**CPE106L (Software Design Laboratory)**
**Expt 4: Data Modeling and Database Systems**

**Content:**

1. **Cover Page**

2. **PreLab**

A. **Readings, Insights, and Reflection**
   **METIS ebooks**:
   - A Guide to SQL.  Philip J. Pratt; et al. 9781337668880
     Chapter 1:
       1) What is a Database
       2) Database Requirements of TAL Distributors, Colonial Adventure Tours, and Solmaris Condominium Group
     Chapter 2:
       1) Database Concepts
       2) Database Design Fundamentals
       3) Normalization

   - Core Python Programming. R. Nageswara Rao. 9789351198918
      Chapter 24:
       1) Types of Databases Used with Python
       2) Using MySQL from Python

   - Python Projects. Laura Cassell.  9781118908891 Chapter 3
     Chapter 3:
       1) Relational Database Concepts
       2) Structured Query Language. DML and DDL SQL commands

   **Website(s)**:
   - https://www.sqlite.org/index.html
   - https://www.sqlitetutorial.net/sqlite-sample-database/

B. **Answer to Questions**
   - Short Answer
     1. What are DML and DDL statements in Structured Query Language? Give examples of each.
     2. What are the categories of SQLite Functions? Give 3 examples of each category
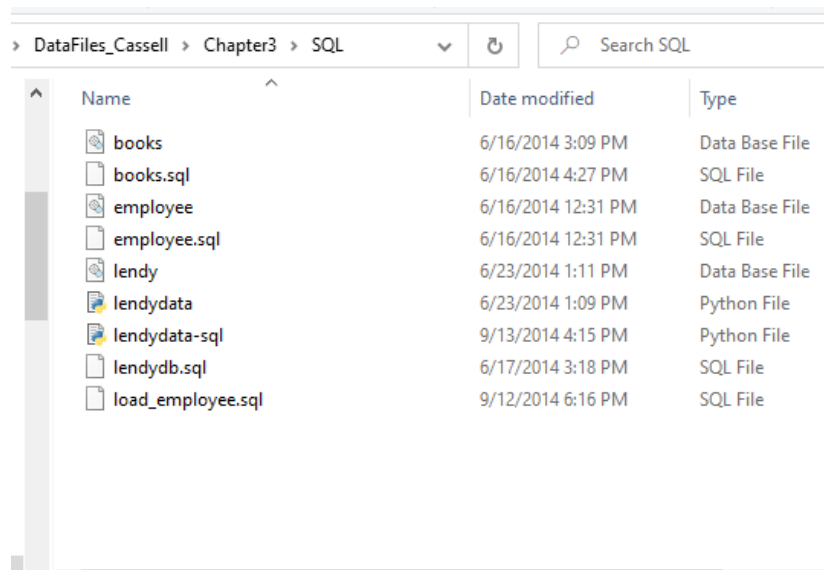     3. How do you check if you have SQLite installed in system using the Linux terminal?

3. **InLab**
   Note: Leaders should assign task to members

   **A.** Objectives (You can state your own objectives based on the readings in Prelab)
   **B.** Steps Performed with screenshots of tools used:
   - Visual Studio Code, PyCharm, Atom or Spyder
   - Git,
   - SQLite running in Linux terminal
   - DB Browser

**C.** Python SQLite Database Connection sample run with **DISCUSSIONS.** Download the chinook sample database from the website mentioned in PreLab section. Using the chinook database, run the SQLite SELECT commands in the Linux terminal and on the DB browser. Do the same using the source codes and SQL files of Cassel (Blackboard Course Materials). See below screengrabs.



> DataFiles_Cassell > Chapter3 > SQL

| Name | Date modified | Type |
|---|---|---|
| books | 6/16/2014 3:09 PM | Data Base File |
| books.sql | 6/16/2014 4:27 PM | SQL File |
| employee | 6/16/2014 12:31 PM | Data Base File |
| employee.sql | 6/16/2014 12:31 PM | SQL File |
| lendy | 6/23/2014 1:11 PM | Data Base File |
| lendydata | 6/23/2014 1:09 PM | Python File |
| lendydata-sql | 9/13/2014 4:15 PM | Python File |
| lendydb.sql | 6/17/2014 3:18 PM | SQL File |
| load_employee.sql | 9/12/2014 6:16 PM | SQL File |

**IMPORTANT**: Include figure numbers and labels. Edit your screengrabs

4. **PostLab**
   Note: Leaders should assign the problems to members

   **A. Machine Problems**

   1. Colonial Adventure Tours is considering offering outdoor adventure classes to prepare people to participate in hiking, biking, and paddling adventures. Only one class is taught on any given day. Participants can enroll in one or more classes. Classes are taught by the guides that Colonial Adventure employs. Participants do not know who the instructor for a particular class will be until the day of the class. Colonial Adventure Tours needs your help with the database design for this new venture. In each step, represent your answer using the shorthand representation and a diagram. Use crow's foot notation for the diagram. Follow the sample SQLite chinook database ERD (Download it from Blackboard Course Materials)
      a) For each participant, list his or her number, last name, first name, address, city, state, postal code, telephone number, and date of birth.
      b) For each adventure class, list the class number, class description, maximum number of people in the class, and class fee.
      c) For each participant, list his or her number, last name, first name, and the class number, class description, and date of the class for each class in which the participant is enrolled.
      d) For each class, list the class date, class number, and class description; and the number, last name, and first name of each participant in the class.

   2. Solmaris Condominium Group has many condos that are available as weekly vacation rentals. Design a database to meet the following requirements:

a) For each renter, list his or her number, first name, middle initial, last name, address, city, state, postal code, telephone number, and email address.
b) For each property, list the condo location number, condo location name, address, city, state, postal code, condo unit number, square footage, number of bedrooms, number of bathrooms, maximum number of persons that can sleep in the unit, and the base weekly rate.
c) For each rental agreement, list the renter number, first name, middle initial, last name, address, city, state, postal code, telephone number, start date of the rental, end date of the rental, and the weekly rental amount. The rental period is one or more weeks.

3. Use SQLite commands to complete the following exercises.

   a) Create a table named ADVENTURE_TRIP. The table has the same structure as the TRIP table shown in Figure 3-2 below except the TRIP_NAME column should use the VARCHAR data type and the DISTANCE and MAX_GRP_SIZE columns should use the NUMBER data type. Execute the command to describe the layout and characteristics of the ADVENTURE_TRIP table.

Figure 3-1. Colonial Adventure Tours TRIP Table

TRIP

| Column | Type | Length | Decimal places | Nulls allowed? | Description |
|---|---|---|---|---|---|
| TRIP_ID | DECIMAL | 3 | 0 | No | Trip ID (primary key) |
| TRIP_NAME | CHAR | 75 | | | Trip name |
| START_LOCATION | CHAR | 50 | | | Start location for trip |
| STATE | CHAR | 2 | | | Trip state |
| DISTANCE | DECIMAL | 4 | 0 | | Distance (length) of trip |
| MAX_GRP_SIZE | DECIMAL | 4 | 0 | | Maximum number of persons |
| TYPE | CHAR | 20 | | | Trip type |
| SEASON | CHAR | 20 | | | Trip season |

   b) Add the following row to the ADVENTURE_TRIP table: trip ID: 45; trip name: Jay Peak; start location: Jay; state: VT; distance: 8; maximum group size: 8; type: Hiking and sea- son: Summer. Display the contents of the ADVENTURE_TRIP table.
   c) Delete the ADVENTURE_TRIP table.
   d) Open the script file (SQLServerColonial.sql) to create the six tables and add records to the tables. Revise the script file so that it can be run in the DB Browser.
   e) Confirm that you have created the tables correctly by describing each table and comparing the results to the figures shown below. Confirm that you have added all data correctly by viewing the data in each table and comparing the results to Figures 1-4 through 1-8 shown below.

## Figure 3-2. Colonial Adventure Tours Database GUIDE Table

GUIDE

| GUIDE_NUM | LAST_NAME | FIRST_NAME | ADDRESS | CITY | STATE | POSTAL_CODE | PHONE_NUM | HIRE_DATE |
|---|---|---|---|---|---|---|---|---|
| AM01 | Abrams | Miles | 54 Quest Ave. | Williamsburg | MA | 01096 | 617-555-6032 | 6/3/2012 |
| BR01 | Boyers | Rita | 140 Oakton Rd. | Jaffrey | NH | 03452 | 603-555-2134 | 3/4/2012 |
| DH01 | Devon | Harley | 25 Old Ranch Rd. | Sunderland | MA | 01375 | 781-555-7767 | 1/8/2012 |
| GZ01 | Gregory | Zach | 7 Moose Head Rd. | Dummer | NH | 03588 | 603-555-8765 | 11/4/2012 |
| KS01 | Kiley | Susan | 943 Oakton Rd. | Jaffrey | NH | 03452 | 603-555-1230 | 4/8/2013 |
| KS02 | Kelly | Sam | 9 Congaree Ave. | Franconia | NH | 03580 | 603-555-0003 | 6/10/2013 |
| MR01 | Marston | Ray | 24 Shenandoah Rd. | Springfield | MA | 01101 | 781-555-2323 | 9/14/2015 |
| RH01 | Rowan | Hal | 12 Heather Rd. | Mount Desert | ME | 04660 | 207-555-9009 | 6/2/2014 |
| SL01 | Stevens | Lori | 15 Riverton Rd. | Coventry | VT | 05825 | 802-555-3339 | 9/5/2014 |
| UG01 | Unser | Glory | 342 Pineview St. | Danbury | CT | 06810 | 203-555-8534 | 2/2/2015 |

## Figure 3-2. Colonial Adventure Tours Database TRIP Table (1)

TRIP

| TRIP_ID | TRIP_NAME | START_LOCATION | STATE | DISTANCE | MAX_GRP_SIZE | TYPE | SEASON |
|---|---|---|---|---|---|---|---|
| 1 | Arethusa Falls | Harts Location | NH | 5 | 10 | Hiking | Summer |
| 2 | Mt Ascutney - North Peak | Weathersfield | VT | 5 | 6 | Hiking | Late Spring |
| 3 | Mt Ascutney - West Peak | Weathersfield | VT | 6 | 10 | Hiking | Early Fall |
| 4 | Bradbury Mountain Ride | Lewiston-Auburn | ME | 25 | 8 | Biking | Early Fall |
| 5 | Baldpate Mountain | North Newry | ME | 6 | 10 | Hiking | Late Spring |
| 6 | Blueberry Mountain | Batchelders Grant | ME | 8 | 8 | Hiking | Early Fall |
| 7 | Bloomfield - Maidstone | Bloomfield | CT | 10 | 6 | Paddling | Late Spring |
| 8 | Black Pond | Lincoln | NH | 8 | 12 | Hiking | Summer |
| 9 | Big Rock Cave | Tamworth | NH | 6 | 10 | Hiking | Summer |
| 10 | Mt. Cardigan - Firescrew | Orange | NH | 7 | 8 | Hiking | Summer |
| 11 | Chocorua Lake Tour | Tamworth | NH | 12 | 15 | Paddling | Summer |
| 12 | Cadillac Mountain Ride | Bar Harbor | ME | 8 | 16 | Biking | Early Fall |
| 13 | Cadillac Mountain | Bar Harbor | ME | 7 | 8 | Hiking | Late Spring |
| 14 | Cannon Mtn | Franconia | NH | 6 | 6 | Hiking | Early Fall |
| 15 | Crawford Path Presidentials Hike | Crawford Notch | NH | 16 | 4 | Hiking | Summer |
| 16 | Cherry Pond | Whitefield | NH | 6 | 16 | Hiking | Spring |
| 17 | Huguenot Head Hike | Bar Harbor | ME | 5 | 10 | Hiking | Early Fall |
| 18 | Low Bald Spot Hike | Pinkam Notch | NH | 8 | 6 | Hiking | Early Fall |
| 19 | Mason's Farm | North Stratford | CT | 12 | 7 | Paddling | Late Spring |
| 20 | Lake Mephremagog Tour | Newport | VT | 8 | 15 | Paddling | Late Spring |
| 21 | Long Pond | Rutland | MA | 8 | 12 | Hiking | Summer |

## Figure 3-2. Colonial Adventure Tours Database TRIP Table (2)

| 22 | Long Pond Tour | Greenville | ME | 12 | 10 | Paddling | Summer |
| 23 | Lower Pond Tour | Poland | ME | 8 | 15 | Paddling | Late Spring |
| 24 | Mt Adams | Randolph | NH | 9 | 6 | Hiking | Summer |
| 25 | Mount Battie Ride | Camden | ME | 20 | 8 | Biking | Early Fall |
| 26 | Mount Cardigan Hike | Cardigan | NH | 4 | 16 | Hiking | Late Fall |
| 27 | Mt. Chocorua | Albany | NH | 6 | 10 | Hiking | Spring |
| 28 | Mount Garfield Hike | Woodstock | NH | 5 | 10 | Hiking | Early Fall |
| 29 | Metacomet-Monadnock Trail Hike | Pelham | MA | 10 | 12 | Hiking | Late Spring |
| 30 | McLennan Reservation Hike | Tyringham | MA | 6 | 16 | Hiking | Summer |
| 31 | Missisquoi River - VT | Lowell | VT | 12 | 10 | Paddling | Summer |
| 32 | Northern Forest Canoe Trail | Stark | NH | 15 | 10 | Paddling | Summer |
| 33 | Park Loop Ride | Mount Desert Island | ME | 27 | 8 | Biking | Late Spring |
| 34 | Pontook Reservoir Tour | Dummer | NH | 15 | 14 | Paddling | Late Spring |
| 35 | Pisgah State Park Ride | Northborough | NH | 12 | 10 | Biking | Summer |
| 36 | Pondicherry Trail Ride | White Mountains | NH | 15 | 16 | Biking | Late Spring |
| 37 | Seal Beach Harbor | Bar Harbor | ME | 5 | 16 | Hiking | Early Spring |
| 38 | Sawyer River Ride | Mount Carrigain | NH | 10 | 18 | Biking | Early Fall |
| 39 | Welch and Dickey Mountains Hike | Thorton | NH | 5 | 10 | Hiking | Summer |
| 40 | Wachusett Mountain | Princeton | MA | 8 | 8 | Hiking | Early Spring |
| 41 | Westfield River Loop | Fort Fairfield | ME | 20 | 10 | Biking | Late Spring |

## Figure 3-2. Colonial Adventure Tours Database CUSTOMER Table

**CUSTOMER**

| CUSTOMER_NUM | LAST_NAME | FIRST_NAME | ADDRESS | CITY | STATE | POSTAL_CODE | PHONE |
|---|---|---|---|---|---|---|---|
| 101 | Northfold | Liam | 9 Old Mill Rd. | Londonderry | NH | 03053 | 603-555-7563 |
| 102 | Ocean | Arnold | 2332 South St. Apt 3 | Springfield | MA | 01101 | 413-555-3212 |
| 103 | Kasuma | Sujata | 132 Main St. #1 | East Hartford | CT | 06108 | 860-555-0703 |
| 104 | Goff | Ryan | 164A South Bend Rd. | Lowell | MA | 01854 | 781-555-8423 |
| 105 | McLean | Kyle | 345 Lower Ave. | Wolcott | NY | 14590 | 585-555-5321 |
| 106 | Morontoia | Joseph | 156 Scholar St. | Johnston | RI | 02919 | 401-555-4848 |
| 107 | Marchand | Quinn | 76 Cross Rd. | Bath | NH | 03740 | 603-555-0456 |
| 108 | Rulf | Uschi | 32 Sheep Stop St. | Edinboro | PA | 16412 | 814-555-5521 |
| 109 | Caron | Jean Luc | 10 Greenfield St. | Rome | ME | 04963 | 207-555-9643 |
| 110 | Bers | Martha | 65 Granite St. | York | NY | 14592 | 585-555-0111 |
| 112 | Jones | Laura | 373 Highland Ave. | Somerville | MA | 02143 | 857-555-6258 |
| 115 | Vaccari | Adam | 1282 Ocean Walk | Ocean City | NJ | 08226 | 609-555-5231 |
| 116 | Murakami | Iris | 7 Cherry Blossom St. | Weymouth | MA | 02188 | 617-555-6665 |
| 119 | Chau | Clement | 18 Ark Ledge Ln. | Londonderry | VT | 05148 | 802-555-3096 |
| 120 | Gernowski | Sadie | 24 Stump Rd. | Athens | ME | 04912 | 207-555-4507 |
| 121 | Bretton-Borak | Siam | 10 Old Main St. | Cambridge | VT | 05444 | 802-555-3443 |
| 122 | Hefferson | Orlauh | 132 South St. Apt 27 | Manchester | NH | 03101 | 603-555-3476 |
| 123 | Barnett | Larry | 25 Stag Rd. | Fairfield | CT | 06824 | 860-555-9876 |
| 124 | Busa | Karen | 12 Foster St. | South Windsor | CT | 06074 | 857-555-5532 |
| 125 | Peterson | Becca | 51 Fredrick St. | Albion | NY | 14411 | 585-555-0900 |
| 126 | Brown | Brianne | 154 Central St. | Vernon | CT | 06066 | 860-555-3234 |

## Figure 3-2. Colonial Adventure Tours Database RESERVATION Table (1)

## RESERVATION

| RESERVATION_ID | TRIP_ID | TRIP_DATE | NUM_PERSONS | TRIP_PRICE | OTHER_FEES | CUSTOMER_NUM |
|---|---|---|---|---|---|---|
| 1600001 | 40 | 3/26/2016 | 2 | $55.00 | $0.00 | 101 |
| 1600002 | 21 | 6/8/2016 | 2 | $95.00 | $0.00 | 101 |
| 1600003 | 28 | 9/12/2016 | 1 | $35.00 | $0.00 | 103 |
| 1600004 | 26 | 10/16/2016 | 4 | $45.00 | $15.00 | 104 |
| 1600005 | 39 | 6/25/2016 | 5 | $55.00 | $0.00 | 105 |
| 1600006 | 32 | 6/18/2016 | 1 | $80.00 | $20.00 | 106 |
| 1600007 | 22 | 7/9/2016 | 8 | $75.00 | $10.00 | 107 |
| 1600008 | 28 | 9/12/2016 | 2 | $35.00 | $0.00 | 108 |
| 1600009 | 38 | 9/11/2016 | 2 | $90.00 | $40.00 | 109 |
| 1600010 | 2 | 5/14/2016 | 3 | $25.00 | $0.00 | 102 |
| 1600011 | 3 | 9/15/2016 | 3 | $25.00 | $0.00 | 102 |
| 1600012 | 1 | 6/12/2016 | 4 | $15.00 | $0.00 | 115 |
| 1600013 | 8 | 7/9/2016 | 1 | $20.00 | $5.00 | 116 |

## TRIP_GUIDES

| TRIP_ID | GUIDE_NUM |
|---|---|
| 1 | GZ01 |
| 1 | RH01 |
| 2 | AM01 |
| 2 | SL01 |
| 3 | SL01 |
| 4 | BR01 |
| 4 | GZ01 |
| 5 | KS01 |
| 5 | UG01 |
| 6 | RH01 |
| 7 | SL01 |
| 8 | BR01 |
| 9 | BR01 |
| 10 | GZ01 |
| 11 | DH01 |
| 11 | KS01 |
| 11 | UG01 |
| 12 | BR01 |
| 13 | RH01 |
| 14 | KS02 |
| 15 | GZ01 |
| 16 | KS02 |
| 17 | RH01 |
| 18 | KS02 |

## TRIP_GUIDES (CONTINUED)

| TRIP_ID | GUIDE_NUM |
|---|---|
| 19 | DH01 |
| 20 | SL01 |
| 21 | AM01 |
| 22 | UG01 |
| 23 | DH01 |
| 23 | SL01 |
| 24 | BR01 |
| 25 | BR01 |
| 26 | GZ01 |
| 27 | GZ01 |
| 28 | BR01 |
| 29 | DH01 |
| 30 | AM01 |
| 31 | SL01 |
| 32 | KS01 |
| 33 | UG01 |
| 34 | KS01 |
| 35 | GZ01 |
| 36 | KS02 |
| 37 | RH01 |
| 38 | KS02 |
| 39 | BR01 |
| 40 | DH01 |
| 41 | BR01 |

    B.  **Debugging and Sample Run** of Python program connection to your created SQLite database (with edited screengrabs and discussion)
        **IMPORTANT**: Include figure numbers and labels. Edit your screengrabs

**Note:**

1. Save all files (Python and SQLite) in one folder. Upload the folder to your OneDrive and put a tiny/bitly url in your OneNote
   Name the folder: <Course and Section>_Group#_Exp#.
   Example: **CPE106L-B1_Group1_Expt2**
2. Commit all Python source codes, QtDesigner ui files, and data files to Github (individual Github account) Github Repository Name: Software Design Lab Exercises
   Put a tiny/bitly url of your Github repository