School of Computing and Information Technology
University of Wollongong

Session: **Autumn 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 domains.

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 6 April 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 marks)

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

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

The company consists of a number of departments located in different places. A department is described by a department name unique in a given city, unique address, unique phone number, and unique fax number. An address consists of city name, street name, and building number.

The company employs different types of employees. The company employs programmers, software designers, and administration employees. Every employee has a unique employee number at a department he/she is assigned to. It means two or more employees assigned to different departments may have the same employee numbers.

One of the administration employees is nominated as a head of department (HOD) and a department does not have more than one HOD. It may happen that a department does not have a HOD.

An employee is described by a first name, last name, date of birth, employment date, and salary. Additionally, programmers are described the names of programming languages known and the names of professional certifications in each language. A programmer may have zero or more professional certifications in each language. A software designer is additionally described by the total number of years of experience as IT professional and by a promotion date to a position of designer.

The employees are assigned to the departments such that each employee is assigned to only one department and a department has one or more employees.

The departments design and implement software projects. A project is described aby a unique title, start date, planned completion date. It may happen that a project is delayed and in such a case it is additionally described by the extension dates. A project may have zero or more extension dates. A project can be implemented by one or more departments and a department usually has more than one project assigned.

The employees are assigned to the projects. Each employee works on only one project at a time. Of course, a project involves more than one employee. An employee is assigned to a project on a given date and then he/she obtains a list of tasks to be completed within a project. A task is described by a unique code, title and a text of specification. Each task has only one employee assigned.

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 !

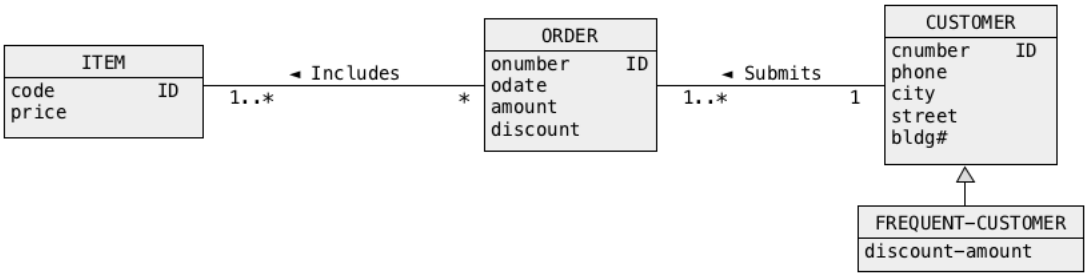
Remember to use `CSIT115-815Palette` palette !

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 (2 marks)
Consider the following conceptual schema. The schema represents a database domain where customers submit orders and orders include items.



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 items: books and DVDs. Books are described by a unique ISBN and a title. DVDs are described by a title and producer.*

(2) *We would like to store in the database information about the unique numbers of discount cards issued to frequent customers.*

(3) *We would like to store in the database information about the contents of the customers' baskets. A basket contains the items a customer is interested in and not ordered yet.*

(4) *We would like to store in the database information about the total number of items of each kind included in each order. For example, if an order includes 3 identical books and 2 identical DVDs then the database must contain information about 3 copies of the same book and 2 copies of the same DVD.*

(5) *We would like to store in the database information about the topics of books each customer is interested in. A customer can be interested in zero or more topics.*

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

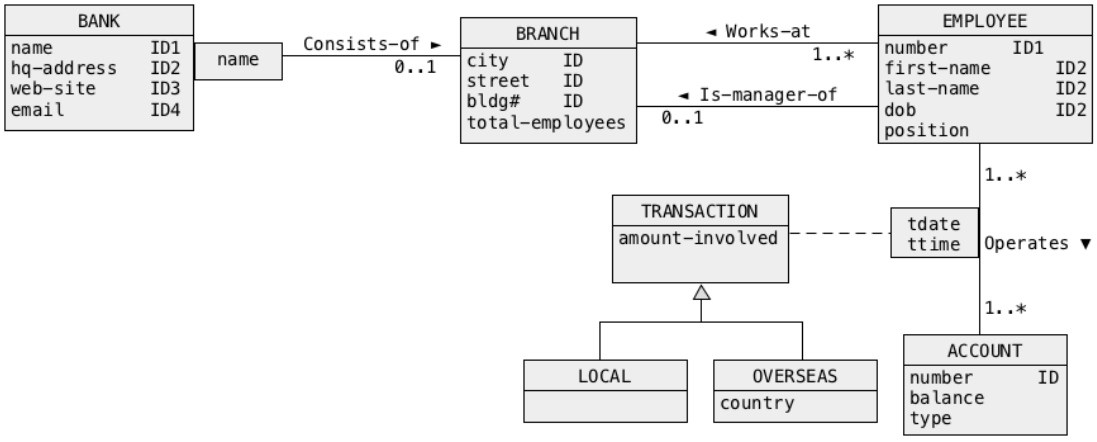
After all extensions save an extended conceptual schema in a file `solution2.uxf`.

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.



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 (S119)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`**

It is expected that all its tasks included within **Assignment 1** will be implemented **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 that assessment task.

End of specification