МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ
«БРЕСТСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

ФАКУЛЬТЕТ ЭЛЕКТРОННО-ИНФОРМАЦИОННЫХ СИСТЕМ

Кафедра интеллектуальных информационных технологий

Отчет по лабораторной работе №4

Специальность ПО5

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«___» _________ 2021 г.

Брест 2021

Цель работы: Приобрести практические навыки в области объектно-ориентированного проектирования.

Вариант 5.

Задание 1.

Требования к выполнению:

- Реализовать указанный класс, включив в него вспомогательный внутренний класс или классы.
- Реализовать 2-3 метода (на выбор).
- Продемонстрировать использование реализованных классов.

5) Создать класс Department (отдел фирмы) с внутренним классом, с помощью объектов которого можно хранить информацию обо всех должностях отдела и обо всех сотрудниках, когда-либо занимавших конкретную должность.

Спецификация ввода:

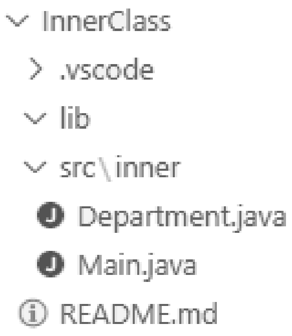
-

Спецификация вывода:

<параметры функций System.out.println() (содержимое полей объектов)>

…

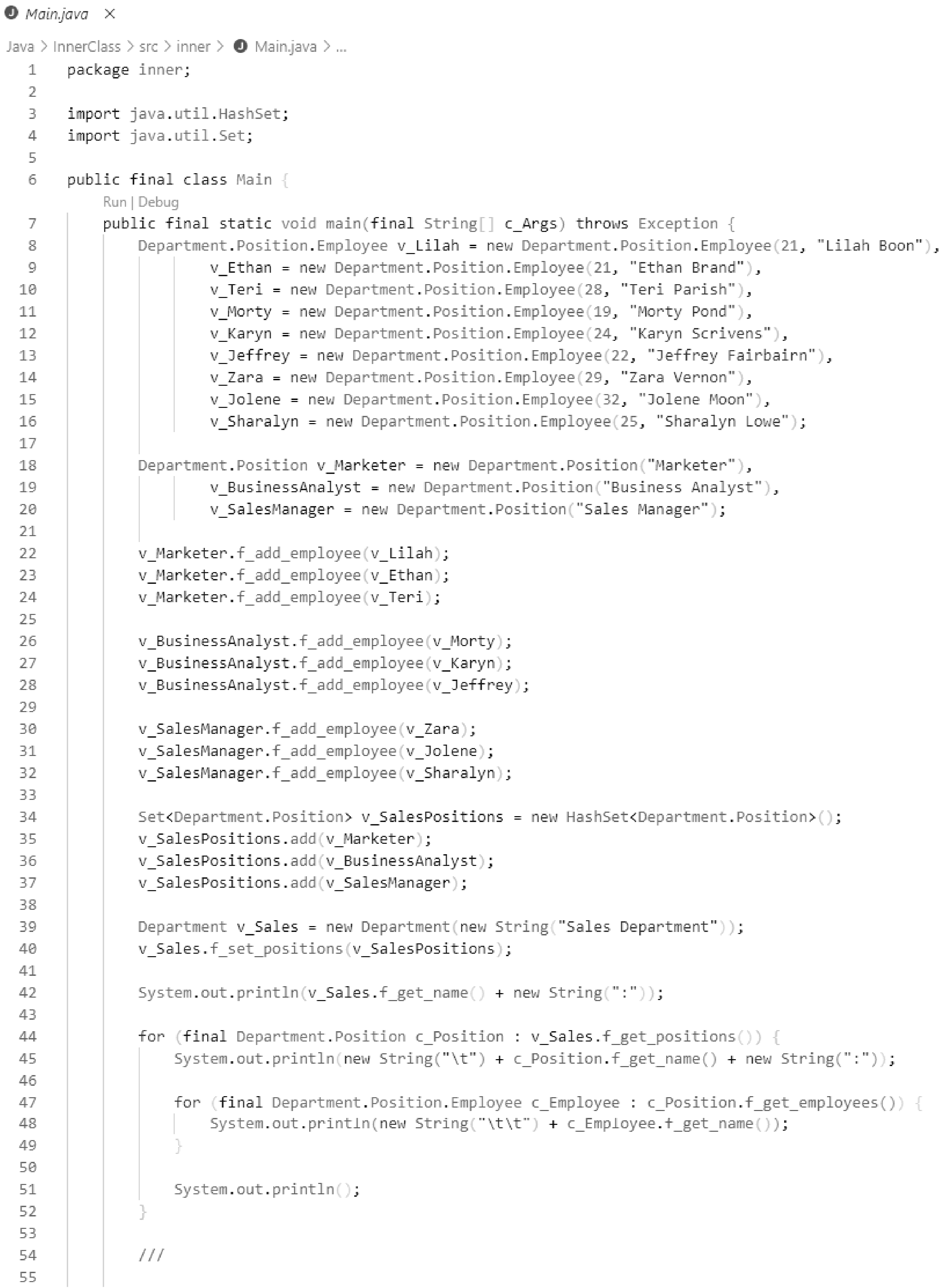
Структура проекта:



```
InnerClass
  .vscode
  lib
  src\inner
    Department.java
    Main.java
  README.md
```

Рисунок 1.1 - Структура проекта.

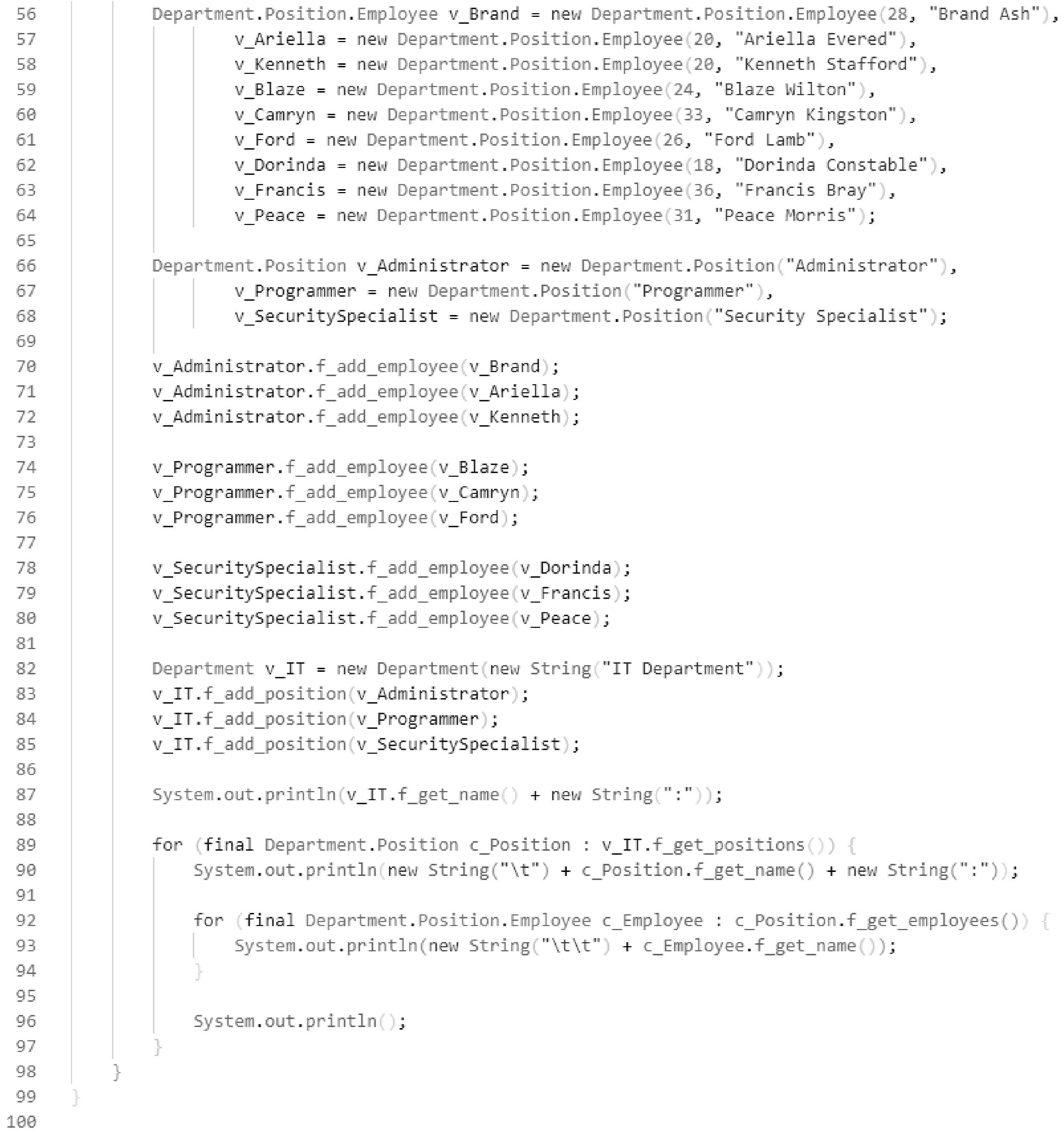
Код программы:



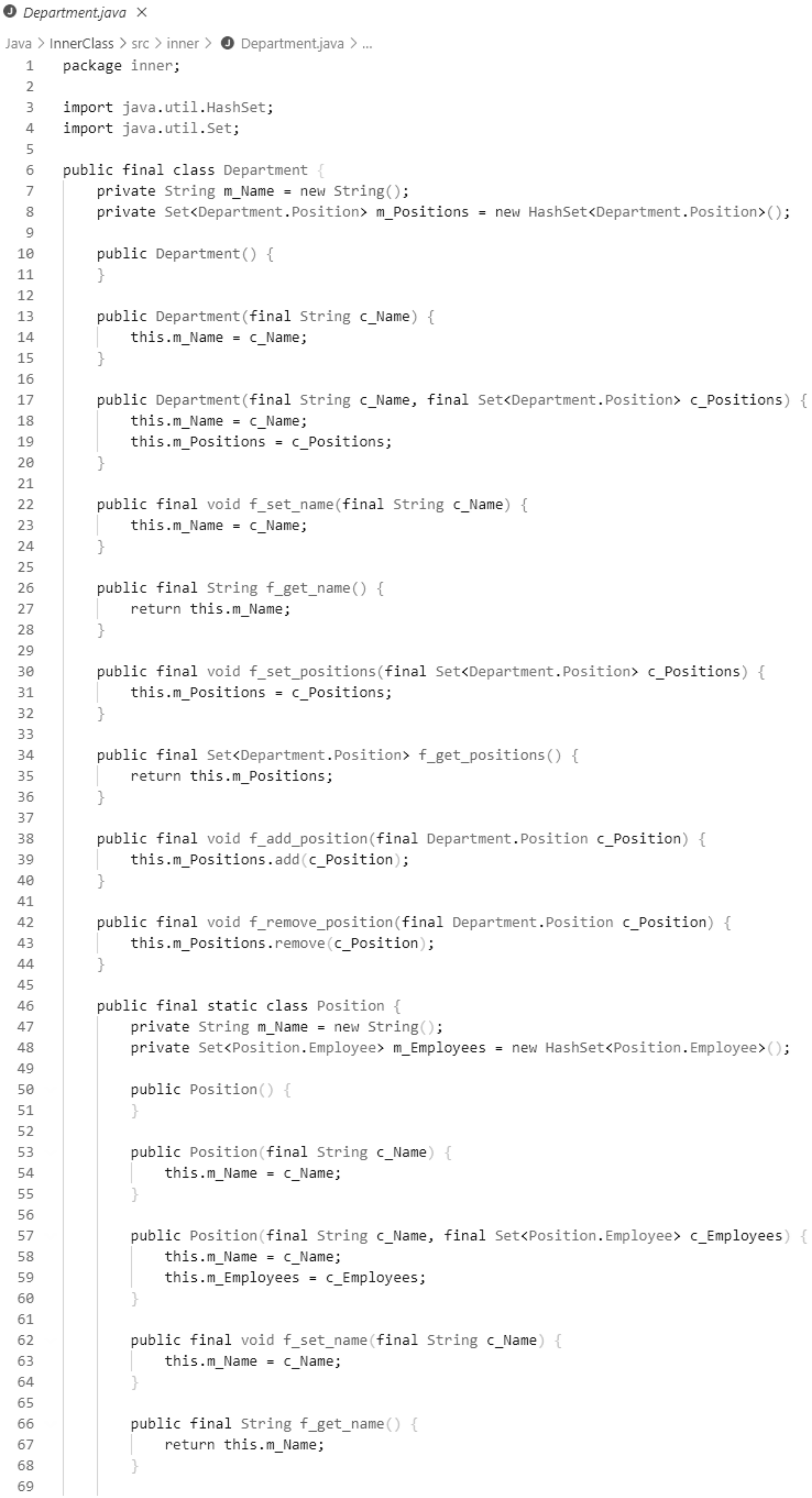
```java
package inner;

import java.util.HashSet;
import java.util.Set;

public final class Main {
    public final static void main(final String[] c_Args) throws Exception {
        Department.Position.Employee v_Lilah = new Department.Position.Employee(21, "Lilah Boon"),
                v_Ethan = new Department.Position.Employee(21, "Ethan Brand"),
                v_Teri = new Department.Position.Employee(28, "Teri Parish"),
                v_Morty = new Department.Position.Employee(19, "Morty Pond"),
                v_Karyn = new Department.Position.Employee(24, "Karyn Scrivens"),
                v_Jeffrey = new Department.Position.Employee(22, "Jeffrey Fairbairn"),
                v_Zara = new Department.Position.Employee(29, "Zara Vernon"),
                v_Jolene = new Department.Position.Employee(32, "Jolene Moon"),
                v_Sharalyn = new Department.Position.Employee(25, "Sharalyn Lowe");

        Department.Position v_Marketer = new Department.Position("Marketer"),
                v_BusinessAnalyst = new Department.Position("Business Analyst"),
                v_SalesManager = new Department.Position("Sales Manager");

        v_Marketer.f_add_employee(v_Lilah);
        v_Marketer.f_add_employee(v_Ethan);
        v_Marketer.f_add_employee(v_Teri);

        v_BusinessAnalyst.f_add_employee(v_Morty);
        v_BusinessAnalyst.f_add_employee(v_Karyn);
        v_BusinessAnalyst.f_add_employee(v_Jeffrey);

        v_SalesManager.f_add_employee(v_Zara);
        v_SalesManager.f_add_employee(v_Jolene);
        v_SalesManager.f_add_employee(v_Sharalyn);

        Set<Department.Position> v_SalesPositions = new HashSet<Department.Position>();
        v_SalesPositions.add(v_Marketer);
        v_SalesPositions.add(v_BusinessAnalyst);
        v_SalesPositions.add(v_SalesManager);

        Department v_Sales = new Department(new String("Sales Department"));
        v_Sales.f_set_positions(v_SalesPositions);

        System.out.println(v_Sales.f_get_name() + new String(":"));

        for (final Department.Position c_Position : v_Sales.f_get_positions()) {
            System.out.println(new String("\t") + c_Position.f_get_name() + new String(":"));

            for (final Department.Position.Employee c_Employee : c_Position.f_get_employees()) {
                System.out.println(new String("\t\t") + c_Employee.f_get_name());
            }

            System.out.println();
        }

        ///

```

Рисунок 1.2 - Содержимое файла Main.java.

Продолжение рисунка 1.2.



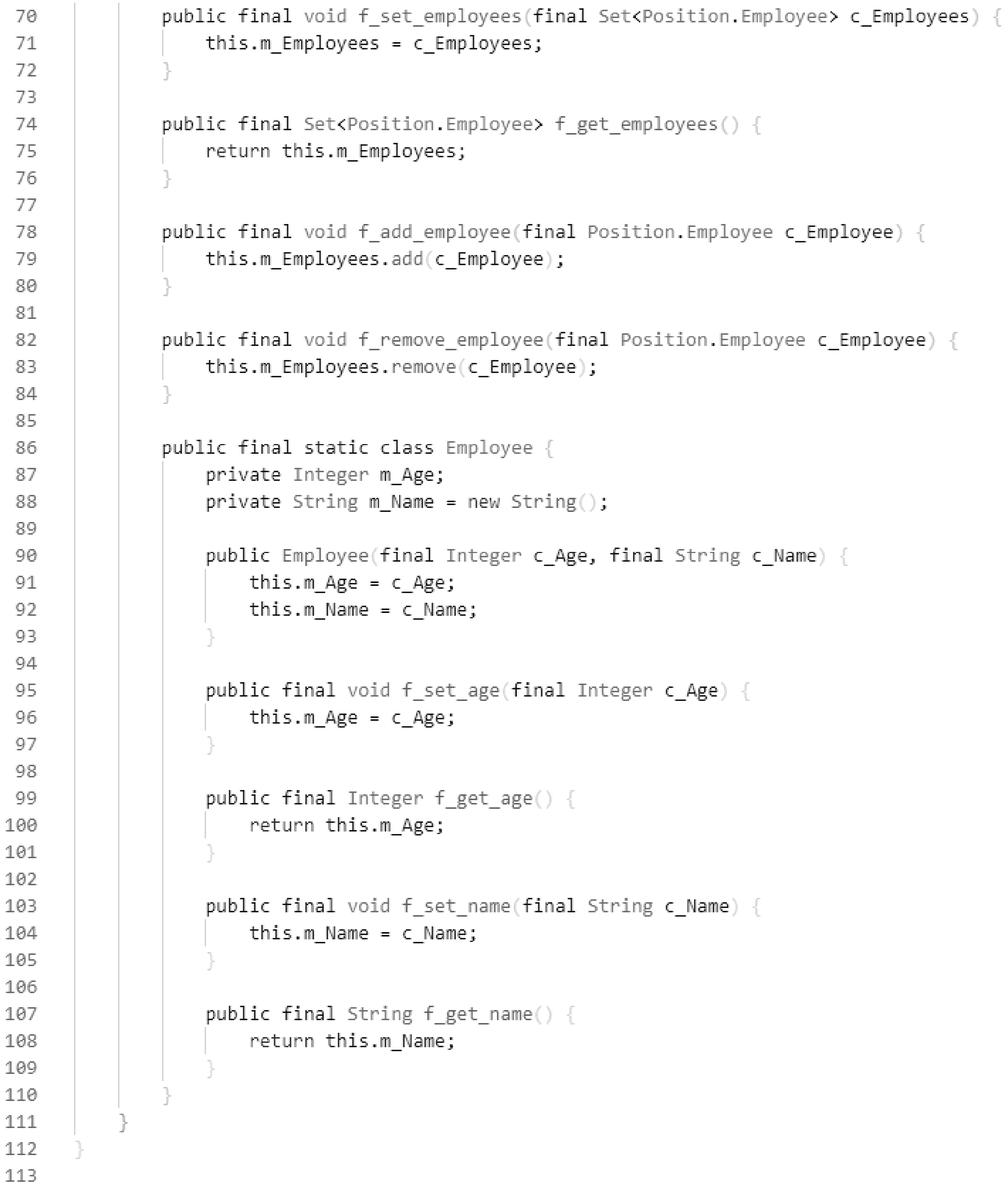
```
        Department.Position.Employee v_Brand = new Department.Position.Employee(28, "Brand Ash"),
                v_Ariella = new Department.Position.Employee(20, "Ariella Evered"),
                v_Kenneth = new Department.Position.Employee(20, "Kenneth Stafford"),
                v_Blaze = new Department.Position.Employee(24, "Blaze Wilton"),
                v_Camryn = new Department.Position.Employee(33, "Camryn Kingston"),
                v_Ford = new Department.Position.Employee(26, "Ford Lamb"),
                v_Dorinda = new Department.Position.Employee(18, "Dorinda Constable"),
                v_Francis = new Department.Position.Employee(36, "Francis Bray"),
                v_Peace = new Department.Position.Employee(31, "Peace Morris");

        Department.Position v_Administrator = new Department.Position("Administrator"),
                v_Programmer = new Department.Position("Programmer"),
                v_SecuritySpecialist = new Department.Position("Security Specialist");

        v_Administrator.f_add_employee(v_Brand);
        v_Administrator.f_add_employee(v_Ariella);
        v_Administrator.f_add_employee(v_Kenneth);

        v_Programmer.f_add_employee(v_Blaze);
        v_Programmer.f_add_employee(v_Camryn);
        v_Programmer.f_add_employee(v_Ford);

        v_SecuritySpecialist.f_add_employee(v_Dorinda);
        v_SecuritySpecialist.f_add_employee(v_Francis);
        v_SecuritySpecialist.f_add_employee(v_Peace);

        Department v_IT = new Department(new String("IT Department"));
        v_IT.f_add_position(v_Administrator);
        v_IT.f_add_position(v_Programmer);
        v_IT.f_add_position(v_SecuritySpecialist);

        System.out.println(v_IT.f_get_name() + new String(":"));

        for (final Department.Position c_Position : v_IT.f_get_positions()) {
            System.out.println(new String("\t") + c_Position.f_get_name() + new String(":"));

            for (final Department.Position.Employee c_Employee : c_Position.f_get_employees()) {
                System.out.println(new String("\t\t") + c_Employee.f_get_name());
            }

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



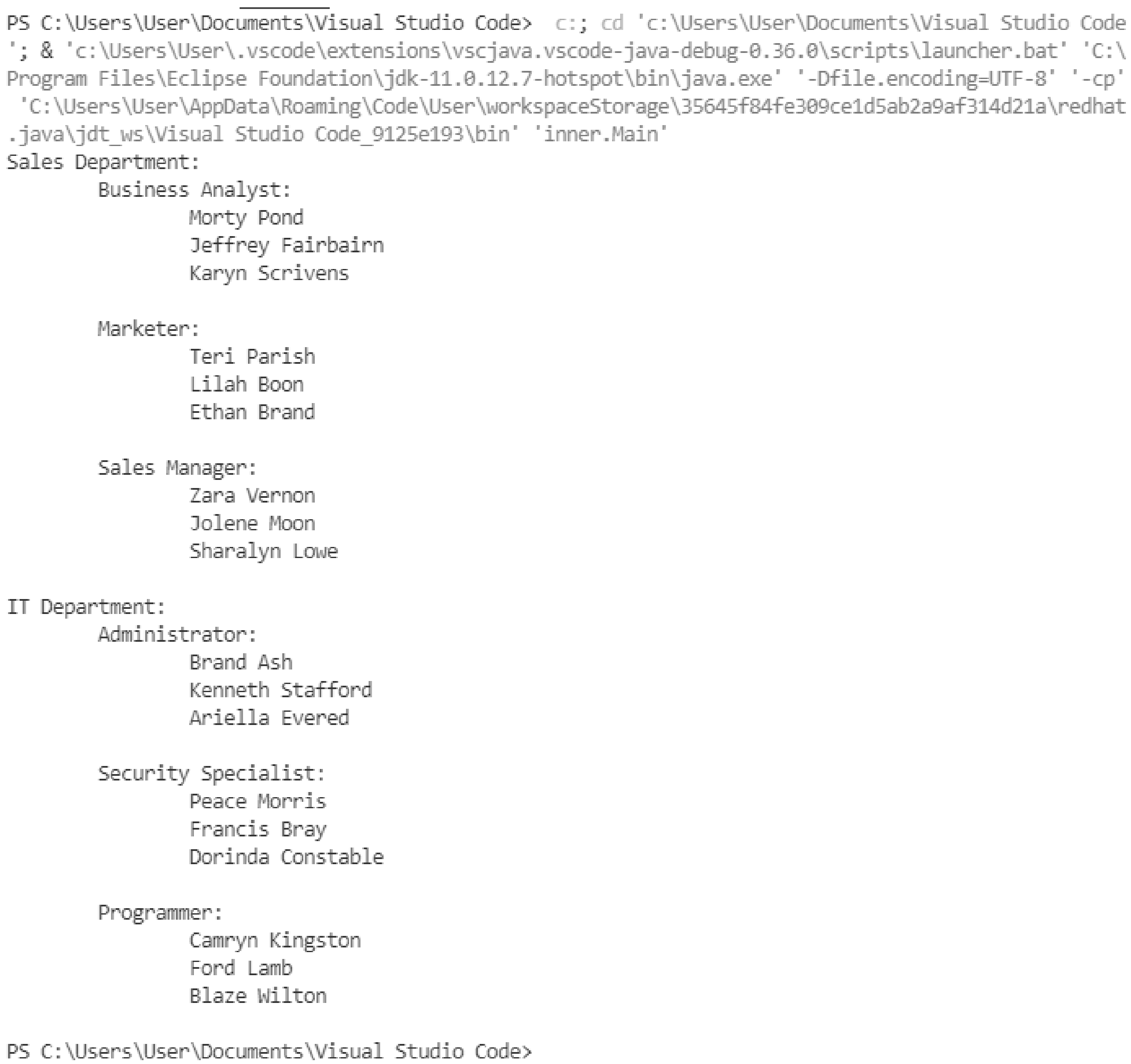
```java
package inner;

import java.util.HashSet;
import java.util.Set;

public final class Department {
    private String m_Name = new String();
    private Set<Department.Position> m_Positions = new HashSet<Department.Position>();

    public Department() {
    }

    public Department(final String c_Name) {
        this.m_Name = c_Name;
    }

    public Department(final String c_Name, final Set<Department.Position> c_Positions) {
        this.m_Name = c_Name;
        this.m_Positions = c_Positions;
    }

    public final void f_set_name(final String c_Name) {
        this.m_Name = c_Name;
    }

    public final String f_get_name() {
        return this.m_Name;
    }

    public final void f_set_positions(final Set<Department.Position> c_Positions) {
        this.m_Positions = c_Positions;
    }

    public final Set<Department.Position> f_get_positions() {
        return this.m_Positions;
    }

    public final void f_add_position(final Department.Position c_Position) {
        this.m_Positions.add(c_Position);
    }

    public final void f_remove_position(final Department.Position c_Position) {
        this.m_Positions.remove(c_Position);
    }

    public final static class Position {
        private String m_Name = new String();
        private Set<Position.Employee> m_Employees = new HashSet<Position.Employee>();

        public Position() {
        }

        public Position(final String c_Name) {
            this.m_Name = c_Name;
        }

        public Position(final String c_Name, final Set<Position.Employee> c_Employees) {
            this.m_Name = c_Name;
            this.m_Employees = c_Employees;
        }

        public final void f_set_name(final String c_Name) {
            this.m_Name = c_Name;
        }

        public final String f_get_name() {
            return this.m_Name;
        }

```

Рисунок 1.3 - Содержимое файла Department.java.

Продолжение рисунка 1.3.



```
        public final void f_set_employees(final Set<Position.Employee> c_Employees) {
            this.m_Employees = c_Employees;
        }

        public final Set<Position.Employee> f_get_employees() {
            return this.m_Employees;
        }

        public final void f_add_employee(final Position.Employee c_Employee) {
            this.m_Employees.add(c_Employee);
        }

        public final void f_remove_employee(final Position.Employee c_Employee) {
            this.m_Employees.remove(c_Employee);
        }

        public final static class Employee {
            private Integer m_Age;
            private String m_Name = new String();

            public Employee(final Integer c_Age, final String c_Name) {
                this.m_Age = c_Age;
                this.m_Name = c_Name;
            }

            public final void f_set_age(final Integer c_Age) {
                this.m_Age = c_Age;
            }

            public final Integer f_get_age() {
                return this.m_Age;
            }

            public final void f_set_name(final String c_Name) {
                this.m_Name = c_Name;
            }

            public final String f_get_name() {
                return this.m_Name;
            }
        }
    }
}

```



```
PS C:\Users\User\Documents\Visual Studio Code>  c:; cd 'c:\Users\User\Documents\Visual Studio Code
'; & 'c:\Users\User\.vscode\extensions\vscjava.vscode-java-debug-0.36.0\scripts\launcher.bat' 'C:\
Program Files\Eclipse Foundation\jdk-11.0.12.7-hotspot\bin\java.exe' '-Dfile.encoding=UTF-8' '-cp'
 'C:\Users\User\AppData\Roaming\Code\User\workspaceStorage\35645f84fe309ce1d5ab2a9af314d21a\redhat
.java\jdt_ws\Visual Studio Code_9125e193\bin' 'inner.Main'
Sales Department:
        Business Analyst:
                Morty Pond
                Jeffrey Fairbairn
                Karyn Scrivens

        Marketer:
                Teri Parish
                Lilah Boon
                Ethan Brand

        Sales Manager:
                Zara Vernon
                Jolene Moon
                Sharalyn Lowe

IT Department:
        Administrator:
                Brand Ash
                Kenneth Stafford
                Ariella Evered

        Security Specialist:
                Peace Morris
                Francis Bray
                Dorinda Constable

        Programmer:
                Camryn Kingston
                Ford Lamb
                Blaze Wilton

PS C:\Users\User\Documents\Visual Studio Code>
```

Рисунок 1.4 - Результат выполнения программы.

Задание 2.

Требования к выполнению:

• Реализовать агрегирование.

• При создании класса агрегируемый класс объявляется как атрибут (локальная переменная, параметр метода).

• Включить в каждый класс 2-3 метода на выбор.

• Продемонстрировать использование разработанных классов.

5) Создать класс Абзац, используя класс Слово.

Спецификация ввода:

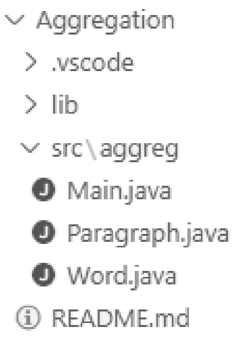
-

Спецификация вывода:

<параметры функций System.out.println() (содержимое полей объектов)>

…

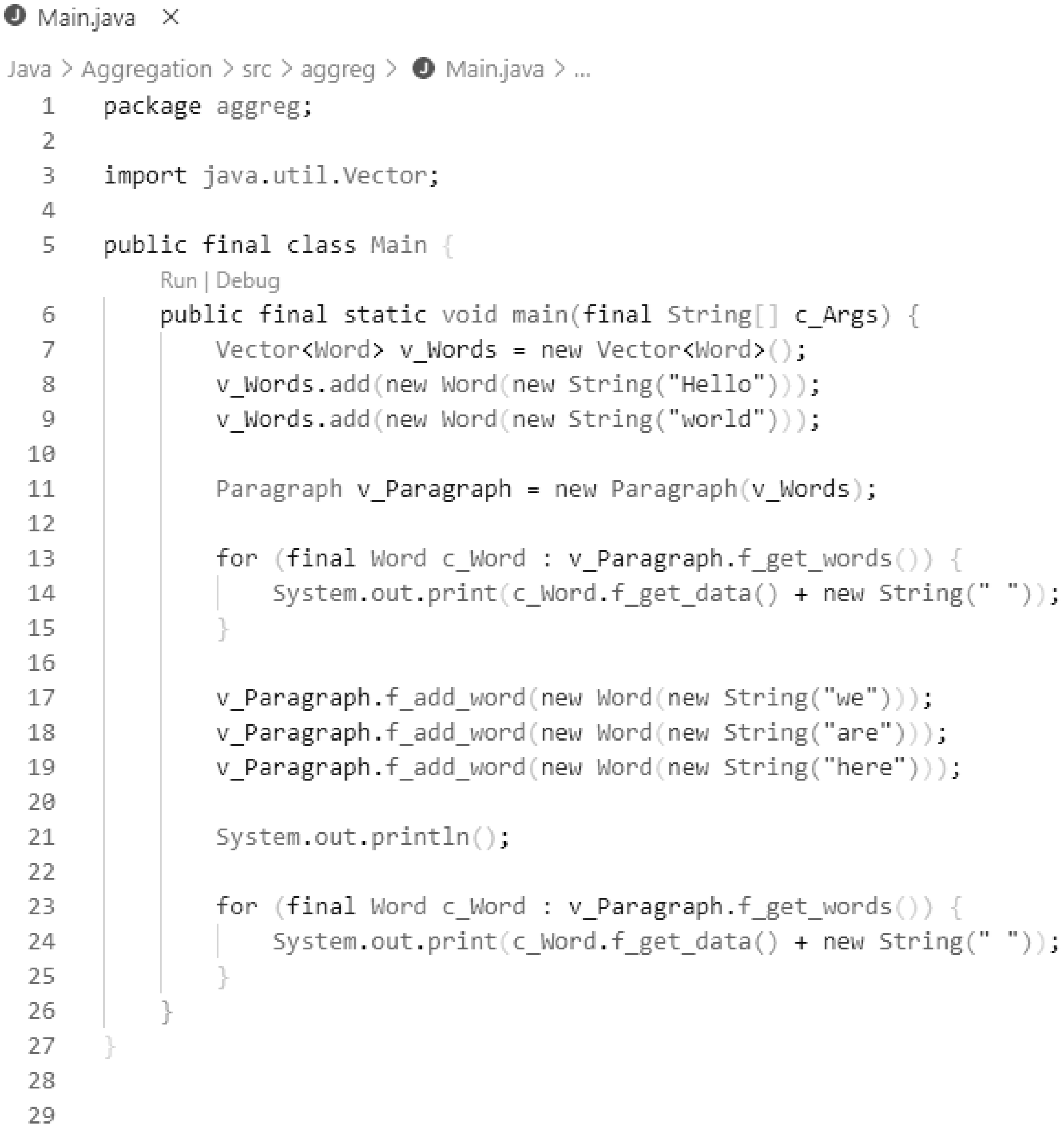
Структура проекта:



```
Aggregation
  .vscode
  lib
  src\aggreg
    Main.java
    Paragraph.java
    Word.java
  README.md
```

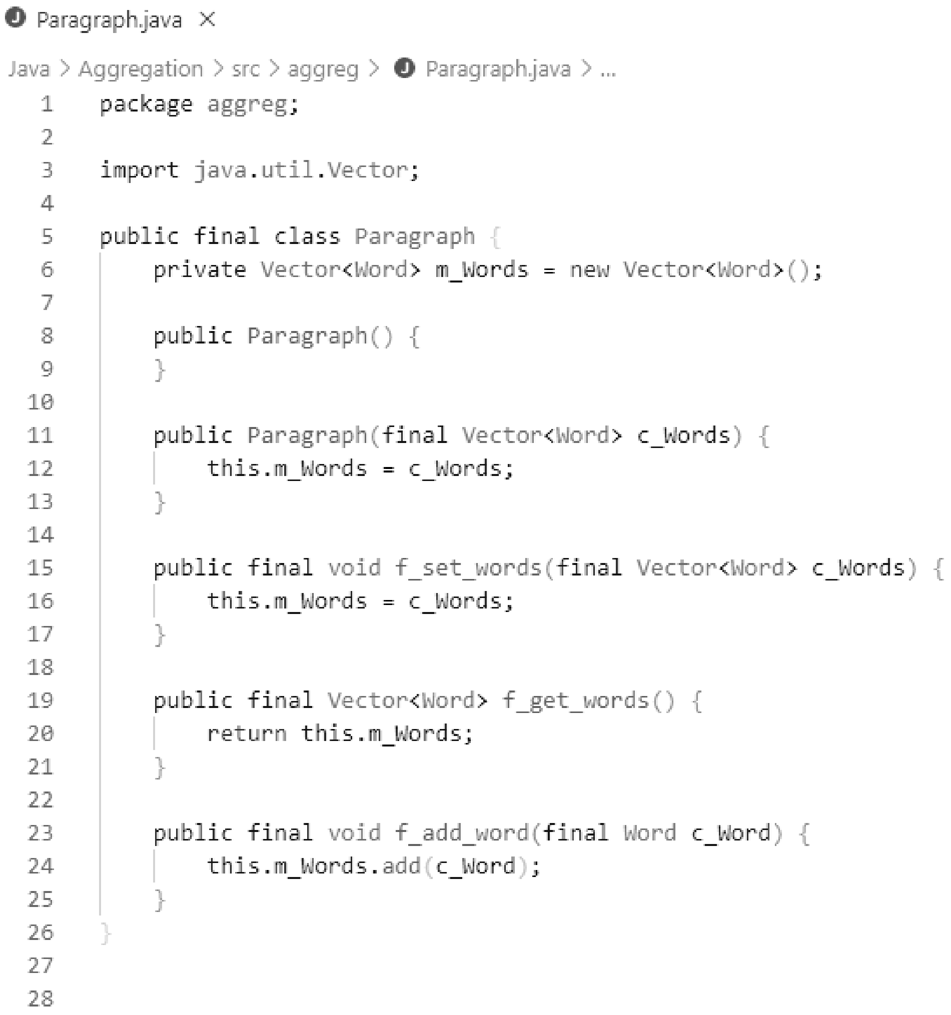
Рисунок 2.1 - Структура проекта.

Код программы:



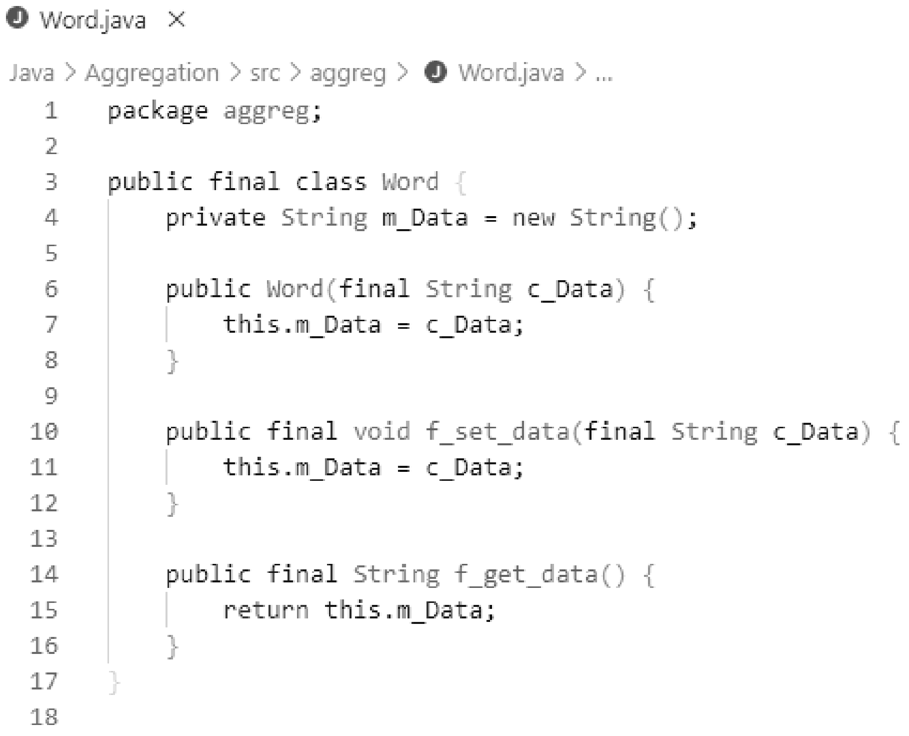
```java
package aggreg;

import java.util.Vector;

public final class Main {
    public final static void main(final String[] c_Args) {
        Vector<Word> v_Words = new Vector<Word>();
        v_Words.add(new Word(new String("Hello")));
        v_Words.add(new Word(new String("world")));

        Paragraph v_Paragraph = new Paragraph(v_Words);

        for (final Word c_Word : v_Paragraph.f_get_words()) {
            System.out.print(c_Word.f_get_data() + new String(" "));
        }

        v_Paragraph.f_add_word(new Word(new String("we")));
        v_Paragraph.f_add_word(new Word(new String("are")));
        v_Paragraph.f_add_word(new Word(new String("here")));

        System.out.println();

        for (final Word c_Word : v_Paragraph.f_get_words()) {
            System.out.print(c_Word.f_get_data() + new String(" "));
        }
    }
}


```

Рисунок 2.2 - Содержимое файла Main.java.



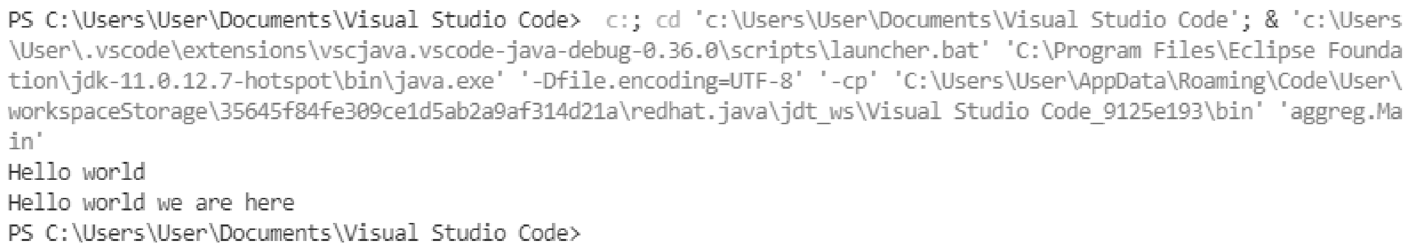
```java
package aggreg;

import java.util.Vector;

public final class Paragraph {
    private Vector<Word> m_Words = new Vector<Word>();

    public Paragraph() {
    }

    public Paragraph(final Vector<Word> c_Words) {
        this.m_Words = c_Words;
    }

    public final void f_set_words(final Vector<Word> c_Words) {
        this.m_Words = c_Words;
    }

    public final Vector<Word> f_get_words() {
        return this.m_Words;
    }

    public final void f_add_word(final Word c_Word) {
        this.m_Words.add(c_Word);
    }
}


```

Рисунок 2.3 - Содержимое файла Paragraph.java.



```java
package aggreg;

public final class Word {
    private String m_Data = new String();

    public Word(final String c_Data) {
        this.m_Data = c_Data;
    }

    public final void f_set_data(final String c_Data) {
        this.m_Data = c_Data;
    }

    public final String f_get_data() {
        return this.m_Data;
    }
}

```

Рисунок 2.4 - Содержимое файла Word.java.



```
PS C:\Users\User\Documents\Visual Studio Code>  c:; cd 'c:\Users\User\Documents\Visual Studio Code'; & 'c:\Users
\User\.vscode\extensions\vscjava.vscode-java-debug-0.36.0\scripts\launcher.bat' 'C:\Program Files\Eclipse Founda
tion\jdk-11.0.12.7-hotspot\bin\java.exe' '-Dfile.encoding=UTF-8' '-cp' 'C:\Users\User\AppData\Roaming\Code\User\
workspaceStorage\35645f84fe309ce1d5ab2a9af314d21a\redhat.java\jdt_ws\Visual Studio Code_9125e193\bin' 'aggreg.Ma
in'
Hello world
Hello world we are here
PS C:\Users\User\Documents\Visual Studio Code>
```

Рисунок 2.5 - Результат выполнения программы.

Задание 3.

Требования к выполнению:

- Построить модель программной системы с применением отношений (обобщения, агрегации, ассоциации, реализации) между классами.
- Задать атрибуты и методы классов.
- Реализовать (если необходимо) дополнительные классы.
- Продемонстрировать работу разработанной системы.

5) Система Библиотека. Читатель оформляет Заказ на Книгу. Система осуществляет поиск в Каталоге. Библиотекарь выдает Читателю Книгу на абонемент или в читальный зал. При невозвращении Книги Читателем он может быть занесен Администратором в “черный список”.

Спецификация ввода:

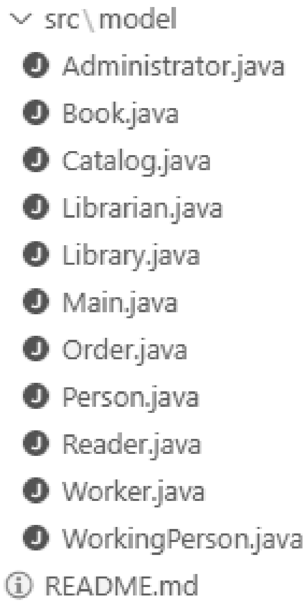
-

Спецификация вывода:

<параметры функций System.out.println() (содержимое полей объектов)>

…

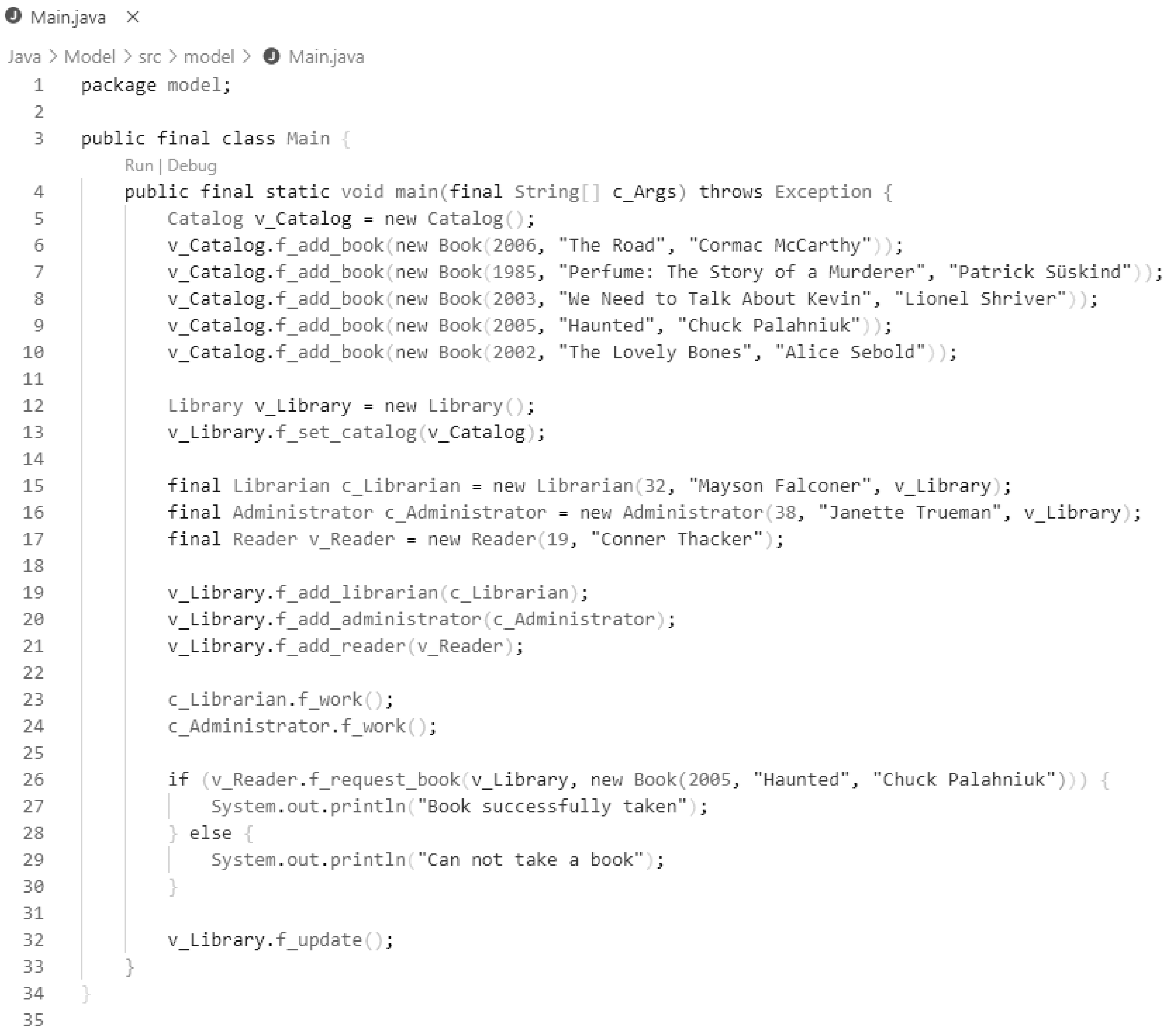
Структура проекта:



```
src\model
  Administrator.java
  Book.java
  Catalog.java
  Librarian.java
  Library.java
  Main.java
  Order.java
  Person.java
  Reader.java
  Worker.java
  WorkingPerson.java
README.md
```

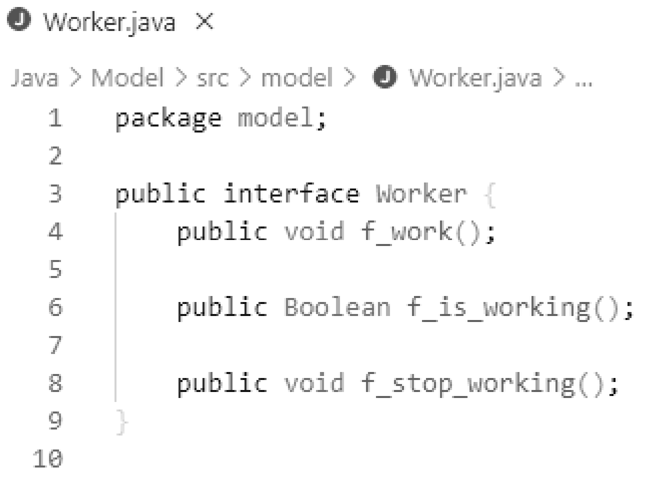
Рисунок 3.1 - Структура проекта.

Код программы:



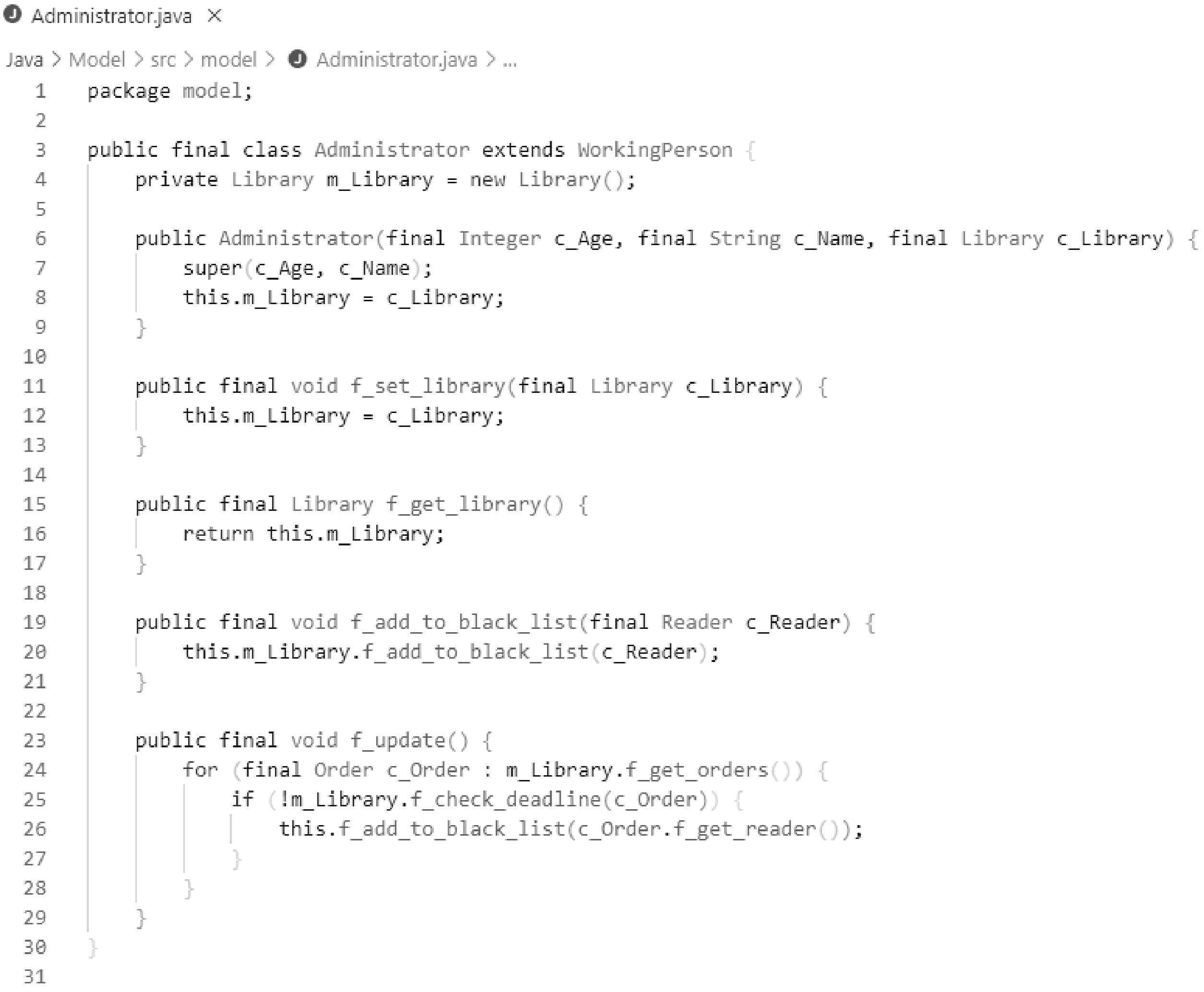
```java
package model;

public final class Main {
    public final static void main(final String[] c_Args) throws Exception {
        Catalog v_Catalog = new Catalog();
        v_Catalog.f_add_book(new Book(2006, "The Road", "Cormac McCarthy"));
        v_Catalog.f_add_book(new Book(1985, "Perfume: The Story of a Murderer", "Patrick Süskind"));
        v_Catalog.f_add_book(new Book(2003, "We Need to Talk About Kevin", "Lionel Shriver"));
        v_Catalog.f_add_book(new Book(2005, "Haunted", "Chuck Palahniuk"));
        v_Catalog.f_add_book(new Book(2002, "The Lovely Bones", "Alice Sebold"));

        Library v_Library = new Library();
        v_Library.f_set_catalog(v_Catalog);

        final Librarian c_Librarian = new Librarian(32, "Mayson Falconer", v_Library);
        final Administrator c_Administrator = new Administrator(38, "Janette Trueman", v_Library);
        final Reader v_Reader = new Reader(19, "Conner Thacker");

        v_Library.f_add_librarian(c_Librarian);
        v_Library.f_add_administrator(c_Administrator);
        v_Library.f_add_reader(v_Reader);

        c_Librarian.f_work();
        c_Administrator.f_work();

        if (v_Reader.f_request_book(v_Library, new Book(2005, "Haunted", "Chuck Palahniuk"))) {
            System.out.println("Book successfully taken");
        } else {
            System.out.println("Can not take a book");
        }

        v_Library.f_update();
    }
}
```

Рисунок 3.2 - Содержимое файла Main.java.



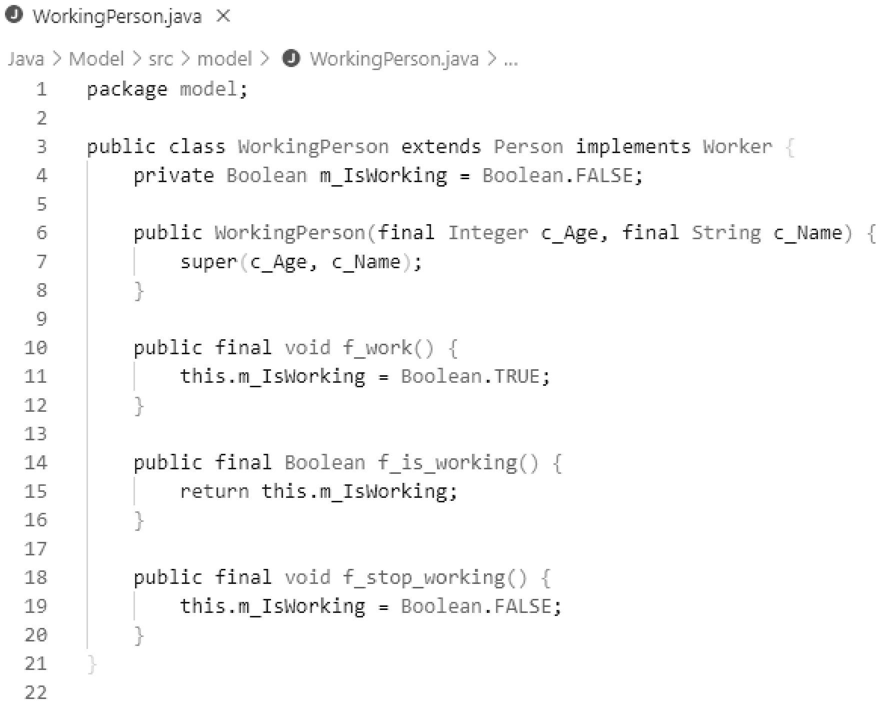
```java
package model;

public interface Worker {
    public void f_work();

    public Boolean f_is_working();

    public void f_stop_working();
}
```

Рисунок 3.3 - Содержимое файла Worker.java.



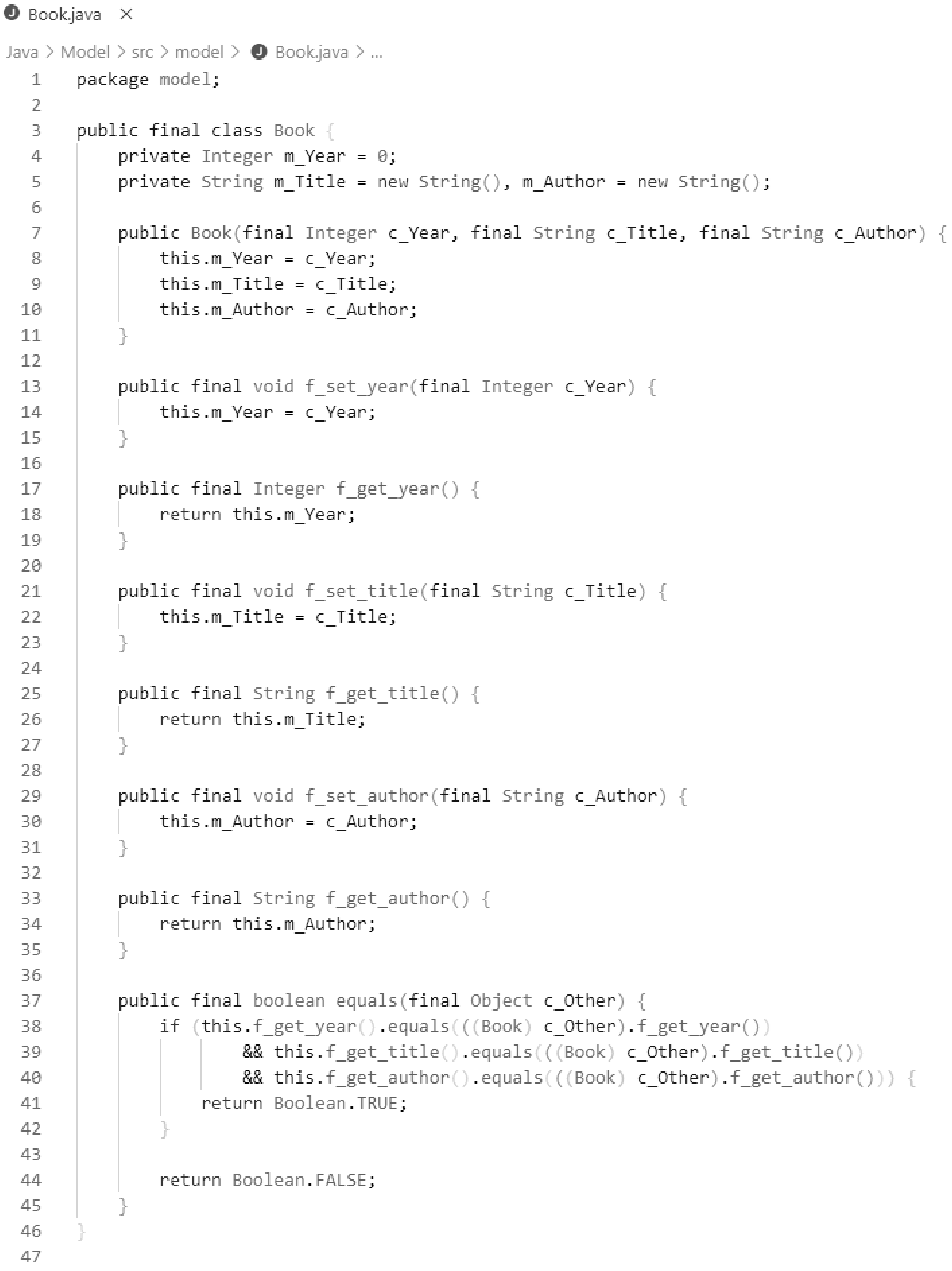
```java
package model;

public final class Administrator extends WorkingPerson {
    private Library m_Library = new Library();

    public Administrator(final Integer c_Age, final String c_Name, final Library c_Library) {
        super(c_Age, c_Name);
        this.m_Library = c_Library;
    }

    public final void f_set_library(final Library c_Library) {
        this.m_Library = c_Library;
    }

    public final Library f_get_library() {
        return this.m_Library;
    }

    public final void f_add_to_black_list(final Reader c_Reader) {
        this.m_Library.f_add_to_black_list(c_Reader);
    }

    public final void f_update() {
        for (final Order c_Order : m_Library.f_get_orders()) {
            if (!m_Library.f_check_deadline(c_Order)) {
                this.f_add_to_black_list(c_Order.f_get_reader());
            }
        }
    }
}

```

Рисунок 3.4 - Содержимое файла Administrator.java.



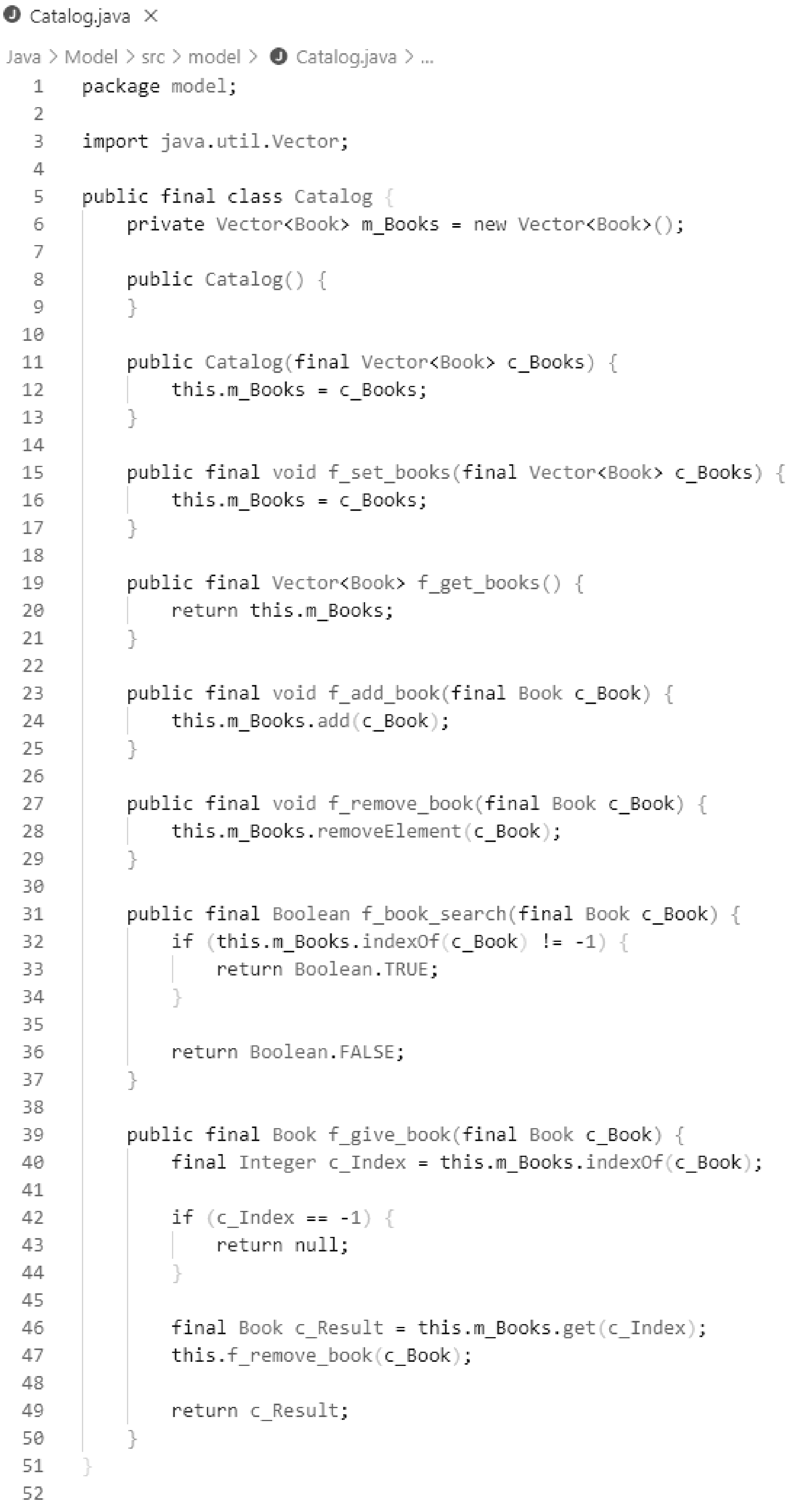
```java
package model;

public class WorkingPerson extends Person implements Worker {
    private Boolean m_IsWorking = Boolean.FALSE;

    public WorkingPerson(final Integer c_Age, final String c_Name) {
        super(c_Age, c_Name);
    }

    public final void f_work() {
        this.m_IsWorking = Boolean.TRUE;
    }

    public final Boolean f_is_working() {
        return this.m_IsWorking;
    }

    public final void f_stop_working() {
        this.m_IsWorking = Boolean.FALSE;
    }
}

```

Рисунок 3.5 - Содержимое файла WorkingPerson.java.



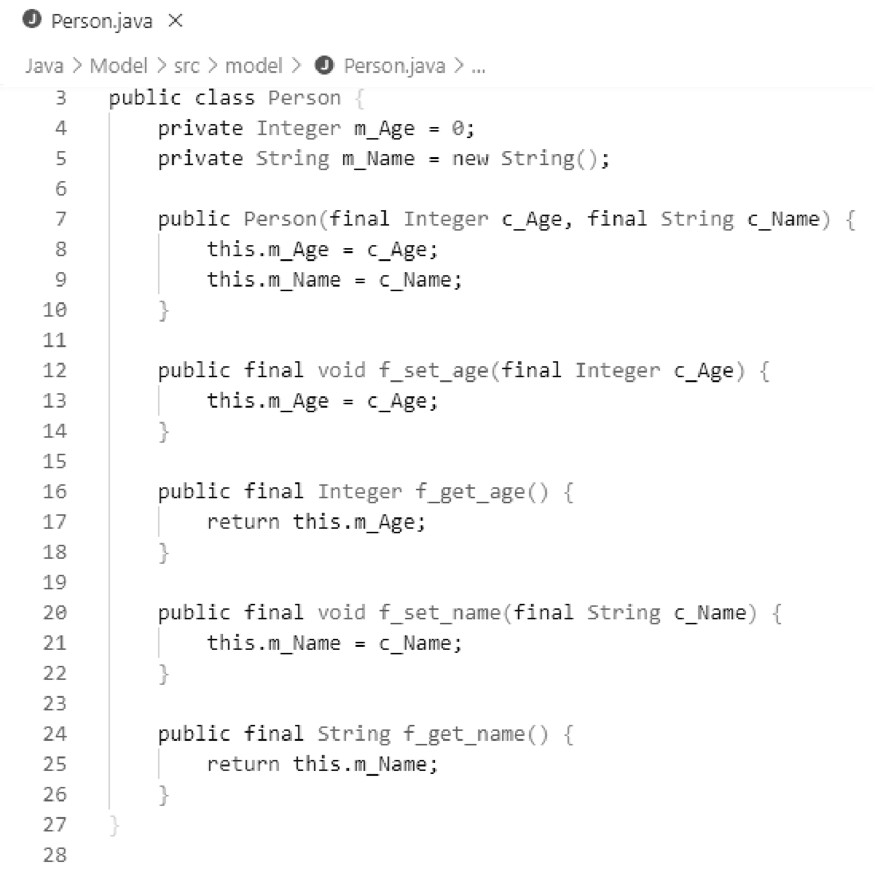
```java
package model;

public final class Book {
    private Integer m_Year = 0;
    private String m_Title = new String(), m_Author = new String();

    public Book(final Integer c_Year, final String c_Title, final String c_Author) {
        this.m_Year = c_Year;
        this.m_Title = c_Title;
        this.m_Author = c_Author;
    }

    public final void f_set_year(final Integer c_Year) {
        this.m_Year = c_Year;
    }

    public final Integer f_get_year() {
        return this.m_Year;
    }

    public final void f_set_title(final String c_Title) {
        this.m_Title = c_Title;
    }

    public final String f_get_title() {
        return this.m_Title;
    }

    public final void f_set_author(final String c_Author) {
        this.m_Author = c_Author;
    }

    public final String f_get_author() {
        return this.m_Author;
    }

    public final boolean equals(final Object c_Other) {
        if (this.f_get_year().equals(((Book) c_Other).f_get_year())
                && this.f_get_title().equals(((Book) c_Other).f_get_title())
                && this.f_get_author().equals(((Book) c_Other).f_get_author())) {
            return Boolean.TRUE;
        }

        return Boolean.FALSE;
    }
}

```

Рисунок 3.6 - Содержимое файла Book.java.



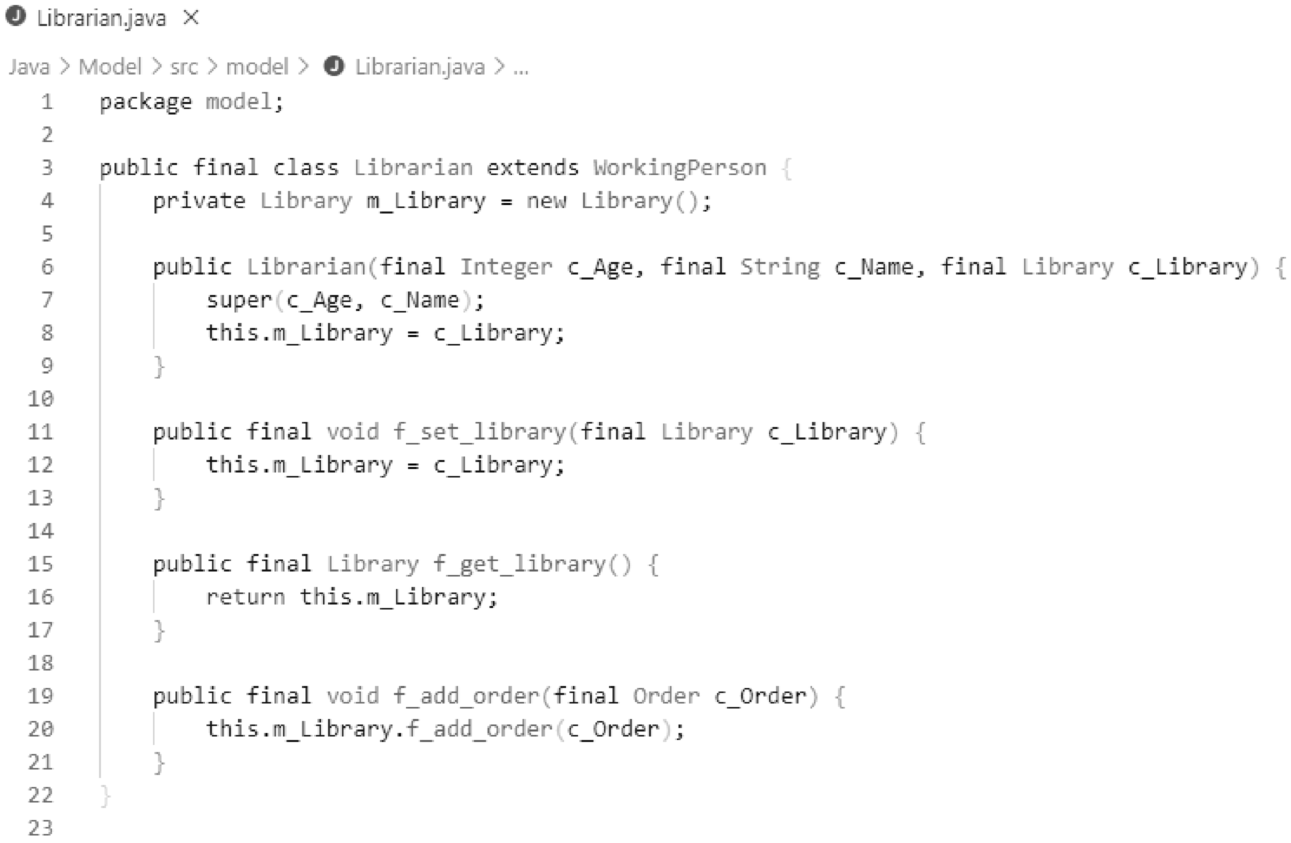
```java
package model;

import java.util.Vector;

public final class Catalog {
    private Vector<Book> m_Books = new Vector<Book>();

    public Catalog() {
    }

    public Catalog(final Vector<Book> c_Books) {
        this.m_Books = c_Books;
    }

    public final void f_set_books(final Vector<Book> c_Books) {
        this.m_Books = c_Books;
    }

    public final Vector<Book> f_get_books() {
        return this.m_Books;
    }

    public final void f_add_book(final Book c_Book) {
        this.m_Books.add(c_Book);
    }

    public final void f_remove_book(final Book c_Book) {
        this.m_Books.removeElement(c_Book);
    }

    public final Boolean f_book_search(final Book c_Book) {
        if (this.m_Books.indexOf(c_Book) != -1) {
            return Boolean.TRUE;
        }

        return Boolean.FALSE;
    }

    public final Book f_give_book(final Book c_Book) {
        final Integer c_Index = this.m_Books.indexOf(c_Book);

        if (c_Index == -1) {
            return null;
        }

        final Book c_Result = this.m_Books.get(c_Index);
        this.f_remove_book(c_Book);

        return c_Result;
    }
}

```

Рисунок 3.7 - Содержимое файла Catalog.java.



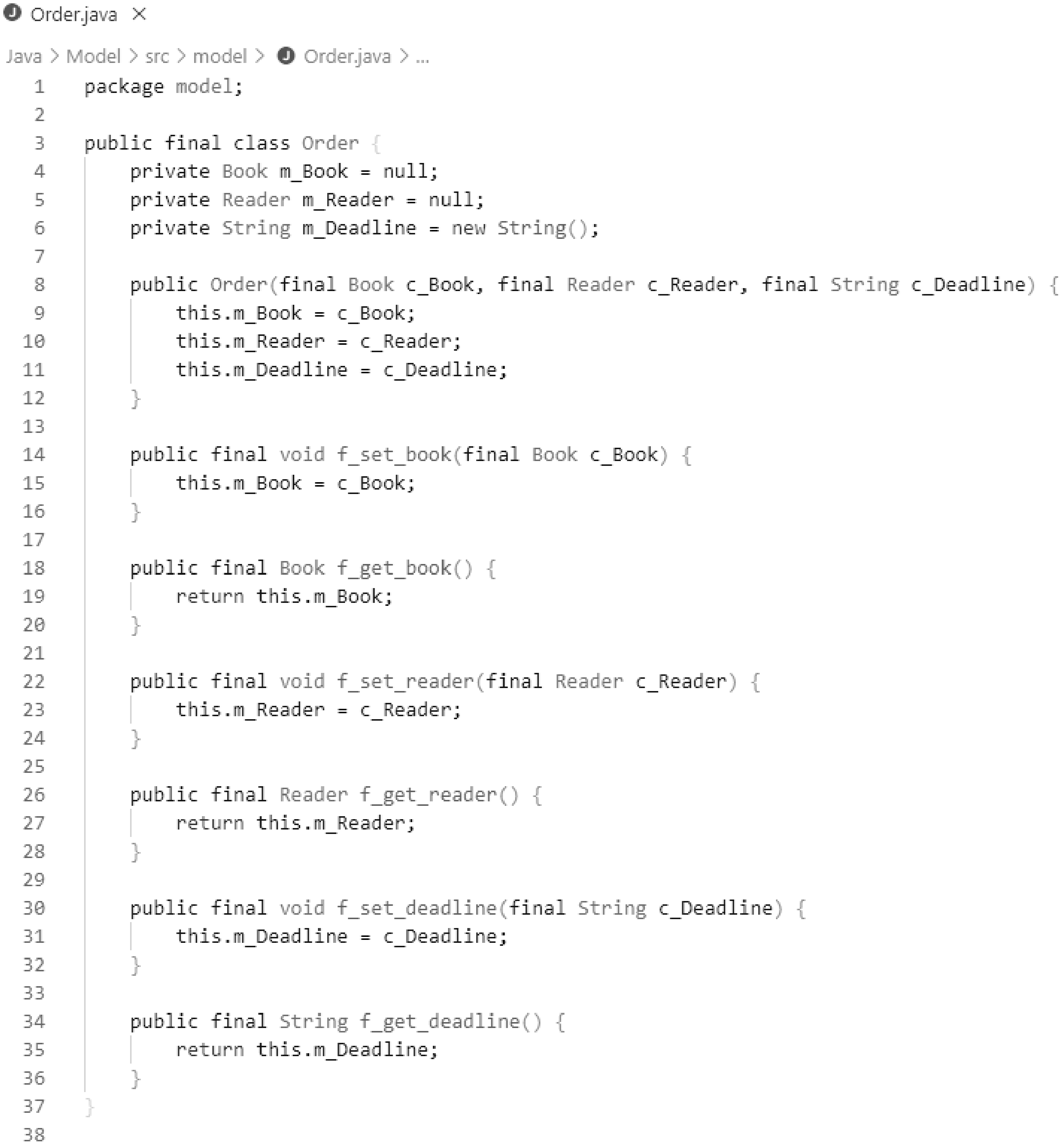
```java
public class Person {
    private Integer m_Age = 0;
    private String m_Name = new String();

    public Person(final Integer c_Age, final String c_Name) {
        this.m_Age = c_Age;
        this.m_Name = c_Name;
    }

    public final void f_set_age(final Integer c_Age) {
        this.m_Age = c_Age;
    }

    public final Integer f_get_age() {
        return this.m_Age;
    }

    public final void f_set_name(final String c_Name) {
        this.m_Name = c_Name;
    }

    public final String f_get_name() {
        return this.m_Name;
    }
}

```

Рисунок 3.8 - Содержимое файла Person.java.



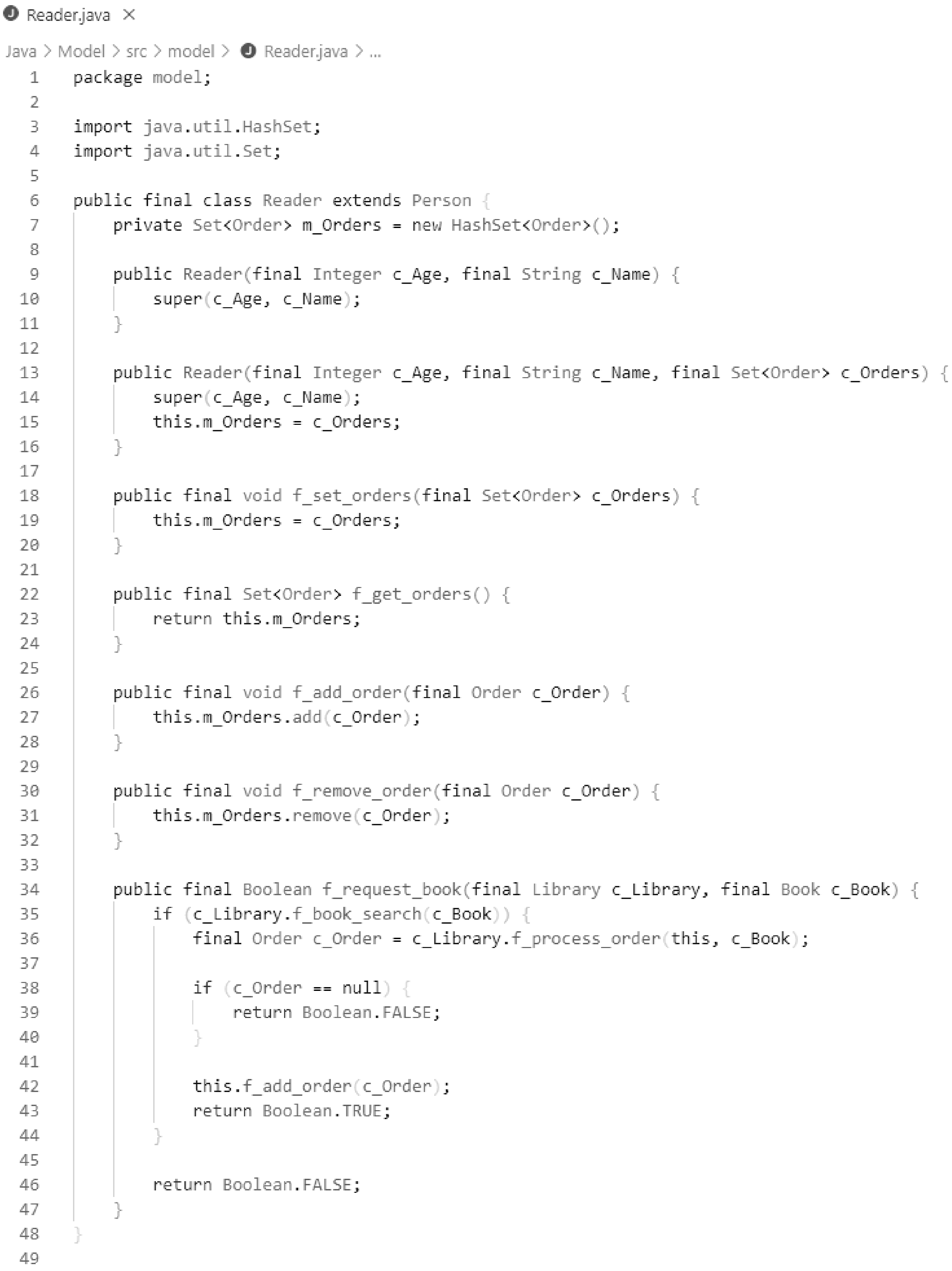
```java
package model;

public final class Librarian extends WorkingPerson {
    private Library m_Library = new Library();

    public Librarian(final Integer c_Age, final String c_Name, final Library c_Library) {
        super(c_Age, c_Name);
        this.m_Library = c_Library;
    }

    public final void f_set_library(final Library c_Library) {
        this.m_Library = c_Library;
    }

    public final Library f_get_library() {
        return this.m_Library;
    }

    public final void f_add_order(final Order c_Order) {
        this.m_Library.f_add_order(c_Order);
    }
}

```

Рисунок 3.9 - Содержимое файла Librarian.java.



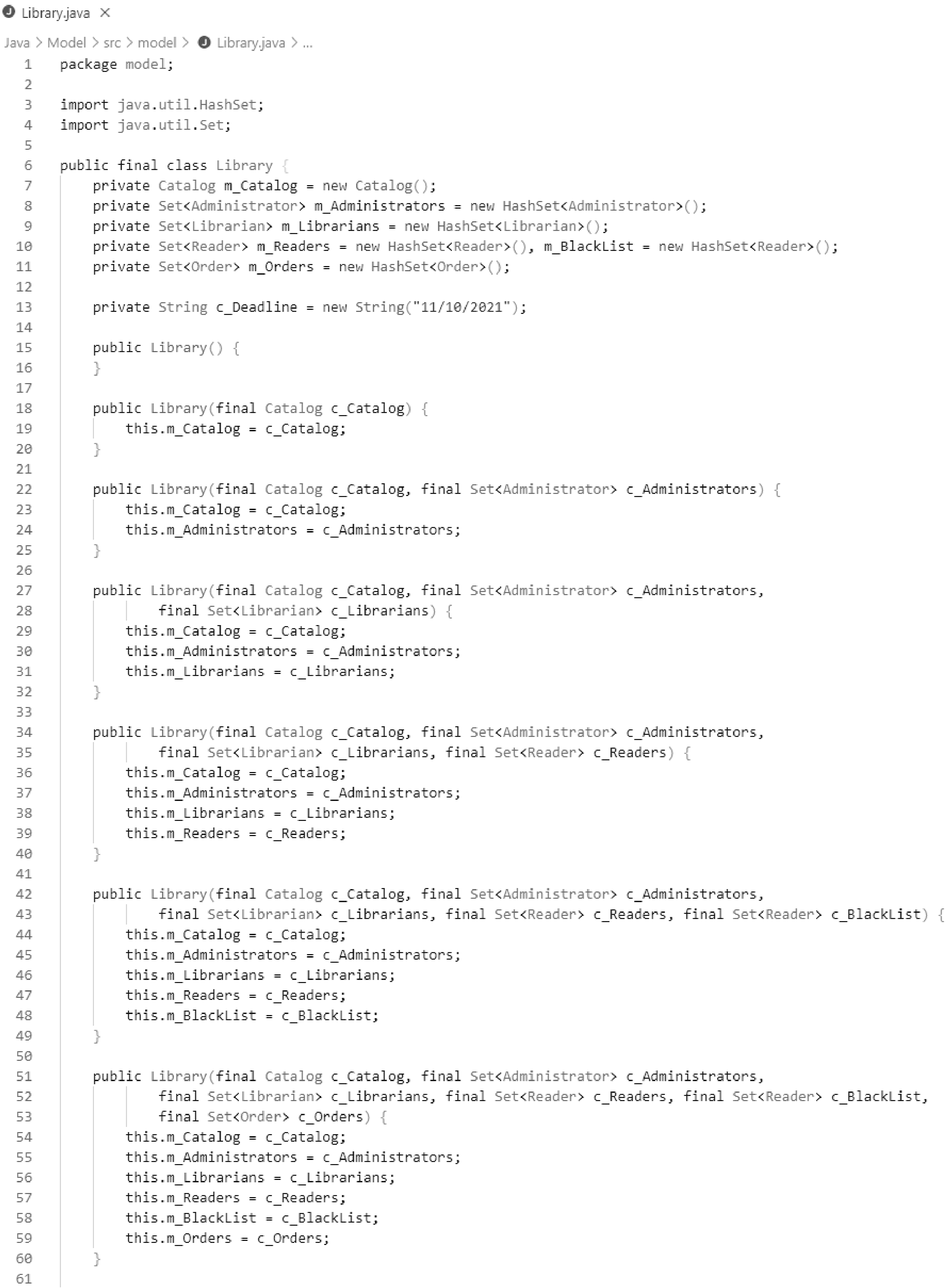
```java
package model;

public final class Order {
    private Book m_Book = null;
    private Reader m_Reader = null;
    private String m_Deadline = new String();

    public Order(final Book c_Book, final Reader c_Reader, final String c_Deadline) {
        this.m_Book = c_Book;
        this.m_Reader = c_Reader;
        this.m_Deadline = c_Deadline;
    }

    public final void f_set_book(final Book c_Book) {
        this.m_Book = c_Book;
    }

    public final Book f_get_book() {
        return this.m_Book;
    }

    public final void f_set_reader(final Reader c_Reader) {
        this.m_Reader = c_Reader;
    }

    public final Reader f_get_reader() {
        return this.m_Reader;
    }

    public final void f_set_deadline(final String c_Deadline) {
        this.m_Deadline = c_Deadline;
    }

    public final String f_get_deadline() {
        return this.m_Deadline;
    }
}

```

Рисунок 3.10 - Содержимое файла Order.java.



```java
package model;

import java.util.HashSet;
import java.util.Set;

public final class Reader extends Person {
    private Set<Order> m_Orders = new HashSet<Order>();

    public Reader(final Integer c_Age, final String c_Name) {
        super(c_Age, c_Name);
    }

    public Reader(final Integer c_Age, final String c_Name, final Set<Order> c_Orders) {
        super(c_Age, c_Name);
        this.m_Orders = c_Orders;
    }

    public final void f_set_orders(final Set<Order> c_Orders) {
        this.m_Orders = c_Orders;
    }

    public final Set<Order> f_get_orders() {
        return this.m_Orders;
    }

    public final void f_add_order(final Order c_Order) {
        this.m_Orders.add(c_Order);
    }

    public final void f_remove_order(final Order c_Order) {
        this.m_Orders.remove(c_Order);
    }

    public final Boolean f_request_book(final Library c_Library, final Book c_Book) {
        if (c_Library.f_book_search(c_Book)) {
            final Order c_Order = c_Library.f_process_order(this, c_Book);

            if (c_Order == null) {
                return Boolean.FALSE;
            }

            this.f_add_order(c_Order);
            return Boolean.TRUE;
        }

        return Boolean.FALSE;
    }
}

```

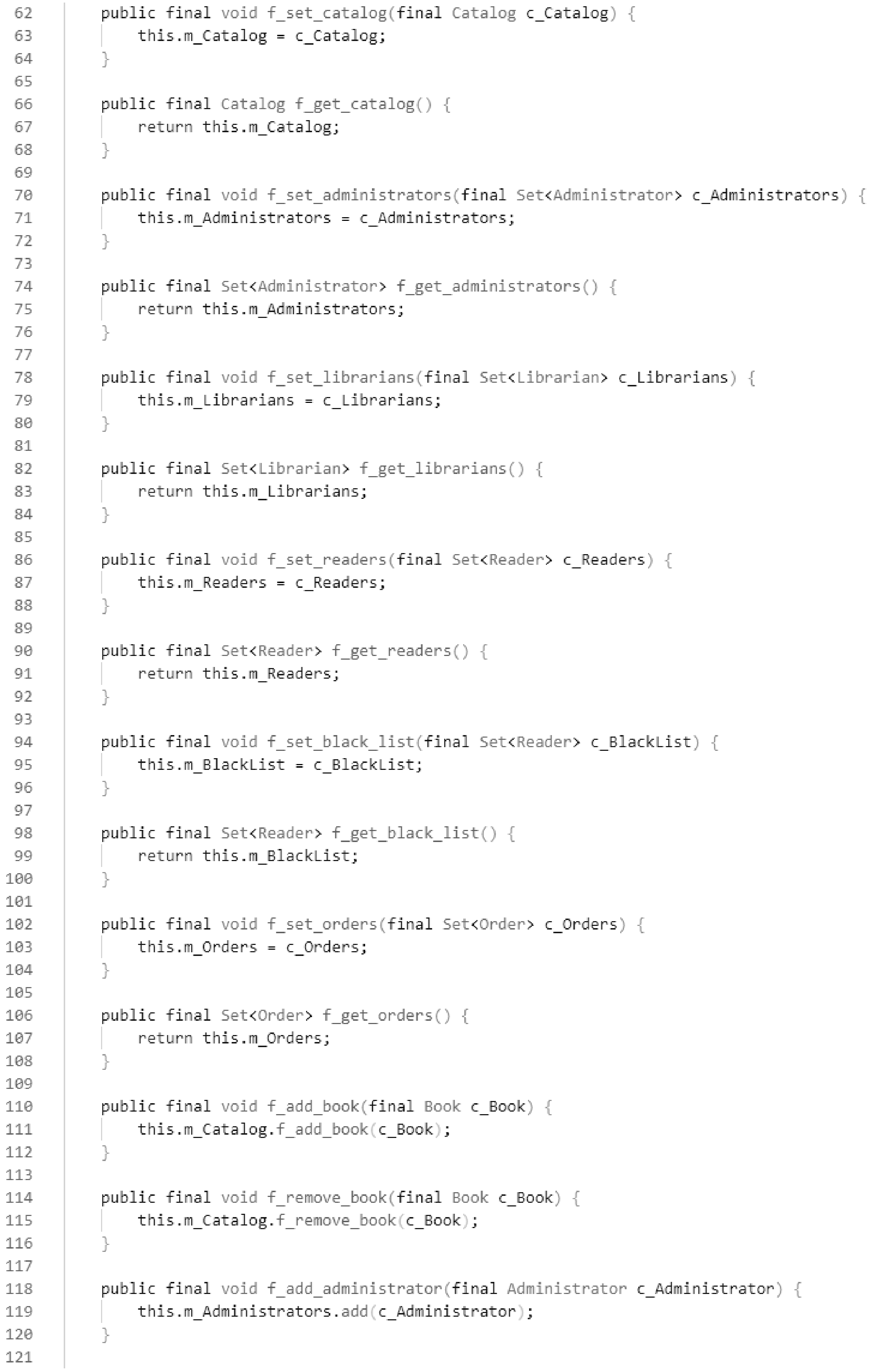
Рисунок 3.11 - Содержимое файла Reader.java.



```java
package model;

import java.util.HashSet;
import java.util.Set;

public final class Library {
    private Catalog m_Catalog = new Catalog();
    private Set<Administrator> m_Administrators = new HashSet<Administrator>();
    private Set<Librarian> m_Librarians = new HashSet<Librarian>();
    private Set<Reader> m_Readers = new HashSet<Reader>(), m_BlackList = new HashSet<Reader>();
    private Set<Order> m_Orders = new HashSet<Order>();

    private String c_Deadline = new String("11/10/2021");

    public Library() {
    }

    public Library(final Catalog c_Catalog) {
        this.m_Catalog = c_Catalog;
    }

    public Library(final Catalog c_Catalog, final Set<Administrator> c_Administrators) {
        this.m_Catalog = c_Catalog;
        this.m_Administrators = c_Administrators;
    }

    public Library(final Catalog c_Catalog, final Set<Administrator> c_Administrators,
            final Set<Librarian> c_Librarians) {
        this.m_Catalog = c_Catalog;
        this.m_Administrators = c_Administrators;
        this.m_Librarians = c_Librarians;
    }

    public Library(final Catalog c_Catalog, final Set<Administrator> c_Administrators,
            final Set<Librarian> c_Librarians, final Set<Reader> c_Readers) {
        this.m_Catalog = c_Catalog;
        this.m_Administrators = c_Administrators;
        this.m_Librarians = c_Librarians;
        this.m_Readers = c_Readers;
    }

    public Library(final Catalog c_Catalog, final Set<Administrator> c_Administrators,
            final Set<Librarian> c_Librarians, final Set<Reader> c_Readers, final Set<Reader> c_BlackList) {
        this.m_Catalog = c_Catalog;
        this.m_Administrators = c_Administrators;
        this.m_Librarians = c_Librarians;
        this.m_Readers = c_Readers;
        this.m_BlackList = c_BlackList;
    }

    public Library(final Catalog c_Catalog, final Set<Administrator> c_Administrators,
            final Set<Librarian> c_Librarians, final Set<Reader> c_Readers, final Set<Reader> c_BlackList,
            final Set<Order> c_Orders) {
        this.m_Catalog = c_Catalog;
        this.m_Administrators = c_Administrators;
        this.m_Librarians = c_Librarians;
        this.m_Readers = c_Readers;
        this.m_BlackList = c_BlackList;
        this.m_Orders = c_Orders;
    }

```

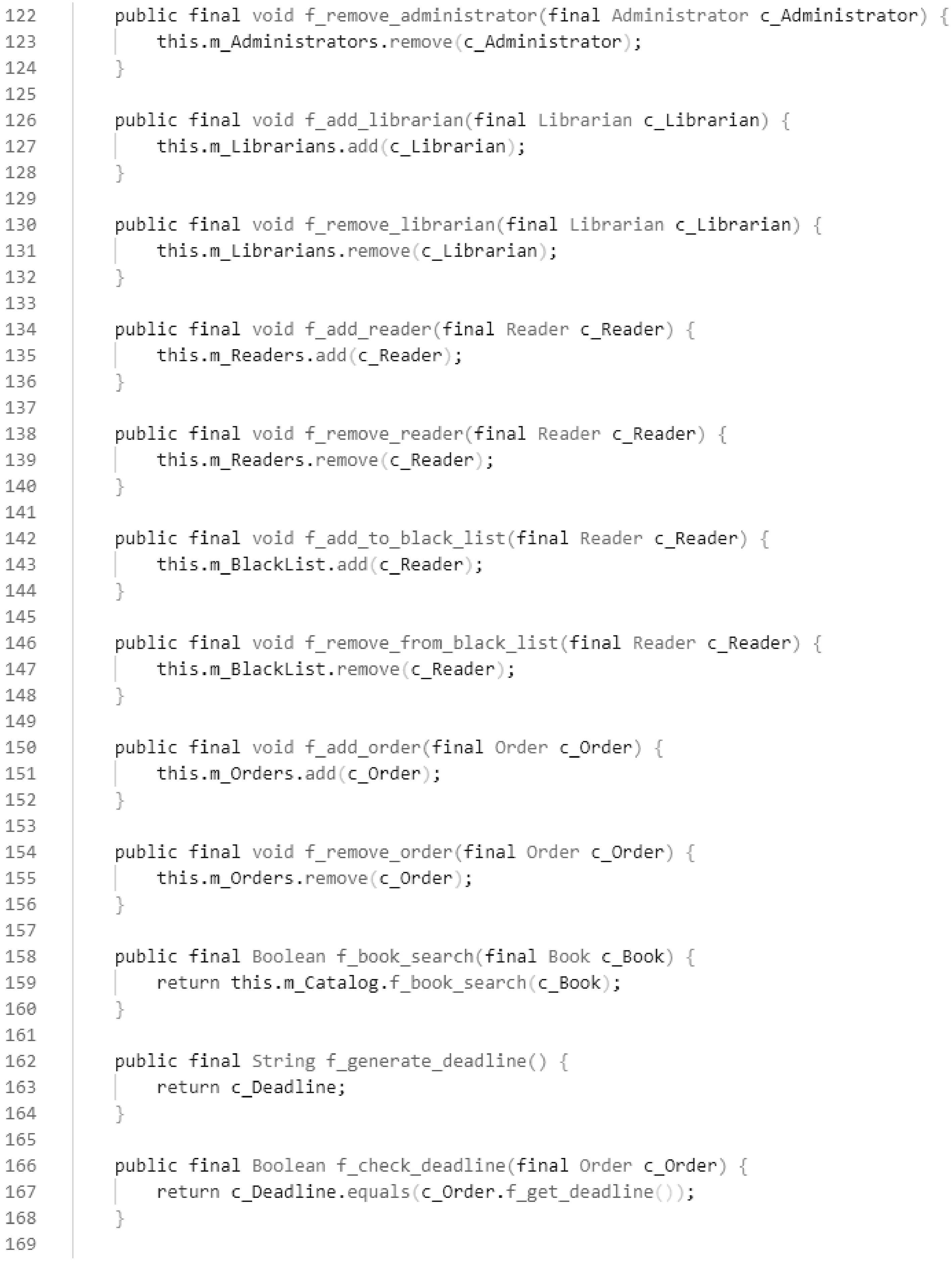
Рисунок 3.12 - Содержимое файла Library.java.

Продолжение рисунка 3.12.



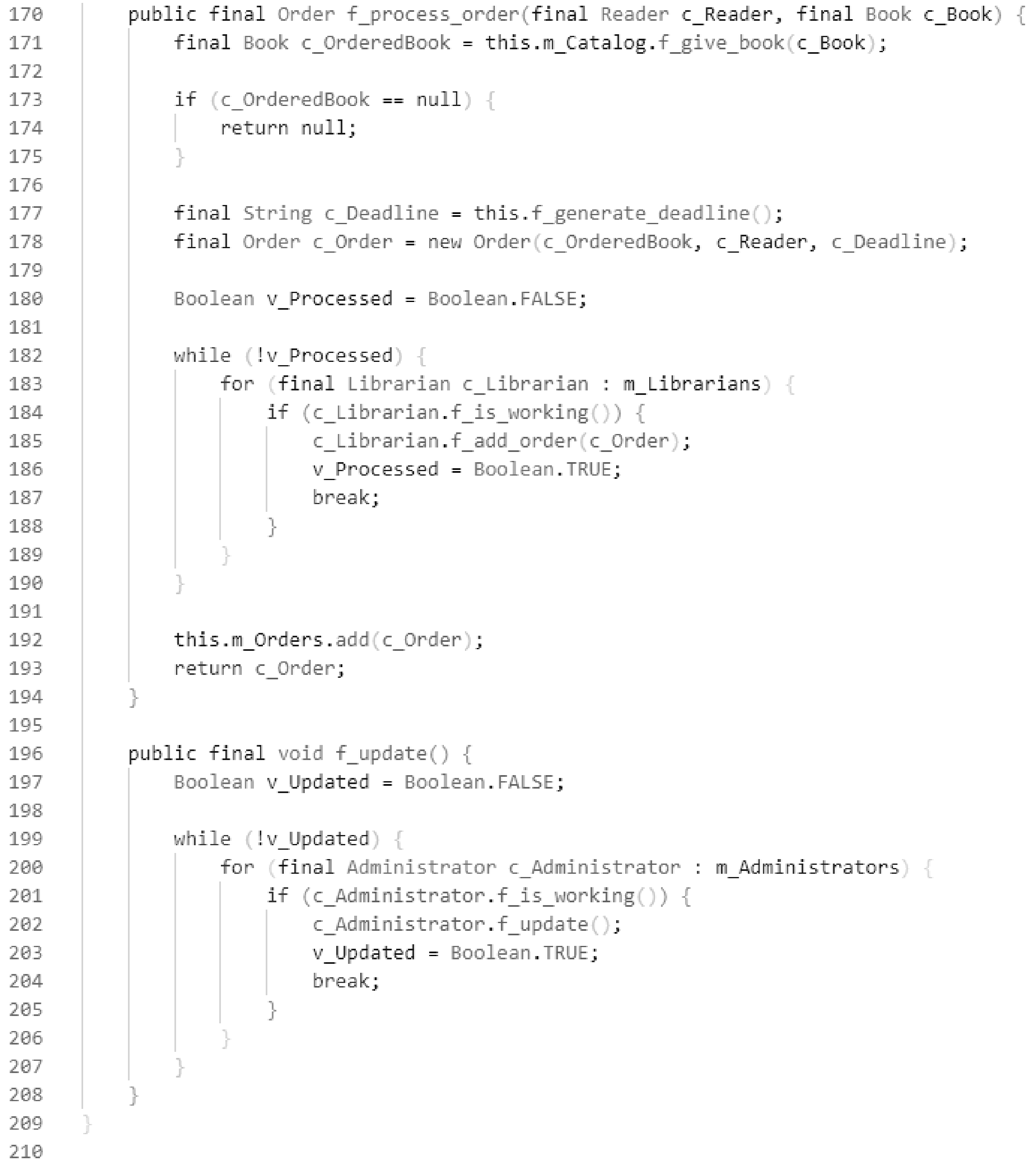
```
    public final void f_set_catalog(final Catalog c_Catalog) {
        this.m_Catalog = c_Catalog;
    }

    public final Catalog f_get_catalog() {
        return this.m_Catalog;
    }

    public final void f_set_administrators(final Set<Administrator> c_Administrators) {
        this.m_Administrators = c_Administrators;
    }

    public final Set<Administrator> f_get_administrators() {
        return this.m_Administrators;
    }

    public final void f_set_librarians(final Set<Librarian> c_Librarians) {
        this.m_Librarians = c_Librarians;
    }

    public final Set<Librarian> f_get_librarians() {
        return this.m_Librarians;
    }

    public final void f_set_readers(final Set<Reader> c_Readers) {
        this.m_Readers = c_Readers;
    }

    public final Set<Reader> f_get_readers() {
        return this.m_Readers;
    }

    public final void f_set_black_list(final Set<Reader> c_BlackList) {
        this.m_BlackList = c_BlackList;
    }

    public final Set<Reader> f_get_black_list() {
        return this.m_BlackList;
    }

    public final void f_set_orders(final Set<Order> c_Orders) {
        this.m_Orders = c_Orders;
    }

    public final Set<Order> f_get_orders() {
        return this.m_Orders;
    }

    public final void f_add_book(final Book c_Book) {
        this.m_Catalog.f_add_book(c_Book);
    }

    public final void f_remove_book(final Book c_Book) {
        this.m_Catalog.f_remove_book(c_Book);
    }

    public final void f_add_administrator(final Administrator c_Administrator) {
        this.m_Administrators.add(c_Administrator);
    }

```

Продолжение рисунка 3.12.

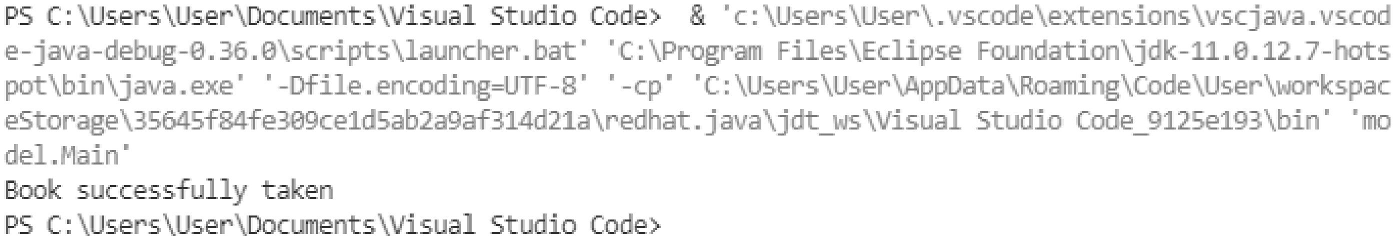


```
    public final void f_remove_administrator(final Administrator c_Administrator) {
        this.m_Administrators.remove(c_Administrator);
    }

    public final void f_add_librarian(final Librarian c_Librarian) {
        this.m_Librarians.add(c_Librarian);
    }

    public final void f_remove_librarian(final Librarian c_Librarian) {
        this.m_Librarians.remove(c_Librarian);
    }

    public final void f_add_reader(final Reader c_Reader) {
        this.m_Readers.add(c_Reader);
    }

    public final void f_remove_reader(final Reader c_Reader) {
        this.m_Readers.remove(c_Reader);
    }

    public final void f_add_to_black_list(final Reader c_Reader) {
        this.m_BlackList.add(c_Reader);
    }

    public final void f_remove_from_black_list(final Reader c_Reader) {
        this.m_BlackList.remove(c_Reader);
    }

    public final void f_add_order(final Order c_Order) {
        this.m_Orders.add(c_Order);
    }

    public final void f_remove_order(final Order c_Order) {
        this.m_Orders.remove(c_Order);
    }

    public final Boolean f_book_search(final Book c_Book) {
        return this.m_Catalog.f_book_search(c_Book);
    }

    public final String f_generate_deadline() {
        return c_Deadline;
    }

    public final Boolean f_check_deadline(final Order c_Order) {
        return c_Deadline.equals(c_Order.f_get_deadline());
    }

```

Продолжение рисунка 3.12.



```java
    public final Order f_process_order(final Reader c_Reader, final Book c_Book) {
        final Book c_OrderedBook = this.m_Catalog.f_give_book(c_Book);

        if (c_OrderedBook == null) {
            return null;
        }

        final String c_Deadline = this.f_generate_deadline();
        final Order c_Order = new Order(c_OrderedBook, c_Reader, c_Deadline);

        Boolean v_Processed = Boolean.FALSE;

        while (!v_Processed) {
            for (final Librarian c_Librarian : m_Librarians) {
                if (c_Librarian.f_is_working()) {
                    c_Librarian.f_add_order(c_Order);
                    v_Processed = Boolean.TRUE;
                    break;
                }
            }
        }

        this.m_Orders.add(c_Order);
        return c_Order;
    }

    public final void f_update() {
        Boolean v_Updated = Boolean.FALSE;

        while (!v_Updated) {
            for (final Administrator c_Administrator : m_Administrators) {
                if (c_Administrator.f_is_working()) {
                    c_Administrator.f_update();
                    v_Updated = Boolean.TRUE;
                    break;
                }
            }
        }
    }
}

```



```
PS C:\Users\User\Documents\Visual Studio Code>  & 'c:\Users\User\.vscode\extensions\vscjava.vscod
e-java-debug-0.36.0\scripts\launcher.bat' 'C:\Program Files\Eclipse Foundation\jdk-11.0.12.7-hots
pot\bin\java.exe' '-Dfile.encoding=UTF-8' '-cp' 'C:\Users\User\AppData\Roaming\Code\User\workspac
eStorage\35645f84fe309ce1d5ab2a9af314d21a\redhat.java\jdt_ws\Visual Studio Code_9125e193\bin' 'mo
del.Main'
Book successfully taken
PS C:\Users\User\Documents\Visual Studio Code>
```

Рисунок 3.13 - Результат работы программы.

Вывод: Приобрел практические навыки в области объектно-ориентированного проектирования.