Module 2: Data Modeling

Lab: Identify Components in Entity Relationship Modeling

Scenario

You are a Business Analyst with a distance learning company. You have been tasked with developing a database to record the information necessary for administering the courses they offer.

You have been given the following statement of data requirements:

> The company needs to keep details of staff and students, the courses that are offered, and the performance of students on these courses. Students are registered with the company before commencing their studies, and are issued with a student identification number. Students are not required to enroll on any course when they register. Students' full names and the date of their registration are recorded. Staff are also issued with a staff number, and their full names are recorded. Each staff member may tutor one or more students on courses. Each student has a tutor for each course on which they are enrolled. Students are allocated a tutor for the course on which they are enrolled at any time after enrollment.
>
> Each course that is available for study is given a course code, a title, and a value for credit (either 0.5 or 1.0). Students are not permitted to enroll on more than three credits worth of courses in any one year. There is a need to record current enrollments only.
>
> Courses may have a quota—the maximum number of students that can be enrolled on the course in any one year. A course may not (yet) have any students enrolled on it. Each course may have up to five assignments that the students are required to complete. These are graded by the tutor assigned to the individual student. The grade for each of these assignments must be recorded as a mark out of 100.

As a Business Analyst, your task is to model these data requirements and develop a conceptual model comprising:

- An ERD, showing entities and relationships.
- A set of entity descriptions, with suitable attributes.
- A statement of the constraints and assumptions made.

This lab can be completed as a paper exercise, but you may want to compare your solutions with the files in the **D:\Labfiles\Lab02\Solution** folder.

Objectives

After completing this lab, you will be able to:

- Identify suitable entities.
- Identify the relationships that need to exist between these entities.
- Identify constraints and assumptions.

Lab Setup

Estimated Time: 50 minutes

Ensure that the 10985C-MIA-DC and 10985C-MIA-SQL virtual machines are both running, and then log on to 10985C-MIA-SQL as **ADVENTUREWORKS\Student** with the password **Pa$$w0rd**.

Exercise 1: Identify Entities

Scenario

Using the data requirement statement in the Lab Scenario, you have been tasked to identify and list suitable entities and their attributes.

The main tasks for this exercise are as follows:

1. Create a List of Suitable Entities
2. Add Suitable Attributes

Task 1: Create a List of Suitable Entities

1. Examine the text of the brief.
2. Use the real nouns from it to develop an initial list of entities.
3. Keep these to use for the subsequent tasks and exercises.

Task 2: Add Suitable Attributes

1. Take each entity from the initial list in turn.
2. For each entity, identify suitable attributes for it.
3. For each attribute, develop a suitable domain for its declaration.
4. Add these attributes to the various entities in the list you developed in the previous task.
5. From these attributes, identify the candidate keys and primary keys.
6. Compare your list with initial_entities.docx in the D:\Labfiles\Lab02\Solution folder.

> **Results**: After completing this exercise, you will have an initial list of entities and attributes that model the data requirements for the brief provided. The entity definitions will include appropriate domains.

Exercise 2: Identify Relationships

Scenario

Using the data requirement statement in the previous Lab Scenario, and the list of entities you created in the previous exercise, you now need to identify and list suitable relationships between these entities. You must develop the relationships, draw an ERD that models them, and resolve any m:n relationships.

The main tasks for this exercise are as follows:

1. Create a List of Named Relationships
2. Draw an ERD Modeling the Entities and Relationships
3. Resolve Any m:n Relationships

Task 1: Create a List of Named Relationships

1. Take each entity in the model in turn.
2. Identify the relationships this has with other entities.
3. List and name these relationships.

Task 2: Draw an ERD Modeling the Entities and Relationships

1. Using the list of entities and relationships, draw an ERD showing each entity and the relationships between them.
2. Remember to name each relationship.
3. Do not forget about optionality and degree for each relationship.
4. Model these relationships by sharing keys.
5. Compare your model with the **initial_ER.docx** in the **D:\Labfiles\Lab02\Solution** folder.
6. What problems do you see for modeling relationships with the model in its current form?

Task 3: Resolve Any m:n Relationships

1. Identify any m:n relationships between entities in your model.
2. Resolve these relationships by a suitable method.
3. Compare your model with the updated_diagram.xps in the D:\Labfiles\Lab02\Solution folder.

> **Results**: After completing this exercise, you will have an initial list of relationships between the entities that model the data requirements for the brief provided. You will have an initial ERD and have resolved any relationships that cannot be modeled (many-to-many relationships).

Exercise 3: Finalize Your Model

Scenario

Using the data requirement statement in the Lab Scenario and the data model you have developed in the previous exercises, you now need to finalize the model, so that it can be used as part of the development process. You must develop a list of constraints and assumptions, and update the data model accordingly.

The main tasks for this exercise are as follows:

1. Develop a List of Constraints and Assumptions
2. Finalize the ERD

Task 1: Develop a List of Constraints and Assumptions

1. From the data brief, identify constraints for the items being recorded.
2. List any assumptions.

Task 2: Finalize the ERD

1. Update your model to include the constraints and assumptions that you identified in the previous task.
2. Compare your model with the **final_ER.docx** in the **D:\Labfiles\Lab02\Solution** folder.

> **Results**: After completing this exercise, you will have a final data model meeting the original specification.

Lab Review

Question: How do you identify entities?

Question: What is a relationship?