# CSCI 4125/5125: Data Models and Database Systems

Phase 1: Database Design & Project Setup

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**Due: Sunday, February 9th @ 11:59pm** (e.c. if submitted early. No late submissions.)
**Reading:** Silberschatz Chapters 1, 2, & 6

**Submission Guidelines:**

1. This assignment is worth 30 points for all students.
   - +6 extra credit points if submitted by Monday, February 3rd @ 11:59pm.
   - +3 extra credit points if submitted by Thursday, February 6th @ 11:59pm.
2. All answers in the form of images or screenshots must be readable.
3. It is your responsibility to make sure all files are readable and submitted on time.

**Submission Files:**

- **[lastname]_Phase1.pdf** – a main PDF file with your name at the top.
- **Phase1.java** – a Java source file with your name as a comment at the top.
- **phase1_output.txt** – a .txt file containing the output generated by your Java code.

**Submission Checklist:**

| Task | Pts | Submission Items |
|---|---|---|
| SQL Developer | 3 | Screenshot in your main PDF. Must show your last name in the connection name. |
| Java Setup | 9 | A Java source file and a .sql file. |
| E-R Modeling | 9 | E-R diagram in your main PDF. |
| E-R Mapping | 9 | Relational schema in your main PDF. |

Table 1: Submission Checklist

**Recommend Completion of Tasks.** You have ∼4 weeks to complete this project phase. I highly recommend allocating several hours/week to this rather than starting on this the day before it is due. Table 2 has a recommended timeline to complete tasks.

| Task | Finish | Notes |
|---|---|---|
| SQL Developer | Mon, 1/20 | Estimated time 10 - 15 min. |
| Java Setup | Mon, 1/20 | Estimated time 3 - 5 hrs. Depends on how much Java review you need. |
| E-R Modeling | Mon, 1/27 | Estimated time 2 - 3 hrs. |
| E-R Mapping | Mon, 2/3 | Estimated time 1 - 2 hrs. |

Table 2: Recommended completion timeline of tasks.

# 1 SQL Developer Connection

In Phase 2 of the project, you will execute SQL DDL to build your tables and SQL DML to populate your tables and execute queries. This task has you set up your database connection to perform Phase 2. We will use a popular IDE supported by Oracle to connect to our database.

## 1.1 Access the Server through UNO WebTerminal

- Go to the UNO WebTerminal connections page.
- Select "Database Systems (Windows) for CSCI 4125/5125"
- Use your UNO credentials to log in.

## 1.2 Run SQL Developer

Run the application, sqldeveloper.exe. It will look like Figure 1. There is a shortcut on your desktop.

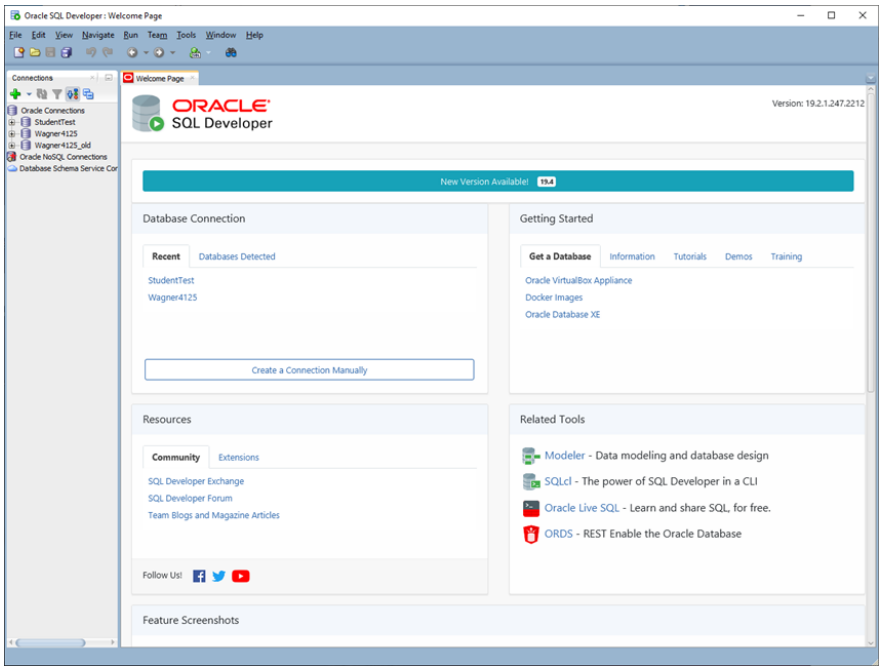


Figure 1: SQL Developer

## 1.3 Create a Connection

In the upper left-hand side of the application, there is a green plus symbol. Click this to create a new database connection. Fill in the following fields (example in Figure 2). *Do not include quotes or brackets.*

- **Name:** Name your connection [Your UNO username][4125/5125].
- **Username:** Use your UNO username.
- **Password:** Use "NewOrleans123" (you will change this later).
- **Save Password:** Don't check until you change your password later.
- **Hostname:** localhost
- **Port:** 1521
- **SID:** Oracle21c
- **ServiceName:** This should not be checked. We won't use this field.
- Click "Test" at the bottom. If everything is correct, "Status" in the lower left-hand corner will say "Success".
- Click the "Save" box at the bottom to save your connection.
- Click the "Connect" box.

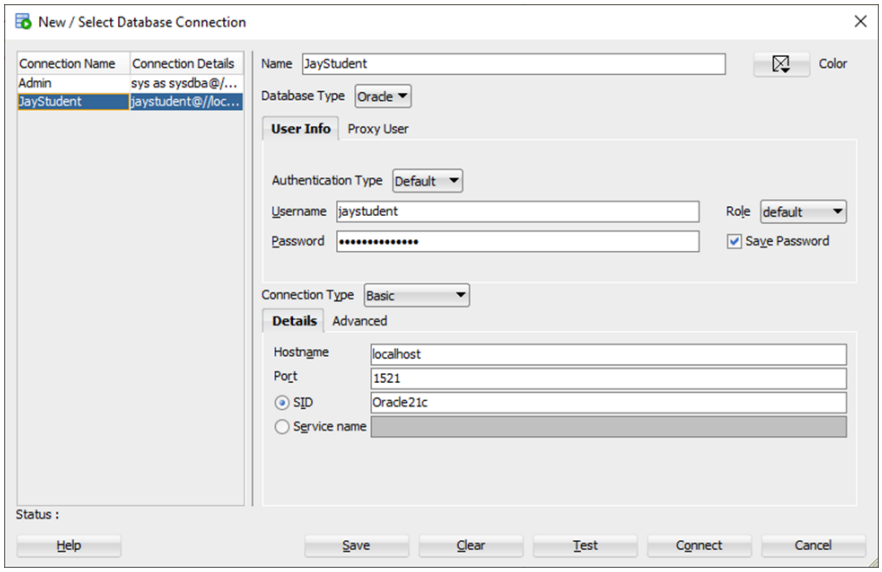


Figure 2: Creating a database connection.

## 1.4 Change Your Password

Click on your connection on the left-hand side of SQL Developer. This should open a blank script in the center of SQL Developer. Type in the following commands. Note the semicolon at the end and do not use the brackets in the password. Do not use quotes for the username or password. Oracle passwords cannot include quotation marks or "@".

ALTER SESSION SET "_ORACLE_SCRIPT"=true;

ALTER USER [your username] IDENTIFIED BY [your new password];

Click the green arrow directly above the script window to run the command. If your command properly runs, you should get a message in the script output: "User [your username] altered."

**Submit.** Include a screenshot (like Figure 3) in your main PDF that shows your connection name and that your change password command properly ran. Note: you can obfuscate or erase your new password in the script if you would like. Your screenshot must use the "Print Screen" command. **DO NOT** submit a picture of your computer using your phone.

**Remember your password.** There is no "forgot password" option. If you forget your password you will have to contact me, and I must manually reset it, which will be a low priority for me. If you will have trouble remembering your password, don't obfuscate it in your screenshot.

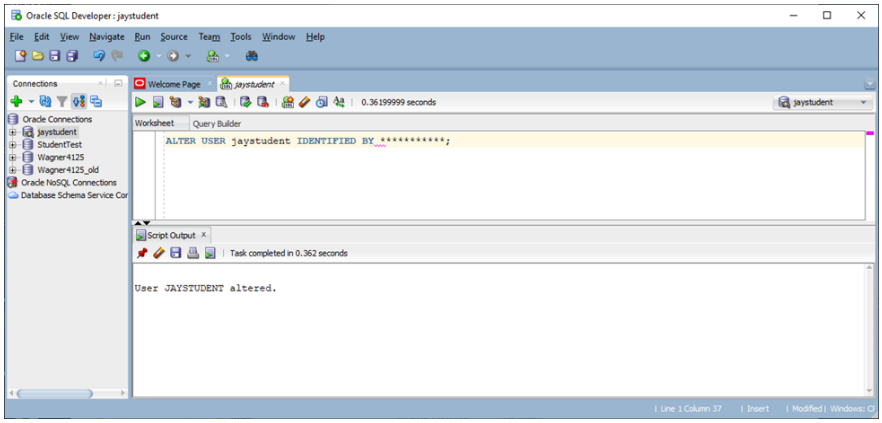


Figure 3: Changing your password.

## 2 Java Review & Setup

We will use Java throughout the course project. Your task for right now is to write a Java program that does a simple evaluation for the data types of values in a file. Your Java program will eventually be able to automatically generate SQL insert statements for all the data we will use rather than you having to repetitively write many SQL insert statements. This will make your life a lot easier!

This task is meant to serve as a Java review. Therefore, if you find this to be significantly challenging and it takes you more than a few hours, you are not prepared for this course and should retake CSCI 1583.

1. Read in the attached text (or csv) file, phase1_spring2025.txt, line-by-line.
2. For each line, do the following:
   (a) Use the split() method (Ex. String[] values = line.split(","); ) to store the (string) values in an array. Then, use a for-loop to iterate over them. Using split() is required.
   (b) For each value in the array, determine if the value is an integer, float, or string.
   - Hint: Integer.parseInt(value) is one way you can determine if a value can be converted to an integer. Also use try catch.
   - Hint: Float.parseFloat(value) is one way you can determine if a value can be converted to a float. Also use try catch.
   - Hint: If the value is not an integer or a float, assume it is a string.
   - Hint: Some values may contain unwanted whitespace, which will interfere with your parsing. Leading and trailing whitespace can be removed with the trim().
3. Store the datatypes in an ArrayList. After you have collected all of the datatypes for a single line use the join() method (Ex. String.join(",", myStrings)) to join all the strings in the ArrayList using a comma. Write your results for the datatypes to a text (or csv) file.

For example, if my input is the following:

- Hello, 99.99, World
- Hello, World, 100, 2

My output file will look like:

- String, Float, String
- String, String, Integer, Integer

**Requirements:**

- Your code must compile and run without any errors.
- This program must work for an input file containing records with any number of values and lines. Don't hardcode line numbers or field (or column) positions.
- The output file must have the same number of lines as the input file. Do not write each individual datatype to a line.
- Your program cannot be longer than 80 lines. It should be 50 lines so if it is significantly longer, your code is inefficient and probably difficult to read/understand.

Below is some pseudocode to give you a better idea of what this program should look like. I would also recommend using methods for the for-loop code.

Declare a variable (e.g., of type FileWriter) to write results to a file
Declare a variable (e.g., of type Scanner) to read the txt/csv file
For each line in the input file:

Initialize an output list
Split line on commas (i.e., line.split(",")) to get an array of values
For each value:
    Remove whitespace.
    If it is an integer, add "Integer" to the output list
    If it is a float, add "Float" to the output list
    Else, assume it's a string. Add "String" to the output list
Generate an output string using String.join() and your output list
Write the output string to the output file.

**Submit.** Submit both your Java source file and your output file (.csv or .txt).

# 3 E-R Modeling

We are building an online retail store. For this company to work, we must design and build a database to manage our data. Below is the verbal description of the data to be modeled. Your task is to draw an E-R diagram containing the entities discussed below, their attributes and keys (underlined), and the relationships (including cardinality and participation) among them. You can use software (e.g., PowerPoint or Visio) or draw a legible, free-hand diagram. Include your E-R diagram in your main PDF file.

Our database keeps track of customers and the orders they make. For each customer, we store a unique customer ID, name, and date of birth. We also allow customers to store multiple shipping addresses. We only allow New Orleanians to be customers so an address is just the street address; we don't store city, state or zip.

Once a customer registers their account, they can place as many orders as they want. However, an order is only made by one customer, no split orders. For each order, we store a unique confirmation number, the order date, the cost of products in the order, the shipping cost, and the total order cost. The cost of the products is computed from the sum of all the items and their quantities. The shipping cost is determined based on the cost of the products. If the order is at least $35, we offer free shipping. Otherwise, we charge a standard $10 for shipping. The total cost is the sum of the product costs and the shipping cost.

Orders may include many products and a product may be part of many orders. For each product, we store a unique ID, name, price, and the inventory. When a product is included in an order, we also record the quantity of the product included in the order; this quantity also needs to be subtracted from the inventory.

We also store anonymous reviews for products. For each review, we store a number, which is only unique for each product, a rating (1 to 5), and the review text, which is limited to 255 characters.

We also track customers who refer other customers and who referred a customer (if anybody). We mail gift cards to customers who refer other customers. A current customer can refer as many people as they want, but only one person can refer another customer.

# 4 E-R Mapping

Your task is to generate a complete relational schema using your E-R diagram. You may submit a drawing using your favorite software (e.g., PowerPoint) or clearly handwritten. Remember that all primary keys are to be underlined with a solid line, all foreign keys use a dotted underline (or clearly stated), and foreign keys must point to the primary key they reference. Include your relational schema diagram in your main PDF file.