DATA1201 – Introduction to Relational Databases

Group Project: Co-working Database

# Learning Objectives

* Design a database according to the requirements of a chosen case study.
* Implement complex SQL queries to retrieve information from multiple tables.
* Create useful sample data to test queries.

# Case Study

[Coworking](https://en.wikipedia.org/wiki/Coworking) is a work style where different individuals or teams share a working environment. If you are self-employed or a working-from-home professional, you would love to have the option to rent a meeting room, or a desk in an office equipped with high-speed internet, printers, copiers, stationaries, and office kitchen. As there is an increase in the number of coworkers and the number of sharable workspaces, we are looking to develop an application to connect both parties. The objective is very similar to how Uber connects riders with drivers and Airbnb connects tenants with landlords.

The **Minimum Viable Product (MVP)** is the smallest conceivable list of features that fulfill the primary business goal of a software product. One way to summarize a feature is by a “user story” – a short sentence describing the feature from the perspective of the user. User stories frequently take the following form: “As a <type of user>, I can <take some action> so I can <some reason>.” You can start with the following user stories as a backlog for your MVP:

1. As a user, I can sign up for an account and provide my personal information: name, phone, and email. I can choose my role as a workspace owner or a coworker.
2. As an owner, I can list a property with the following information:
   1. Address (e.g. 345 - 6 Avenue SE, Calgary, AB T2G 4V1),
   2. Neighborhood (e.g. Downtown, Kensington, Beltline),
   3. Area (in square meters),
   4. Whether it includes parking or not,
   5. Whether it is reachable by public transportation or not.
3. As an owner, I can select one of my properties and list multiple workspaces for rent in that property. Workspaces can be one of the following options: meeting rooms, private office rooms, or desks in an open work area. For each workspace I can specify how many individuals it can seat, the availability date, the lease term (day, week, or month), and price.
4. As an owner, I can modify the data for any of my properties or any of my properties’ workspaces.
5. As an owner, I can delist (delete) any of my properties or any of my properties’ workspaces from the database.
6. As a coworker, I can search for workspaces by address, neighborhood, area (square meters), with or without parking, with or without public transportation, the number of individuals it can seat, the availability date, the lease term, or price.
7. As a coworker, I can select a property or workspace and view its details.
8. As a coworker, I can get the contact information of a workspace owner (name, phone, and email).

# Project Overview

Your task in this assessment is to work as a group to create a database and queries for the case study. This project has two phases:

1. Database Design (50%)
2. Database Implementation (50%)

The requirements and rubric for each phase are detailed below.

## Phase 1: Database Design

Phase 1 is all about designing your database. Do not actually create a database or produce any SQL files to manipulate data in this phase.

Your task is to produce a well-designed and detailed ER diagram that meets all the requirements of the case study above. Additionally, prepare sample data for each entity in a table format.

**ER Diagram Requirements**

The ER diagram should include the following information:

1. Tables with names and attributes.
2. Indications of which columns are primary or foreign keys.
3. Relationships between tables, including ordinality.
4. Any special constraints that should be noted.
5. Check each of the entities for normalization to avoid and eliminate anomalies.

**Sample Data Requirements**

For each table in your ERD create a table of sample data using a Word document, Excel spreadsheet, or similar program. The sample data should meet the following requirements:

1. Include the column names for each table.
2. Include a minimum of 5 rows of useful sample data.
3. Foreign keys should exist as a primary key in the related table.

For example, sample data for a vendor and product database might look like this:

|  |  |  |  |
| --- | --- | --- | --- |
| **Product table** | | | |
| Id | Name | VendorId | UnitPrice |
| 1 | Gum drops | 2 | .99 |
| 2 | Candy canes | 1 | 1.50 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Vendor table** | | | | | |
| Id | Name | Address | City | State | Phone |
| 1 | Wonka Co | 123 Fake St | Tampa | FL | 555-555-5555 |
| 2 | North Pole Inc | 555 Fiction Ave | Minneapolis | MN | NULL |

**Submission Instructions**

* Submit two documents:
  + ER diagram as an image file, PDF, or Word document.
  + Sample data for all entities as a PDF, Word document, or Excel spreadsheet.
* Include each group member’s name on each file.
* Make sure to properly reference any outside resources that you use.
* Place all source files into a zipped (compressed) folder, then upload it to D2L.

**Rubric**

* 50 points available.
* Partial credit will be given.
* Worth 15% of final grade.

|  |  |
| --- | --- |
| **Grading Items** | **Points** |
| ER Diagram:   * Correct tables are identified. * Correct attributes are identified. * Relationships are identified. * Primary keys and foreign keys are identified. * Data is normalized to 3NF. | 40 |
| Sample data:   * Tables match the design. * Minimum of 5 rows of data for each table. * Sample data is logical and applies to the case study. | 10 |
| **TOTAL** | **50** |

## Phase 2: Database Implementation

Phase 2 is about implementing your design from Phase 1 into a real, useful database.

Your task is to create your database and populate it with your sample data. Additionally, prepare queries to retrieve meaningful information based on the case study.

**Database Creation Requirements**

Create an SQL file named *“create\_database.sql”*. This file should perform the following actions:

* Delete the database if it already exists.
* Create the database.
* Create all tables based off your design.
* Create the appropriate primary and foreign keys.
* Create the appropriate constraints.

Create an SQL file named *“populate\_database.sql”.* This file should perform the following actions:

* Populate each table in the database with the sample data from Phase 1.
* Include at least 5 rows of data per table.
* Use primary keys and foreign keys appropriately.
* Act as test cases for your retrieval queries (discussed below).

**Retrieval Query Requirements**

Create an SQL file named *“query\_database.sql”*. This file should contain 10 queries that retrieve meaningful information based on the case study. You may assume that the database and tables exist, but you should connect to your database with the USE command at the start of the file.

Create queries that span the concepts your have learned in this course.

**Submission Instructions**

* Submit 3 files:
  + *create\_database.sql*
  + *populate\_database.sql*
  + *query\_database.sql*
* Include each group member’s name on each file.
* Make sure to properly reference any outside resources that you use.
* Place all source files into a zipped (compressed) folder, then upload it to D2L.

**Rubric**

* 50 points available.
* Partial credit will be given.
* Worth 15% of final grade.

|  |  |
| --- | --- |
| **Grading Items** | **Points** |
| Database creation:   * Script runs without errors. * Database structure matches the design and feedback from Phase 1. * Data types are reasonable. * Primary keys, foreign keys, and other constraints are reasonable. | 10 |
| Database population:   * Script runs without errors. * Data represents reasonable test values for queries. | 10 |
| Retrieval queries:   * 10 queries (2 points each). * Script runs without errors. * Queries return correct results. * Queries are formatted according to best practices. * Queries span the concepts learned in this course. | 20 |
| Presentation (approximately 5 minutes):   * All group members participate. * Present the creation and population of the database. * Present 3 different retrieval queries. * Discuss lessons learned from this project (e.g. what went right, what went wrong, what would you do differently next time). | 10 |
| **TOTAL** | **50** |