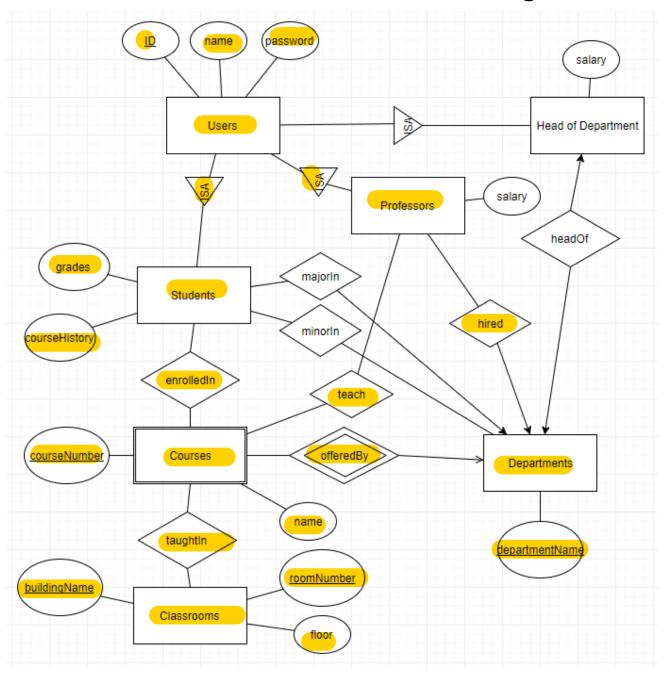# University Database

Data Model & Database Design Document

Team 5

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Data Model & Database Design

Database Design:

1. Entity Sets
   a. Users
      i. Attributes: <u>ID</u>, name, password
      ii. Dependencies: ID → 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 → 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 → 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 → 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: <u>courseNumber</u>, name
      ii. Dependencies: courseNumber → 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: <u>departmentName</u>

        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: <u>buildingName</u>, <u>roomNumber</u>, floor

        ii.   Dependencies: <u>roomNumber</u> → 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
)

TaughtIn(
    courseNumber,
    dpartmentName,
    buildingName,
    roomNumber
)