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ОТЧЕТ
по лабораторной работе №4
по дисциплине СПП

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

Вариант 13

Задание 1. Создать класс Зачетная Книжка с внутренним классом, с помощью объектов которого можно хранить информацию о сессиях, зачетах, экзаменах.

Реализация алгоритмов:

Main.java

```
package lab;

public class Main {

    public static void main(String[] args) {

        RecordBook book = new RecordBook();
        book.AddExam(1, "Math", "Volkova", 8);
        book.AddExam(2, "PE", "Baranov", 10);
        book.AddExam(3, "OSiSP", "Habib", 10);

        book.show();
    }
}
```

RecordBook.java

```
package lab;
import java.util.ArrayList;

public class RecordBook {
    private class Exam {
        int exam_id;
        String subject;
        String teacher;
        int mark;

        @Override
        public String toString() {
            return "Exam " + exam_id +
                "\nSubject: " + subject +
                "\nTeacher: " + teacher +
                "\nMark: " + mark + "\n";
        }
    }

    ArrayList<Exam> exams = new ArrayList<>();

    public void AddExam (int _id, String _sub, String _teacher, int _mark) {
        Exam ex = new Exam();
        ex.exam_id = _id;
        ex.subject = _sub;
        ex.teacher = _teacher;
        ex.mark = _mark;
        exams.add(ex);
    }

    public void show () {
        for (Exam ex : exams) {
            System.out.println(ex.toString());
        }
    }
}
```

```
}  
}  
}
```

Результат работы программы:

```
Exam 1  
Subject: Math  
Teacher: Volkova  
Mark: 8
```

```
Exam 2  
Subject: PE  
Teacher: Baranov  
Mark: 10
```

```
Exam 3  
Subject: OSiSP  
Teacher: Habib  
Mark: 10
```

Задание 2. Создать класс Строка, используя классы Слово, Символ Реализация алгоритма:

Main.java

```
package lab;  
import java.util.Vector;  
public class Main {  
  
    public static void main(String[] args) {  
        Symbol symb1 = new Symbol('m');  
        Symbol symb2 = new Symbol('a');  
        Symbol symb3 = new Symbol('m');  
        Symbol symb4 = new Symbol('a');  
  
        Symbol symb5 = new Symbol('p');  
        Symbol symb6 = new Symbol('a');  
        Symbol symb7 = new Symbol('p');  
        Symbol symb8 = new Symbol('a');  
  
        Word word1 = new Word();  
        word1.AddSymbol(symb1);  
        word1.AddSymbol(symb2);  
        word1.AddSymbol(symb3);  
        word1.AddSymbol(symb4);  
  
        Word word2 = new Word();  
        word2.AddSymbol(symb5);  
        word2.AddSymbol(symb6);  
        word2.AddSymbol(symb7);  
        word2.AddSymbol(symb8);  
  
        MyString str = new MyString();  
        str.AddWord(word1);  
        str.AddWord(word2);  
    }  
}
```

```

        System.out.println(str.toString());
    }
}

class Symbol {
    private char symbol;

    public Symbol (char c) {
        this.symbol = c;
    }

    public char getSymbol() {
        return symbol;
    }
}

class Word {
    private Vector<Symbol> word = new Vector<>();

    void AddSymbol (Symbol symbol) {
        word.add(symbol);
    }

    @Override
    public String toString() {
        StringBuilder str = new StringBuilder();
        for (Symbol symb: word)
            str.append(symb.getSymbol());
        return str.toString();
    }
}

class MyString {
    private Vector<Word> mystr = new Vector<>();

    void AddWord(Word word) {
        mystr.add(word);
    }

    @Override
    public String toString() {
        StringBuilder str = new StringBuilder();
        for (Word word: mystr) {
            str.append(word.toString());
            str.append(' ');
        }
        return str.toString();
    }
}

```

Результат работы программы:

```
mama  papa
```

```
Process finished with exit code 0
```

Задание 2. Система Вступительные экзамены. Абитуриент регистрируется на Факультет, сдает Экзамены. Преподаватель выставляет Оценку. Система подсчитывает средний балл и определяет Абитуриентов, зачисленных в учебное заведение.

Реализация алгоритма:

Main.java

```
package lab;

public class Main {

    public static void main(String[] args) {
        Faculty feis = new Faculty(Faculty.FacultyName.FEIS);
        Faculty msf = new Faculty(Faculty.FacultyName.MSF);

        Exam ex1 = new Exam(Exam.Subjects.Math);
        Exam ex2 = new Exam(Exam.Subjects.Physics);
        Exam ex3 = new Exam(Exam.Subjects.Language);

        Teacher teacher1 = new Teacher("Andrei", "Volkov", ex1);
        Teacher teacher2 = new Teacher("Michail", "Makoed", ex2);
        Teacher teacher3 = new Teacher("Anna", "Veremeuk", ex3);

        //FEIS
        Abiturient abit1 = new Abiturient("Marina", "Shostak");
        Abiturient abit2 = new Abiturient("Dmitry", "Sergievich");
        Abiturient abit3 = new Abiturient("Egor", "Yaroshuk");

        abit1.Register(feis);
        abit2.Register(feis);
        abit3.Register(feis);

        abit1.PassExam(teacher1.Rate(8), teacher1.getSubject());
        abit1.PassExam(teacher2.Rate(6), teacher2.getSubject());
        abit1.PassExam(teacher3.Rate(10), teacher3.getSubject());

        abit2.PassExam(teacher1.Rate(7), teacher1.getSubject());
        abit2.PassExam(teacher2.Rate(9), teacher2.getSubject());
        abit2.PassExam(teacher3.Rate(5), teacher3.getSubject());

        abit3.PassExam(teacher1.Rate(9), teacher1.getSubject());
        abit3.PassExam(teacher2.Rate(6), teacher2.getSubject());
        abit3.PassExam(teacher3.Rate(8), teacher3.getSubject());

        feis.showRegisteredAbiturients();
        feis.Reception();
        feis.showRecivedAbiturients();

        //msf
        Abiturient abit4 = new Abiturient("Pavel", "Tutin");
        Abiturient abit5 = new Abiturient("Katerina", "Kalinovskaya");
        Abiturient abit6 = new Abiturient("Roman", "Pigas");

        abit4.Register(msf);
        abit5.Register(msf);
        abit6.Register(msf);

        abit4.PassExam(teacher1.Rate(4), teacher1.getSubject());
        abit4.PassExam(teacher2.Rate(5), teacher2.getSubject());
        abit4.PassExam(teacher3.Rate(6), teacher3.getSubject());
    }
}
```

```

        abit5.PassExam(teacher1.Rate(7), teacher1.getSubject());
        abit5.PassExam(teacher2.Rate(9), teacher2.getSubject());
        abit5.PassExam(teacher3.Rate(10), teacher3.getSubject());

        abit6.PassExam(teacher1.Rate(9), teacher1.getSubject());
        abit6.PassExam(teacher2.Rate(7), teacher2.getSubject());
        abit6.PassExam(teacher3.Rate(5), teacher3.getSubject());

        msf.showRegisteredAbiturients();
        msf.Reception();
        msf.showRecivedAbiturients();

    }
}

```

Abiturient.java

```

package lab;
import java.util.HashMap;

public class Abiturient {
    private String name;
    private String surname;

    private Faculty faculty;
    private HashMap<Exam.Subjects, Mark> results = new HashMap<>();

    public Abiturient (String _name, String _surname) {
        name = _name;
        surname = _surname;
    }

    public void Register (Faculty fac) {
        fac.AddAbiturientToFaculty(this);
        faculty = fac;
    }

    public void PassExam(Mark _mark, Exam.Subjects _sub) {
        results.put(_sub, _mark);
    }

    public int getResults(Exam.Subjects _sub) {
        return this.results.get(_sub).getMark();
    }

    public double GetAverage () {
        return (this.getResults(Exam.Subjects.Math) +
this.getResults(Exam.Subjects.Physics) +
        this.getResults(Exam.Subjects.Language))/3;
    }

    @Override
    public String toString() {
        return "\nName: " + name + '\n' +
            "Surname: " + surname + '\n' +
            "Math: " + results.get(Exam.Subjects.Math).getMark() + '\n' +
            "Physics: " + results.get(Exam.Subjects.Physics).getMark() + '\n'
+
            "Language: " + results.get(Exam.Subjects.Language).getMark() +
'\n' +
            "Average: " + GetAverage();
    }
}

```

```

        public String toSmallString() {
            return name + ' ' + surname;
        }
    }
}

```

Faculty.java

```

package lab;
import java.util.ArrayList;

public class Faculty {
    public enum FacultyName {
        FEIS,
        SF,
        MSF,
        FISE
    }
    private FacultyName name;
    private ArrayList<Abiturient> RegisteredAbiturients = new ArrayList<>();
    private ArrayList<Abiturient> ReceivedAbiturients = new ArrayList<>();

    public Faculty (FacultyName _name) {
        name = _name;
    }

    public void AddAbiturientToFaculty (Abiturient abit) {
        RegisteredAbiturients.add(abit);
    }

    public void Reception () {
        for (Abiturient _abit:RegisteredAbiturients) {
            if (_abit.GetAverage() > 6) ReceivedAbiturients.add(_abit);
        }
    }

    public void showRegisteredAbiturients() {
        System.out.println("Registered abiturients to " + name);
        for (Abiturient abit: RegisteredAbiturients)
            System.out.println(abit.toString());
        System.out.println('\n');
    }

    public void showRecivedAbiturients () {
        System.out.println("Received abiturients to " + name);
        for (Abiturient abit: ReceivedAbiturients)
            System.out.println(abit.toSmallString());
        System.out.println('\n');
    }
}

```

Teacher.java

```

package lab;

public class Teacher {
    private String name;
    private String surname;
    private Exam.Subjects subject;
    public Teacher (String _name, String _surname, Exam _ex) {
        name = _name;
        surname = _surname;
    }
}

```

```

        subject = _ex.getSubject();
    }
    public Mark Rate(int _mark) {
        Mark mark = new Mark();
        mark.setMark(_mark);
        return mark;
    }

    public Exam.Subjects getSubject() {
        return subject;
    }
}

```

Exam.java

```

package lab;

public class Exam {

    public enum Subjects {
        Math, Physics, Language
    }
    private Subjects subject;
    public Exam (Subjects _sub) {
        subject = _sub;
    }

    public Subjects getSubject() {
        return subject;
    }
}

```

Mark.java

```

package lab;

public class Mark {
    private int mark;

    public int getMark() {
        return mark;
    }

    public void setMark(int _mark) {
        mark = _mark;
    }
}

```

Результат работы:

Registered abiturients to FEIS

Name: Marina
Surname: Shostak
Math: 8
Physics: 6
Language: 10
Average: 8.0

Name: Dmitry
Surname: Sergievich
Math: 7
Physics: 9
Language: 5
Average: 7.0

Name: Egor
Surname: Yaroshuk
Math: 9
Physics: 6
Language: 8
Average: 7.0

Received abiturients to FEIS

Marina Shostak
Dmitry Sergievich
Egor Yaroshuk
Registered abiturients to MSF

Name: Pavel
Surname: Tutin
Math: 4
Physics: 5
Language: 6
Average: 5.0

Name: Katerina
Surname: Kalinovskaya
Math: 7
Physics: 9
Language: 10
Average: 8.0

Name: Roman
Surname: Pigas
Math: 9
Physics: 7
Language: 5
Average: 7.0

Received abiturients to MSF

Katerina Kalinovskaya
Roman Pigas

Вывод: приобрели практические навыки в области объектно-ориентированного проектирования