

CSIT115 Data Management and Security

Laboratory 1

Scope

This laboratory includes the following:

- tasks related to the simple applications of the software systems that will be used in this subject
- tasks related to conceptual modelling of the sample database domains

Important message

Please bring with you to a laboratory class USB memory stick or USB external drive needed to save an exported appliance (Ubuntu 19.10 operating system together with installation of MySQL 8.0.18 Community edition). Your external persistent memory must have at least 12 Gbytes of free space. In all laboratory and assignment specifications we refer to "USB memory stick or USB external drive" as to "USB drive".

More implementation related information can be found in "How to ... ?" Cookbook at:
<http://www.uow.edu.au/~jrg/115/COOKBOOK>.

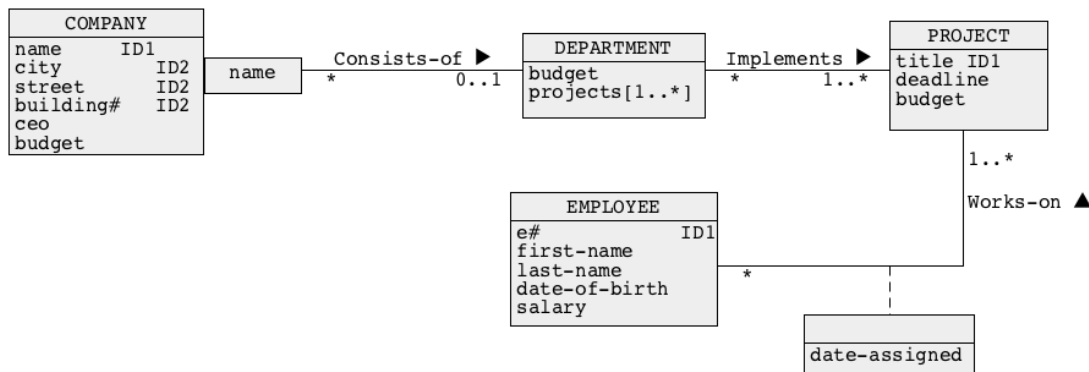
Specification of each task starts from a new page.

It is recommended to solve the problems before attending an enrolled laboratory class in order to efficiently use supervised laboratory time.

Task 1

Perform the following steps.

- (1) Start and connect to your Windows 10 system (if it is not started yet and you are not connected). UMLetlet is a simplified tool for drawing UML class diagrams. To start UMLetlet navigate to a drive Local Disk (C:) and later on to a folder UMLetlet-14.2.
- (2) Start UMLet application (an icon consists of a red circle crossed with a horizontal dark blue bar).
- (3) Use UMLet application to draw the following diagram.



It is explained in the Cookbook, Recipe 2.1, "How to create very simple conceptual schemas with UMLetlet?"

- (4) Add one more attribute to a class DEPARTMENT and one more attribute to a class PROJECT. The names of attributes are up to you. Make one of the attributes optional.
- (5) Use an option File->Save to save your diagram in a file solution1.uxf. Do not delete a file solution1.uxf.
- (6) Use an option File->Export as... to export your diagram into a file solution1.bmp in BMP format. Do not delete an exported file. You will submit it as one of the deliverables from your laboratory work.

Task 2

Perform the following steps.

- (1) Start and connect to your Windows 10 system (if it is not started yet and you are not connected) and then start Oracle VM VirtualBox. A shortcut to VirtualBox is available on a desktop. **It is explained in the Cookbook, Recipe 1.1, Step 1 "How to start VirtualBox ?" how to start VirtualBox.**
- (2) Import an appliance `ubuntu19.10-64bits-mysql8.0.18-27-dec-2019.ova` located on the lab machine. **It is explained in the Cookbook, Recipe 1.1 Step 2 "How to import an appliance to VirtualBox ?" how to import an appliance.**
- (3) Connect your USB drive to VirtualBox. **It is explained in the Cookbook, Recipe 1.1 Step 3 "How to connect USB drive to VirtualBox ?" how to connect USB drive to VirtualBox.**
- (4) Export a virtual machine to your USB drive. **It is explained in the Cookbook, Recipe 1.1 Step 5 "How to export an appliance from VirtualBox ?" how to export a virtual machine.** Note, that exporting a virtual machine takes some time, usually more than 5 minutes.
- (5) When your virtual machine is exported, navigate to a folder on your USB drive where the exported files have been saved.

To take an image of a screen, simultaneously press "Shift" and "Print Scrn" buttons.

Next, start Paint program to save the image in a file. A path to start Paint program is: "Start button->Accessories->Paint". When started, simultaneously press the keys CTRL V to load the image into Paint. To save the image in a file `solution2.png` use "Save" button (small disk icon in the topmost menu). When saved you can quit Paint and move to the next task.

Make sure that the saved screen image contains the names of files created by VirtualBox after an appliance has been exported in the previous step. Do not delete a file `solution2.png`.

Task 3

Before implementation of this task it is strongly recommended to read from the Cookbook all steps of Recipe 3.1 "How to use mysql a command based interface to MySQL database server ?".

Perform the following steps.

If an appliance `ubuntu19.10-64bits-mysql8.0.18-27-dec-2019.ova` is already imported then skip step (1) and (2) and start from a step (3).

- (1) Otherwise, start and login to your Windows 10 system (if it is not started yet and you are not connected). Next, start Oracle VM VirtualBox. **A shortcut to VirtualBox is available on a desktop. Cookbook, Recipe 1.1, Step 1 "How to start VirtualBox ?" how to start VirtualBox.**
- (2) Import an appliance `ubuntu19.10-64bits-mysql8.0.18-27-dec-2019.ova` located on a drive `VMs(F:)` in a folder `Virtual Machines\CSIT115`. **It is explained in Cookbook, Recipe 1.1 Step 2 "How to import an appliance to VirtualBox ?" how to import an appliance.**
- (3) Power on a virtual machine `ubuntu19.10-64bits-mysql8.0.18-27-dec-2019.ova`. **It is explained Cookbook, Recipe 1.1 Step 4 "How to power on a virtual machine ?" how to power on a virtual machine.**
- (4) When prompted by Ubuntu 19.10 operating system to type in a password to login as `CSIT115` user enter `csit115` and press Enter key. Then, wait until operating system displays a column of icons on the left hand side of a screen.
- (5) Start Terminal program (a black rectangle icon with white frame in a column of icons). Next, in Terminal window type `gedit task3.sql` and press Enter key to open a text editor with a new file `task3.sql`.
- (6) Type into gedit window the following lines.

```
SELECT CURDATE() "Today is:"  
FROM DUAL;
```

and save a file `task3.sql`. **Note, that there is no blank between "CURDATE" and "()" !** Quit gedit editor.

- (7) Type at command prompt:

```
mysql -u csit115 -p -v
```

and press Enter key to start command based interface to MySQL database server.

(8) When started execute a command:

```
use csit115;
```

at mysql> prompt to select `csit115` database.

(9) Next, execute a command:

```
source task3.sql;
```

at mysql> prompt to submit a script `task3.sql` for processing by MySQL.

(10) When ready shrink a window with VirtualBox and save screen image in a file `solution3.png` in the same way as you did it in a Task 2.

Make sure that the results from processing of a script `task3.sql` are visible in an image. Do not delete a file `solution3.png`.

Task 4

Before implementation of this task it is strongly recommended to read from the Cookbook all steps of Recipe 3.2 "How to use "MySQL Workbench" graphical interface to MySQL database server?".

It is assumed that after implementation of Task 3 your appliance is up and running. If not, then start VirtualBox, import your appliance, and run it.

Perform the following steps.

- (1) To start MySQL Workbench graphical interface click at a blue icon with a silhouette of a white dolphin.
- (2) Next, click at a small "+" sign located after "MySQL Connections" string to create a new connection. Type into a field Connection Name your connection name (use a name different from `csit115`), into a field Username `csit115`, and into a field Default Schema `csit115`. Finally, click at OK button.
- (3) To open your new connection leftclick at a rectangle that represents a new connection in a front panel of MySQL Workbench. Next, type in a password: `csit115` of `csit115` database user and click at OK button.
- (4) Leftclick at the second icon of left with text SQL and a small image of a folder, i.e. Open SQL script file in a new query tab icon. Select a file `task3.sql` and click at Open button.
- (5) To submit a script for processing by MySQL database server leftclick at the first line of a script and later on leftclick at "yellow lightning" icon just above a workspace with the script. You should get the results of processing in a workspace below.
- (6) When ready shrink a window with VirtualBox and save screen image in a file `solution4.png` in the same way as you did it in a Task 2.

Make sure that the results from processing of a script `task3.sql` are visible in an image. Do not delete a file `solution4.png`.

Task 5

Read the following specification of a sample database domain.

A network of vehicle repair facilities has the locations distributed all over a country. A vehicle repair facility is located at a unique address and has a unique name.

A facility employs a number of mechanics and administration staff members. An employee is described by an employee number, which is unique at a facility, first name, last name, phone number and optional email address. A group of senior mechanics has their certification documents recorded. All mechanics are additionally described by a driver license number and type of a license owned.

Vehicles are repaired at the facilities. A facility repairs passenger cars, trucks, small delivery vans and buses. A repair process is described by a start date/time, end date/time, mechanics involved and the names of spare parts used. At the end of repair process a report that describes the repair process is created. A repair process consists of ordered steps and short description of actions performed at each step.

Your task is to create a conceptual schema of the sample database domain given above and to draw such schema in a notation of UML simplified classes of objects. To do so, perform analysis of the sample database domain in the following way. First, read through the specification listed above and find all classes of objects. Next, read through the specification again and find all attributes. Next, read through the specification again and find all associations, link attributes, and association classes. Next, read through the specification again and find identifiers and qualifications. Finally, read through the specification and find generalizations.

To create the fragments of conceptual schema obtained after each iteration and use a diagram drawing tool UMLetlet.

It is possible to include the fragments of text into a Word document and to insert into it the fragments and the final diagram as bmp file obtained from an option File->Export as ... option of UMLetlet. A structure of the file should include the specification of a sample database domain with the fragments of text with the UML simplified class diagrams representing a solution expanded step by step. When ready convert Word document into pdf format and save it as a file solution5.pdf.

Task 6

Read the following specification of a sample database domain.

A database should contain information about the sports cars and their owners.

The first name, last name, phone number, and address describe an owner of a car. An address consists of a suburb name, street name, building number, and optional flat number. A pair of attributes: first name and last name uniquely identifies an owner. A phone number can also be used to identify an owner.

An owner owns one or more sports cars. Each car has only one owner. The database should contain information about the present owner of a car and date when an owner purchased a car. A car is identified by a registration number.

We consider only two sorts of sports cars: spartan or luxurious. A spartan sports car is additionally described by an engine capacity.

It is not allowed to add any artificial identification attributes also known as "id" attributes to the specification given above.

Construct a conceptual schema for the specification of a database domain listed above. Use UMLetlet to create a drawing of a conceptual schema in a notation of UML simplified class diagrams. Use an option File->Export as... to export your diagram into a file `solution6.bmp` in BMP format. Do not delete an exported file.

In this task there is NO need to provide a detailed analysis of a conceptual schema like in the previous task. The final conceptual schema expressed in a notation of UML simplified class is completely sufficient.