**Project – 1: Integrated Academic & Personnel Database – Modelling**

The database keeps track of three types of persons: employees, alumni, and students. A person can belong to one, two, or all three of these types. Each person has a name, SSN, sex, address, and birth date.

* Every employee has a salary, and there are three types of employees: faculty, staff, and student assistants. Each employee belongs to exactly one of these types. For each alumnus, a record of the degree or degrees that he or she earned at the university is kept, including the name of the degree, the year granted, and the major department. Each student has a major department.
* Each faculty has a rank, whereas each staff member has a staff position. Student assistants are classified further as either research assistants or teaching assistants, and the percent of time that they work is recorded in the database. Research assistants have their research project stored, whereas teaching assistants have the current course they work on.
* Students are further classified as either graduate or undergraduate, with the specific attribute’s degree program (M.S., Ph.D., M.B.A., and so on) for graduate students and class (freshman, sophomore, and so on) for under- graduates.

**Detailed Explanation:**

* Entities and Their Attributes:
  + Person
    - Attributes: Name, SSN (Primary Key), Sex, Address, Birth Date
    - Relationships: Can be an Employee, an Alumnus, and/or a Student
  + Employee
    - Inherits Person
    - Attributes: Salary
    - Relationships: Subclassified into Faculty, Staff, or Student Assistant
  + Faculty
    - Inherits Employee
    - Attributes: Rank
    - Relationships: Belongs to a Department
  + Staff
    - Inherits Employee
    - Attributes: Position
    - Relationships: Belongs to a Department
  + Student Assistant
    - Inherits Employee
    - Attributes: Percent Time Worked
    - Relationships: Subclassified into Research Assistant or Teaching Assistant
  + Research Assistant
    - Inherits Student Assistant
    - Attributes: Research Project
    - Relationships: Associated with one or more Departments (through projects)
  + Teaching Assistant
    - Inherits Student Assistant
    - Attributes: Current Course
    - Relationships: Associated with one or more Departments (through courses)
  + Alumnus
    - Inherits Person
    - Attributes: Degree Name, Year Granted
    - Relationships: Has one or more Degrees, each associated with a Department
  + Student
    - Inherits Person
    - Attributes: Major Department
    - Relationships: Classified as Graduate or Undergraduate
  + Graduate Student
    - Inherits Student
    - Attributes: Degree Program (e.g., M.S., Ph.D., M.B.A.)
  + Undergraduate Student
    - Inherits Student
    - Attributes: Class (e.g., Freshman, Sophomore)
  + Department
    - Attributes: Name
    - Relationships: Associated with Faculty, Staff, Students, Degrees
* Relationships:
  + Employee to Department: Many-to-One (Each employee works in exactly one department, but departments can have many employees).
  + Alumnus to Department: Many-to-Many (An alumnus can have degrees from multiple departments, and each department can grant degrees to many alumni).
  + Student to Department: Many-to-One (Each student is associated with exactly one major department, but departments can have many students).
* Additional Considerations:
  + Inheritance is used to represent the IS-A relationships, for example, a Faculty is a type of Employee.
  + Associative Entities may be needed for handling many-to-many relationships, such as between Alumni and Departments for the degrees.
  + Composite Attributes could be considered for addresses if detailed breakdowns (street, city, state, zip code) are required.

**Answer**

#Create Person table

CREATE TABLE Person (

SSN VARCHAR(9) PRIMARY KEY,

Name VARCHAR(255),

Sex CHAR(1),

Address VARCHAR(255),

BirthDate DATE

);

#Create Employee table

CREATE TABLE Employee (

SSN VARCHAR(9) PRIMARY KEY,

Salary DECIMAL(10, 2),

FOREIGN KEY (SSN) REFERENCES Person(SSN)

);

# Create Faculty table

CREATE TABLE Faculty (

SSN VARCHAR(9) PRIMARY KEY,

Rank VARCHAR(50),

FOREIGN KEY (SSN) REFERENCES Employee(SSN)

);

#Create Staff table

CREATE TABLE Staff (

SSN VARCHAR(9) PRIMARY KEY,

Position VARCHAR(50),

FOREIGN KEY (SSN) REFERENCES Employee(SSN)

);

#Create StudentAssistant table

CREATE TABLE StudentAssistant (

SSN VARCHAR(9) PRIMARY KEY,

PercentTimeWorked DECIMAL(5, 2),

FOREIGN KEY (SSN) REFERENCES Employee(SSN)

);

#Create ResearchAssistant table

CREATE TABLE ResearchAssistant (

SSN VARCHAR(9) PRIMARY KEY,

ResearchProject VARCHAR(255),

FOREIGN KEY (SSN) REFERENCES StudentAssistant(SSN)

);

#Create TeachingAssistant table

CREATE TABLE TeachingAssistant (

SSN VARCHAR(9) PRIMARY KEY,

CurrentCourse VARCHAR(255),

FOREIGN KEY (SSN) REFERENCES StudentAssistant(SSN)

);

# Create Alumnus table

CREATE TABLE Alumnus (

SSN VARCHAR(9) PRIMARY KEY,

DegreeName VARCHAR(255),

YearGranted YEAR,

FOREIGN KEY (SSN) REFERENCES Person(SSN)

);

#Create Student table

CREATE TABLE Student (

SSN VARCHAR(9) PRIMARY KEY,

MajorDepartment VARCHAR(255),

FOREIGN KEY (SSN) REFERENCES Person(SSN)

);

#Create GraduateStudent table

CREATE TABLE GraduateStudent (

SSN VARCHAR(9) PRIMARY KEY,

DegreeProgram VARCHAR(50),

FOREIGN KEY (SSN) REFERENCES Student(SSN)

);

# Create UndergraduateStudent table

CREATE TABLE UndergraduateStudent (

SSN VARCHAR(9) PRIMARY KEY,

Class VARCHAR(20),

FOREIGN KEY (SSN) REFERENCES Student(SSN)

);

#Create Department table

CREATE TABLE Department (

Name VARCHAR(255) PRIMARY KEY

);

+-------------------+

| Person |

+-------------------+

| PK SSN |

| Name |

| Sex |

| Address |

| Birth Date |

+-------------------+

|

|

+-------------------+

| Employee |

+-------------------+

| FK SSN |

| Salary |

+-------------------+

/ | \

/ | \

+----------------+ +--------+ +--------------------+

| Faculty | | Staff | | Student Assistant |

+----------------+ +--------+ +--------------------+

| FK SSN | | FK SSN | | FK SSN |

| Rank | | Position| | Percent Time Worked|

+----------------+ +--------+ +--------------------+

| | |

| | |

+-------+-------+ +-----+-----+ +-------------+

| Research Asst.| | Teach. Asst.| | Alumnus |

+---------------+ +-------------+ +-------------+

| FK SSN | | FK SSN | | FK SSN |

| Research Project| | Current Course | | Degree Name|

+----------------+ +-------------+ | Year Granted|

+-------------+

/ | \

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+--------+ +-----------+ +-----------+

| Student| |Grad Student| |Undergrad Student|

+--------+ +-----------+ +-----------+

| FK SSN | | FK SSN | | FK SSN |

| Major | | Degree | | Class |

| Dept. | | Program | | |

+--------+ +-----------+ +-----------+

+-------------------+

| Department |

+-------------------+

| Name |

+-------------------+