School of Computing and Information Technology
University of Wollongong

Session: **Spring 2019**
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CSIT115/CSIT815 Data Management and Security
Assignment 1

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Scope

This assignment is related to conceptual modelling of the sample database domain, extension of a given conceptual schema and logical design.

Please read very carefully information listed below.

This assignment contributes to 6% of the total evaluation in a subject CSIT115 and it contributes to 6% of the total evaluation in a subject CSIT815.

The outcomes of the assignment work are due by **Saturday 31 August 2019, 7.00 pm (sharp).**

A submission procedure is explained at the end of specification.

This assignment consists of 3 tasks and specification of each task starts from a new page.

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

A submission marked by Moodle as `Late` is treated as a late submission no matter how many seconds it is late.

A policy regarding late submissions is included in the subject outline.

A submission of compressed files (zipped, gzipped, rared, tared, 7-zipped, lhzed, … etc) is not allowed. The compressed files will not be evaluated.

All files left on Moodle in a state "`Draft(not submitted)`" will not be evaluated.

An implementation that does not compile due to one or more syntactical errors scores no marks.

It is expected that all tasks included within **Assignment 1** will be solved **individually without any cooperation** with the other students. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or office hours. Plagiarism will result in a **FAIL** grade being recorded for the assessment task.

Tasks

Task 1 (2.5 marks)

Read and analyse the following specification of a sample database domain.

A transportation company would like to create a database to record some its operations.

The company owns and uses a number of busses to implement the transportation services between the cities.

The company employs administration staff members, drivers and mechanics. A common description of an employee consists of a unique employee number, first name last name and date of birth. Additionally, drivers are described by a unique driving licence number and category of a driving licence. Mechanics are also described by a list of qualifications acquired in the past together with a date when each qualification has been acquired.

The company supports a number of transportation services. A service starts at a city, passes through a number of intermediate stops and ends in another or the same city. An origin location, a sequence of intermediate stops, and a destination location of a service are described by unique addresses. An address consists of city name, street name and building number. Each intermediate stop has a unique number in a sequence of intermediate stops within a transportation service.

A transportation service is described by a planned departure time from an origin location, the planned arrival times and departure times at the intermediate stops and a planned arrival time a destination location. A city of departure, planned departure time, and a city of destination uniquely identify each transportation service.

The transportation company assigns the drivers and busses to the transportation services. Shorter transportation services have one bus and one driver assigned. Longer transportation services have a single bus and multiple drivers assigned. Each driver is assigned to a section of a longer transportation service, A section starts at a location and it includes a number of successive locations a transportation service passes through.

A description of a bus consists of a registration number, make, model fuel consumption and total number of seats available.

An objective if this task is to construct a conceptual schema for the specification of a database domain listed above.

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

Use UMLet tool to create a drawing of a conceptual schema in a notation of UML simplified class diagrams explained to you during the lecture classes in CSIT115. No other notation will be accepted !

Remember to use `CSIT115-815Palette` palette !

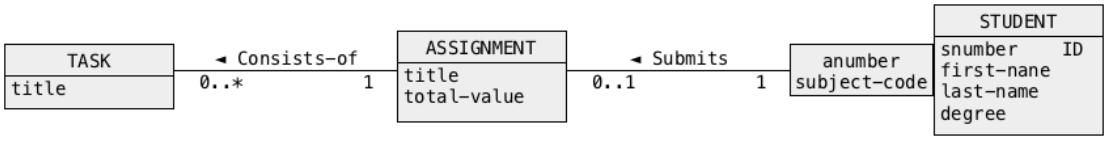
Use an option File->Export as… to export your diagram into a file `solution1.bmp` in `BMP` format. Do not delete an exported file. You will submit it as one of the deliverables from your laboratory work.

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

Deliverables

A file `solution1.bmp` with the final design of a conceptual schema. Submission of a file with a different name and/or different extension and/or different type scores no marks.

Task 2 (1.5 mark)
Consider the following conceptual schema. The schema represents a database domain where the students submit the assignments and assignments consist of tasks.



Your task is to extend the schema such after the extension it would be possible to store the following information in the database.

(1) *We would like to store in the database information about two different types of students: postgraduate students and undergraduate students. Postgraduate students are additionally described by a title of research project. Undergraduate students are described by an optional title of software project.*

(2) *We would like to store in the database information about the titles and topics of all software projects and the groups of students who participate in each project. Assume that a title uniquely identifies each project.*

(3) *We would like to add information about the total number of tasks included in each assignment and for each task we would like to store information about a name of file of each task and a sequence number of a task within an assignment. Do not forget about an identifier of a class* `TASK`.

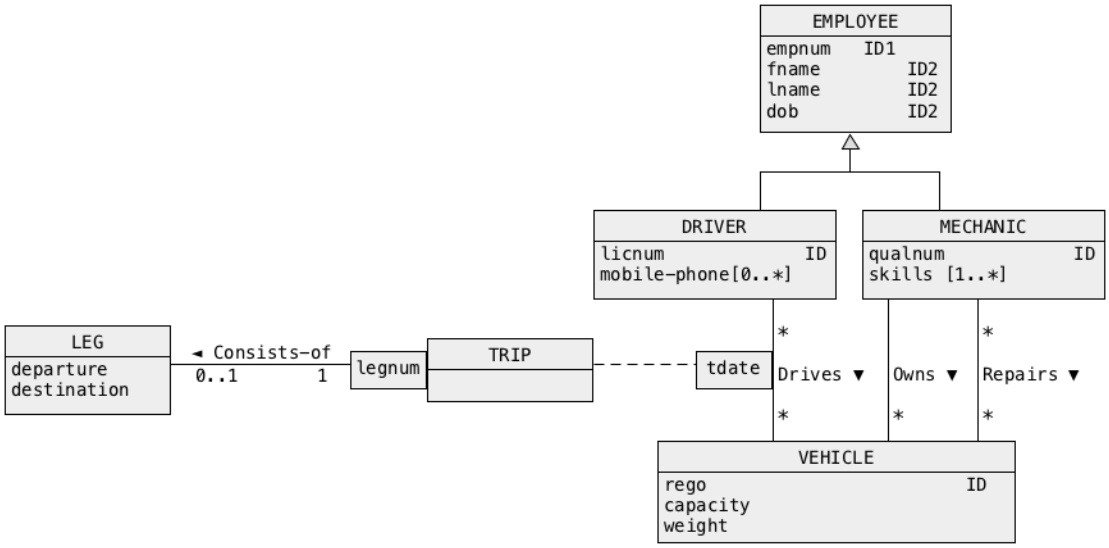
Use UMLet and `CSIT115-815Palette` palette to extend the conceptual schema. The original schema is provided in a file `task2.uxf`.

After all extensions save an extended conceptual schema in a file `solution2.uxf`.

Next, use an option File->Export as... to export your diagram into a file `solution2.bmp` in `BMP` format. Do not delete the exported file. You will submit it as one of the deliverables from your laboratory work

Deliverables
A file `solution2.bmp` with an extended conceptual schema. Submission of a file with a different name and/or different extension and/or different type scores no marks.

Task 3 (2 marks)
Consider a conceptual schema given below.



Assume that each driver has a different number of mobile phone or does not have a mobile phone at all. Also, assume that skills can be shared by mechanics.

Your task is to perform logical database design, i.e. to transform a conceptual schema given above into a collection of relational schemas.

For each relational schema created clearly list the names of attributes, primary key, candidate keys (if any), and foreign keys (if any). Assume, that the **subset method** must be used to implement a generalization (if any). A way how a conceptual schema can be transformed into a collection of relational schemas is explained in a presentation 06 Logical Design.

The relational schemas must be listed in a format presented in the slides 44 and 45 in a presentation 06 Logical Design. Listing of the relational schemas in the other format scores no marks.

Deliverables
A file `solution3.pdf` with a list of relational schemas, primary key for each relational schema, candidate keys (if any) for each relational schema, foreign keys (if any) for each relational schema. Submission of a file with a different name and/or different extension and/or different type scores no marks.

Submission

Note, that you have only one submission. So, make it absolutely sure that you submit the correct files with the correct contents and correct types. No other submission is possible !

Submit the files **solution1.bmp**, **solution2.bmp**, and **solution3.pdf** through Moodle in the following way:

(1) Access Moodle at **http://moodle.uowplatform.edu.au/**
(2) To login use a **Login** link located in the right upper corner the Web page or in the middle of the bottom of the Web page
(3) When logged select a site **CSIT115/CSIT815 (S219)Data Management and Security**
(4) Scroll down to a section **Submissions**
(5) Click at a link **In this place you can submit the outcomes of Assignment 1**
(6) Click at a button **Add Submission**
(7) Move a file **solution1.bmp** into an area **You can drag and drop files here to add them**. You can also use a link **Add**...
(8) Repeat step (7) for the files **solution2.bmp** and **solution3.pdf**.
(9) Click at a button **Save changes**
(10) Click at a button **Submit assignment**
(11) Click at the checkbox with a text attached: **By checking this box, I confirm that this submission is my own work,** ... in order to confirm the authorship of your submission
(12) Click at a button **Continue**

End of specification