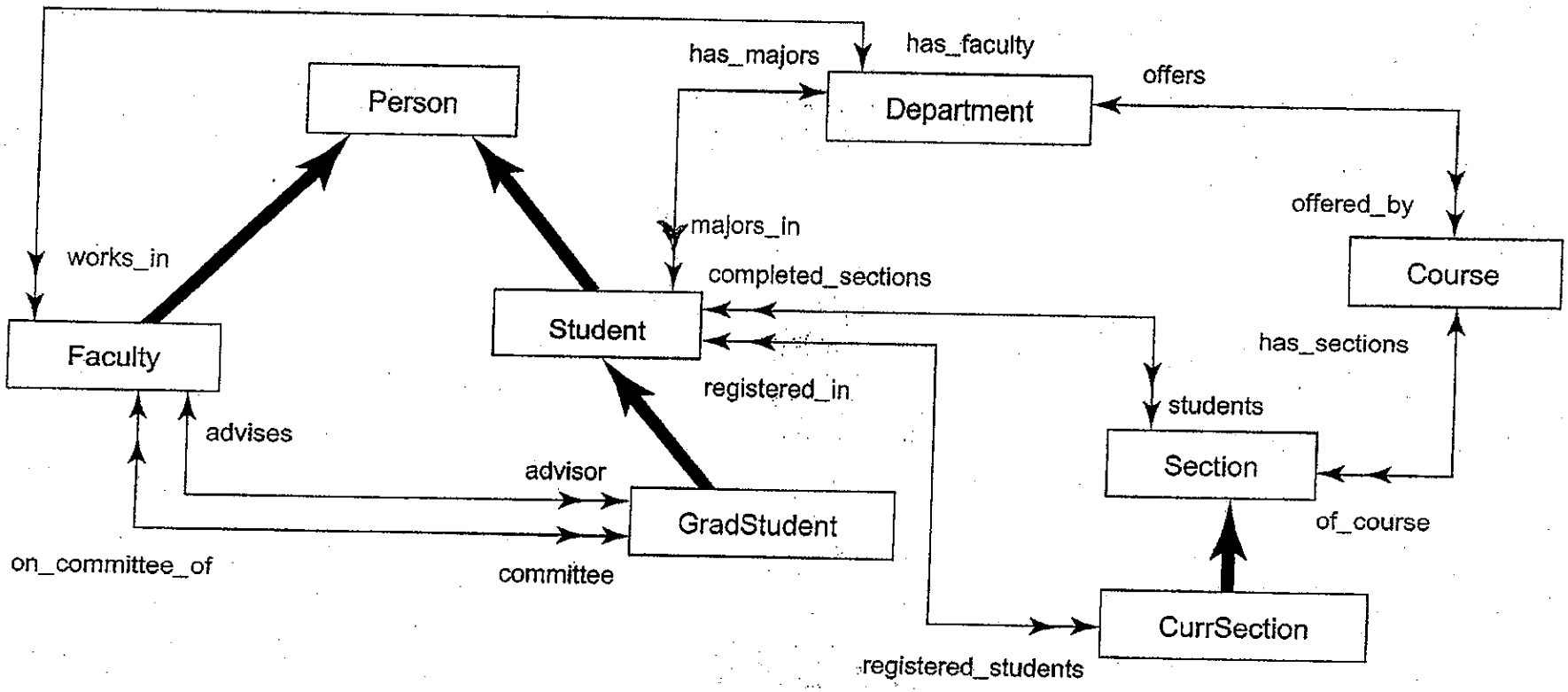
CSC 8490

ODL-OQL handout

Figure 12.5 An example of a database schema. (b) A graphical object database schema for part of the UNIVERSITY database.



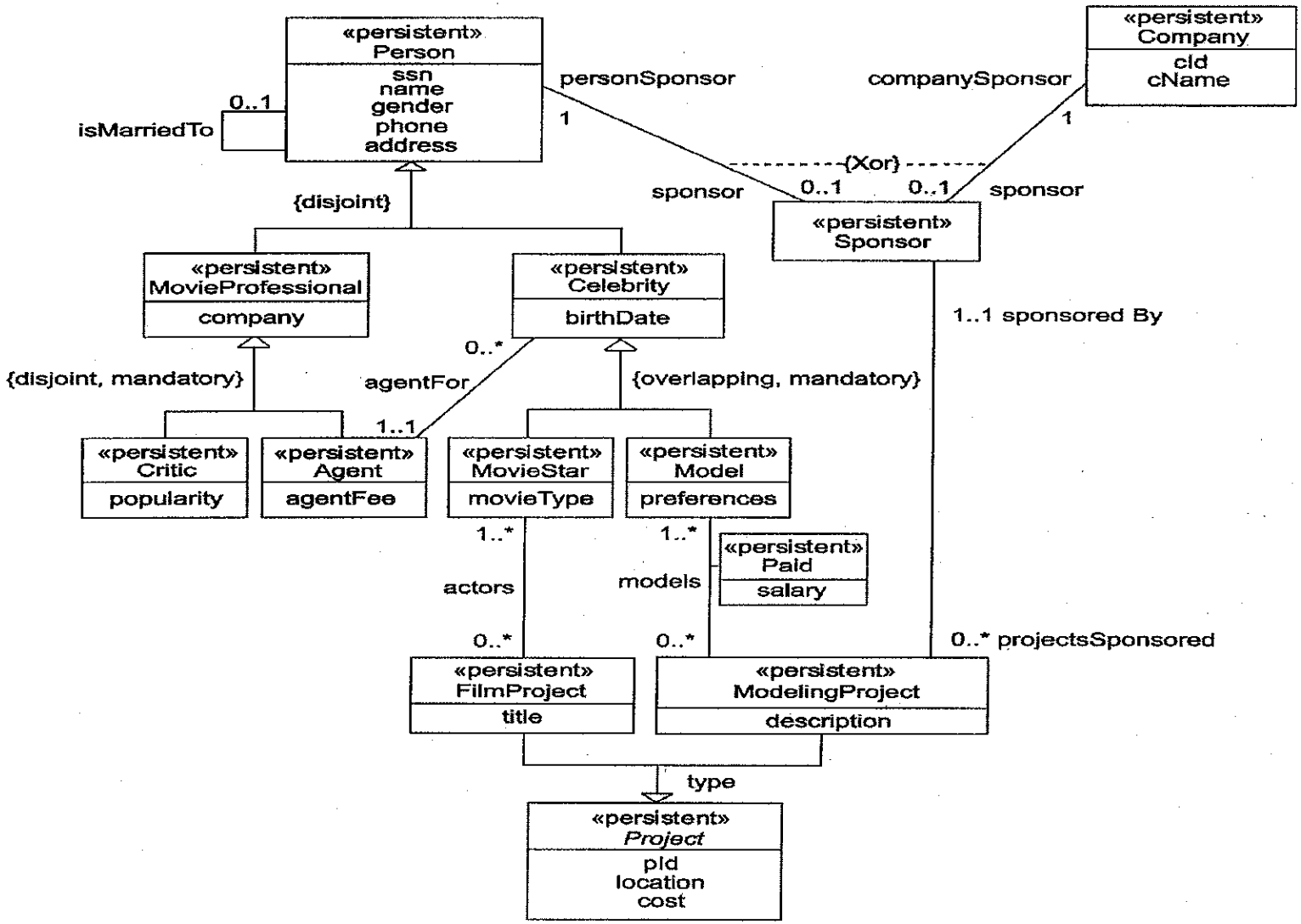
```
class PERSON
(  extent       PERSONS
   key          Ssn )
{  attribute    struct Pname {   string   Fname,
                                 string   Mname,
                                 string   Lname  }   Name;
   attribute    string                               Ssn;
   attribute    date                                 Birth_date;
   attribute    enum Gender(M, F)                    Sex;
   attribute    struct Address {  short   No,
                                  string  Street,
                                  short   Apt_no,
                                  string  City,
                                  string  State,
                                  short   Zip  }      Address;
   short        Age();   };

class FACULTY extends PERSON
(  extent       FACULTY )
{  attribute    string          Rank;
   attribute    float           Salary;
   attribute    string          Office;
   attribute    string          Phone;
   relationship DEPARTMENT      Works_in inverse DEPARTMENT::Has faculty;
   relationship set<GRAD_STUDENT> Advises inverse GRAD_STUDENT::Advisor;
   relationship set<GRAD_STUDENT> On_committee_of inverse GRAD_STUDENT::Committee;
   void         give_raise(in float raise);
   void         promote(in string new rank);   };

class GRADE
(  extent       GRADES )
{
   attribute    enum GradeValues{A,B,C,D,F,I, P} Grade;
   relationship SECTION Section inverse SECTION::Students;
   relationship STUDENT Student inverse STUDENT::Completed_sections;   };

class STUDENT extends PERSON
(  extent       STUDENTS )
{  attribute    string          Class;
   attribute    Department      Minors_in;
   relationship Department Majors_in inverse DEPARTMENT::Has_majors;
   relationship set<GRADE> Completed_sections inverse GRADE::Student;
   relationship set<CURR_SECTION> Registered_in inverse CURR_SECTION::Registered_students;
   void         change_major(in string dname) raises(dname_not_valid);
   float        gpa();
   void         register(in short secno) raises(section_not_valid);
   void         assign_grade(in short secno; in GradeValue grade)
                   raises(section_not_valid,grade_not_valid);   };
```

Figure 21.6
Possible ODL schema for the UNIVERSITY database of Figure 21.5(b) (continued).

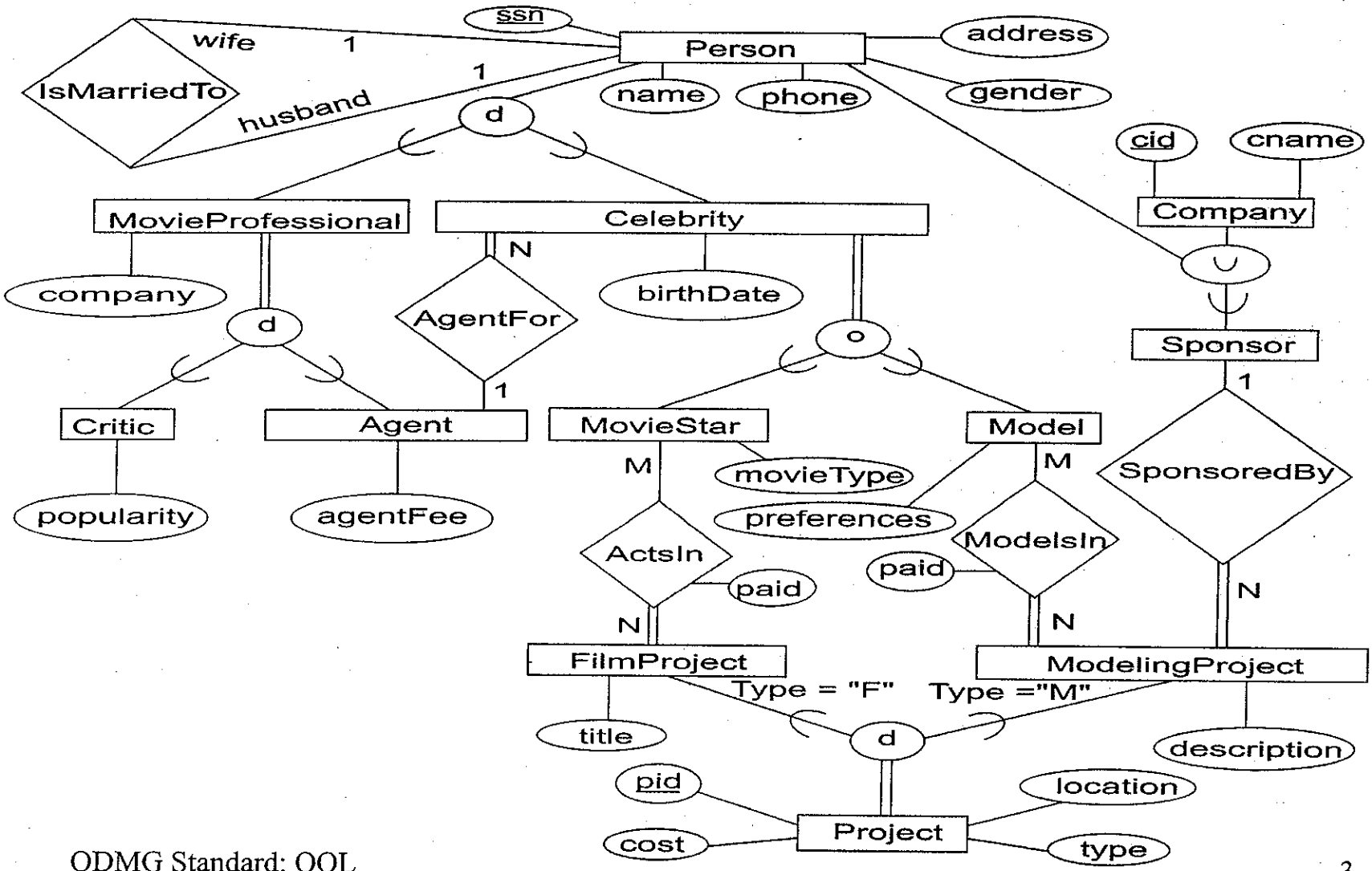
Figure 21.6 (continued)
Possible ODL schema for the UNIVERSITY database of Figure 21.5(b).

```
class DEGREE
( attribute      string      College;
  attribute      string      Degree;
  attribute      string      Year;    );

class GRAD_STUDENT extends STUDENT
( extent         GRAD_STUDENTS )
{ attribute set<Degree>      Degrees;
  relationship Faculty Advisor inverse FACULTY::Advises;
  relationship  set<FACULTY> Committee inverse FACULTY::On_committee_of;
  void         assign_advisor(in string Lname; in string Fname)
                 raises(faculty_not_valid);
  void         assign_committee_member(in string Lname; in string Fname)
                 raises(faculty_not_valid); };

class DEPARTMENT
( extent         DEPARTMENTS
  key            Dname )
{ attribute      string      Dname;
  attribute      string      Dphone;
  attribute      string      Doffice;
  attribute      string      College;
  attribute      FACULTY     Chair;
  relationship   set<FACULTY> Has_faculty inverse FACULTY::Works_in;
  relationship   set<STUDENT> Has_majors inverse STUDENT::Majors_in;
  relationship   set<COURSE> Offers inverse COURSE::Offered_by; };

class COURSE
( extent         COURSES
  key            Cno )
{ attribute      string      Cname;
  attribute      string      Cno;
  attribute      string      Description;
  relationship set<SECTION> Has_sections inverse SECTION::Of_course;
  relationship <DEPARTMENT> Offered_by inverse DEPARTMENT::Offers; };

class SECTION
( extent         SECTIONS )
{ attribute      short       Sec_no;
  attribute      string      Year;
  attribute      enum Quarter{Fall, Winter, Spring, Summer}
                             Qtr;
  relationship set<Grade> Students inverse Grade::Section;
  relationship COURSE Of_course inverse COURSE::Has_sections; };

class CURR_SECTION extends SECTION
( extent         CURRENT_SECTIONS )
{ relationship set<STUDENT> Registered_students
                   inverse STUDENT::Registered_in
  void         register_student(in string Ssn)
                   raises(student_not_valid, section_full); };
```

HOLLYWOOD SCHEMA UML DIAGRAM



HOLLYWOOD SCHEMA EER DIAGRAM



ODMG Standard: OQL

Q0: **Select** d.dname
From d **in** departments
Where d.college = 'Engineering';

Q1: departments;

Q1a: csdepartment;

Q2: csdepartment.chair;

Q2a: csdepartment.chair.rank;

Q2b: csdepartment.has_faculty;

Q3: csdepartment.has_faculty.rank;

Q3a: **select** f.rank
from f **in** csdepartment.has_faculty;

Q3b: **select** **distinct** f.rank
from f **in** csdepartment.has_faculty;

Q4: csdepartment.chair.advises;

Q4a:
```
select struct (name: struct(last_name:
                            s.name.lname,
                            first_name:
                            s.name.fname),
               degrees: (select struct (deg:
                                        d.degree,
                                        yr: d.year,
                                        College:
                                        d.college)
                         from d in s.degrees))
from s in csdepartment.chair.advises;
```

Q5a:
```
select struct (last_name: s.name.lname,
               first_name: s.name.fname,
               gpa: s.gpa)
from s in csdepartment.has_majors
where s.class = 'senior'
order by gpa desc, last_name asc,
         first_name asc;
```

Q5b:
```
select struct (last_name: s.name.lname,
               first_name: s.name.fname,
               gpa: s.gpa)
from s in students
where s.majors_in.dname =
                        'Computer Science'
and s.class = 'senior'
order by gpa desc, last_name asc,
          first_name asc;
```

V1:
```
define has_minors(deptname) as
select s
from s in students
where s.minor_in.dname = deptname;
```

Q6:
```
element (select d
         from d in departments
         where d.dname = 'Computer Science');
```

Q7:
```
count (s in has_minors('Computer Science'));
```

Q8:
```
avg (select s.gpa
     from s in students
     where s.major_in.dname = 'Computer
           Science' and s.class = 'senior');
```

Q9:
```
select d.dname
from d in departments
where count (d.has_majors) > 100;
```

Q10:
```
select s.name.lname, s.name.fname
from s in students
where 'Database Systems I' in
        (select c.cname from c in
    s.completed_sections.section.of_course);
```

Q11:
```
Jeremy in has_minors('Computer Science');
```

Q12:
```
for all g in
   (select s
    from s in grad_students
    where s.majors_in.dname = 'Computer
                                Science')
: g.advisor in csdepartment.has_faculty;
```

Q13:
```
exists g in
(select s
 from s in grad_students
 where s.major_in.dname = 'Computer
                          Science')
: g.gpa = 4;
```

Q10 (corrected):

```
select s.name.lname, s.name.fname
from s in students,
     q in s.completed_sections
where q.section.of_course.cname = 'Database Systems I';
```

Q14:
```
first (select   struct(faculty: f.name.lname,
                       salary: f.salary)
        from    f in faculty
        order by f.salary desc);
```

Q15:
```
(select struct(last_name: s.name.lname,
               first_name: s.name.fname,
               gpa: s.gpa)
 from s in csdepartment.has_majors
 order by gpa desc) [0:2];
```

Q16:
```
select struct(deptname, number_of_majors:
              count (partition))
from s in students
group by deptname: s.major_in.dname;
```

Q17:
```
select deptname, avg_gpa: avg (select p.s.gpa
                               from p
                               in partition)
from s in students
group by deptname: s.majors_in.dname
having count (partition) > 100;
```