

Objects as Attributes

Christian Rodríguez Bustos

Edited by Juan Mendivelso

Object Oriented Programming



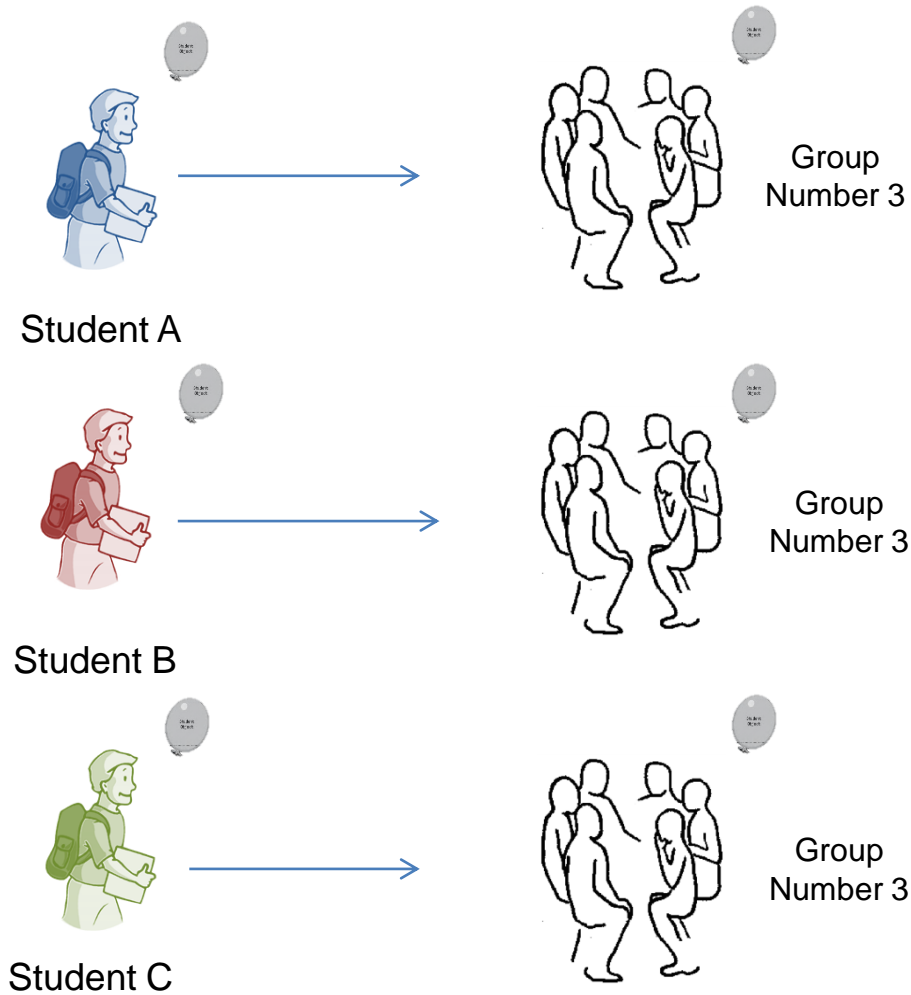
Do you remember the Student Class?

Attribute	Type
Id	Long
User	String
First Name	String
Last Name	String
Birth Date	Date
Group Taught	int

```
public class Student {  
  
    private long id;  
    private String user;  
    private String firstName;  
    private String lastName;  
    private Date birthDate;  
    private int groupNumber;  
}
```



Data redundancy !!!

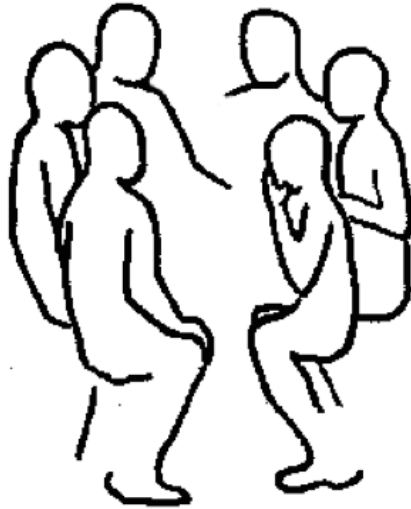


```
public class Student {  
  
    private long id;  
    private String user;  
    private String firstName;  
    private String lastName;  
    private Date birthDate;  
    private int groupNumber;  
}
```

Data redundancy !!!

All students are linked
to different groups

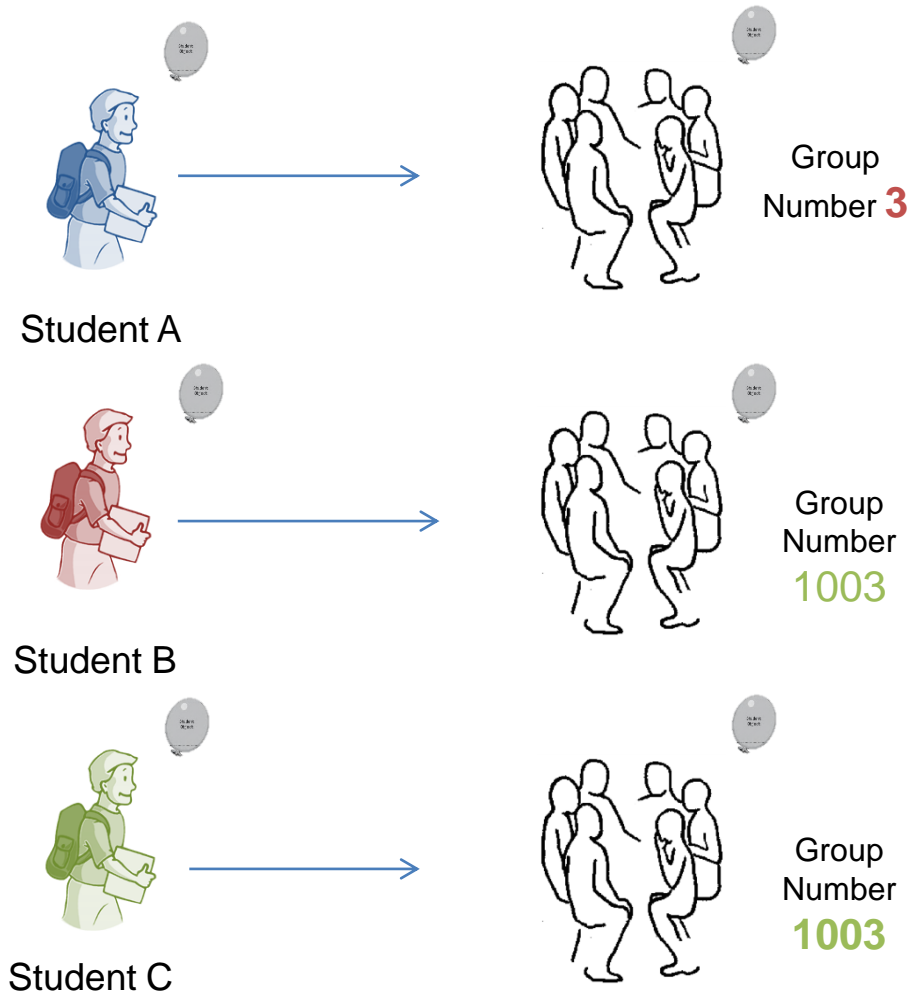
Changing enviroment



**The old group
number is 3**

**The new group
number is 1003**

Loss of data integrity



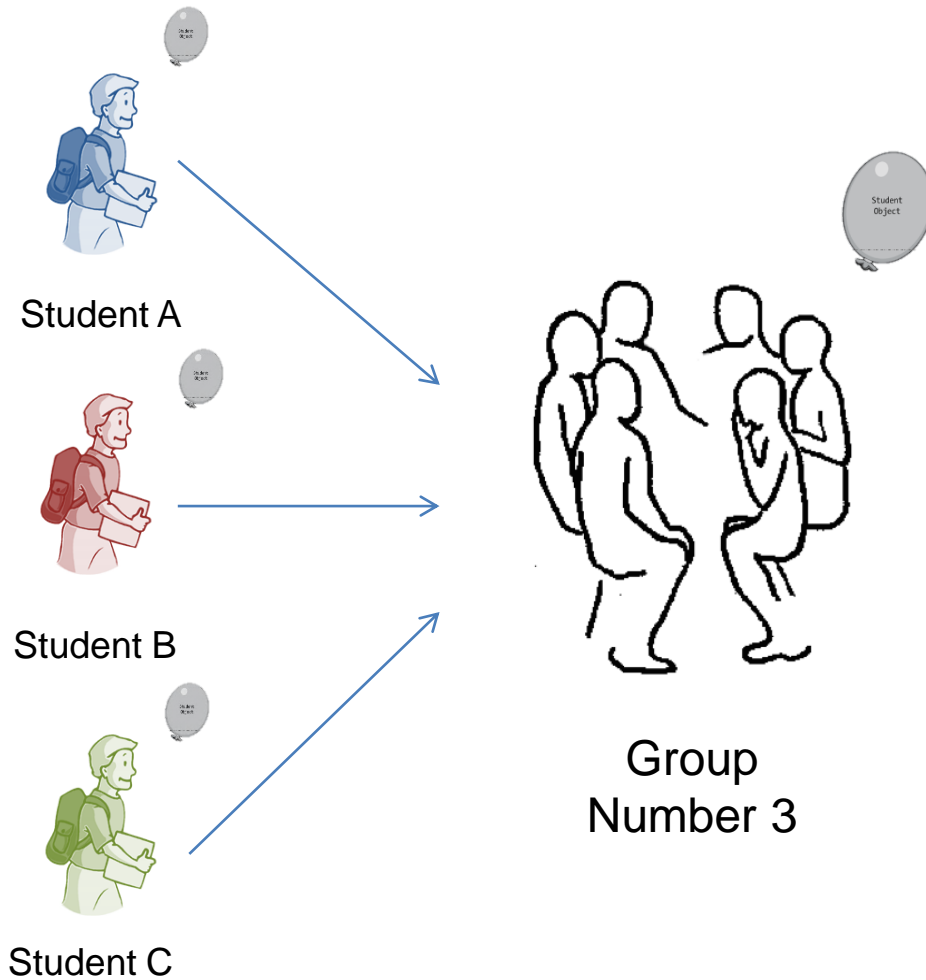
```
public class Student {  
  
    private long id;  
    private String user;  
    private String firstName;  
    private String lastName;  
    private Date birthDate;  
    private int groupNumber;  
}
```

Loss of data integrity

All students are using different instances and probably do not work with an update object

Solution is
Objects as attributes

Avoid data redundancy



```
public class Student {  
  
    private long id;  
    private String user;  
    private String firstName;  
    private String lastName;  
    private Date birthDate;  
    private Group group;  
}
```

**Avoid data
redundancy and
loss of data integrity**

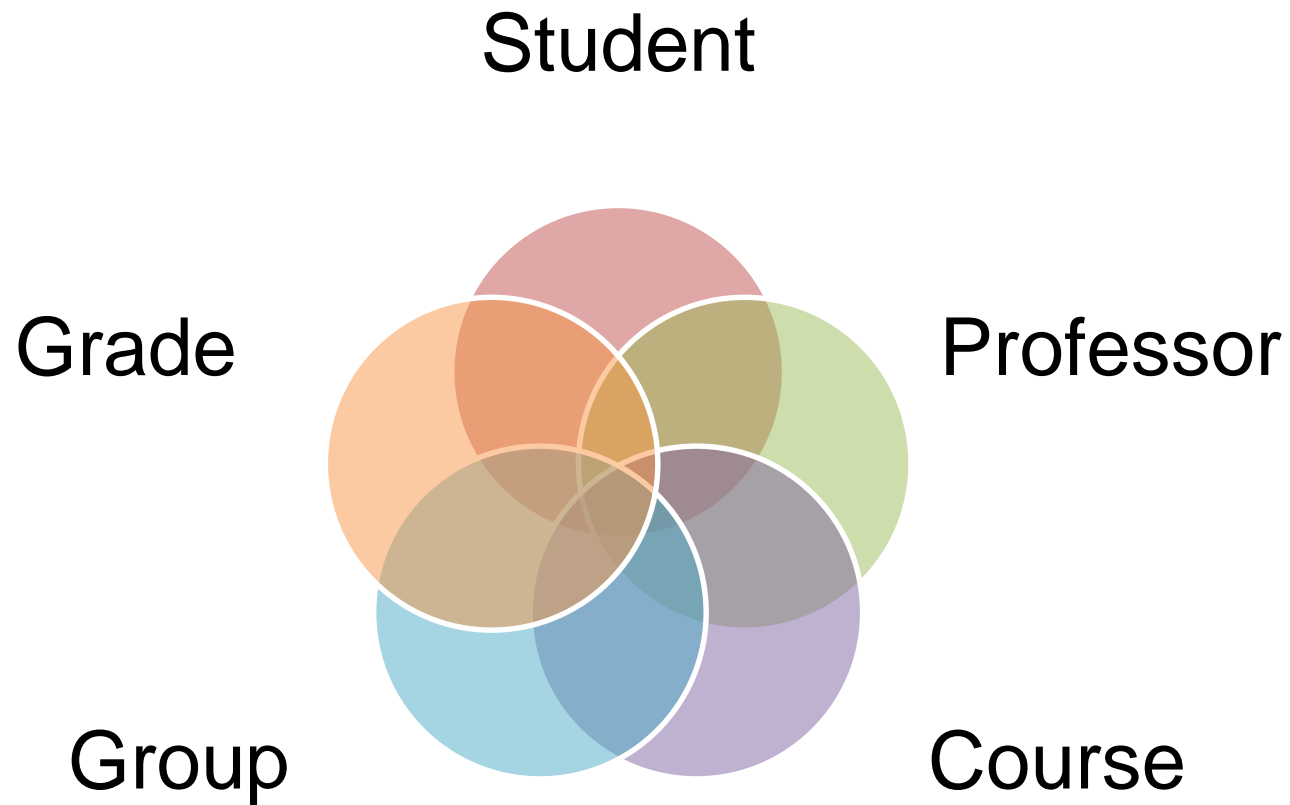
All students can use
the same Group
instance

Last class activity

Last Class activity

1. **Abstract the model to submit the grades of a student in the SIA (Classes, behaviors, attributes, etc)**
2. Create a Java project in NetBeans or Eclipse
3. Create the Java classes of the proposed model
4. Encapsulate the classes

Class List



Class Grade

Attribute	Type
Student	Student
Group	Group
Grade	double

```
public class Grade {  
  
    Student student;  
    Group group;  
    double grade;  
  
}
```

Class Student


Attribute	Type
Id	Long
User	String
First Name	String
Last Name	String
Birth Date	Date
Attends	List of Groups

```
import java.util.Date;
import java.util.List;

public class Student {

    private long id;
    private String user;
    private String firstName;
    private String lastName;
    private Date birthDate;
    private List<Group> attends;

}
```



List of **User define objects** can be used as attributes

Class Professor

Attribute	Type
Id	Long
User	String
First Name	String
Last Name	String
Birth Date	Date
Groups Taught	List of Groups

```
import java.util.Date;
import java.util.List;

public class Professor {

    private long id;
    private String user;
    private String firstName;
    private String lastName;
    private Date birthDate;
    private List<Group> groupsTaught;

}
```

Class Course

Attribute	Type
Number	Long
Name	String
Offered As	List of Groups

```
import java.util.List;

public class Course {

    private int number;
    private String name;
    private List<Group> offeredAs;

}
```

Class Group

Attribute	Type
Number	Long
Days Of Week	String Array
Times Of Day	String Array
Semester	String
Represents	Course
Taught By	Professor
Attended By	List of Student
Issue	List of Grades

```
import java.util.List;

public class Group {

    private long number;
    private String[] daysOfWeek;
    private String[] timesOfDay;
    private String semester;
    private Course represents;
    private Professor taughtBy;
    private List<Student> attendedBy;
    private List<Grade> issues;

}
```

References

- [Barker] J. Barker, *Beginning Java Objects: From Concepts To Code*, Second Edition, Apress, 2005.
- [Deitel] H.M. Deitel and P.J. Deitel, *Java How to Program*, Prentice Hall, 2007 - 7th ed.
- [Sierra] K. Sierra and B. Bates, *Head First Java*, 2nd Edition, O'Reilly Media, 2005.