NYU Tandon School of Engineering
CS-UY 3083-B Spring 2025
Professor Salim Arfaoui

Assignment 01: ER Modeling

Due: 11:59pm, Monday, Feb 09, 2025

No late submissions will be accepted.

This assignment covers the following topics:

- **ER Modeling**
- **Relational Model**
- **Schema Refinement**

Submission instructions

- You should submit your homework on Gradescope.
- For this assignment you should turn in **1** **pdf** file.
- The PDF file should contain a header comment block as follows:

```
"""
Author: [Your name here]
Assignment: HW1
Date due: Feb 09, 11:59pm
I pledge that I have completed this assignment without collaborating
with anyone else, in conformance with the NYU School of Engineering
Policies and Procedures on Academic Misconduct.
"""
```

For each of the 4 requirement specification, you should:

1. **Draw the Entity Relationship Diagram (ERD/ERM):**
   - Identify the entities.
   - Determine the relationships between entities.
   - Define the attributes of each entity and relationship.
   - Show primary keys and foreign keys.
   - Use cardinality symbols.
2. **Translate the ER Diagram (ERD) into a Relational Model (RM):**
   - Generate the schema statements for each entity and relationship.
   - Indicate primary keys and foreign keys for relational integrity.

There are several easy-to-use web-based software (some are free, some offer a free trial) that you can use to draw an E-R diagram:

- **Draw.io (Recommended)**
- Excalidraw
- Lucidchart
- yEd
- Dia

RS1) Restaurant Management System

Requirement Specification: In the Restaurant Management System, the database should manage information about dishes, customers, and orders. Each dish is uniquely identified by a `DishID` and includes attributes such as `Name`, `Price`, and `Category`. Customers are uniquely identified by a `CustomerID` and have attributes like `Name`, `Phone Number`, and `Email`. Each order is uniquely identified by an `OrderID` and includes the `Order Date`, along with a reference to the `CustomerID` as a foreign key. An order can contain multiple dishes, and each dish in an order is recorded with attributes such as `Quantity` and `Price`, making the **Order Details** an associative entity that links `OrderID` and `DishID`. The system allows each order to contain multiple dishes, and each dish can appear in multiple orders.

RS2) Event Management System

Requirement Specification: In the Event Management System, the database should manage information about events, attendees, venues, and tickets. Each event is uniquely identified by an `EventID` and includes attributes such as `Event Name`, `Date`, and a reference to `VenueID`. Venues are uniquely identified by a `VenueID` and include attributes like `Name`, `Location`, and `Capacity`. Attendees are uniquely identified by an `AttendeeID` and have attributes such as `Name` and `Email Address`. Each ticket is uniquely identified by a `TicketID` and includes details about `Ticket Type`, `Price`, and references to both `EventID` and `AttendeeID`. Each ticket is associated with a specific event and attendee, ensuring that each event can have multiple tickets and each attendee may purchase multiple tickets.

RS3) University Enrollment System

Requirement Specification: In the University Enrollment System, the database should manage data about students, courses, instructors, enrollments, and departments. Each student is uniquely identified by a `StudentID` and includes attributes such as `Name`, `Date of Birth`, and `Major`. Each course is uniquely identified by a `CourseID` and includes attributes such as `Course Name`, `Credits`, and a reference to `DepartmentID`. Instructors are uniquely identified by an `InstructorID` and have attributes such as `Name`, `Email`, and a reference to `DepartmentID`. Departments are uniquely identified by a `DepartmentID` and include attributes such as `Department Name` and `Office Location`. Enrollments are uniquely identified by an `EnrollmentID` and include details such as `Enrollment Date`, `Grade`, and references to both `StudentID` and `CourseID`. Each course is offered by a specific department, and each instructor belongs to a department, reflecting the organizational structure of the university.

RS4) Fitness Center Management System

Requirement Specification: In the Fitness Center Management System, the database should manage data about members, trainers, fitness classes, and class schedules. Each member is uniquely identified by a `MemberID` and includes attributes such as `Name`, `Membership Type`, and `Contact Information`. Trainers are uniquely identified by a `TrainerID` and have attributes such as `Name` and `Specialization`. Each fitness class is uniquely identified by a `ClassID` and includes details such as `Class Name` and `Maximum Capacity`. Class schedules are uniquely identified by a `ScheduleID` and include the `Schedule Date`, `Time`, along with references to both `ClassID` and `TrainerID`. Each member can participate in multiple fitness classes, and each class can be scheduled multiple times. This allows the system to track each class's schedule, trainer assignments, and member enrollments efficiently.