

Zealot Industries Inc. is a manufacturing firm with over 200 employees. The firm has been expanding well beyond the founders' expectations. However, it faces a severe hindrance to additional expansion — the absence of a computerized Human Resource Management System (HRMS) which could facilitate management of human resource related issues.

Precision Software Inc. is a software engineering firm contracted to develop and implement the HRMS project. After a preliminary meeting with Zealot's senior management, the lead software engineer on the Precision Software team documents his findings as follows:

- A detailed employee profile consists of the employee's personal information, employment history, education history and beneficiary information.
- Every employee belongs to a department, and is assigned a specific job description (there may be more than one employees with the same job description).
- Employees are classified according to the salary range that they fall in.
- Each employee has a compensation package which outlines basic salary and other benefits. Benefits include health insurance, retirement plan, life insurance, professional development allowance, housing allowance, traveling allowance, entertainment allowance, vacation allowance, education allowance.
- A payroll log keeps track of remuneration paid out to employees.
- Each employee is assigned to at least one project; the number of employees assigned to a project depends on the size and complexity of the project.

1. Identify all information entities (object types) mentioned or implied in the case.

[10]

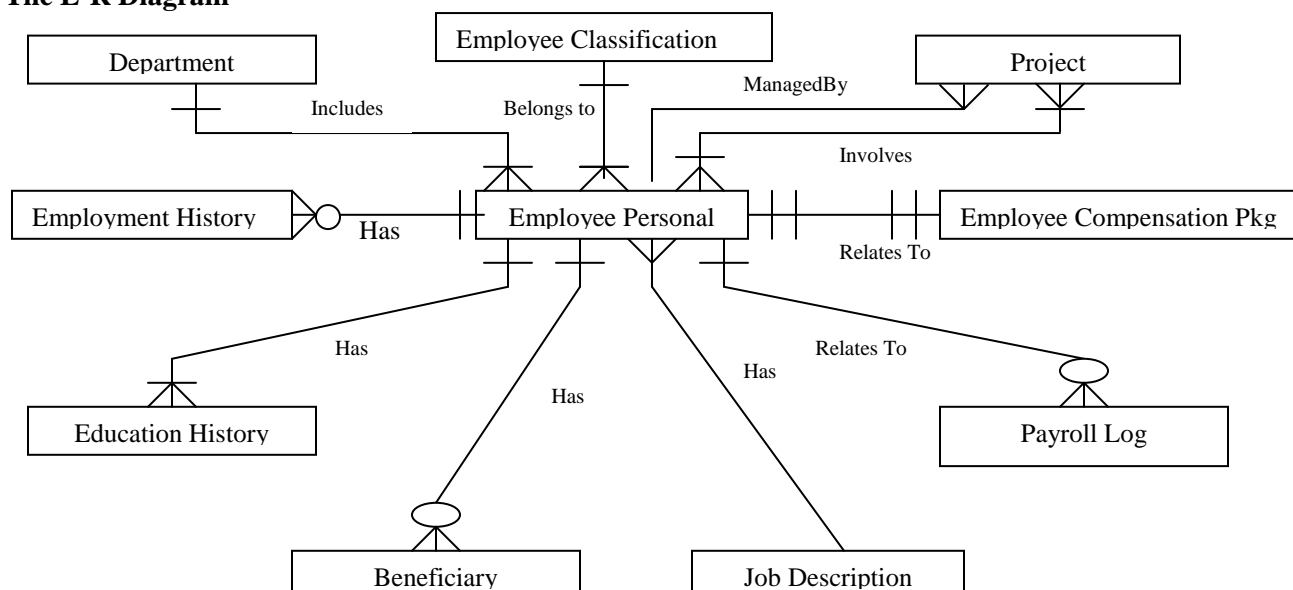
Information Entities

- Employee Personal
- Department
- Employment History
- Education History
- Beneficiary
- Employee Classification
- Employee Compensation
- Payroll Log
- Project
- Job Description

2. Identify all relationships among the entities (object types) and represent them on an ERD.

[20]

The E-R Diagram



Q2 continued:

Note: An alternate ERD is to have the entity Employee Profile forming a component relationship with components Employee Personal, Employee Employment History, Employee Academic History, and Employee Beneficiary. In this case, Employee Profile would form relationship with surrounding entities such as Department, Employee Classification, etc.

3. Use the information in the case, combined with the information conveyed by the E-R diagram and your own intuitive design skills to propose relations and their associated attributes for each of the entities represented on the E-R diagram, in a Relation-Attributes List (RAL). For each entity, clearly indicate its primary key, a few other essential attributes, and any foreign key(s) it may contain. You may also introduce additional relation(s) to take care of M:M relationship(s) which may exist. [60]

Given the E-R Diagram above, we can define the relations as follows (note the placement of foreign keys):

Department

- Dept Number [PK]
- Dept Name

Employee Classification

- Class Code [PK]
- Class Description
- Minimum Salary
- Max Salary

Job Description

- Job Code [PK]
- Job Title
- Job Description

Employee

- Emp Number [PK]
- Last Name
- First Name
- Middle Initial(s)
- ...
- Dept Number (ref. Department)
- Class Code (ref. Employee Classification)
- Social Security Number [CK]

Project

- Project Code [PK]
- Project Name
- Project Description
- Project Schedule
- Project Manager's Emp Number

Employment History

- Employee Number (ref Employee)] [PK]
- EH-Sequence Number]
- Employer
- Start Date
- End Date
- Job Title
- Reason for Leaving

Employee Beneficiary

- Employee Number (ref Employee)] [PK]
- Ben Sequence Number]
- Ben First Name
- Ben Last Name
- Ben Middle Name
- Relation to Employee
- ...

Education History

- Employee Number (ref Employee)] [PK]
- EH-Sequence Number]
- Institution
- Start Date
- End Date
- Achievement
- Graduation Flag (yes or no)

Project Assignment

- Employee Number (ref Employee)
- Project Code (ref Project)
- Project Sequence Number

Note: Candidate keys are
[Employee Number & Project Code] and
[Employee Number & Project Sequence Number]

Q3 continued:

Employee Compensation

- Employee Number (ref Employee) [PK]
- Basic Salary
- Health Insurance
- Retirement Plan
- Life Insurance
- Education Allowance
- Housing
- Professional Development Allowance
- Traveling
- Entertainment
- Vacation Allowance
- Other Benefits

Payroll Log

- Employee Number (ref Employee)] [PK]
- Pay Date
- Basic Pay
- Health Insurance
- Retirement Plan
- Life Insurance
- Education Allowance
- Housing
- Professional Development Allowance
- Traveling
- Entertainment
- Vacation Allowance
- Other Benefits

Note: The relations **Payroll Log** and **Employee Compensation** can be further refined by introducing a third relation that stores definitions of each compensation item; then modify **Payroll Log** and **Employee Compensation** to reference these compensation items. As an exercise, try this refinement on your own.

Alternately, you may treat **Health Insurance**, **Life Insurance**, and **Retirement Plan** as entities in their own rights, to be referenced from **Payroll Log** and **Employee Compensation** respectively. As an exercise, try this refinement on your own.