School of Computing and Information Technology
University of Wollongong

Session: **Autumn 2017**
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CSIT115/CSIT815 Data Management and Security
Assignment 1
27 February 2017

Scope

This assignment consists of the tasks related to conceptual modelling of the sample database domains.

The outcomes of the assignment are due by **Saturday, 25 March, 2017, 7.00 pm sharp.**

This assignment contributes to 6% (5% for CSIT815 students) of the total evaluation in the subject.

A submission procedure is explained at the end of assignment specification.

This assignment consists of 4 tasks and specification of each task starts from a new page.

Tasks

Task 1 (2 marks)

Read the following specification of a sample database domain.

A travel agency would like to create a travel management database that contains information about the airlines, flights, customers, and bookings performed by the customers.

An airline company is described by an airline name (such as Qantas, KLM, ... etc.), phone number, fax number, and link to Web site. Airline name, phone number, fax number and link to Web site are unique for all airline companies.

An airline company offers flights for its customers. A flight is described by a flight number, departure airport, destination airport, departure time, arrival time, flight type (daily or weekly). A flight number uniquely identifies each flight. There are many seats available for the customers on each flight. The seats are located in different classes (economy, business, and first class), and price is of course different in each class.

The customers book seats on the flights. A customer is described by a customer id, full name, date of birth, nationality, phone number, and home address. The customer id is unique and it is automatically created at the beginning of the first booking process.

A booking of a seat on a given flight and in a given class is described by a booking date and time, and departure date and time and credit card number used by the customer.

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 the analysis of database domain given above in the same way as it has been explained to you in a lecture presentation 04 Conceptual Modeling. Read through the specification listed above several times and in each pass extend your conceptual schema with the new components. Start from the discovery of classes of objects, followed by the discovery of associations and association classes, followed by the discovery of attributes and links attributes, and so on. For a summary of complete process see slide 4 in a presentation 04 Conceptual Modeling.

It is forbidden to add any additional attributes to the specification given above !

To create the fragments of conceptual schemas and the final conceptual schema (a diagram of UML simplified classes of objects) use a diagram drawing tool UMLetlet.

A structure of the final document that shows a design process and the final conceptual schema should be similar to a structure of examples in a presentation 04 Conceptual Modeling, i.e. it should be a specification of a sample database domain with the fragments of text in a red and blue font interleaved with the UML simplified class diagrams representing the expanded solution.

Use Word to create the final document and when ready save it as `pdf` file. It is possible to get the fragments of text of original text of specification of a sample database domain included in a file `task1.docx` zipped into a file `assignment1-all-files.zip`. The fragments of conceptual schema and the final conceptual schema can be created as `bmp` files through application of an option File->Export As … of UMLetlet. The diagrams should be pasted into the appropriate locations in the Word document.

When ready, save the final outcomes in a file `solution1.pdf`.

Deliverables
A file `solution1.pdf` with a complete description of a process of conceptual modelling and with the final design of a conceptual schema.

Your file must be in `pdf` format ! Submission of a file in the other format will be ignored and it will result with no marks scored for the task !

Task 2 (1.5 mark)
Read and analyse the following specification of a sample database domain.

A large bank would like to create a database to record some its operations.

The bank is divided into several branches and each branch is described by a unique branch number, unique branch name, and unique address.

The bank employs a number of tellers. Every teller has a unique employee number and he/she is described by full name, address, date of birth, status, and salary. The tellers are assigned to the branches such that each teller is assigned to only one branch and a branch has one or more tellers.

The bank employs a number of IT specialists. Every IT specialist is described by a unique employee number and he/she is described by full name, address, date of birth, list of skills, and salary.

Apart from the tellers, and IT specialists the bank employs other employees described by a unique employee number, full name, address, date of birth, and salary.

The bank opens accounts for the customers. To open an account a customer provides his/her personal data, i.e. first and last name, date of birth, address, and optional email. Each customer obtains from the bank a unique identification number.

A customer is allowed to own many bank accounts. Each bank account is owned by precisely one customer. An account is described by a number, which is unique at a branch, balance, and type. There are three types of accounts: either saving accounts, or checking accounts, or loan accounts. When account is opened the bank records information about date and time when it was opened and which teller was involved in the operation. Customers are allowed to open many accounts at many different branches.

The customers perform operations on the bank accounts. A type of operation (either deposit, or withdrawal), amount of money involved, and date and time when an operation has been performed is recorded for each operation.

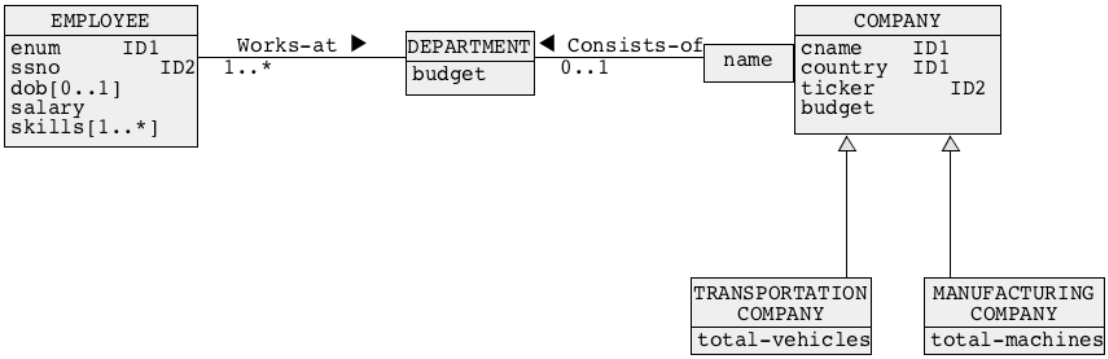
Construct a conceptual schema for the specification of a database domain listed above. Use UMLetlet to create a drawing of a conceptual schema in a notation of UML simplified class diagrams and to export the final diagram into a file `solution2.bmp`. The final conceptual schema can be created as `bmp` file through application of an option File->Export As … of UMLetlet and exporting a diagram in `bmp` format.

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.

Deliverables
A file `solution2.bmp` with the final design of a conceptual schema.

Your file must be in `bmp` format ! Submission of a file in the other format will be ignored and it will result with no marks scored for the task !

Task 3 (1 mark)
Analyse the following conceptual schema.

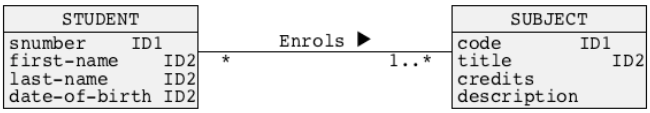


Write a natural language specification of a sample a database domain (like for example, the specifications written by your lecture in the tasks 1 and 2 and such that it contains all information included in a conceptual schema given above. Save your specification of a sample database domain in a file `solution3.pdf`.

Deliverables
A file `solution3.pdf` with a specification of a sample database domain related to a conceptual schema given above.

Your file must be in `pdf` format ! Submission of a file in the other format will be ignored and it will result with no marks scored for the task !

Task 4 (1.5 mark)
Analyse the following conceptual schema.



Extend the conceptual schema such that after the extensions it represents the following information.

(1) *There are two types of students: undergraduate students and postgraduate students. Undergraduate students are described by their HSC result and postgraduate students are described by a name of an undergraduate degree completed.*

(2) *The students enrol the subjects. For each enrolment we need to store in a database information about the enrolment date, time, IP address of computer system used to perform an enrolment, student number and subject code.*

(3) *The subjects have the specifications of assignments. We need to store information about assignment number, release date, and specifications of several tasks included within an assignment. An assignment is uniquely identified by a triple of attributes: subject code, assignment number, and release date.*

The original conceptual schema is included in a file `task4.uxf` zipped into a file `assignment1-all-files.zip`.

Draw an extended conceptual schema and export it into a file `solution4.bmp`. Use UMLetlet to draw an extended schema and to export it to `bmp` file.

Deliverables
A file `solution4.bmp` with the extended conceptual schema.

Your file must be in `bmp` format ! Submission of a file in the other format will be ignored and it will result with no marks scored for the task !

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.pdf`**, **`solution2.bmp`**, **`solution3.pdf`**, and **`solution4.bmp`** 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 **`CSIT815/CSIT115 (S117) 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.pdf`** 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`**, **`solution3.pdf`**, and **`solution4.bmp`**.
(8) Click at a button **`Save changes`**
(9) Click at a button **`Submit assignment`**
(10) Click at a button **`Continue`**

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

Only one submission of the first assignment is allowed and only one submission per student is accepted.

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

A submission that contains an incorrect file attached is treated as a correct submission with all consequences coming from the evaluation of the file attached.

A submission of a compressed file (`zip`, `rar`, ... etc) will be ignored and it will result with no marks scored for the entire assignment.

It is expected that all its 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 that assessment task.

The evaluated outcomes of the Assignment 1 will be electronically returned to the students before 11.55pm on Saturday, 8 April, 2017.

End of specification