Nama : La Ode Muhammad Gazali
NIM : 222212696
Kelas : 2KS2

PRA PERTEMUAN 5 PEMROGRAMAN BERBASIS OBJEK

(UML dan Class Diagram)

Studi Kasus

- A university consists of multiple faculties which are composed of university various institutes. Each faculty and each institute has a name. An address is known for each institute.
- Each faculty is led by a dean, who is an employee of the university.
- The total number of employees is known. Employees have a social security number, a name, and an e-mail address. All employees have same obligation, namely to take the attendance. There is a distinction between research and administrative personnel.
- Calculation of attendance percentages are different for both research and administrative personnel. Administrative personnel: based on routine attendance per day. Research personnel: based on the number of teaching hours
- Research associates are assigned to at least one institute. The field of study of each research associate is known. Furthermore, research associates can be involved in projects for a certain number of hours, and the name, starting date, and end date of the projects are known. Some research associates teach courses. They are called lecturers.
- Courses have a unique number (ID), a name, and a weekly duration in hours.

A. Idenifikasi Classes

Ekstrak kata benda (noun) pada studi kasus tersebut:

- A **university** consists of multiple **faculties** which are composed of university various **institutes**. Each faculty and each institute has a name. An address is known for each institute.
- Each faculty is led by a **dean**, who is an **employee** of the university.
- The total number of employees is known. Employees have a social security number, a name, and an e-mail address. All employees have same obligation, namely to take the attendance. There is a distinction between **research** and **administrative personnel**.
- Calculation of attendance percentages are different for both research and administrative personnel. Administrative personnel: based on routine attendance per day. Research personnel: based on the number of teaching hours

- Research associates are assigned to at least one institute. The field of study of each research associate is known. Furthermore, research associates can be involved in **projects** for a certain number of hours, and the name, starting date, and end date of the projects are known. Some research associates teach **courses**. They are called **lecturers**.
- Courses have a unique number (ID), a name, and a weekly duration in hours.

B. Eliminasi class yang tidak relevan

Dari kata benda yang telah diekstrak, selanjutnya untuk menetapkan class apa saja yang harus dibuat, maka terlebih dahulu perlu dieliminasi kata benda yang kurang sesuai dengan proses bisnis pada studi kasus tersebut. Berikut class yang harus dieliminasi:

- University, karena kita sedang memodelkan sistem di universitas
- Dean, dapat gabungkan dengan employee karena tidak memiliki atribut lain yang berbeda dengan employee

Berikut Classes yang telah diidentifikasi dan siap diimplementasikan:

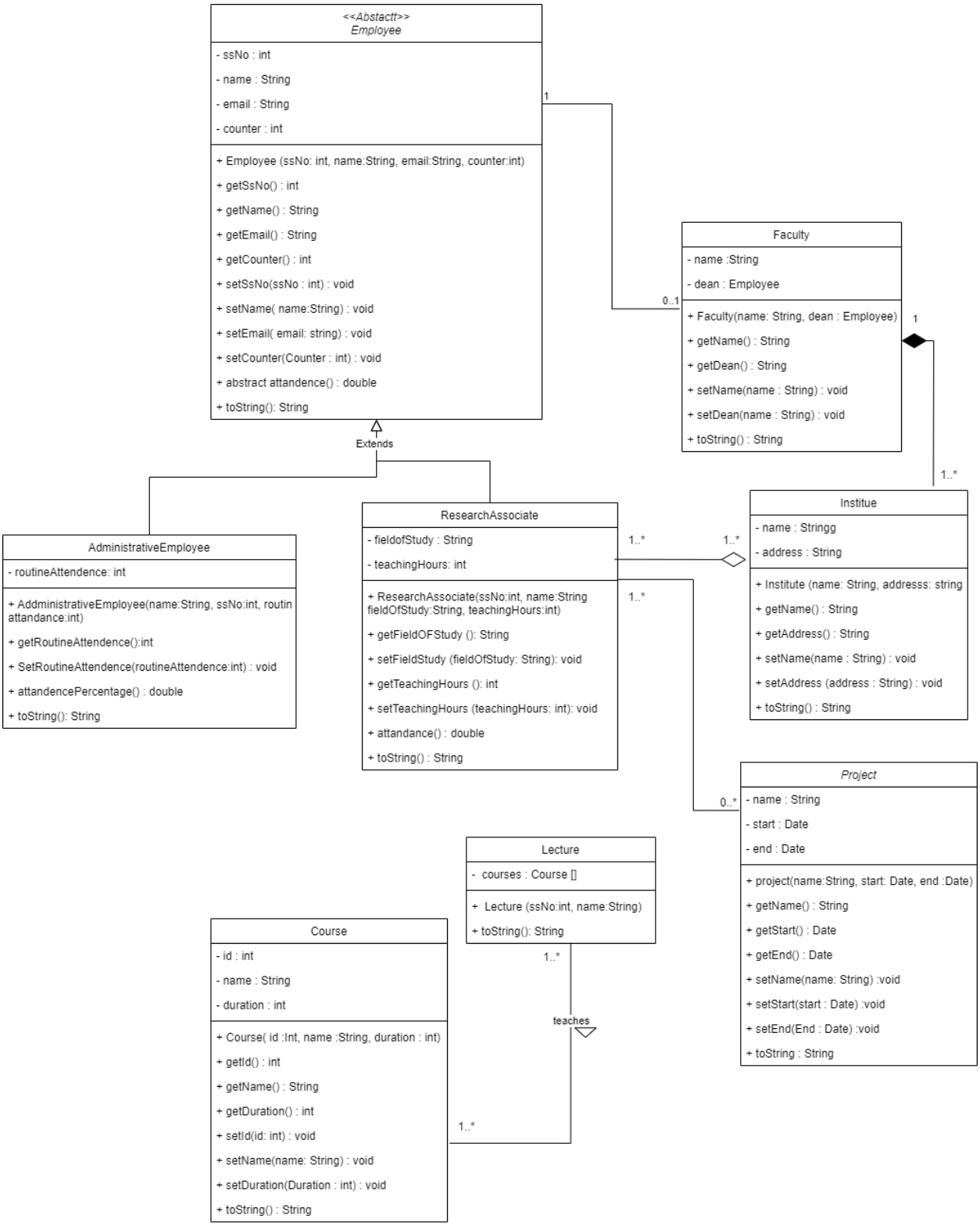
- Faculty
- Institute
- Employee
- Research Associate
- Administrative Employee
- Project
- Course
- Lecture

C. Identifikasi Atribut

Statement	Atribut
A university consists of multiple faculties which are composed of university various institutes. "Each faculty and each institute has a name. An address is known for each institute" "Each faculty is led by a dean, who is an employee of the university."	– Faculty • name (String) • dean (Employee) – Institute • name (String) • address (String)
"The total number of employees is known. Employees have a social	– Employee • ssNo (int)

security number, a name, and an e-mail address”	• name (String) • email (String) • Counter (Iint)
“There is a distinction between research and administrative personnel” “Administrative personnel: based on routine attendance per day. Research personnel: based on the number of teaching hours” “Research associates are assigned to at least one institute. The field of study of each research associate is known. Furthermore, research associates can be involved in projects for a certain number of hours, and the name, starting date, and end date of the projects are known. Some research associates teach courses. They are called lecturers.”	– Administrative Employee • routineAttendence(int) – Research Associate • fieldfOfStudy (String) • teachingHours (int) – Project • name (String) • start (Date) • end (Date)
“Some research associates teach courses. They are called lecturers.” “Courses have a unique number (ID), a name, and a weekly duration in hours.”	– Course • name (String) • id (int) • duration (int) – Lecture • Courses [] (Course)

D. Class Diagram University



E. Implementasi Program

Employee.java

```java
package university;

/**
 *
 * @author U53R
 */
public abstract class Employee {
    private int ssNo;
    private String name;
    private String email;
    private int counter;

    public Employee(int ssNo, String name, String email, int counter) {
        this.ssNo = ssNo;
        this.name = name;
        this.email = email;
        this.counter = counter;
    }

    public int getSsNo() {
        return ssNo;
    }

    public void setSsNo(int ssNo) {
        this.ssNo = ssNo;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getEmail() {
        return email;
    }

    public void setEmail(String email) {
        this.email = email;
    }

    public int getCounter() {
        return counter;
    }

    public void setCounter(int counter) {
        this.counter = counter;
    }

    public abstract double  attendence();
```

```
    public abstract double  attendence();

    @Override
    public String toString() {
        return "Employee{" +
                "socialSecurityNumber='" + ssNo + '\'' +
                ", name='" + name + '\'' +
                ", email='" + email + '\'' +
                '}';
    }
}
```

Faculty.java

```
package university;

/**
 *
 * @author U53R
 */
public class Faculty {
    private String name;
    private Employee dean;

    public Faculty(String name, Employee dean) {
        this.name = name;
        this.dean = dean;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public Employee getDean() {
        return dean;
    }

    public void setDean(Employee dean) {
        this.dean = dean;
    }

    @Override
    public String toString() {
        return "Faculty{" +
                "name='" + name + '\'' +
                ", dean=" + dean +
                '}';
```

Institute.java

```java
package university;

/**
 *
 * @author U53R
 */
public class Institute {
    private String name;
    private String address;

    public Institute(String name, String address) {
        this.name = name;
        this.address = address;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getAddress() {
        return address;
    }

    public void setAddress(String address) {
        this.address = address;
    }

    @Override
    public String toString() {
        return "Institute{" +
                "name='" + name + '\'' +
                ", address='" + address + '\'' +
                '}';
    }
}
```

AdministrativeEmployee.java

```java
package university;

/**
 *
 * @author U53R
 */
public class AdministrativeEmployee extends Employee {
    private int routineAttendence;

    public AdministrativeEmployee(int routineAttendence, int ssNo, String name, String email, int counter) {
        super(ssNo, name, email, counter);
        this.routineAttendence = routineAttendence;
    }

    public int getRoutineAttendence() {
        return routineAttendence;
    }

    public void setRoutineAttendence(int routineAttendence) {
        this.routineAttendence = routineAttendence;
    }

     @Override
    public double attendence() {
        return ((double)routineAttendence/30*100);
    }

    @Override
    public String toString() {
        return "AdministrativePersonnel{"+ super.toString()
                + "attendance=" + routineAttendence + '}';
    }
}
```

ResearchAssociate.java

```java
package university;
/**
 * @author U53R
 */
public class ResearchAssociate extends Employee {
    private String fieldOfStudy;
    private int teachingHours;

    public ResearchAssociate(int ssNo, String name, String email, int counter, String fieldOfStudy, int teachingHours) {
        super(ssNo, name, email, counter);
        this.fieldOfStudy = fieldOfStudy;
        this.teachingHours = teachingHours;
    }

    public String getFieldOfStudy() {
        return fieldOfStudy;
    }

    public void setFieldOfStudy(String fieldOfStudy) {
        this.fieldOfStudy = fieldOfStudy;
    }

    public int getTeachingHours() {
        return teachingHours;
    }
}
```

```
    public void setTeachingHours(int teachingHours) {
        this.teachingHours = teachingHours;
    }

    @Override
    public double attendence(){
        return ((double)teachingHours/240*100);
    }

    @Override
    public String toString() {
        return "ResearchAssociate{"+super.toString()+ "fieldOfStudy="
                + fieldOfStudy + ", teachingHours=" + teachingHours + "}\n";
    }
```

Lecture.java

```
package university;

import java.util.ArrayList;

public class Lecture extends ResearchAssociate {
    private ArrayList<Course> courses;

    public Lecture(ArrayList<Course> courses, String fieldOfStudy, int teachingHours, int ssNo, String name, String email, int counter) {
        super(ssNo, name, email, counter, fieldOfStudy, teachingHours);
        this.courses = courses;
    }

    public ArrayList<Course> getCourses() {
        return courses;
    }

    public void setCourses(ArrayList<Course> courses) {
        this.courses = courses;
    }

    @Override
    public String toString() {
        return "Lecture{" + super.toString() + ", courses=" + courses + '}';
    }
}
```

Course.java

```
package university;

/**
 *
 * @author U53R
 */
public class Course {
    private int id;
    private String name;
    private int duration;

    public Course(int id, String name, int duration) {
        this.id = id;
        this.name = name;
        this.duration = duration;
    }

    public int getId() {
        return id;
    }

```

```
    public void setId(int id) {
        this.id = id;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public int getDuration() {
        return duration;
    }

    public void setDuration(int duration) {
        this.duration = duration;
    }

    @Override
    public String toString() {
        return "Course{" + "id=" + id + ", name=" + name + ", Duration=" + duration +  '}';
    }

}
```

Project.java

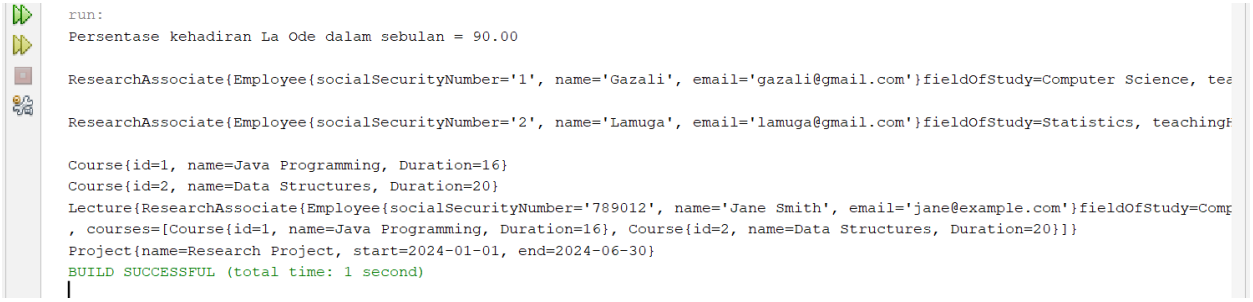
```
package university;

/**
 *
 * @author U53R
 */
import java.time.LocalDate;
public class Project {
    private String name;
    private LocalDate start;
    private LocalDate end;

    public Project(String name, LocalDate start, LocalDate end) {
        this.name = name;
        this.start = start;
        this.end = end;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public LocalDate getStart() {
        return start;
    }

```

```
31      public void setStart(LocalDate start) {
32          this.start = start;
33      }
34
35      public LocalDate getEnd() {
36          return end;
37      }
38
39      public void setEnd(LocalDate end) {
40          this.end = end;
41      }
42
43       @Override
44      public String toString() {
45          return "Project{" + "name=" + name + ", start=" + start +", end=" + end +'}';
46      }
47  }
```

University.java (main class)

```
1   package university;
2
3   /**
4    *
5    * @author U53R
6    */
7   import java.time.LocalDate;
8   import java.util.ArrayList;
9   public class University {
10      public static void main(String[] args) {
11          // Creating instances of Employee
12          AdministrativeEmployee LaOde = new AdministrativeEmployee(25, 123456, "La Ode", "laode@gmail.com", 100);
13          LaOde.setRoutineAttendence(27);
14          System.out.format("Persentase kehadiran La Ode dalam sebulan = %.2f\n\n",LaOde.attendence());
15
16          ResearchAssociate Gazali = new ResearchAssociate(1, "Gazali", "gazali@gmail.com", 200, "Computer Science", 40);
17          System.out.println(Gazali.toString());
18
19          ResearchAssociate Lamuga = new ResearchAssociate(2, "Lamuga", "lamuga@gmail.com", 180, "Statistics", 35);
20          System.out.println(Lamuga.toString());
21
22          // Creating instances of Course
23          Lecture lecture = new Lecture(new ArrayList<>(), "Computer Science", 40, 789012, "Jane Smith", "jane@example.com", 200);
24          Course course1 = new Course(1, "Java Programming", 16);
25          Course course2 = new Course(2, "Data Structures", 20);
26          System.out.println(course1);
27          System.out.println(course2);
28
29          // Adding courses to Lecture
30          lecture.getCourses().add(course1);
31          lecture.getCourses().add(course2);
32          System.out.println(lecture);
33
34          // Creating instance of Project
35          LocalDate projectStart = LocalDate.of(2024, 1, 1);
36          LocalDate projectEnd = LocalDate.of(2024, 6, 30);
37          Project project = new Project("Research Project", projectStart, projectEnd);
38          System.out.println(project.toString());
39      }
40
41  }
```

Output



run:

Persentase kehadiran La Ode dalam sebulan = 90.00

ResearchAssociate{Employee{socialSecurityNumber='1', name='Gazali', email='gazali@gmail.com'}fieldOfStudy=Computer Science, teachingHours=40}

ResearchAssociate{Employee{socialSecurityNumber='2', name='Lamuga', email='lamuga@gmail.com'}fieldOfStudy=Statistics, teachingHours=35}

Course{id=1, name=Java Programming, Duration=16}

Course{id=2, name=Data Structures, Duration=20}

Lecture{ResearchAssociate{Employee{socialSecurityNumber='789012', name='Jane Smith', email='jane@example.com'}fieldOfStudy=Computer Science, teachingHours=40}

, courses=[Course{id=1, name=Java Programming, Duration=16}, Course{id=2, name=Data Structures, Duration=20}]}

Project{name=Research Project, start=2024-01-01, end=2024-06-30}

BUILD SUCCESSFUL (total time: 1 second)