CPS510
Section: 01 Group: 02

Lab Assignment 9 - Project Instructions

Library Database Management System (DBMS)

Github Repository Link: https://github.com/WafeeRahman/LibraryDBMS/tree/main

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Setting up the CLI Version

The CLI version of the Library DBMS runs directly on TMU's moons servers using Python and Oracle SQLPlus. The steps below describe how to set up the CLI environment:

1. Connect to the moons server
   SSH into moons using your TMU CS credentials:
   ssh <username>@moon.scs.ryerson.ca

   Create or enter a working directory:
   mkdir -p ~/LibraryDBMS
   cd ~/LibraryDBMS

2. Create the db.env file
   Inside the LibraryDBMS directory, create a file called db.env:
   nano db.env

   Insert the following line, replacing <username> and <password> with your Oracle DB login:

   export
   DB_CONN='<username>/<password>@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=oracle.scs.ryerson.ca)(PORT=1521))(CONNECT_DATA=(SID=orcl)))'

   Load the environment variable:
   source db.env
   echo $DB_CONN

   Seeing the connection string printed confirms that it loaded correctly.

3. Upload the CLI Script (a9cli.py) to moons

   Use scp on your machine to transfer the CLI script to moons (using separate terminal):
   scp "~<your-path-to-a9cli.py>" <username>@moon.scs.ryerson.ca:~/LibraryDBMS/

Verify the upload:
cd ~/LibraryDBMS
ls

You should see both a9cli.py and db.env.

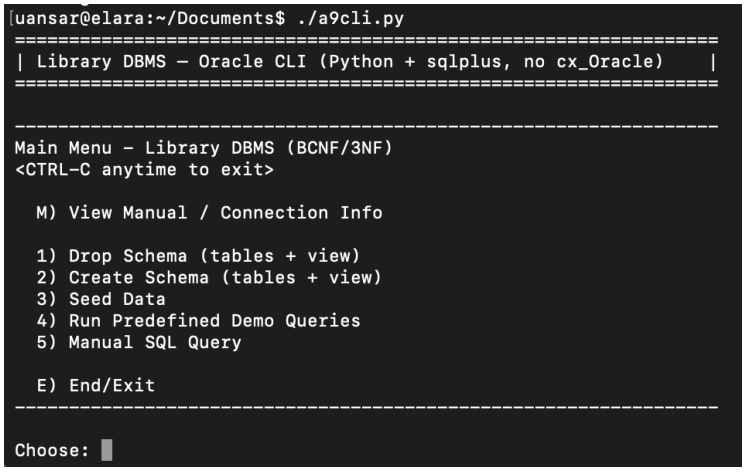
4. Make the CLI Executable
   Run:
   chmod u+rwx a9cli.py

5. Run CLI Script

   Test your database connectivity:
   sqlplus64 "$DB_CONN"
   A successful login confirms that the CLI will be able to run queries.
   CLI Setup Complete

   Run the CLI menu:
   ./a9cli.py

How to Use CLI Version



Once you run ./a9cli.py on the terminal, the CLI menu will appear.

To use the menu, type the number or letter that corresponds to the option and press Enter. For example, enter M to view the manual, 2 to create the schema, or 3 to seed the database. Option 5 allows you to type any SQL query manually. Press E at any time to exit the program.

Setting up the GUI Version

The GUI version of the Library DBMS runs locally on a personal machine using Python, Oracle Instant Client, and Oracle XE. The following steps describe how to set up the environment required to run the GUI application:

1. Install Oracle Instant Client
   Download the Oracle Instant Client ZIP file from the Oracle website, extract it to a location on your machine, and note the absolute path to the extracted folder. This path will be used later by the GUI script.

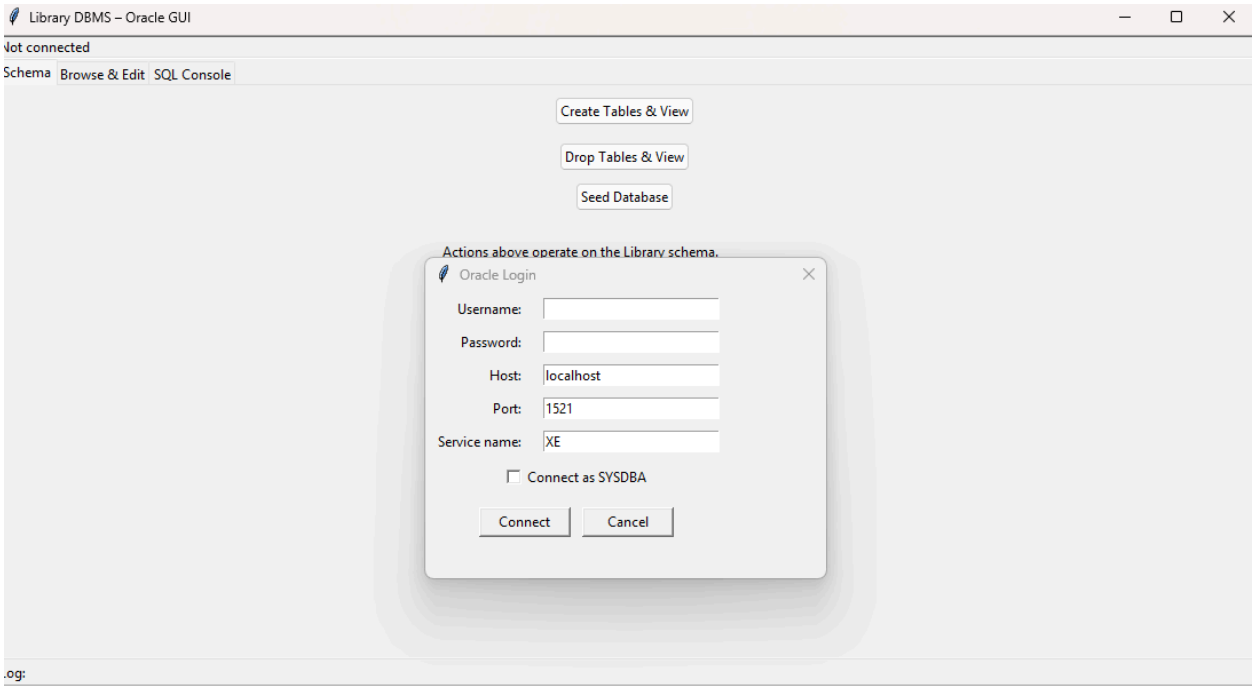
2. Install Oracle XE 21c
   Download and install Oracle Database Express Edition (XE) 21c. This provides a local Oracle server that the GUI will connect to. Complete the installation and ensure the service is running.

3. Install Required Python Packages
   The GUI application requires the cx_Oracle and customtkinter packages. Install them using:
   pip install cx_Oracle
   pip install customtkinter
   On Windows systems, ensure that Microsoft Visual C++ Build Tools are installed. Otherwise, cx_Oracle may not install correctly.

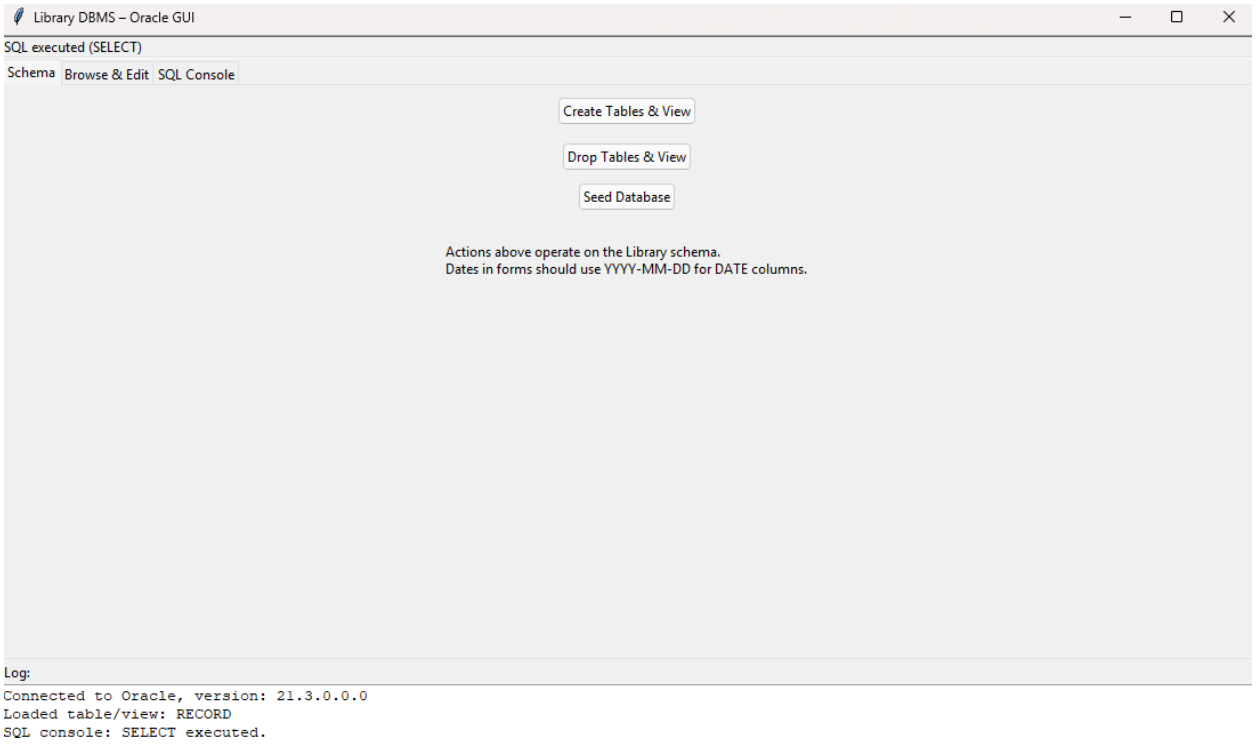
4. Configure the GUI Script
   Open the a9gui.py file and locate the Oracle client initialization section:
   cx_Oracle.init_oracle_client(lib_dir=r"...")
   Replace the "..." with the absolute path to the Instant Client directory extracted in Step 1. This ensures that the GUI can load the Oracle client libraries correctly.

5. Running the GUI
   Navigate to the directory containing a9gui.py and run the application using:
   python a9gui.py
   A login window will appear. Enter your Oracle XE username, password, host (usually "localhost"), port (1521), and service name (XE or XEPDB1). Upon success, the main interface will open.

How to Use GUI Version

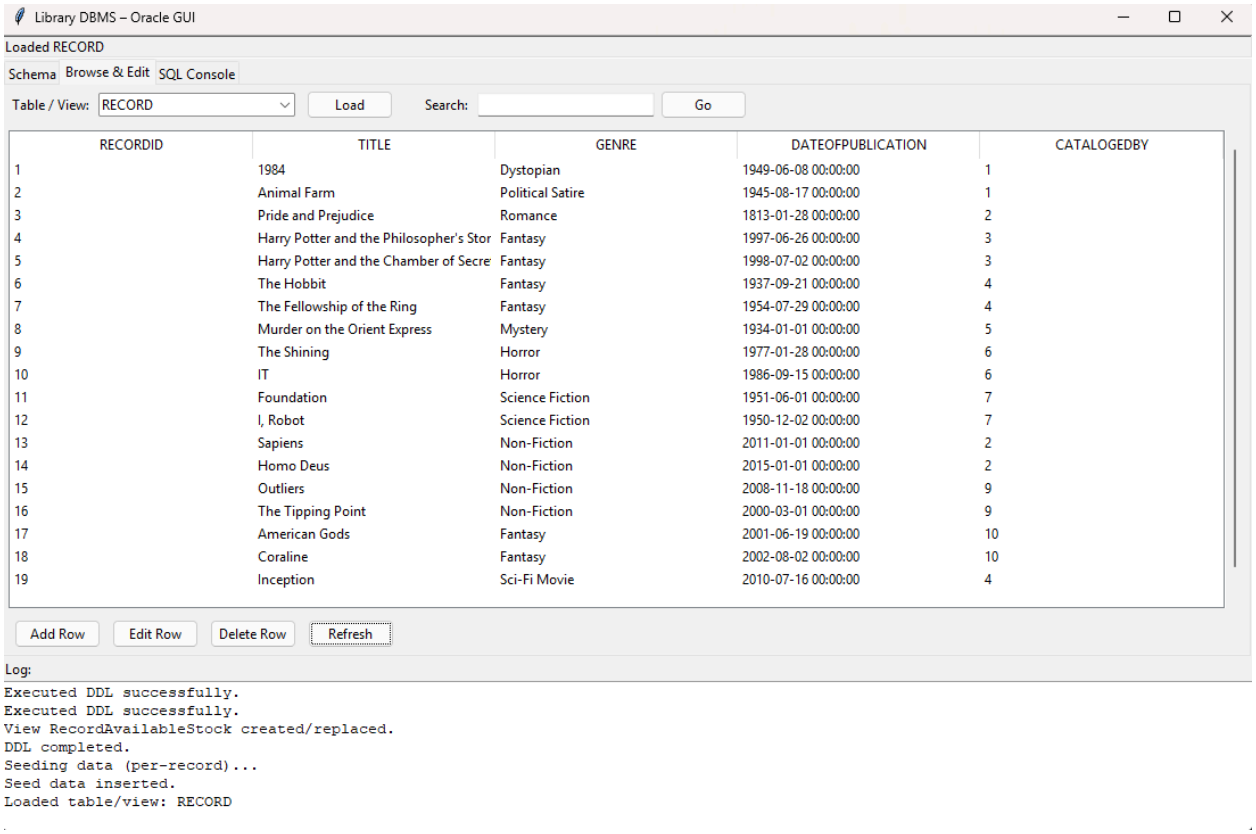


Upon running the a9gui.py script, you will be met with the following login screen. You will be asked to login with credentials that matched the credentials setup when running the setup script for Oracle XE 21c. Once logged in with the correct credentials, you will be connected to the database.

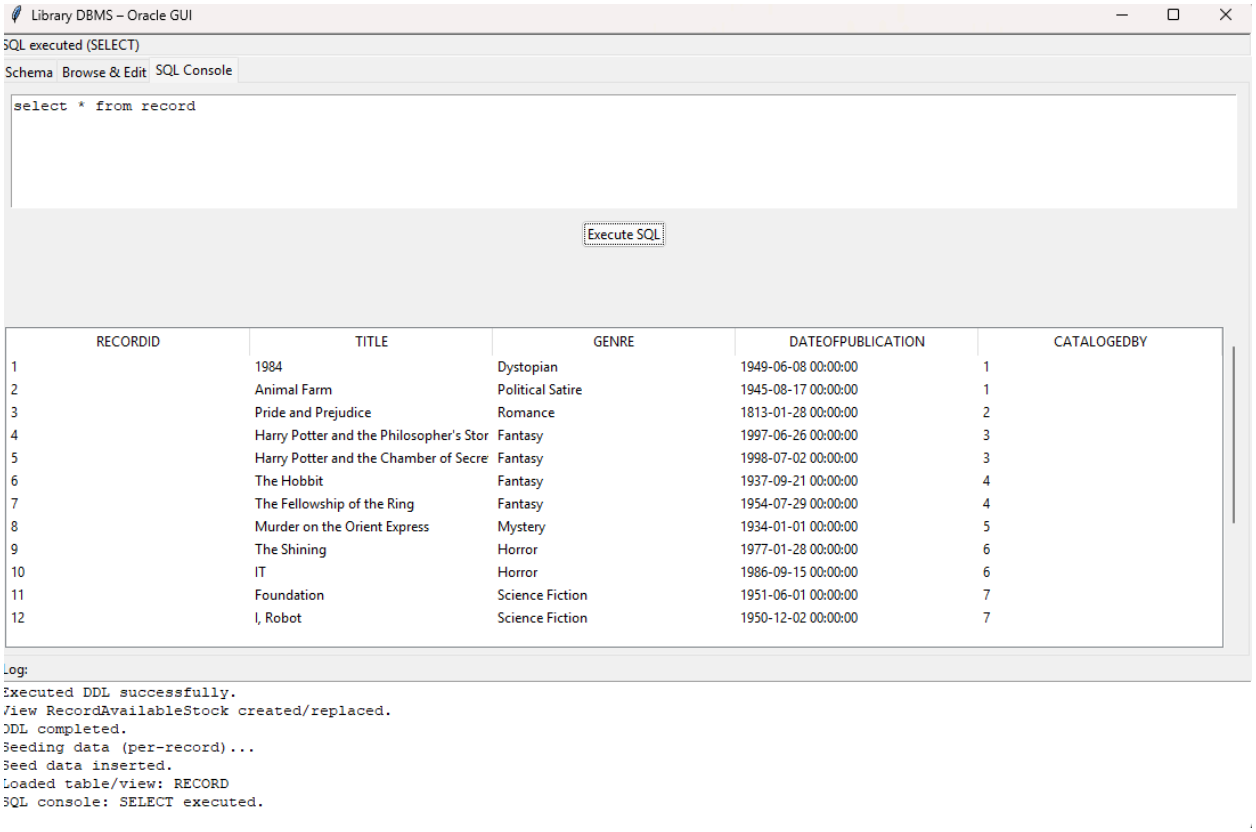


After logging into the database, you have access to three tabs, the schema tab, the browse & edit tab, and SQL console tab. You will also be able to see operation feedback in real time based on the console on the bottom of the application.

The **Schema** tab allows you to create the tables and views based on our main.sql file provided in the a9.zip (normalized database schema), note that this may fail if the tables have already been created before. You are also able to drop tables and associated records as well in the schema tab



The **Browse & Edit** tab allows you to browse through each table in the database and create, read, update and delete rows. Note that when editing dates, you need to remove the trailing 00:00:00 in the edit menu to avoid a date SQL error. Edits will only go through if you are in the SYS or DBA group when logging in. Read only views cannot be edited.



The **SQL Console** tab allows you to directly execute SQL statements on the database. The log in the bottom of the application will describe how each command is being executed. Results for each query are displayed.