

Assignment 1
Modelling Information Systems-ITD122

Assignment 1 Handout- Individual Work
Information System Modelling with ORM Model
Due Date: 11:59 PM, Friday Week 8, 13 December 2019
Weight: 30%

INSTRUCTIONS

The following tasks are to be attempted:

- Please attempt all the three (3) tasks. Marks are as indicated.
- This is an individual assignment.
- Do not forget to include your name (full name as appears in your ID cards) in your final reports.
- You can use Microsoft Word drawing tools or Microsoft Visio. MS Visio is a very good option but this is not part of the standard software packages used at QUTIC (not available at any lab). The following are FREE web-based systems that can use Visio file formats and do all the same type of stuff:
<https://www.draw.io/>
<https://www.lucidchart.com/pages/usecase/education>
- There are **three parts for this assignment** (you must complete all parts and submit them as one word document/report. Please also zip and submit other source files/original models e.g. drawing as .xml, .vsd or .html via Blackboard just in case we need to refer to the original files.

Note: Case-by-case decisions could be made on adjustments to marks for all assignments. If a unit coordinator has reasonable concerns that a student's actions could be dealt with as a case of major academic misconduct, the unit coordinator may require the student to authenticate their learning (QUT MoPP, 2016). The authentication process will provide you with an opportunity to demonstrate your competence or knowledge in the subject matter of the assessment item in question. For example, your tutor could setup **an individual skill check** exam to test your knowledge.

SCENARIO

In a software company, workers are standardly identified by their initials, but also have a unique name. Each worker has access to exactly one personal computer (PC), and each PC is accessed by at least one worker. For each PC a record is kept of its room location, the worker(s) who access it, and the programming language(s), if any, installed on this PC. A sample report from the software company with the above discussed information is proposed below.

<i>PC</i>	<i>Room</i>	<i>Workers with access</i>		<i>Languages installed</i>
pc01	507	EFC TAH	(Ed Codfish) (Terry Happy)	Pascal, Prolog, SQL
pc02	507	NW	(Nancy Wirth)	Pascal, Modula-2
pc03	618	PAB	(Paul Boles)	Hope, Miranda
		JM	(Joan McCarthy)	
pc04	508	IN	(Ima Newie)	
pc05	508	PNC	(Peter Crusoe)	COBOL, SQL
...

Each programming language is one of three types (declarative, functional, or procedural). The PC a worker accesses must be in the room in which he/she works. Some workers are hired as experts in one or several programming languages. The next table gives a full record of the languages, their types, experts at languages, and each expert's room.

<i>Language</i>	<i>Type</i>	<i>Experts (rooms)</i>
COBOL	procedural	PNC(508), REK(611)
Hope	functional	
LISP	functional	JM(618)
Modula-2	procedural	NW(507)
Miranda	functional	PAB(618), DC(708)
Pascal	procedural	NW(507), TAH(507)
Prolog	declarative	JS(407)
SQL	declarative	EFC(507), PNC(508), TAH(507)

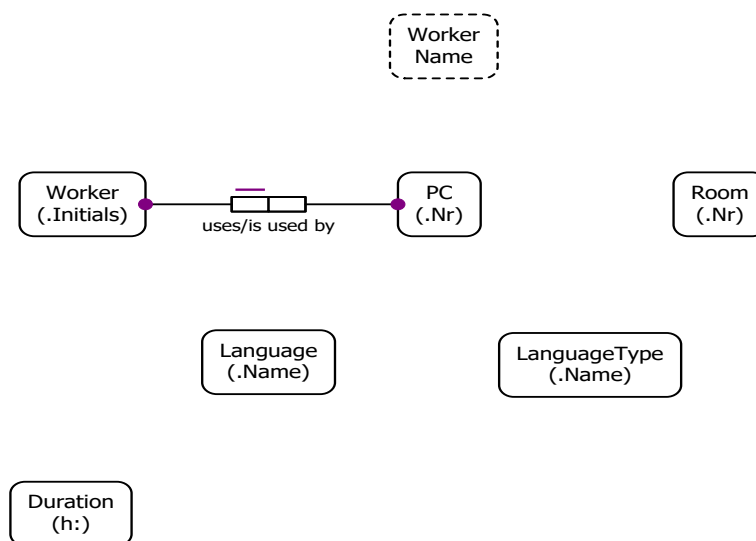
A workshop on programming languages is to be delivered by some of the workers. The full workshop program, shown in the final table below, indicates how many hours (h) speakers talk about each language and the total hours for each language type.

<i>Declarative (6 h)</i>		<i>Functional (4 h)</i>		<i>Procedural (6 h)</i>	
Prolog:	JS (3 h)	LISP:	JM (1 h)	Modula-2:	NW (3 h)
SQL:	PNC (1 h)	Miranda:	PAB (3 h)	Pascal:	NW (2 h)
SQL:	TAH (2 h)			COBOL:	REK (1 h)

Task 1 (15 Marks)

As of today, all the information described in the scenario is kept on paper. You are hired to design an information model that suggests an effective and efficient way for storing this information in an Information System. As you are an expert in ORM, you decide to develop an ORM model.

Complete the drawing of the ORM conceptual schema proposed below for the universe of discourse specified in the scenario by **performing steps 1-5** of the Conceptual Schema Design Procedure as described in lecture notes. Use only those entity types and value types proposed below (Do NOT introduce new entity/value types in this task).



Step 1: Transform familiar examples into elementary facts, and apply quality checks.

List all the deep structure sentences that you can identify based on the familiar examples from the scenario. For example:

“ The **Worker** with WorkerInitials ‘EFC’ *uses* the **PC** with PCNr ‘pc01’ ”.

Step 2: Draw the fact types, and apply a population check.

Hint: Do NOT use nesting for this task.

Use the deep structure sentences from Step 1 to draw fact types. As an example, consider the only binary fact type shown in the diagram above. Note that this fact type is introduced based on the example deep structure sentence proposed in the description of Step 1.

Perform a population check by populating identified fact types with the fact instances captured in the deep structure sentences. This can be accomplished by drawing fact tables.

For all the identified fact types discuss/demonstrate that they are indeed elementary by performing all the necessary split and join operations on sample populations.

Step 3: Check for entity types to be combined, and note any arithmetic derivations.

Discuss in text if it does or does not make sense to combine any of the entity types proposed in the diagram. Introduce arithmetically derivable fact type from the scenario in your ORM model. You can use any notation or a textual description to explain this derivable fact type. See the template for more information.

Step 4: Add uniqueness constraints and check for logical derivations

Introduce all the uniqueness constraints in your ORM model that you can identify based on the scenario. For each introduced uniqueness constraint, explain the rationale behind your decision to include it in the model.

Step 5: Add mandatory role constraints and check for logical derivations

Introduce all the mandatory role constraints in your ORM model that you can identify based on the scenario. For each introduced mandatory role constraint, explain the rationale behind your decision to include it in the model.

Add other constraints (as described in lecture notes) and perform final checks

Don't forget to include the final model too.

Task 2 (10 Marks)

Suggest and discuss some additional piece of information that the software company can store in an Information System by extending the ORM model obtained as your answer to Task 1. Your extension should introduce at least 3-4 fresh entity/value types and several (interesting and useful) fact types to the model. A few very simple/basic entity/value types may not be accepted.

For example, a simple suggestion would be to propose to the software company to keep track of teams/groups of workers that are currently involved in different software projects. One can start implementing this extension by introducing entity types Team and Project to the model.

For the extension, implement and discuss steps 1-5 of the Conceptual Schema Design Procedure by following the structure proposed as part of Task 1.

Also, show your final model. **In your final report, present this extended model separately from the one you developed to answer Task 1.**

Task 3 (5 Marks)

A) What is Information Systems Modelling and why do we need different modelling techniques?

(3 Marks)

B) What is Conceptual Modelling, and the rationale for conceptual modelling? (2 Marks)

Note: Please consult the information on QUT Library resources (for complete guide to citation, referencing and academic writing) for avoiding plagiarism.

Submission:

This has to be submitted via Blackboard submission box before **Due Date: 11:59 PM, Friday Week 8, 13 December 2019**

Each submission must contain a declaration, signed by students, stating that he/she has viewed the final version of the assignment that is to be submitted and that it is their original work (see Appendix A).

Sample structure for Assignment 1 report is provided below:

- Cover page (include your full names, topic, date, etc...).
- Answer to Task 1 which includes an ORM final model and the discussion of all steps of the Conceptual Model Design Procedure that you have taken to develop the model.
- Answer to Task 2 which includes an extended version of the ORM model developed as your answer to Task 1 and a discussion of all steps of the Conceptual Model Design Procedure that you have taken to develop the extension.
- Answer to Task 3 (Requires a very good research on all questions-include your references)
- Declaration by individual (see template in Appendix A)

LATE SUBMISSIONS

According to QUT policies, submissions past the deadline will **NOT** be marked, and will thus attract a mark of 0/100. Therefore, you are strongly advised to submit your report, even if this is a draft only, by the due date.

EXTENSIONS

According to QUT policies, an extension to the due date of the assignment may only be granted on medical/compassionate grounds. All requests for extensions must be submitted via the QUTIC admin office & in writing with appropriate documentation (e.g. a medical certificate clearly stating the actual condition, the period of illness, and the length of the illness, etc.).

Reasons such as busy schedules, other commitments, machine downtime, unexpected work pressures, interstate travels for work, unawareness of the due date of the assignment, corrupted discs etc. will not qualify as a basis for requesting an extension. You need to allow some times for unexpected events to ensure you can submit your assignment on time.

ACADEMIC HONESTY

Any action or practice on your part which would defeat the purposes of assessment is regarded as academic dishonesty. The penalties for academic dishonesty are provided in the Student Rules. For more information consult the information on Blackboard and QUT Library resources for avoiding plagiarism.

GETTING FEEDBACK

The teaching team will be available to answer your questions about the assignment, but **not to pre-mark** assignments. Lecturers and tutors will **NOT** read report drafts and review detailed models prior to the submission of the assignment.

GENERAL INQUIRIES

For specific content-related inquiries about your assessments, please contact your tutor.

Marking Scheme (Total Mark: 30)

The following marking scheme and criteria will be used as a basis for marking your reports.

Task 1

15 Marks

	3	2	1	0	Marks
Step 1	All elementary fact types from the scenario are recognized and are exemplified by correct deep structure sentences.	The proposed deep structure sentences correctly reflect most of the elementary fact types from the scenario.	The proposed deep structure sentences correctly reflect some of the elementary fact types from the scenario.	The proposed deep structure sentences do not reflect any of the elementary fact types from the scenario.	
Step 2	All elementary fact types from the scenario are correctly drawn in the diagram. Each elementary fact type is supplied with a fact table that correctly contains some facts from the scenario. For each elementary fact type, a short explanation is given on why this fact type is elementary.	Most of the proposed fact types, fact tables, and explanations are correct.	Some of the proposed fact types, fact tables, and explanations are correct.	None of the proposed fact types, fact tables, and explanations is correct.	
Step 3	Two sub-tasks are accomplished correctly: Entity types that can be combined are correctly identified or an explanation on why none of the entity types from the diagram can be combined is provided.	One of the two sub-tasks is accomplished correctly	One of the two sub-tasks is accomplished correctly- partly correct answers to the sub-tasks.	None of the above two sub-tasks is accomplished correctly.	

Step 4	All the introduced uniqueness constraints are correct with respect to the familiar examples from the scenario. Each uniqueness constraint is supported with a short explanation that justifies its inclusion in the diagram.	Most of the proposed uniqueness constraints are correct.	Some of the proposed uniqueness constraints are correct.	None of the proposed uniqueness constraints is correct.	
Step5	All the introduced mandatory role constraints are correct with respect to the familiar examples from the scenario. Each mandatory role constraint is supported with a short explanation that justifies its inclusion in the diagram.	Most of the proposed mandatory role constraints are correct.	Some of the proposed mandatory role constraints are correct.	None of the proposed mandatory role constraints is correct.	
Notes: <ul style="list-style-type: none"> • Parts of marks will be given for partly correct answers to the sub-tasks. • No final diagram for task 1 will result in 35% penalty. • You must include all steps, if not, there will be a penalty – no marks for Step 1 and the maximum mark for other parts will not be greater than pass. A hand drawn model will not be marked/accepted (will be considered as zero).					Total:

Task 2

10 Marks

Your answer to Task 2 will be marked according to the marking criteria of Task 1 & must show all steps of the Conceptual Schema Design Procedure. However, the final mark for Task 2 will be adjusted to 66% of 15 Marks to yield the maximum of 10 marks for Task 2.

To get pass marks for this section, students need to: introduce a few significant fact types (**note: introducing three or four simple value types is not sufficient. Students need to add at least two interesting and useful entity types**), correctly identify all entity types in the new proposal that can be combined, or an explanation as to why none of the entity types from the diagram can be combined is provided, make sure most the introduced uniqueness and mandatory constraints are correct and if possible introduce the required arithmetically derivable fact types and/or value constraint. To get 6 or above students need to present a very impressive and sophisticated solution, that showcase their skills.

Notes:

- Parts of marks will be given for partly correct answers to the sub-tasks.
 - No final diagram for task 1 will result in 35% penalty.
 - You must include all steps, if not, there will be a penalty – no marks for Step 1 and the maximum mark for other parts will not be greater than pass.
- A hand drawn model will not be marked/accepted (will be considered as zero).

Task 3

5 Marks

Question A: 3 Marks

Significant confusion and incorrect answers – (0-1 mark)

The answers are mostly correctly – (1.5-2 marks)

Clear and accurate answer – (2.5 marks)

Impressive answer (e.g. Complete and excellent explanation, references, diagrams, comparison, demonstration and good research) – (3 marks)

Question B: 2 Marks

Significant confusion and incorrect answers – (0 - 0.5 mark)

The answers are mostly correctly – (1 marks)

Clear and accurate answer – (1.5 marks)

Impressive answer (e.g. Complete and excellent explanation, references, diagrams, comparison, demonstration and good research) – (2 marks)

APPENDIX A – DECLARATION TEMPLATE

By submitting this assignment, I am aware of the University rule that a student must not act in a manner which constitutes academic dishonesty as stated and explained in the QUT Manual of Policies and Procedures (MoPP). I confirm that this work represents my individual effort. I have viewed the final version and declare that it does not contain plagiarized material.

Full Name	Student No.	Signature