

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

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Кафедра математичного моделювання та аналізу даних

ПРАКТИЧНА РОБОТА №2

на тему: «Використання нормалізації і вдосконалення програми для обробки великого обсягу даних»

Виконав: студент 2 курсу групи КС21__

Спеціальності 122 «Комп'ютерні науки»

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Мета роботи: Метою роботи є нормалізація і вдосконалення програми для обробки даних з файлів з великим обсягом даних.

Постановка задачі: У другій частині завдання ви повинні змінити свою програму, щоб адаптуватись до змін у форматі вхідних даних. Очікується, що ви будете дотримуватись строгого формату виведення. Нагадаємо, що вихідний файл `students.txt` мав такий формат:

```
StLastName, StFirstName, Grade, Classroom, Bus, TLastName, TFirstName
```

Взагалі кажучи, якщо кожен учитель викладає саме в одному класі це займає багато місця, щоб поставити ім'я вчителя проти імені кожного учня. Тому тепер ми переглядаємо формат вхідного файлу. Тепер оригінальний `students.txt` замінюється парою файлів: `list.txt` та `teacher.txt`.
Файл `list.txt` має такий формат:

```
StLastName, StFirstName, Grade, Classroom, Bus
```

Зразок рядка файла `list.txt`:

```
DROP, SHERMAN, 0, 104, 53
```

Це можна інтерпретувати наступним чином: Sherman DROP учень, який навчається у класі (номер класної кімнати) 104, та їде автобусом № 53. Формат `teacher.txt` має вигляд:

```
TLastName, TFirstName, Classroom
```

Рядок з файла `teachers.txt` має вигляд:

```
NIBLER, JERLENE, 104
```

Це можна інтерпретувати наступним чином: NIBLER Jerlene викладає у класі (номер класної кімнати) 104.

Інформація в цих файлах точно така ж, як і у вихідному файлі `students.txt`, тому відповіді на тестові пошуки в обох версіях вашої програми повинні бути однаковими.

Ваша мета - змінити програму шкільного пошуку з першої практичної роботи, для обробки нових форматів вхідних даних. Крім того, вам пропонується розробити та впровадити у новій програмі додаткові засоби пошуку.

Під час виконання необхідно скопіювати результати роботи першої практичної роботи та порівняти з результатами другої. Також обов'язково необхідно додати час виконання кожного з запитів.

Текст програми з коментарями: або Модель:

```
import java.io.*;
```

```

import java.util.*;

public class SchoolSystem {

    private List<Student> students = new ArrayList<>();
    private Map<Integer, Teacher> teachers = new HashMap<>();

    public SchoolSystem(String studentFile, String teacherFile) throws IOException {
        loadStudents(studentFile);
        loadTeachers(teacherFile);
    }

    private void loadStudents(String fileName) throws IOException {
        BufferedReader br = new BufferedReader(new FileReader(fileName));
        String line;
        while ((line = br.readLine()) != null) {
            String[] parts = line.split(",\\s*");
            students.add(new Student(parts[0], parts[1], Integer.parseInt(parts[2]),
                                     Integer.parseInt(parts[3]), Integer.parseInt(parts[4])));
        }
        br.close();
    }

    private void loadTeachers(String fileName) throws IOException {
        BufferedReader br = new BufferedReader(new FileReader(fileName));
        String line;
        while ((line = br.readLine()) != null) {
            String[] parts = line.split(",\\s*");
            teachers.put(Integer.parseInt(parts[2]),
                        new Teacher(parts[0], parts[1], Integer.parseInt(parts[2])));
        }
        br.close();
    }

    public void findAllInfoByLastName(String lastName) {
        for (Student student : students) {
            if (student.lastName.equalsIgnoreCase(lastName)) {
                Teacher teacher = teachers.get(student.classroom);
            }
        }
    }
}

```

```

        System.out.println("Student Info: " + student.lastName + ", " +
student.firstName +
        ", Grade: " + student.grade + ", Classroom: " + student.classroom +
        ", Bus: " + student.bus + ", Teacher: " +
        (teacher != null ? teacher.firstName + " " + teacher.lastName :
"Unknown"));
    }
}

public void findStudentByName(String name) {
    for (Student student : students) {
        if (student.lastName.equalsIgnoreCase(name) ||
student.firstName.equalsIgnoreCase(name)) {
            Teacher teacher = teachers.get(student.classroom);
            System.out.println(student.firstName + " " + student.lastName +
                " is in classroom " + student.classroom + ", Teacher: " +
                (teacher != null ? teacher.firstName + " " + teacher.lastName :
"Unknown"));
        }
    }
}

public void findBusByName(String name) {
    for (Student student : students) {
        if (student.lastName.equalsIgnoreCase(name) ||
student.firstName.equalsIgnoreCase(name)) {
            System.out.println(student.firstName + " " + student.lastName +
                " takes bus " + student.bus);
        }
    }
}

public void findStudentsByTeacher(String teacherName) {
    for (Map.Entry<Integer, Teacher> entry : teachers.entrySet()) {
        Teacher teacher = entry.getValue();
        if (teacher.lastName.equalsIgnoreCase(teacherName) ||
teacher.firstName.equalsIgnoreCase(teacherName)) {
            for (Student student : students) {

```

```

        if (student.classroom == teacher.classroom) {
            System.out.println(student.firstName + " " + student.lastName);
        }
    }
}

public void findStudentsByBusRoute(int busRoute) {
    for (Student student : students) {
        if (student.bus == busRoute) {
            System.out.println(student.firstName + " " + student.lastName +
                " takes bus " + busRoute);
        }
    }
}

public void findStudentsByGrade(int grade) {
    for (Student student : students) {
        if (student.grade == grade) {
            Teacher teacher = teachers.get(student.classroom);
            System.out.println(student.firstName + " " + student.lastName + " is in
grade " + grade +
                ", Teacher: " +
                (teacher != null ? teacher.firstName + " " + teacher.lastName :
"Unknown"));
        }
    }
}

public void findStudentsByClassroom(int classroom) {
    for (Student student : students) {
        if (student.classroom == classroom) {
            System.out.println(student.firstName + " " + student.lastName +
                " is in classroom " + classroom);
        }
    }
}

```

```

public void startMenu() {
    Scanner scanner = new Scanner(System.in);
    while (true) {
        System.out.println("\n-----MENU-----");
        System.out.println("1. Find all info by student's last name");
        System.out.println("2. Search by name (search class and teacher)");
        System.out.println("3. Search by name (search bus)");
        System.out.println("4. Search students by teacher");
        System.out.println("5. Search for students by bus");
        System.out.println("6. Search students by grade");
        System.out.println("7. Search students by classroom");
        System.out.println("8. Exit the program");
        System.out.print("Choose an option (1-8): ");

        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                System.out.print("Enter the student's last name: ");
                String lastName = scanner.nextLine();
                findAllInfoByLastName(lastName);
                break;
            case 2:
                System.out.print("Enter the student's last or first name: ");
                String name = scanner.nextLine();
                findStudentByName(name);
                break;
            case 3:
                System.out.print("Enter the student's last or first name: ");
                name = scanner.nextLine();
                findBusByName(name);
                break;
            case 4:
                System.out.print("Enter the teacher's last or first name: ");
                String teacherName = scanner.nextLine();
                findStudentsByTeacher(teacherName);
                break;
            case 5:

```

```

        System.out.print("Enter the bus number: ");
        int busRoute = scanner.nextInt();
        findStudentsByBusRoute(busRoute);
        break;
    case 6:
        System.out.print("Enter student's Grade Level (0 for Kindergarten): ");
        int grade = scanner.nextInt();
        findStudentsByGrade(grade);
        break;
    case 7:
        System.out.print("Enter the classroom number: ");
        int classroom = scanner.nextInt();
        findStudentsByClassroom(classroom);
        break;
    case 8:
        System.out.println("Exit...");
        scanner.close();
        return;
    default:
        System.out.println("ERROR: Wrong choice, try again.");
    }
}
}

static class Student {
    String lastName, firstName;
    int grade, classroom, bus;

    Student(String lastName, String firstName, int grade, int classroom, int bus) {
        this.lastName = lastName;
        this.firstName = firstName;
        this.grade = grade;
        this.classroom = classroom;
        this.bus = bus;
    }
}

static class Teacher {
    String lastName, firstName;

```

```
int classroom;

Teacher(String lastName, String firstName, int classroom) {
    this.lastName = lastName;
    this.firstName = firstName;
    this.classroom = classroom;
}

public static void main(String[] args) {
    try {
        SchoolSystem school = new SchoolSystem("list.txt", "teacher.txt");
        school.startMenu();
    } catch (IOException e) {
        e.printStackTrace();
    }
}
```

Результат виконання:


```

-----MENU-----
1. Find all info by student's last name
2. Search by name (search class and teacher)
3. Search by name (search bus)
4. Search students by teacher
5. Search for students by bus
6. Search students by grade
7. Search students by classroom
8. Exit the program
Choose an option (1-8): 1
Enter the student's last name: bex
Student Info: BEX, TAMESHA, Grade: 4, Classroom: 105, Bus: 55, Teacher: JONATHAN FAFARD
Student Info: BEX, JANNETTE, Grade: 2, Classroom: 107, Bus: 51, Teacher: BENITO FALKER
Student Info: BEX, FLOY, Grade: 3, Classroom: 110, Bus: 54, Teacher: BENITO KERBS
Student Info: BEX, BILLY, Grade: 5, Classroom: 110, Bus: 55, Teacher: BENITO KERBS
Student Info: BEX, TAMESHA, Grade: 3, Classroom: 107, Bus: 52, Teacher: BENITO FALKER
Student Info: BEX, RANDOLPH, Grade: 6, Classroom: 104, Bus: 51, Teacher: NANCY HANTZ
Student Info: BEX, HYE, Grade: 1, Classroom: 101, Bus: 55, Teacher: ADOLPH CHIONCHIO
Student Info: BEX, INGER, Grade: 2, Classroom: 101, Bus: 53, Teacher: ADOLPH CHIONCHIO
Student Info: BEX, HYE, Grade: 5, Classroom: 108, Bus: 54, Teacher: ADOLPH NISTENDIRK
Student Info: BEX, DICK, Grade: 4, Classroom: 106, Bus: 54, Teacher: JED STEIB
Student Info: BEX, BILLY, Grade: 4, Classroom: 103, Bus: 51, Teacher: REUBEN FAFARD
Student Info: BEX, HYE, Grade: 3, Classroom: 110, Bus: 51, Teacher: BENITO KERBS
Student Info: BEX, HYE, Grade: 1, Classroom: 107, Bus: 55, Teacher: BENITO FALKER
Student Info: BEX, XUAN, Grade: 5, Classroom: 105, Bus: 55, Teacher: JONATHAN FAFARD
Student Info: BEX, JANNETTE, Grade: 5, Classroom: 105, Bus: 51, Teacher: JONATHAN FAFARD
Student Info: BEX, DICK, Grade: 5, Classroom: 108, Bus: 52, Teacher: ADOLPH NISTENDIRK
Student Info: BEX, DIMPLE, Grade: 2, Classroom: 104, Bus: 54, Teacher: NANCY HANTZ
Student Info: BEX, ZANDRA, Grade: 5, Classroom: 104, Bus: 55, Teacher: NANCY HANTZ
Student Info: BEX, DIMPLE, Grade: 1, Classroom: 112, Bus: 54, Teacher: PERLA GAMBREL
Student Info: BEX, FLOY, Grade: 1, Classroom: 101, Bus: 52, Teacher: ADOLPH CHIONCHIO
Student Info: BEX, CARTER, Grade: 1, Classroom: 101, Bus: 56, Teacher: ADOLPH CHIONCHIO
Student Info: BEX, RANDOLPH, Grade: 2, Classroom: 105, Bus: 52, Teacher: JONATHAN FAFARD
Student Info: BEX, WAN, Grade: 2, Classroom: 109, Bus: 53, Teacher: BENITO GAMBREL

```

Скріншот 1: Пошук всієї інформації про студента за прізвищем студента
(прізвище - BEX)

```
-----MENU-----
1. Find all info by student's last name
2. Search by name (search class and teacher)
3. Search by name (search bus)
4. Search students by teacher
5. Search for students by bus
6. Search students by grade
7. Search students by classroom
8. Exit the program
Choose an option (1-8): 2
Enter the student's last or first name: bex
TAMESHA BEX is in classroom 105, Teacher: JONATHAN FAFARD
JANNETTE BEX is in classroom 107, Teacher: BENITO FALKER
FLOY BEX is in classroom 110, Teacher: BENITO KERBS
BILLY BEX is in classroom 110, Teacher: BENITO KERBS
TAMESHA BEX is in classroom 107, Teacher: BENITO FALKER
RANDOLPH BEX is in classroom 104, Teacher: NANCY HANTZ
HYE BEX is in classroom 101, Teacher: ADOLPH CHIONCHIO
INGER BEX is in classroom 101, Teacher: ADOLPH CHIONCHIO
HYE BEX is in classroom 108, Teacher: ADOLPH NISTENDIRK
DICK BEX is in classroom 106, Teacher: JED STEIB
BILLY BEX is in classroom 103, Teacher: REUBEN FAFARD
HYE BEX is in classroom 110, Teacher: BENITO KERBS
HYE BEX is in classroom 107, Teacher: BENITO FALKER
XUAN BEX is in classroom 105, Teacher: JONATHAN FAFARD
JANNETTE BEX is in classroom 105, Teacher: JONATHAN FAFARD
DICK BEX is in classroom 108, Teacher: ADOLPH NISTENDIRK
DIMPLE BEX is in classroom 104, Teacher: NANCY HANTZ
ZANDRA BEX is in classroom 104, Teacher: NANCY HANTZ
DIMPLE BEX is in classroom 112, Teacher: PERLA GAMBREL
FLOY BEX is in classroom 101, Teacher: ADOLPH CHIONCHIO
CARTER BEX is in classroom 101, Teacher: ADOLPH CHIONCHIO
RANDOLPH BEX is in classroom 105, Teacher: JONATHAN FAFARD
WAN BEX is in classroom 109, Teacher: BENITO GAMBREL
```

Скріншот 2: Пошук класу і викладача студента за прізвищем студента
(прізвище - BEX)

```
-----MENU-----
1. Find all info by student's last name
2. Search by name (search class and teacher)
3. Search by name (search bus)
4. Search students by teacher
5. Search for students by bus
6. Search students by grade
7. Search students by classroom
8. Exit the program
Choose an option (1-8): 3
Enter the student's last or first name: bex
TAMESHA BEX takes bus 55
JANNETTE BEX takes bus 51
FLOY BEX takes bus 54
BILLY BEX takes bus 55
TAMESHA BEX takes bus 52
RANDOLPH BEX takes bus 51
HYE BEX takes bus 55
INGER BEX takes bus 53
HYE BEX takes bus 54
DICK BEX takes bus 54
BILLY BEX takes bus 51
HYE BEX takes bus 51
HYE BEX takes bus 55
XUAN BEX takes bus 55
JANNETTE BEX takes bus 51
DICK BEX takes bus 52
DIMPLE BEX takes bus 54
ZANDRA BEX takes bus 55
DIMPLE BEX takes bus 54
FLOY BEX takes bus 52
CARTER BEX takes bus 56
RANDOLPH BEX takes bus 52
WAN BEX takes bus 53
```

Скріншот 3: Пошук маршруту студента за прізвищем студента (прізвище - BEX)

```
-----MENU-----  
1. Find all info by student's last name  
2. Search by name (search class and teacher)  
3. Search by name (search bus)  
4. Search students by teacher  
5. Search for students by bus  
6. Search students by grade  
7. Search students by classroom  
8. Exit the program  
Choose an option (1-8): 4  
Enter the teacher's last or first name: nancy  
NOLAN WOOLERY  
EMMANUEL VILARDO  
XUAN COOKUS  
CARTER BERBES  
HYE BRODERSEN  
BILLY BUSSMANN  
FLOY CREMEANS  
FLOY CLECKLER  
DICK CLECKLER  
ZANDRA CORONADO  
ZANDRA CREMEANS  
ZANDRA BUSSMANN  
WAN CLECKLER  
BILLY CORKER  
TOMAS BERBES  
BILLY COMO  
MANIE CREMEANS  
TAMESHA CORKER  
RANDOLPH BEX  
RANDOLPH CORKER  
TOMAS BUSSMANN  
TOMAS CREMEANS  
DICK COOKUS
```

Скріншот 4: Пошук студентів за прізвищем викладача (ім'я - NANCY)

```
-----MENU-----
1. Find all info by student's last name
2. Search by name (search class and teacher)
3. Search by name (search bus)
4. Search students by teacher
5. Search for students by bus
6. Search students by grade
7. Search students by classroom
8. Exit the program
Choose an option (1-8): 5
Enter the bus number: 56
NOEL RACANELLO takes bus 56
EMMANUEL VILARDO takes bus 56
VALENTIN KRAKE takes bus 56
INGER BEAN takes bus 56
BILLY BUSSMANN takes bus 56
WILFREDO FEYEREISEN takes bus 56
FLOY BREVO takes bus 56
JANNETTE CREMEANS takes bus 56
XUAN COMO takes bus 56
CARTER CREMEANS takes bus 56
HYE BRODERSEN takes bus 56
DIMPLE COMO takes bus 56
INGER CORKER takes bus 56
WAN CLECKLER takes bus 56
WAN COOKUS takes bus 56
BILLY BEAN takes bus 56
RANDOLPH BOYTER takes bus 56
TOMAS BOYTER takes bus 56
DICK CORKER takes bus 56
INGER CORONADO takes bus 56
WAN CLECKLER takes bus 56
TOMAS BUSSMANN takes bus 56
BILLY CLECKLER takes bus 56
```

Скріншот 5: Пошук студента за маршрутом (маршрут - 56)


```

-----MENU-----
1. Find all info by student's last name
2. Search by name (search class and teacher)
3. Search by name (search bus)
4. Search students by teacher
5. Search for students by bus
6. Search students by grade
7. Search students by classroom
8. Exit the program
Choose an option (1-8): 6
Enter student's Grade Level (0 for Kindergarten): 5
FLOY BREVO is in grade 5, Teacher: JED STEIB
TOMAS CLECKLER is in grade 5, Teacher: ADOLPH CHIONCHIO
FLOY BREVO is in grade 5, Teacher: BENITO GAMBREL
FLOY CIGANEK is in grade 5, Teacher: PERLA GAMBREL
MANIE BERBES is in grade 5, Teacher: BENITO KERBS
XUAN COMO is in grade 5, Teacher: PERLA GAMBREL
INGER CORONADO is in grade 5, Teacher: BENITO FALKER
MANIE COOKUS is in grade 5, Teacher: PERLA GAMBREL
JANNETTE CORONADO is in grade 5, Teacher: BENITO FALKER
MANIE BREVO is in grade 5, Teacher: LUZ NISTENDIRK
BILLY BEAN is in grade 5, Teacher: REUBEN FAFARD
BILLY BEX is in grade 5, Teacher: BENITO KERBS
WAN COOKUS is in grade 5, Teacher: BENITO GAMBREL
RANDOLPH COOKUS is in grade 5, Teacher: LUZ NISTENDIRK
BILLY BEAN is in grade 5, Teacher: JONATHAN FAFARD
RANDOLPH BOYTER is in grade 5, Teacher: ADOLPH NISTENDIRK
INGER CLECKLER is in grade 5, Teacher: REUBEN FAFARD
WAN BEAN is in grade 5, Teacher: JED STEIB
JANNETTE COOKUS is in grade 5, Teacher: JONATHAN FAFARD
TAMESHA CORKER is in grade 5, Teacher: PERLA HAMER
JANNETTE CORKER is in grade 5, Teacher: BENITO FALKER
JANNETTE COVINGTON is in grade 5, Teacher: ADOLPH CHIONCHIO
WAN BOYTER is in grade 5, Teacher: JONATHAN FAFARD

```

Скріншот 6: Пошук класу та викладача студента за прізвищем студента
(маршрут - 56)

```
-----MENU-----  
1. Find all info by student's last name  
2. Search by name (search class and teacher)  
3. Search by name (search bus)  
4. Search students by teacher  
5. Search for students by bus  
6. Search students by grade  
7. Search students by classroom  
8. Exit the program  
Choose an option (1-8): 7  
Enter the classroom number: 106  
ELLIOTT ZAPPAVIGNA is in classroom 106  
REED FRIEDSTROM is in classroom 106  
DICK BREVO is in classroom 106  
FLOY BREVO is in classroom 106  
RANDOLPH CORKER is in classroom 106  
DICK BERBES is in classroom 106  
MANIE COMO is in classroom 106  
DIMPLE COVINGTON is in classroom 106  
DIMPLE COMO is in classroom 106  
HYE CIGANEK is in classroom 106  
DICK BUSSMANN is in classroom 106  
INGER CORKER is in classroom 106  
WAN CORKER is in classroom 106  
TOMAS COVINGTON is in classroom 106  
WAN BEAN is in classroom 106  
ZANDRA COOKUS is in classroom 106  
WAN CIGANEK is in classroom 106  
ZANDRA BOYTER is in classroom 106  
HYE COVINGTON is in classroom 106  
DICK BEAN is in classroom 106  
DICK BEX is in classroom 106  
WAN BREVO is in classroom 106  
DICK BOYTER is in classroom 106
```

Скріншоти 7: Пошук студента за кабінетом (кабінет - 106)

```
-----MENU-----  
1. Find all info by student's last name  
2. Search by name (search class and teacher)  
3. Search by name (search bus)  
4. Search students by teacher  
5. Search for students by bus  
6. Search students by grade  
7. Search students by classroom  
8. Exit the program  
Choose an option (1-8): 8  
Exit...  
  
...Program finished with exit code 0  
Press ENTER to exit console.
```

Скріншот 8: Завершення роботи програми за викликом

Висновки: Цей оновлений варіант коду нам демонструє базові концепції обробки даних, організацію пошуку та взаємодію з користувачем через примітивне консольне меню. Закріплює навички роботи із файлами, обробку та структурування інформації, отриманої з файла.

Посилання на мою Git-сторінку з повним лістингом проєкту (репозиторій закритий але з доступом для викладача):

- <https://github.com/rymendet>