University Database

Data Model & Database Design Document

Team 5

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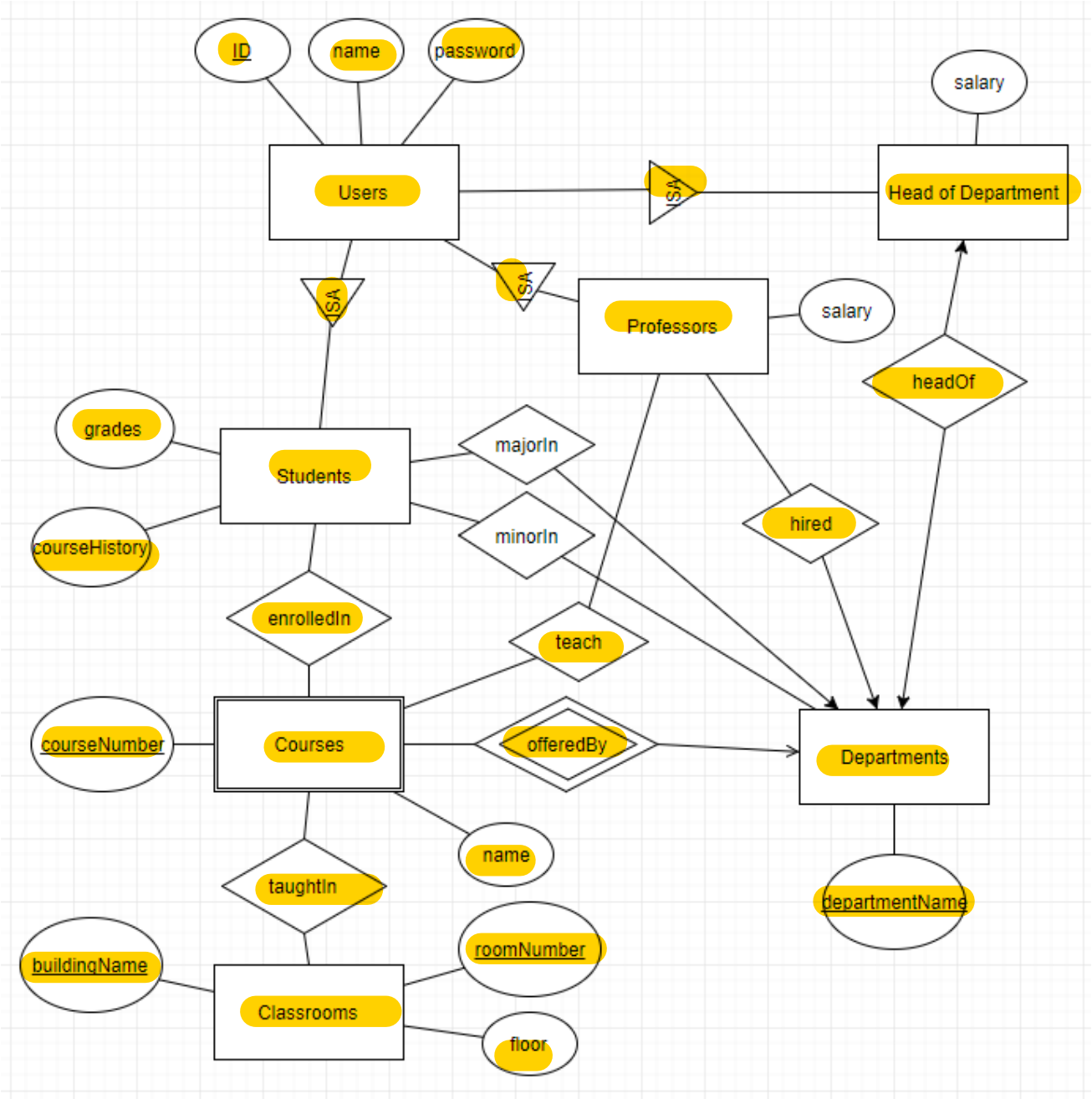
Data Model & Database Design



Database Design:

1. Entity Sets
    a. Users
        i. Attributes: ID, name, password
        ii. Dependencies: ID → 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: courseNumber, 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: 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
)

TaughtIn(
    courseNumber,
    dpartmentName,
    buildingName,
    roomNumber
)