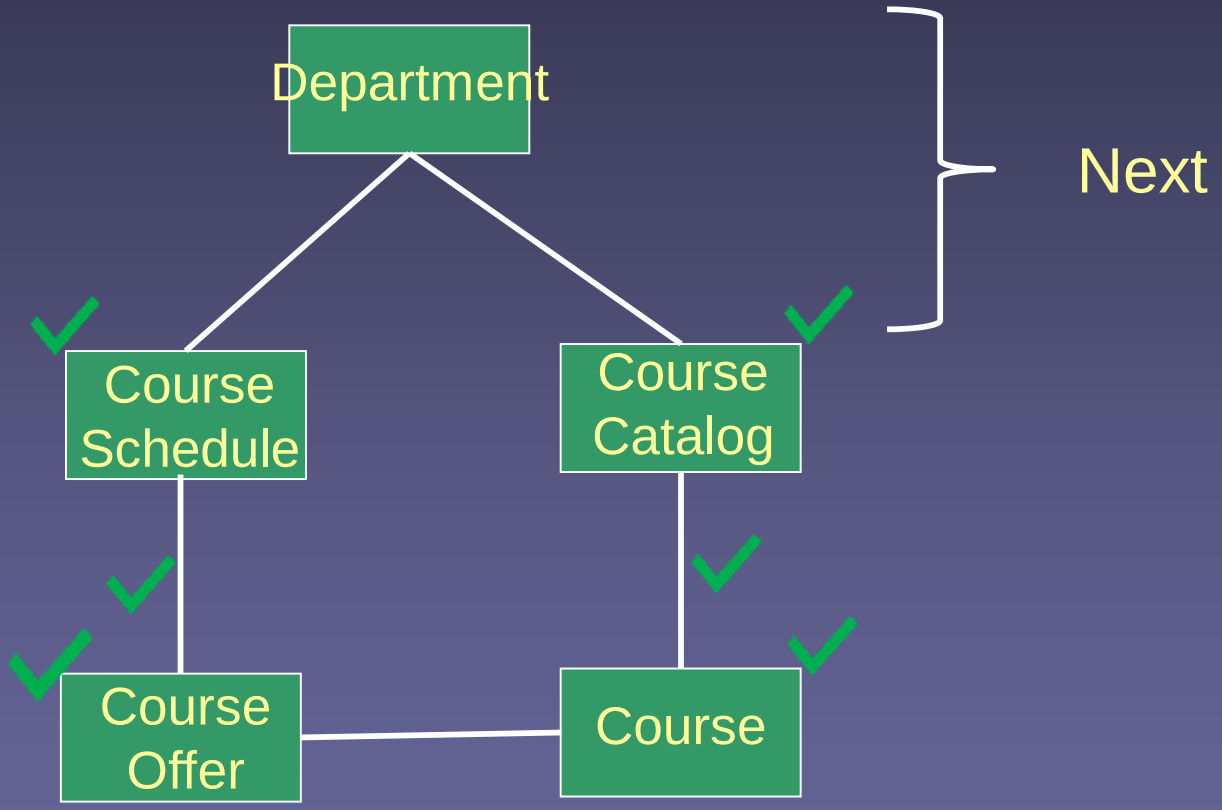
University Model Design and Implementation Approaches Prof Bugrara

Java Coding Patterns


Department
Course Schedule
Course Catalog
Course Offer
Course
Next

Department

```
public class Department {

    String name;
    CourseCatalog coursecatalog;
    PersonDirectory persondirectory;
    StudentDirectory studentdirectory;
    FacultyDirectory facultydirectory;
    //EmployerDirectory employerdirectory;

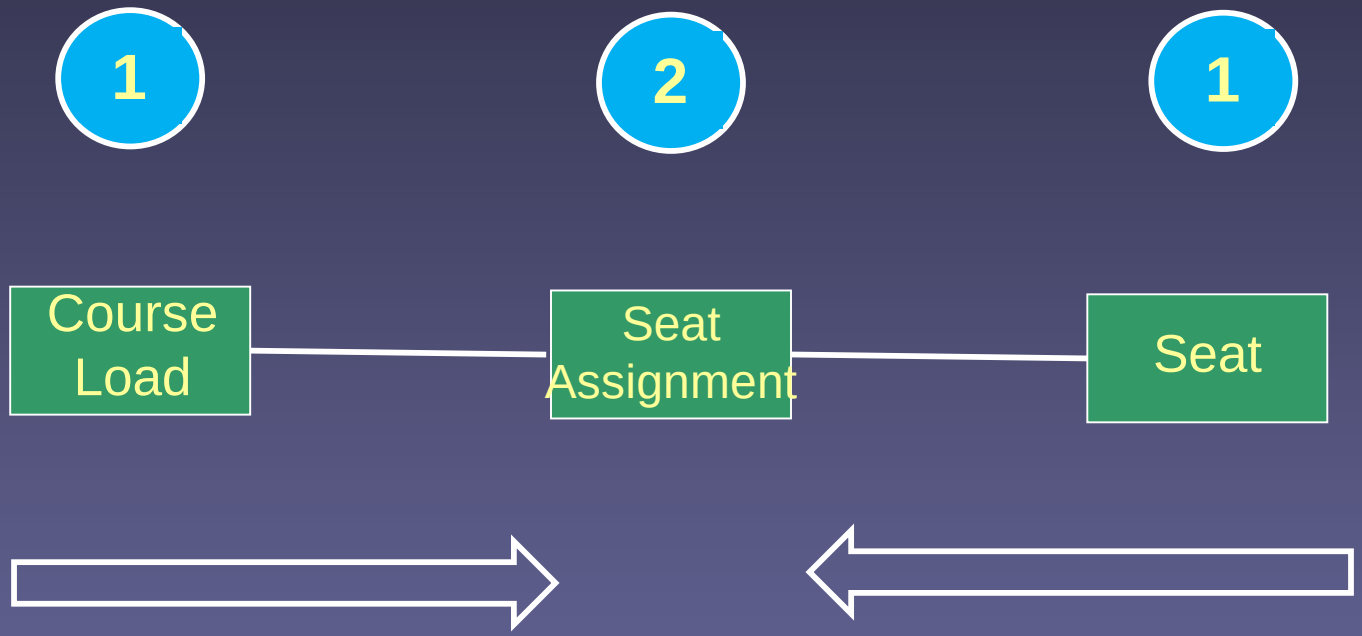
    HashMap<String, CourseSchedule> mastercoursecatalog;

    public Department(String n) {
        name = n;
        mastercoursecatalog = new HashMap<String, CourseSchedule>();
        coursecatalog = new CourseCatalog(this);
        studentdirectory = new StudentDirectory(this); //pass the departm
        persondirectory = new PersonDirectory();
    }
```


2
1
Course Offer
Course


2
1
Patient
Person


2
1
Person
Course Offer


1
2
1
Course Load
Seat Assignment
Seat

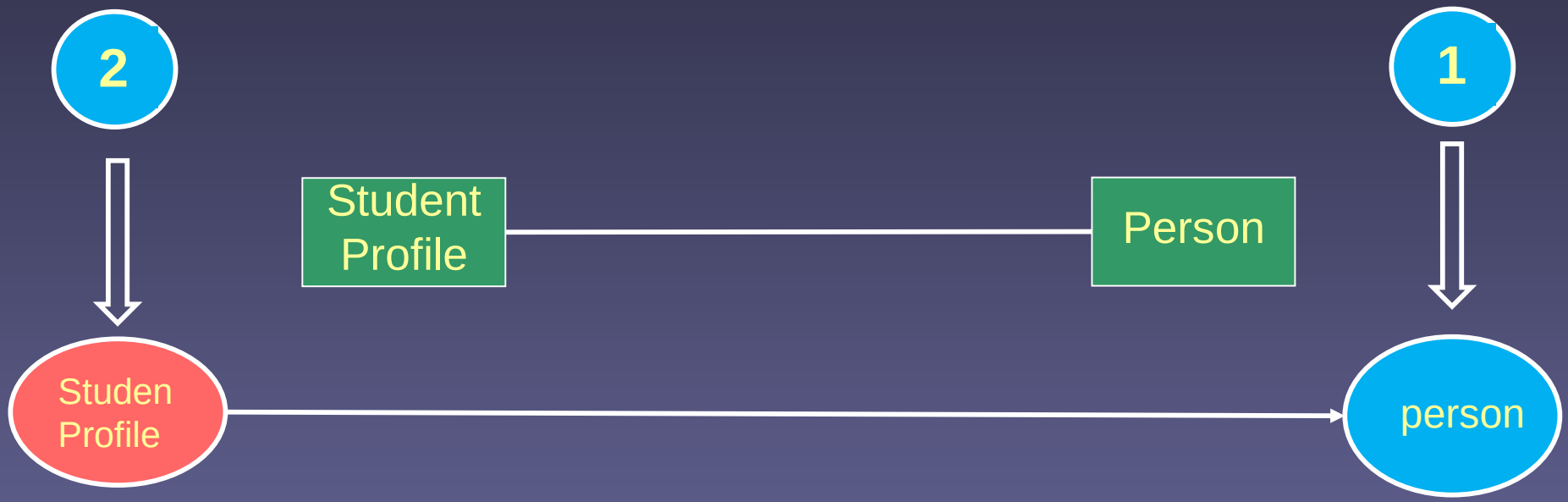
1. Create Course First 2. Link CourseOffer to course


```
public class CourseOffer {

   Course course;
      public CourseOffer(Course c){
         course =c;
   }
   public String getCourseNumber(){
      return course.getCOurseNumber();
   }
```

```
Course c = coursecatalog.getCourseByNumber(n);
CourseOffer co = new CourseOffer(c);
schedule.add(co);
```

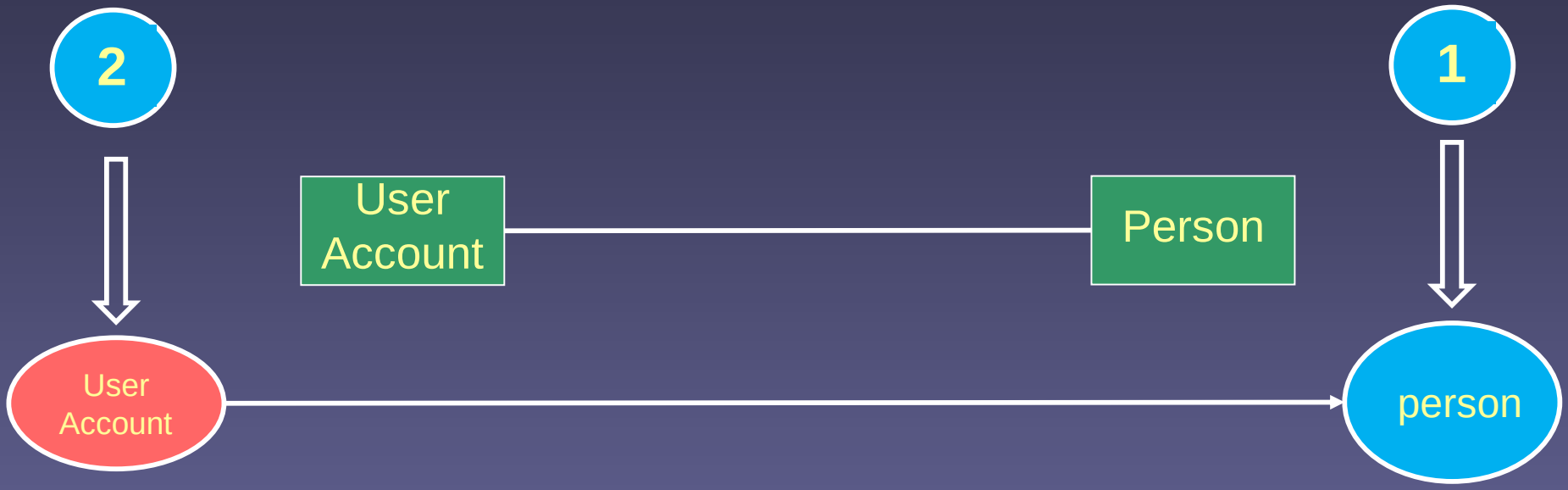
1. Create Person First 2. Link Link StudentProfile next




```
public class StudentProfile {
    Person person;
    public StudentProfile(Person p) {
        person = p;
}
```

```
PersonDirectory pd = department.getPersonDirectory();
Person person = pd.newPerson("0112303");
StudentDirectory sd = department.getStudentDirectory();
StudentProfile student = sd.newStudentProfile(person);
```

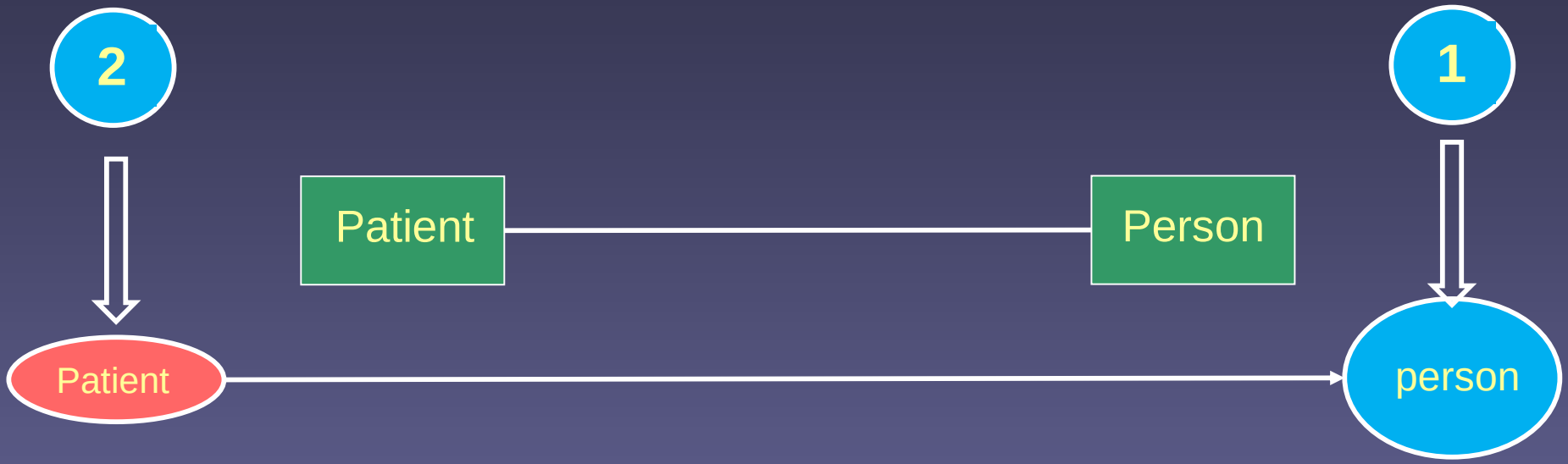
1. Create Person First 2. Link Link User Account next




```
public class UserAccount {
    Person person;
```String username;
    public UserAccount(Person p) {
        person = p;
}
```

```
PersonDirectory pd = department.getPersonDirectory();
Person person = pd.newPerson("0112303");
UserADirectory ud = department.getUserADirectory();
UserAccount student  = ud.newUserAccount(person);
```
```

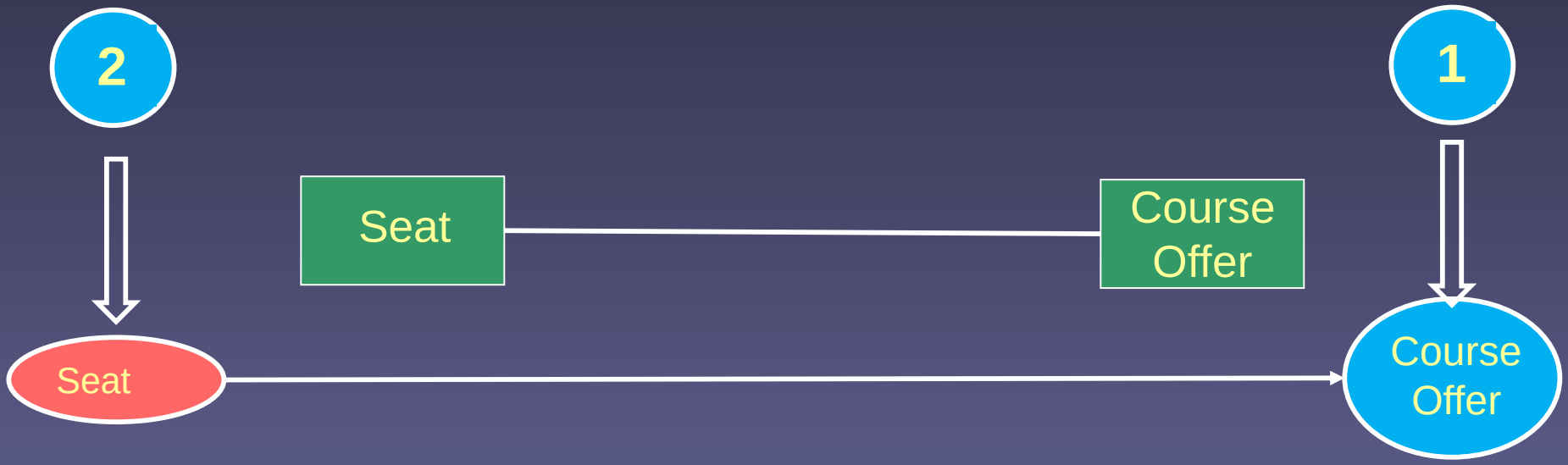
1. Create Person First 2. Link Link StudentProfile next




```
public class Patient {
    Person person;
    public Patient(Person p) {
        person = p;
}
```

```
Person person = new Person("0112303");
Patient patient = new Patient(person);
```

1. Create Course Offer First 2. Link Seat next




```
public class Seat {
    Boolean occupied;
    int number;
   CourseOffer courseoffer;
    public Seat (CourseOffer co, int n){
        courseoffer = co;
        Number = n;
}
```

```
Course course = new Course('info 5100",,)
CourseOffer co = new CourseOffer(course);
Seat seat = new Seat(co, 1); //seat numner 1
```

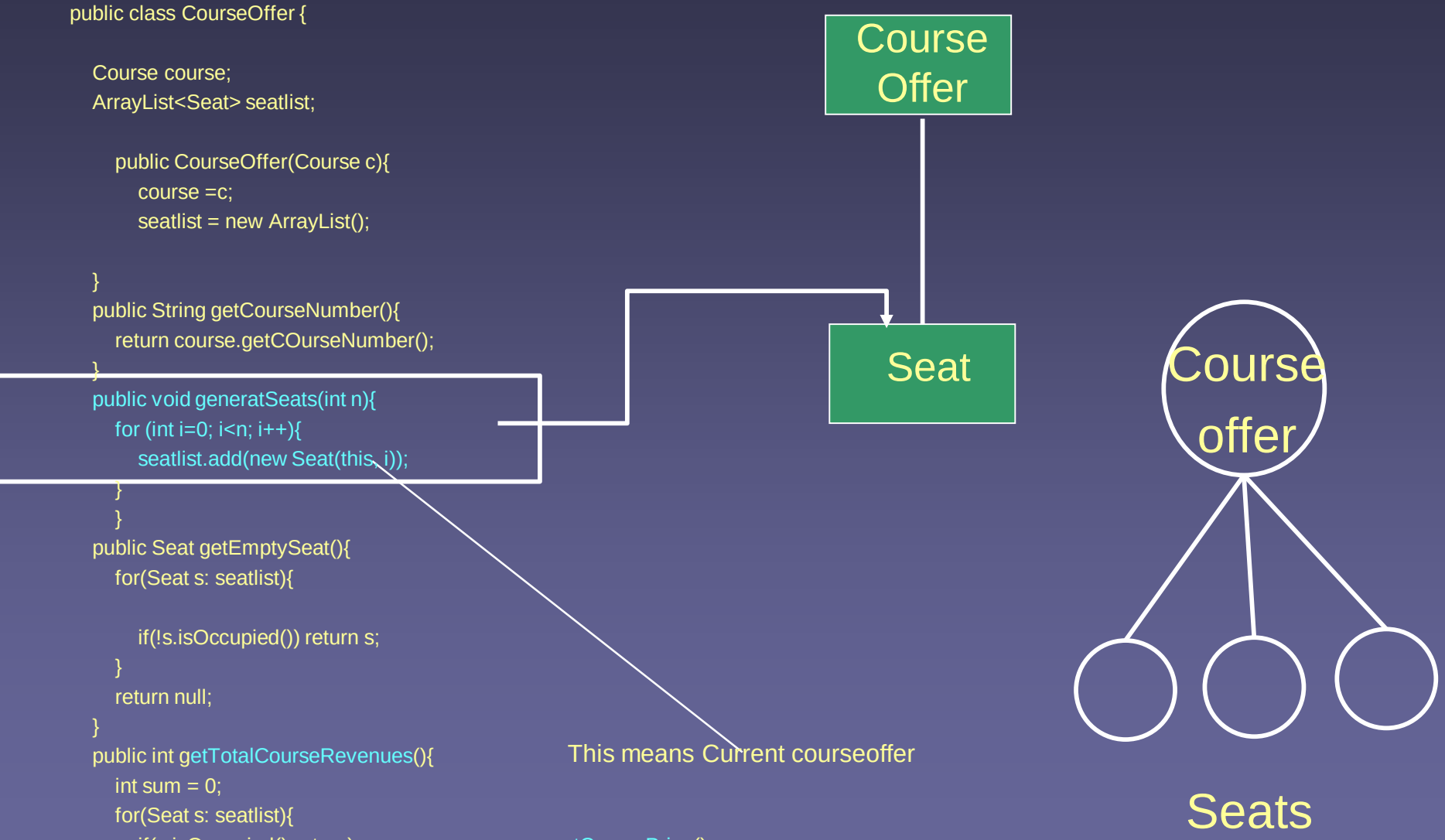
```
public class CourseOffer {

    Course course;
    ArrayList<Seat> seatlist;

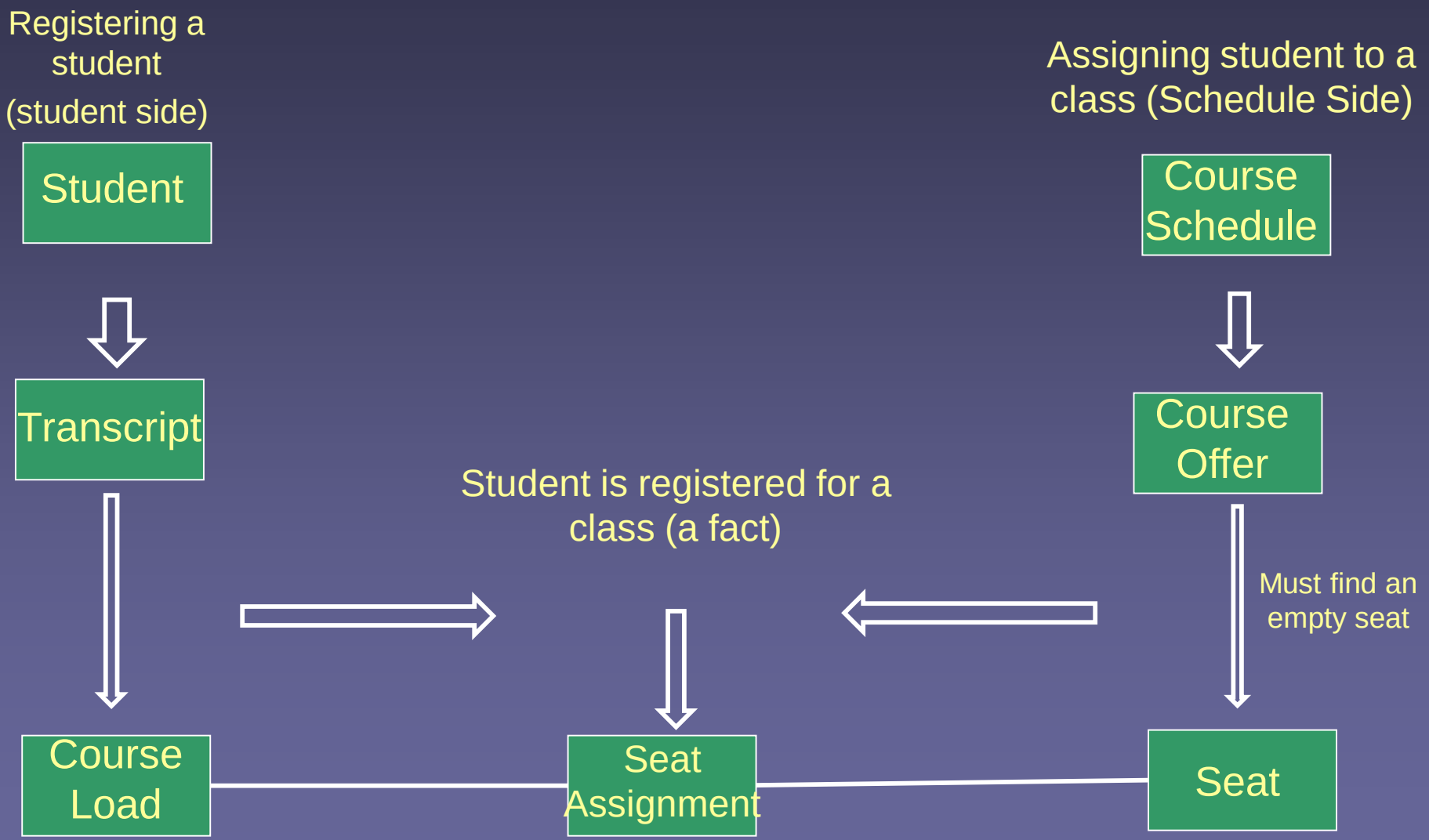
        public CourseOffer(Course c){
            course =c;
            seatlist = new ArrayList();

    }
    public String getCourseNumber(){
        return course.getCOurseNumber();
    }
    public void generatSeats(int n){
        for (int i=0; i<n; i++){
            seatlist.add(new Seat(this, i));
        }
        }
    public Seat getEmptySeat(){
        for(Seat s: seatlist){

            if(!s.isOccupied()) return s;
        }
        return null;
    }
    public int getTotalCourseRevenues(){
        int sum = 0;
        for(Seat s: seatlist){
            if(s.isOccupied()==true) sum = sum + course.getCoursePrice();
        }
        return sum;
```



Two ways of registering students



Course Schedule

Seat

Student Profile

Transcript

Course

Course Schedule

Course Load

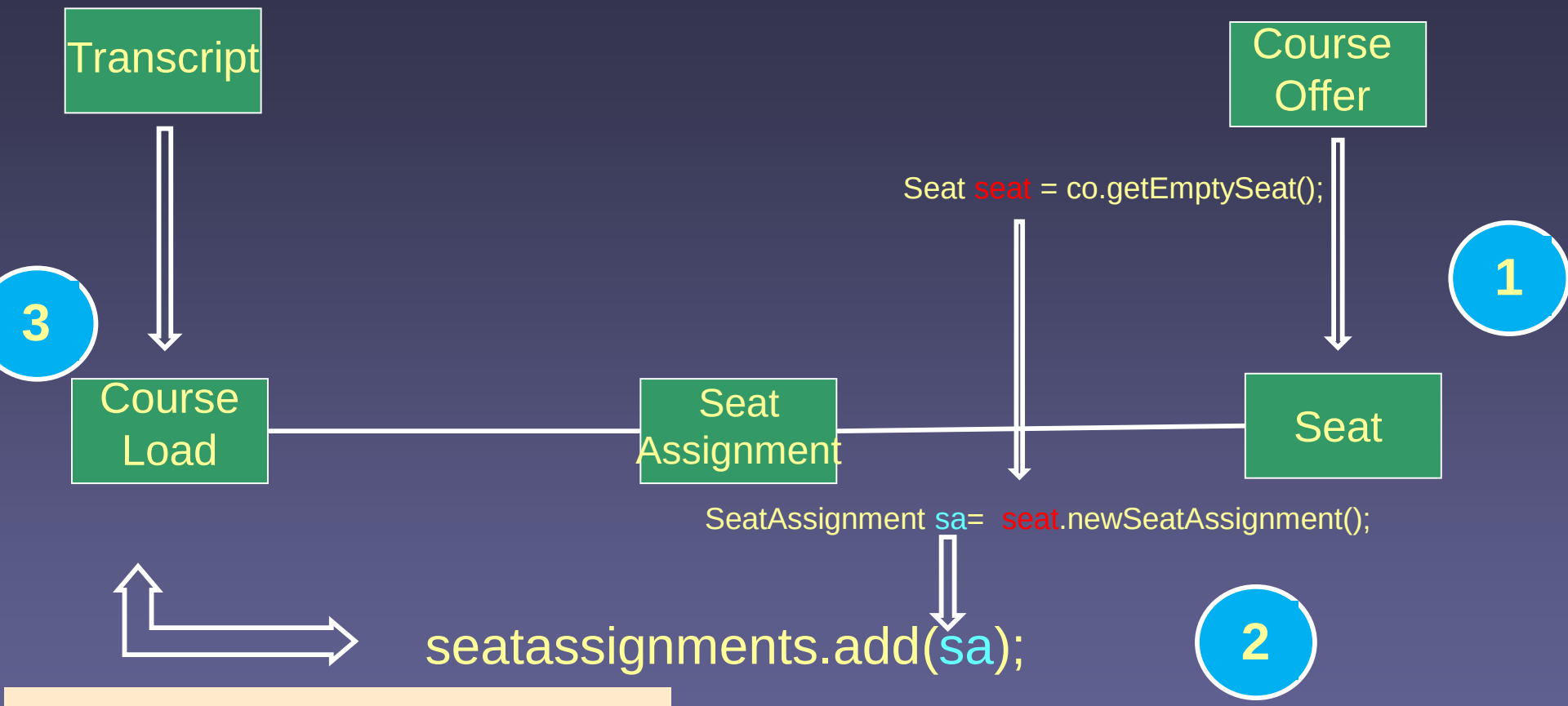
Course Offer

Degree

Seat Assignment

Department

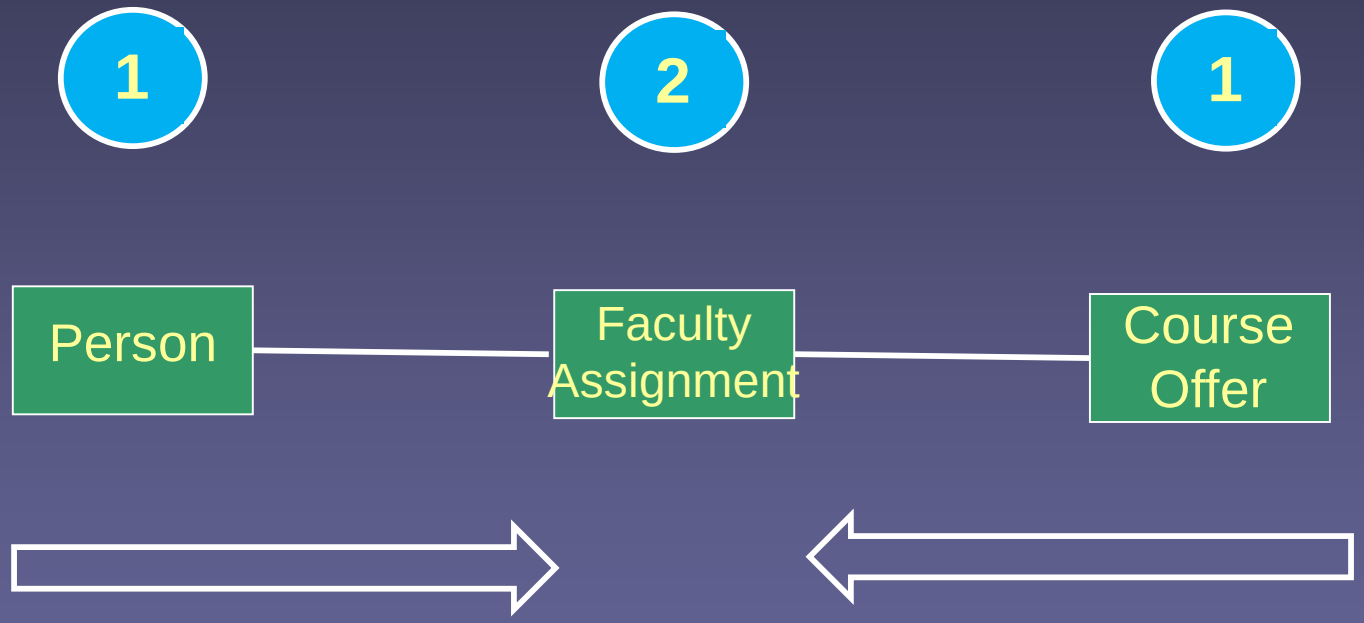
Student Directory



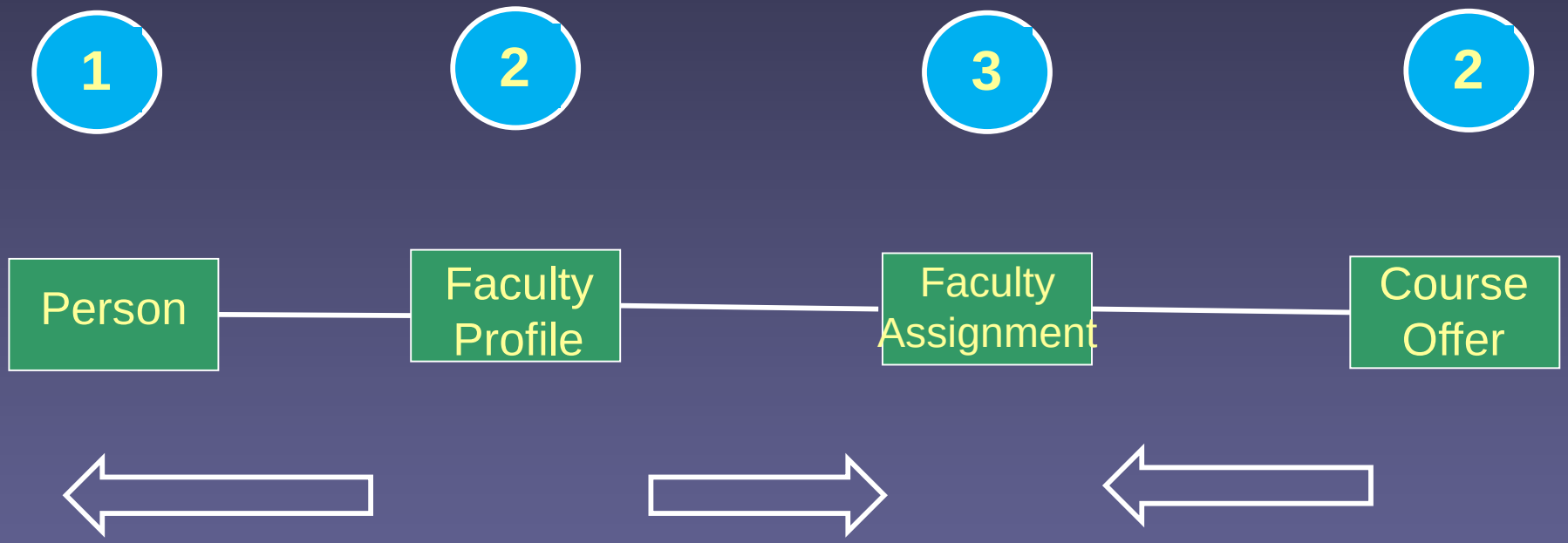

```
public SeatAssignment newSeatAssignment(CourseOffer co){

    Seat seat = co.getEmptySeat(); // seat linked to courseoffer
    if (seat==null) return null;
    SeatAssignment sa = seat.newSeatAssignment();
    seatassignments.add(sa);  //add to students course load
    return sa;
}
```

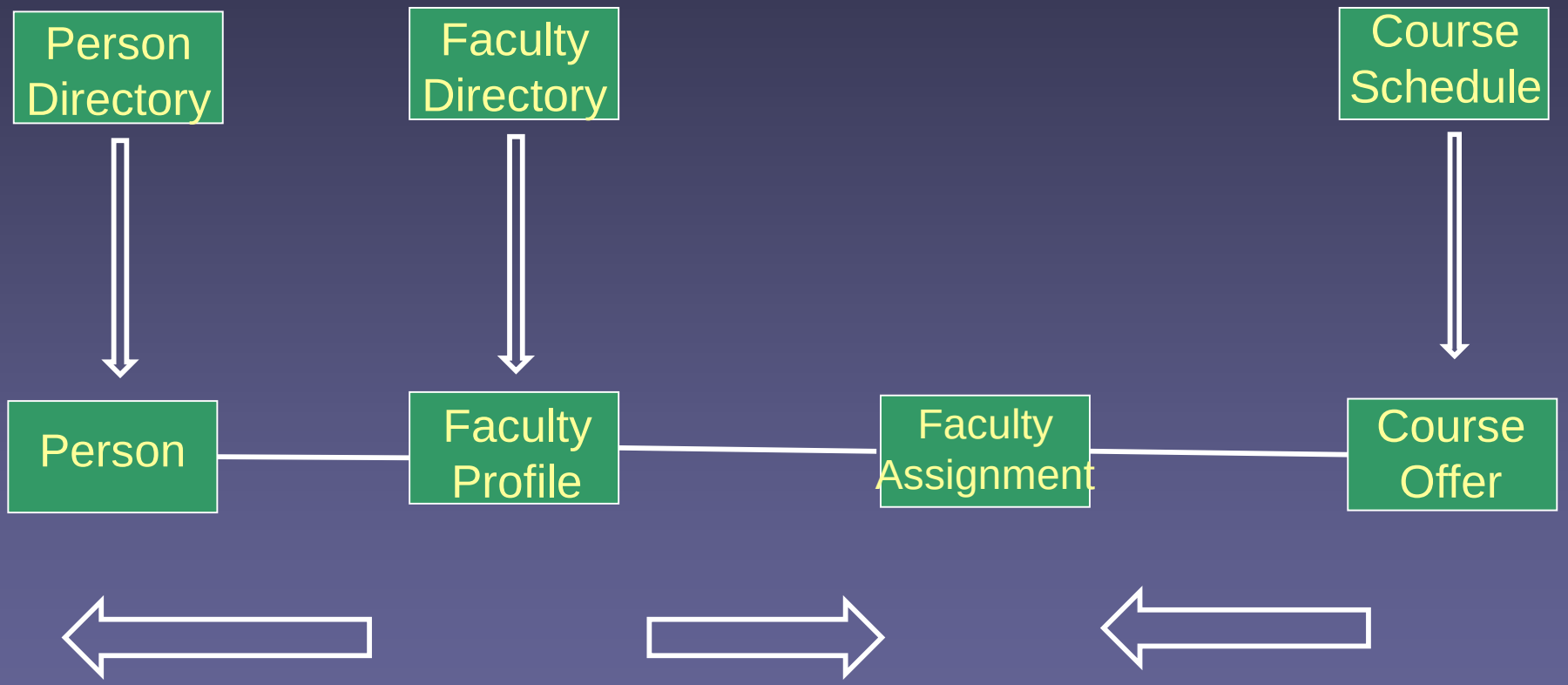
How to assign a teacher to a class



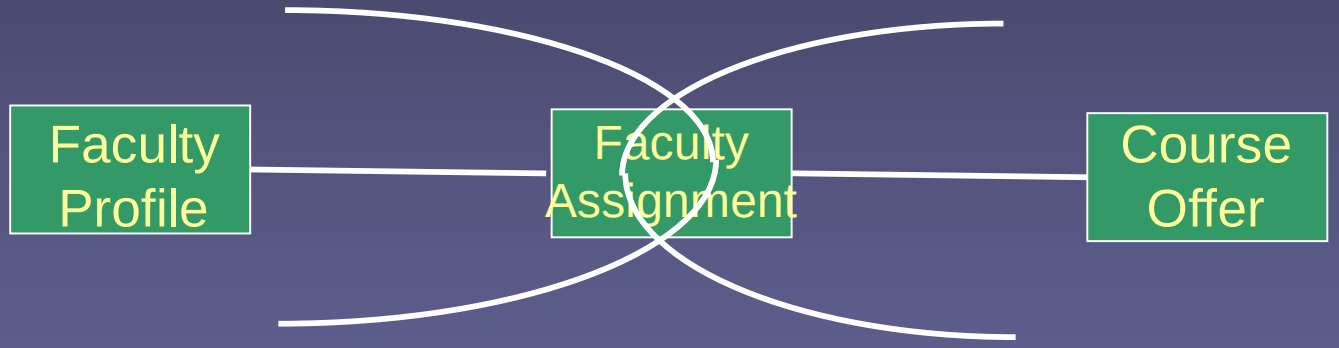
How to assign a teacher to a class



How to assign a teacher to a class



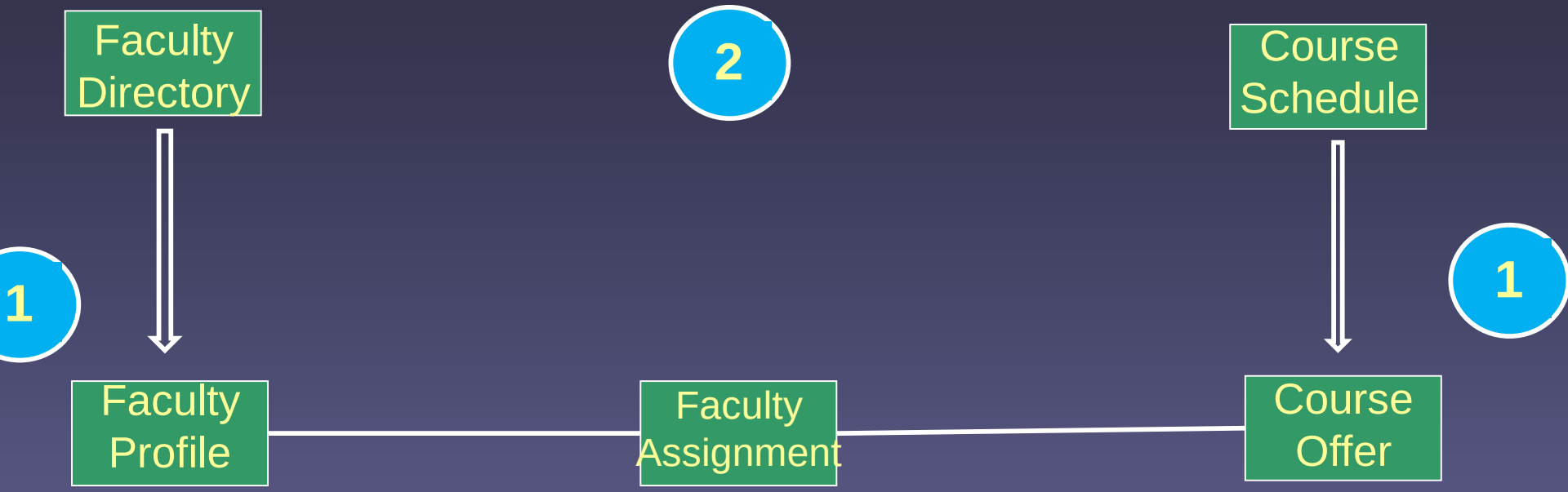
The binding object is shared by both. The faculty assignment knows the teacher and the course




```
public class FacultyAssignment {

    CourseOffer courseoffer;
    FacultyProfile facultyprofile;
    public FacultyAssignment(FacultyProfile fp, CourseOffer co){
        courseoffer = co;
        facultyprofile = fp;
    }
```

the teacher for the class



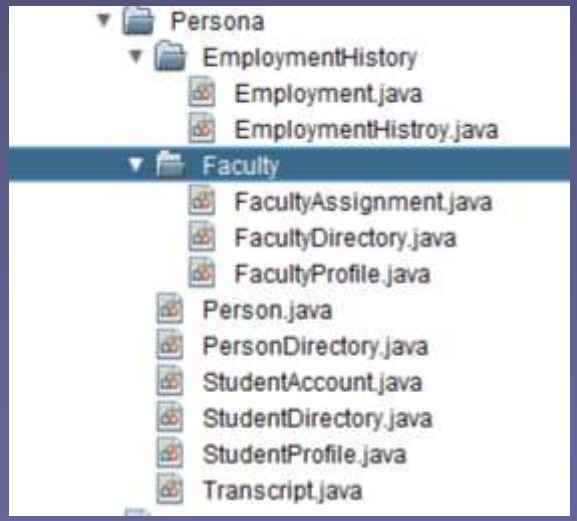
Find teacher => faculty profile

Find course offer => course offer

From Course offer assign teacher “course offer has faculty assignment attribute

Courseoffer.assignteacher(teacher profile)


Faculty Directory
Course Schedule
1
2
1
Faculty Profile
Faculty Assignment
Course Offer


Persona
EmploymentHistory
Employment.java
EmploymentHistroy.java
Faculty
FacultyAssignment.java
FacultyDirectory.java
FacultyProfile.java
Person.java
PersonDirectory.java
StudentAccount.java
StudentDirectory.java
StudentProfile.java
Transcript.java


```
public class FacultyProfile {

    Person person;
    ArrayList <FacultyAssignment> facultyassignments;

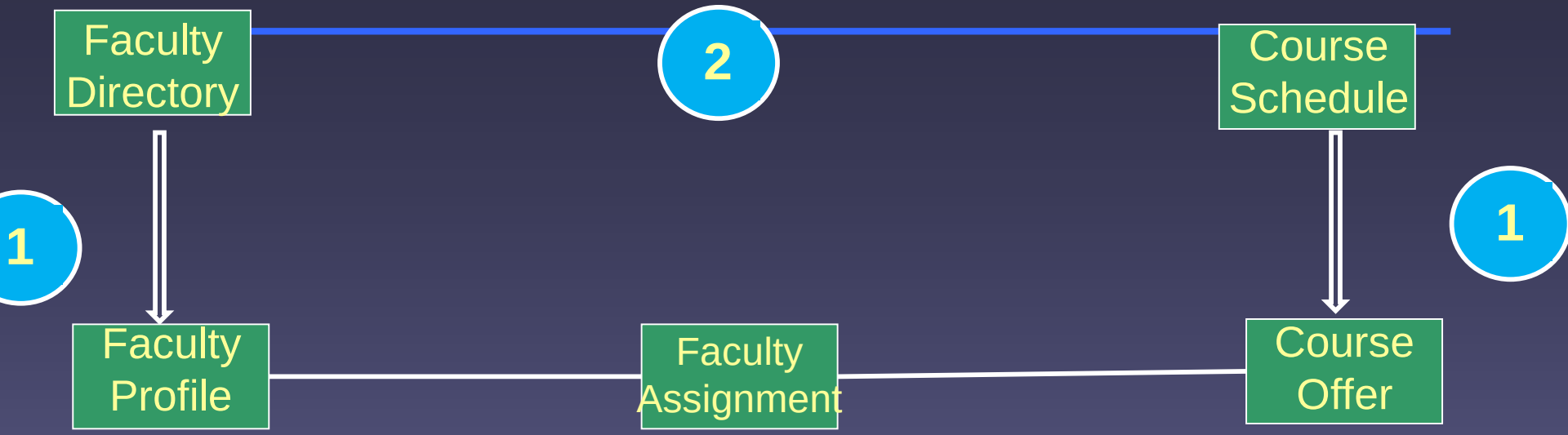
    public FacultyProfile(Person p) {

        person = p;
        facultyassignments = new ArrayList();
    }

    public FacultyAssignment AssignAsTeacher(CourseOffer co){

        FacultyAssignment fa = new FacultyAssignment(this, co);
        facultyassignments.add(fa);

        return fa;
    }
```




```
public class CourseOffer {

    Course course;
    ArrayList<Seat> seatlist;
    FacultyAssignment facultyassignment;

    public CourseOffer(Course c) {
        course = c;
        seatlist = new ArrayList();
    }
    public void AssignAsTeacher(FacultyProfile fp) {

        facultyassignment = new FacultyAssignment(fp, this);
    }

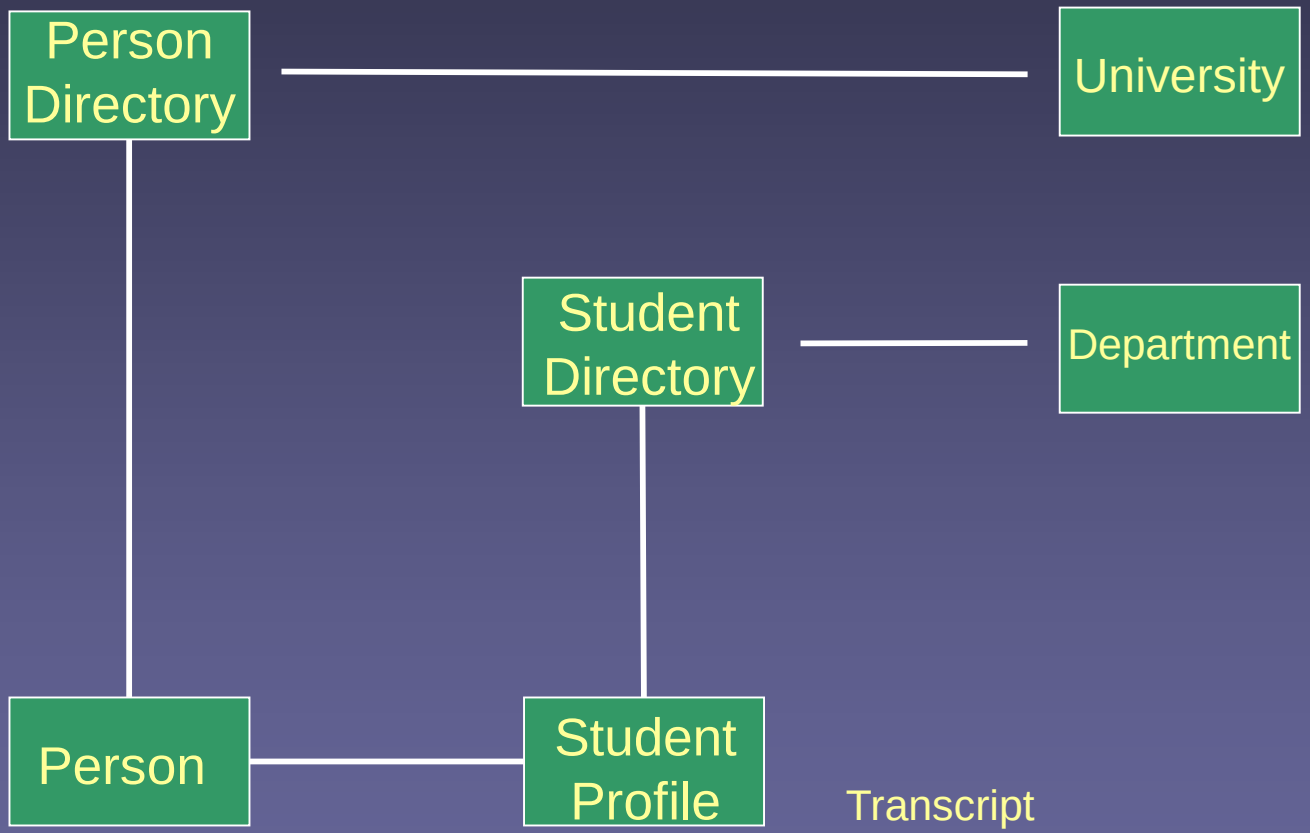
    public FacultyProfile getFacultyProfile() {
        return facultyassignment.getFacultyProfile();
    }
```


```
 */
public class FacultyAssignment {

    CourseOffer courseoffer;
    FacultyProfile facultyprofile;
    public FacultyAssignment(FacultyProfile fp, CourseOffer co){
        courseoffer = co;
        facultyprofile = fp;
    }
    public FacultyProfile getFacultyProfile(){
        return facultyprofile;
    }

}
```

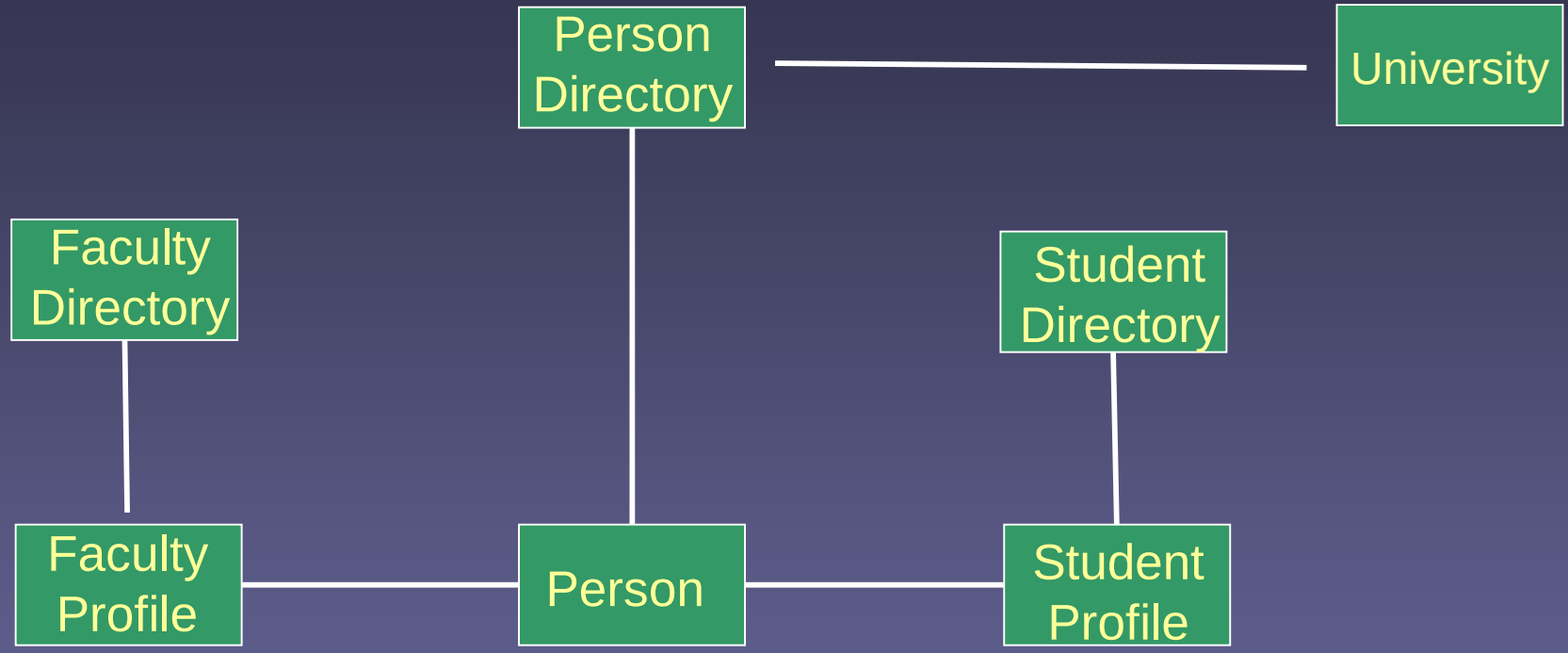
How to model a person role – step 1



Legal Identity

Transcript
Financial Account
Degree reqs

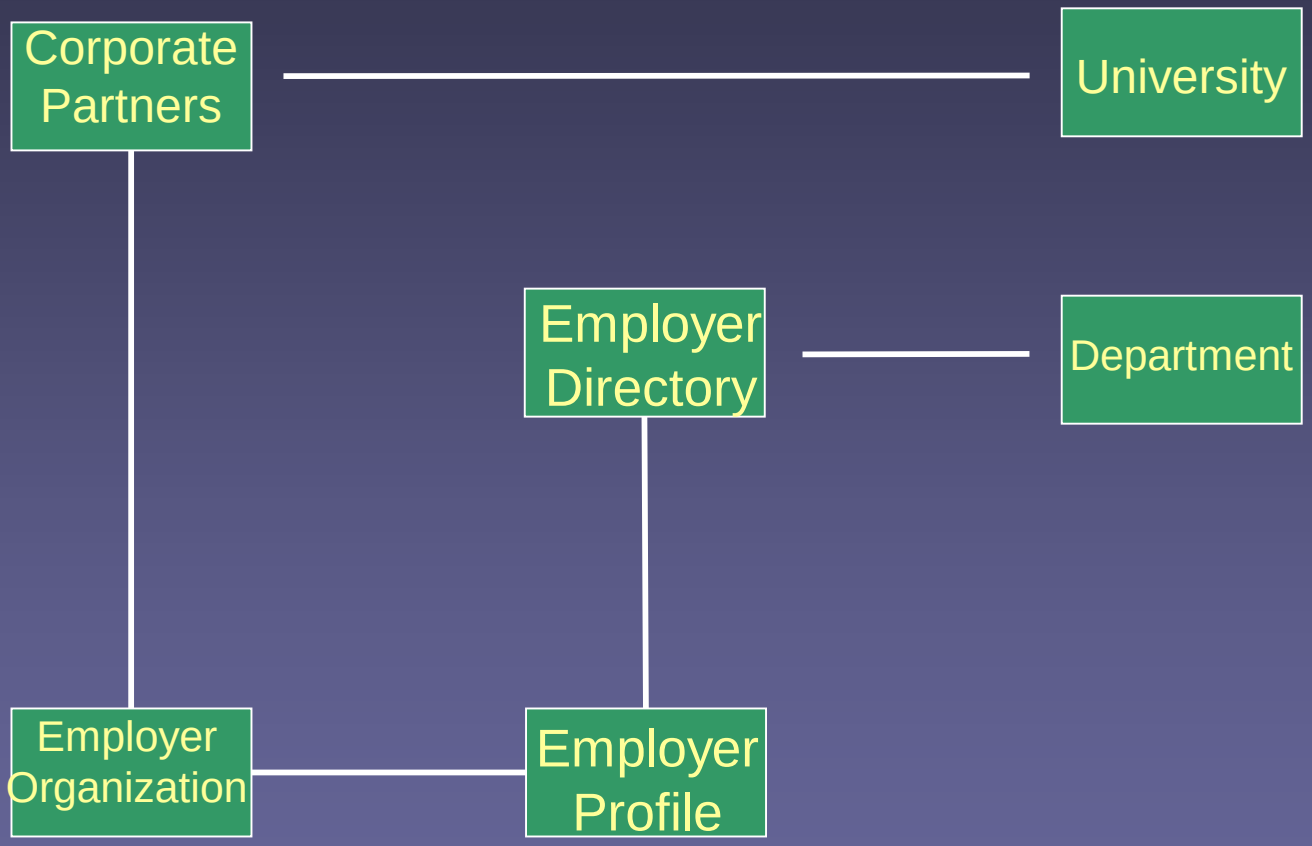
How to model a person role – step 1



Department
Classes
Performance evaluations

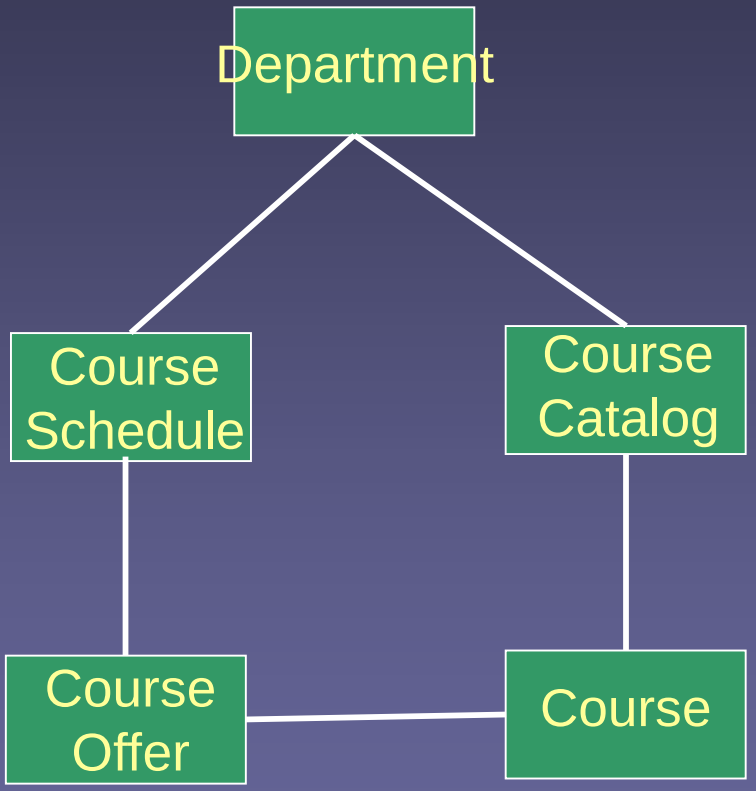
Transcript
Financial Account
Degree reqs

How to model a person role – step 1



Legal Identity

Goal is to define the java code for this component of the department



Course is the first building block

Course

```
public class Course {
    String number;
    String name;
    int credits;
    int price = 1250; //per credit hour
    public Course(String n, String numb, int ch, int p){
        name = n;
        number = numb;
        credits = ch;
        price = p;
    }
    public String getCOurseNumber(){
        return number;
    }

    public int getCoursePrice(){
        return price*credits;

    }
}
```


```
public class CourseCatalog {

    String lastupdated;
    ArrayList<Course> courselist;
    public CourseCatalog(){
        courselist = new ArrayList();
    }

    public ArrayList<Course> getCourseList(){
        return courselist;
    }
    public Course newCourse(String n, String nm, int cr){
        Course c = new Course(n, nm, cr);
        courselist.add(c);
        lastupdated = todaysdate();
        return c;
    }
    public Course getCourseByNumber(String n){
        for( Course c: courselist){

            if(c.getCOurseNumber().equals(n)) return c;
        }
        return null;
    }
}
```

Order of generating the data

Course offerings

0

Course	Fall 2020	Spring 2021	Summer 2021	Fall 2021
Info 5001				
Info 5100				
Info 6210				
Info 6101				

1 2 2

Every Semester there is a schedule

Course offerings

0

Course	Fall 2020	Spring 2021	Summer 2021	Fall 2021
Info 5001				
Info 5100				
Info 6210				
Info 6101				

```
HashMap<String, CourseSchedule> mastercoursecatalog;
```

```
public Department(String n) {
    name = n;
    mastercoursecatalog = new HashMap<String, CourseSchedule>();
```

Transcript == Course Loads

Course offerings

Course 0	Fall 2022	Spring 2023	Summer 2023	Fall 2023
Course load 1	Info 6210 Info 5100			
Course load 2		Info 6205 Info 6105		
Course load 3			Info 6150	
Course load 4				Info 6250 CSYE 7280
	1	2	3	4

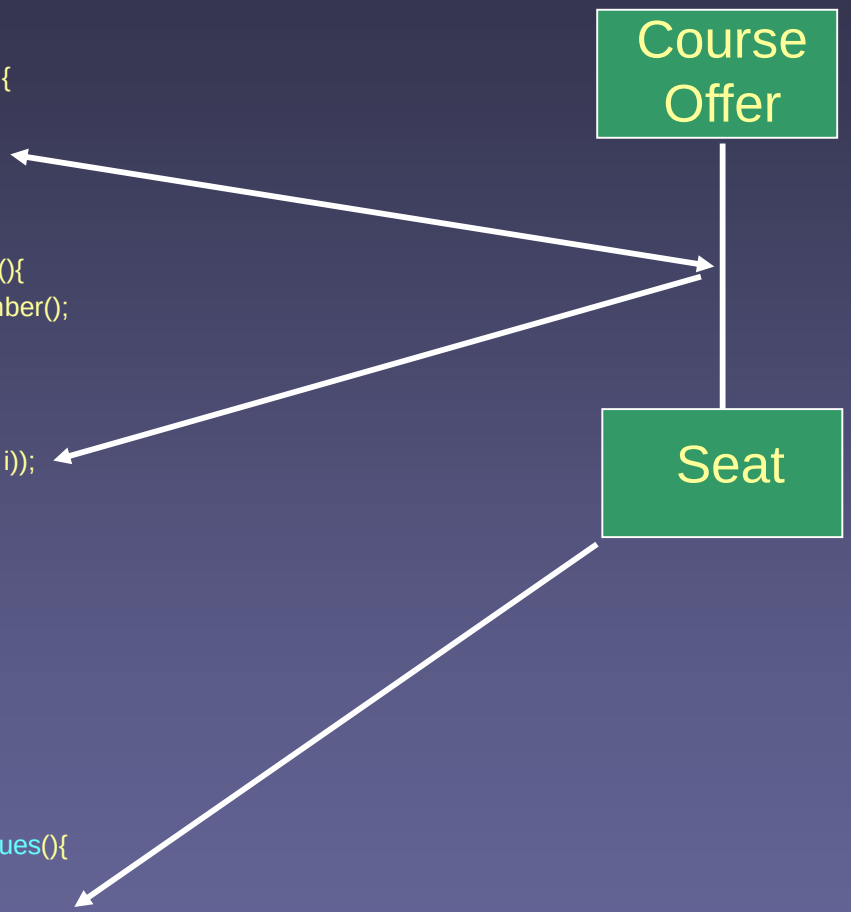
```
public class CourseOffer {

    Course course;
    ArrayList<Seat> seatlist;

        public CourseOffer(Course c){
            course =c;
            seatlist = new ArrayList();

    }
    public String getCourseNumber(){
        return course.getCOurseNumber();
    }
    public void generatSeats(int n){
        for (int i=0; i<n; i++){
            seatlist.add(new Seat(this, i));
        }
        }
    public Seat getEmptySeat(){
        for(Seat s: seatlist){

            if(s.isOccupied()) return s;
        }
        return null;
    }
    public int getTotalCourseRevenues(){
        int sum = 0;
        for(Seat s: seatlist){
            if(s.isOccupied()==true) sum = sum + course.getCoursePrice();
        }
        return sum;
    }
}
```



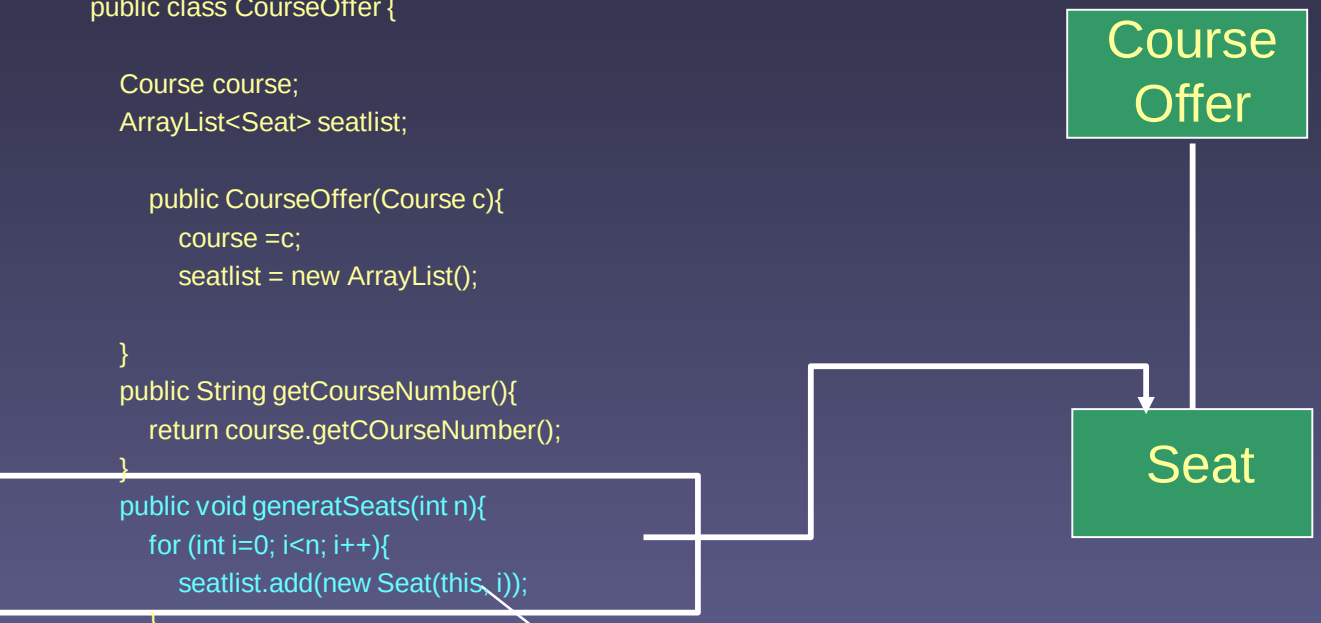
```
public class CourseOffer {

    Course course;
    ArrayList<Seat> seatlist;

        public CourseOffer(Course c){
            course =c;
            seatlist = new ArrayList();

    }
    public String getCourseNumber(){
        return course.getCOurseNumber();
    }
    public void generatSeats(int n){
        for (int i=0; i<n; i++){
            seatlist.add(new Seat(this, i));
        }
        }
    public Seat getEmptySeat(){
        for(Seat s: seatlist){

            if(s.isOccupied()) return s;
        }
        return null;
    }
    public int getTotalCourseRevenues(){
        int sum = 0;
        for(Seat s: seatlist){
            if(s.isOccupied()==true) sum = sum + course.getCoursePrice();
        }
        return sum;
```



This means Current courseoffer

Seats

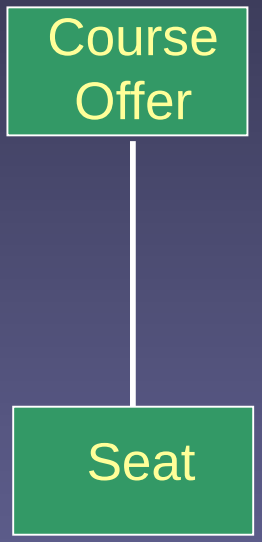

```
public class CourseOffer {

    Course course;
    ArrayList<Seat> seatlist;

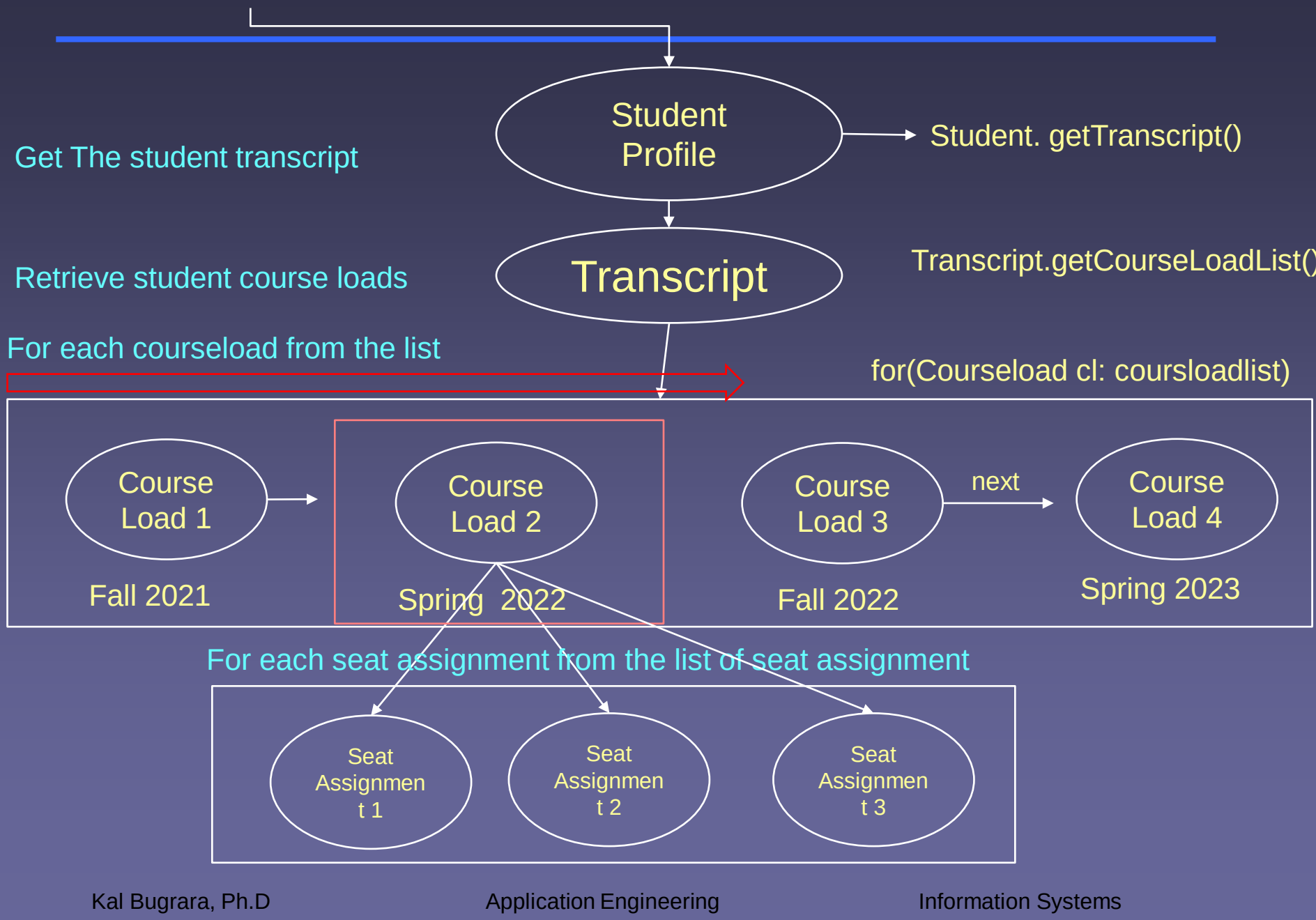
        public CourseOffer(Course c){
            course =c;
            seatlist = new ArrayList();

    }
    public String getCourseNumber(){
        return course.getCOurseNumber();
    }
    public void generatSeats(int n){
        for (int i=0; i<n; i++){
            seatlist.add(new Seat(this, i));
        }
        }
    public Seat getEmptySeat(){
        for(Seat s: seatlist){

            if(s.isOccupied()) return s;
        }
        return null;
    }
    public int getTotalCourseRevenues(){
        int sum = 0;
        for(Seat s: seatlist){
            if(s.isOccupied()==true) sum = sum + course.getCoursePrice();
        }
        return sum;
    }
}
```



Student Directory



For each seat assignment from the list of seat assignments