.java_lab_1.store.WoodDirectory;

import java.util.Scanner;

public class TestByConsole {
    private WoodDirectory wd = new WoodDirectory();
    private ProductStore ps = new ProductStore();

    private void addWood() {
        Scanner s = new Scanner(System.in);
        int id;
        String name;
        float density;

        System.out.print("Id: ");
        id = s.nextInt();
        s.nextLine();
        System.out.print("Name: ");
        name = s.nextLine();
        System.out.print("Density: ");
        density = s.nextFloat();
        s.nextLine();
        if (wd.add(new Wood(id, name, density))) {
            System.out.println("Wood added");
        } else {
            System.out.println("Wood with id " + id + " already exists");
        }
    }

    private void addTimber() {
        Scanner s = new Scanner(System.in);
        int id;
        float l, h, w;

        System.out.print("Id: ");
        id = s.nextInt();
        s.nextLine();
        System.out.print("Length: ");
        l = s.nextFloat();
        s.nextLine();
        System.out.print("Height: ");
        h = s.nextFloat();
        s.nextLine();
        System.out.print("Width: ");
        w = s.nextFloat();
        s.nextLine();
        Wood wood = wd.get(id);
        if (wood != null) {
            ps.add(new Timber(wood, l, h, w));
            System.out.println("Timber added");
        } else {
            System.out.println("Wood not found");
        }
    }
```

Продовження:

```
    private void calcWeight() {
        float result = 0f;
        for (Timber t :
                ps.getArr()) {
            result += t.weight();
        }
        System.out.printf("Total weight: %1.3f\n", result);
    }

    private void startApp() {
        System.out.println("/ / / Timber management system \\ \\ \\");

        while (true) {
            System.out.println("\nMenu:");
            System.out.println("1: Add wood");
            System.out.println("2: Add timber");
            System.out.println("3: Calculate total weight");
            System.out.println("4: Exit");
            Scanner s = new Scanner(System.in);
            int choice = s.nextInt();
            s.nextLine();

            switch (choice) {
                case 1:
                    addWood();
                    break;
                case 2:
                    addTimber();
                    break;
                case 3:
                    calcWeight();
                    break;
                case 4:
                    return;
            }
        }
    }

    public static void main(String[] args) {
        TestByConsole app = new TestByConsole();
        app.startApp();
    }
}
```

Тестування:

За допомогою класу TestApp:

```
Каталог деревини:
Wood{id=1, name='Модрина', density=1.1}
Wood{id=2, name='Ялина', density=0.9}
Wood{id=3, name='Сосна', density=0.7}

Перелік брусів:
Timber{wood=Модрина, weight=1.1}
Timber{wood=Ялина, weight=1.8}

Загальна вага: 2,900
```

За допомогою класу TestByConsole:

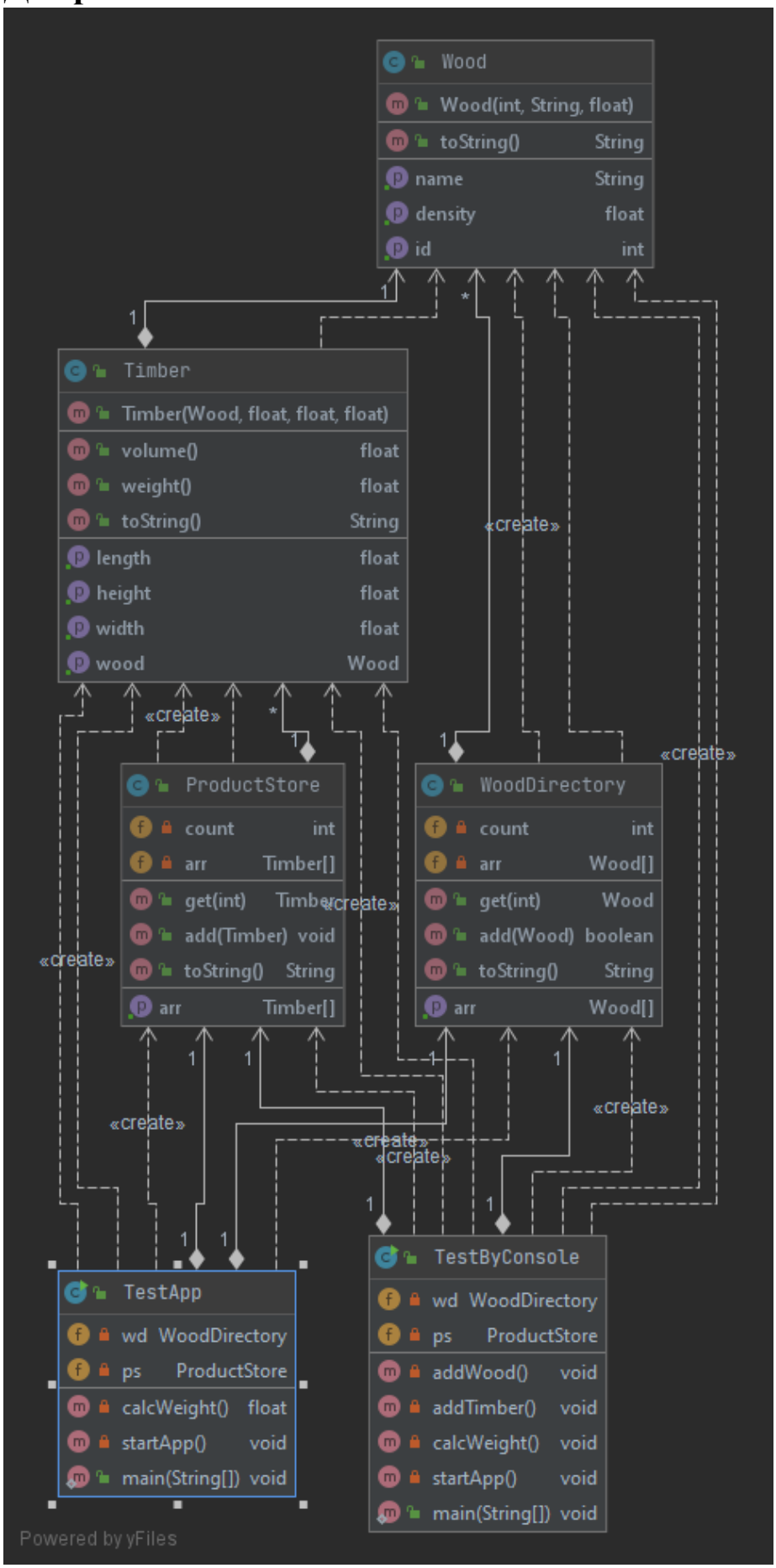
```
/ / / Timber management system \ \ \

Menu:
1: Add wood
2: Add timber
3: Calculate total weight
4: Exit
2
Id: 2
Length: 2,6
Height: 4,4
Width: 1
Timber added

Menu:
1: Add wood
2: Add timber
3: Calculate total weight
4: Exit
3
Total weight: 10,296

Menu:
1: Add wood
2: Add timber
3: Calculate total weight
4: Exit
4
```

Діаграма класів:



Висновки:

На цій лабораторній роботі я створив додаток для обліку інформації про бруси, а також інформації про деревину з якої вони зроблені. Під час виконання роботи я навчився працювати з класами Java, а також використовувати засоби генерації коду середовища IntelliJ IDEA.