

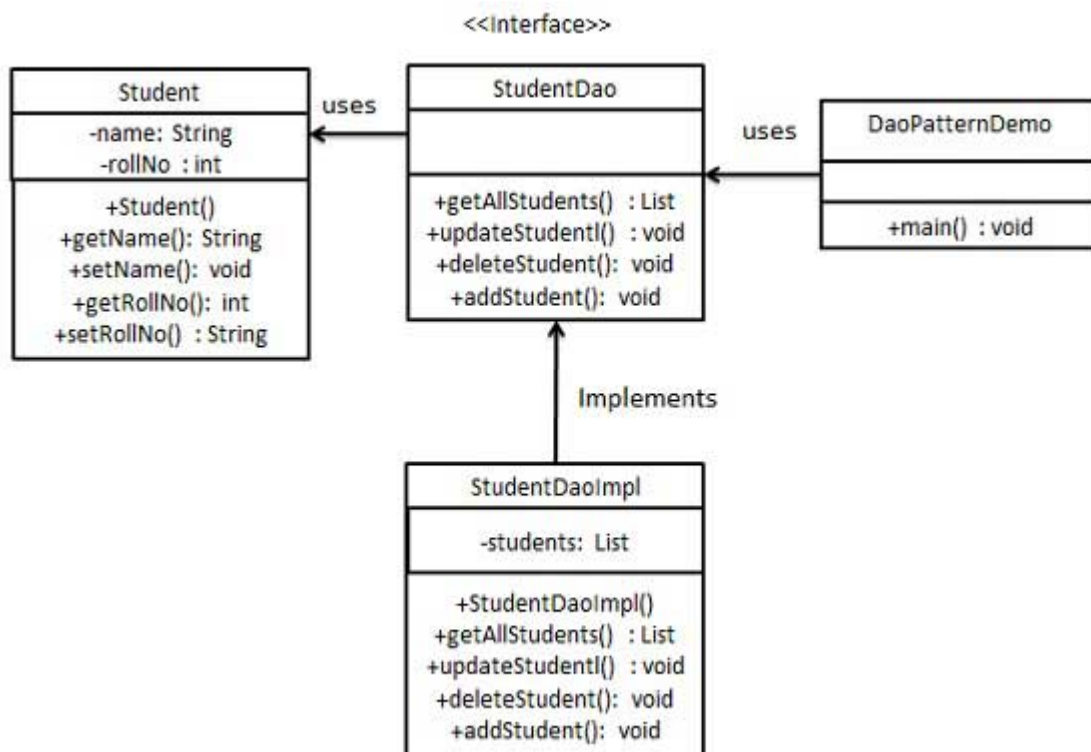
## Data Access Object Pattern

Data Access Object Pattern or DAO pattern is used to separate low level data accessing API or operations from high level business services. Following are the participants in Data Access Object Pattern.

- **Data Access Object Interface** - This interface defines the standard operations to be performed on a model object(s).
- **Data Access Object concrete class** - This class implements above interface. This class is responsible to get data from a data source which can be database / xml or any other storage mechanism.
- **Model Object or Value Object** - This object is simple POJO containing get/set methods to store data retrieved using DAO class.

### Implementation

We are going to create a *Student* object acting as a Model or Value Object. *StudentDao* is Data Access Object Interface. *StudentDaoImpl* is concrete class implementing Data Access Object Interface. *DaoPatternDemo*, our demo class, will use *StudentDao* to demonstrate the use of Data Access Object pattern.



## Step 1

Create Value Object.

*Student.java*

```
public class Student {
    private String name;
    private int rollNo;

    Student(String name, int rollNo){
        this.name = name;
        this.rollNo = rollNo;
    }

    public String getName() {
        return name;
    }

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

    public int getRollNo() {
        return rollNo;
    }

    public void setRollNo(int rollNo) {
        this.rollNo = rollNo;
    }
}
```

## Step 2

Create Data Access Object Interface.

*StudentDao.java*

```
import java.util.List;

public interface StudentDao {
    public List<Student> getAllStudents();
    public Student getStudent(int rollNo);
    public void updateStudent(Student student);
    public void deleteStudent(Student student);
}
```

### Step 3

Create concrete class implementing above interface.

*StudentDaoImpl.java*

```
import java.util.ArrayList;
import java.util.List;

public class StudentDaoImpl implements StudentDao {

    //list is working as a database
    List<Student> students;

    public StudentDaoImpl(){
        students = new ArrayList<Student>();
        Student student1 = new Student("Robert",0);
        Student student2 = new Student("John",1);
        students.add(student1);
        students.add(student2);
    }

    @Override
    public void deleteStudent(Student student) {
        students.remove(student.getRollNo());
        System.out.println("Student: Roll No " + student.getRollNo() + ", deleted");
    }

    //retrive list of students from the database
    @Override
    public List<Student> getAllStudents() {
        return students;
    }

    @Override
    public Student getStudent(int rollNo) {
        return students.get(rollNo);
    }

    @Override
    public void updateStudent(Student student) {
        students.get(student.getRollNo()).setName(student.getName());
        System.out.println("Student: Roll No " + student.getRollNo() + ", updated");
    }
}
```

## Step 4

Use the *StudentDao* to demonstrate Data Access Object pattern usage.

*DaoPatternDemo.java*

```
public class DaoPatternDemo {  
    public static void main(String[] args) {  
        StudentDao studentDao = new StudentDaoImpl();  
  
        //print all students  
        for (Student student : studentDao.getAllStudents()) {  
            System.out.println("Student: [RollNo : " + student.getRollNo() + ",  
        }  
  
        //update student  
        Student student =studentDao.getAllStudents().get(0);  
        student.setName("Michael");  
        studentDao.updateStudent(student);  
  
        //get the student  
        studentDao.getStudent(0);  
        System.out.println("Student: [RollNo : " + student.getRollNo() + ", Name : " + student.getName() + "]");  
    }  
}
```

## Step 5

Verify the output.

```
Student: [RollNo : 0, Name : Robert ]  
Student: [RollNo : 1, Name : John ]  
Student: Roll No 0, updated in the database  
Student: [RollNo : 0, Name : Michael ]
```