

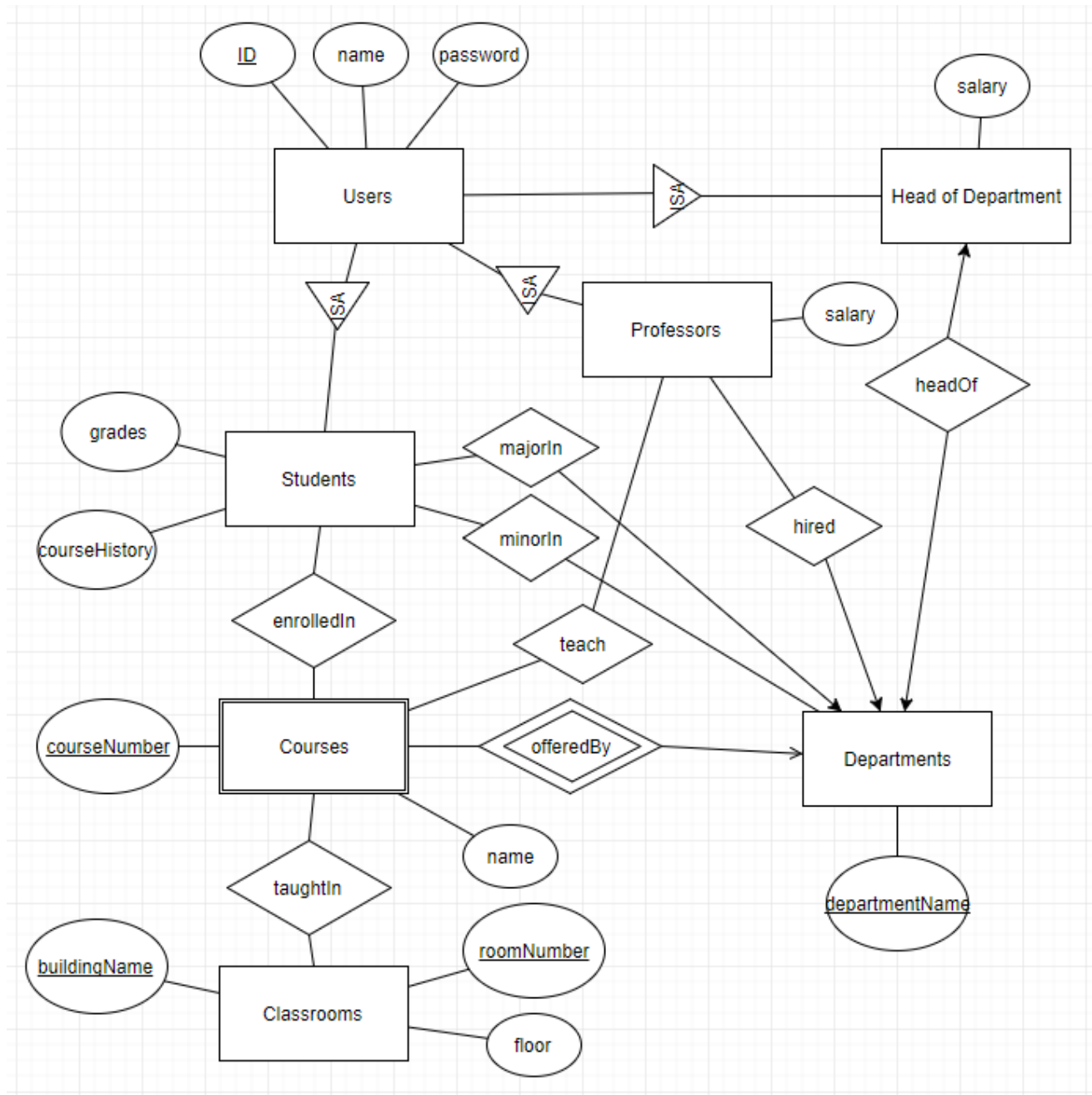
University Database

Data Model & Database Design Document

Team 5

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Data Model & Database Design



Database Design:

1. Entity Sets

a. Users

- i. Attributes: ID, name, password
- ii. Dependencies: $ID \rightarrow \text{name, password}$
- iii. Relationships: Head of Department ISA User. Student ISA User. Professor ISA User.
- iv. Explanation: This entity set models user accounts in the system.

b. Students

- i. Attributes: courseHistory, grades
- ii. Dependencies: $ID \rightarrow \text{courseHistory, grades}$
- iii. Relationships: Student ISA User. Students ENROLLEDIN Courses.
- iv. Explanation: This entity set models user accounts owned by Students.

c. Head of Department

- i. Attributes: salary
- ii. Dependencies: $ID \rightarrow \text{salary}$
- iii. Relationships: Head of Department ISA User. Head of Department HEADOF Departments.
- iv. Explanation: This entity set models user accounts owned by heads of department.

d. Professors

- i. Attributes: salary
- ii. Dependencies: $ID \rightarrow \text{salary}$
- iii. Relationships: Professor ISA User. Professor TEACH Courses.
- iv. Explanation: This entity set models user accounts owned by professors.

e. Courses [Weak Entity Set]

- i. Attributes: courseNumber, name
- ii. Dependencies: $\text{courseNumber} \rightarrow \text{name}$
- iii. Relationships: [Weak Relationship] Courses OFFEREDBY Departments. Courses TAUGHTIN Classrooms. Students ENROLLEDIN Courses. Professors TEACH Courses.
- iv. Explanation: This entity set models available courses offered by various college departments.

f. Departments

- i. Attributes: departmentName

- ii. Dependencies: none
- iii. Relationships: Courses OFFEREDBY Department. Head of Department HEADOF Departments.
- iv. Explanation: This entity set models the various departments that exist in the university.

g. Classrooms

- i. Attributes: buildingName, roomNumber, floor
- ii. Dependencies: roomNumber → floor
- iii. Relationships: Courses TAUGHTIN Classrooms.
- iv. Explanation: This entity set models available classrooms.

2. Relationships

a. HeadOf

- i. Entity Sets Involved: Head of Department, Departments
- ii. Constraints: 1 to 1. Only 1 Head of Department is allowed per department. A Head of Department cannot be the head of multiple different departments.
- iii. Explanation: This relationship represents the connection between the heads of department and their respective departments.

b. Teach

- i. Entity Sets Involved: Professors, Courses
- ii. Constraints: None
- iii. Explanation: This relationship represents professors and the courses that they currently teach.

c. EnrolledIn

- i. Entity Sets Involved: Students, Courses
- ii. Constraints: None
- iii. Explanation: This relationship represents students and the courses that they are each currently enrolled in.

d. majorIn

- i. Entity Sets Involved: Students, Departments
- ii. Constraints: many to 1. Students can only have one major
- iii. Explanation: show that a student may have up to one major, in one department

e. minorIn

- i. Entity Sets Involved: Students, Departments
- ii. Constraints: None
- iii. Explanation: represents the many (or none) minors students can take in any departments.

f. TaughtIn

- i. Entity Sets Involved: Courses, Classrooms
 - ii. Constraints: None
 - iii. Explanation: This relationship represents the specific classroom that each course is taught in.
- g. Hired
 - i. Entity Sets Involved: Professors, Departments
 - ii. Constraints: many to 1. A professor can only be hired by one departments.
 - iii. Explanation: Shows that a department can hire as many professors as it wants, but a professor can only be in one department.
- h. OfferedBy [Weak Relationship]
 - i. Entity Sets Involved: Courses, Departments
 - ii. Constraints: Many to 1 (rounded arrow). Every course MUST be offered by exactly 1 department.
 - iii. Explanation: This weak relationship represents the courses and their respective departments. Course number alone cannot uniquely identify a course; however, the course number along with the name of the department that it is offered in can function as a key for the weak entity set Courses.

Database Schema:

```
Users(  
    id,  
    password,  
    name  
)  
Students(  
    id,  
    courseHistory,  
    grades  
)  
Professors(  
    id,  
    salary  
)  
HeadofDept(  
    id,  
    salary  
)  
Courses(  
    courseNumber,  
    departmentName,  
    courseName  
)  
Departments(  
    departmentName  
)  
Classrooms(  
    roomNumber,  
    buildingName,  
    Floor  
)  
HeadOf(  
    departmentName,  
    headOfDepartmentID  
)
```

```
EnrolledIn(  
    studentID,  
    courseNum,  
    departmentName  
)  
MajorIn(  
    studentID,  
    departmentName  
)  
MinorIn(  
    studentID,  
    departmentName  
)  
Teach(  
    professorID,  
    courseNum,  
    departmentName  
)  
Hired(  
    departmentName,  
    professorID  
)  
LocatedIn(  
    classroomNum,  
    buildingName,  
    courseNumber,  
    departmentName  
)  
TaughtIn(  
    courseNumber,  
    departmentName,  
    buildingName,  
    roomNumber  
)
```