Ollscoil Chathair
Bhaile Átha Cliath
Dublin City University

SEMESTER 1 Continuous Assessment 1

MODULE: CA218 - Introduction to Databases

PROGRAMME(S): CASE2

YEAR OF STUDY: 2

EXAMINER(S):

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TIME ALLOWED: 1 Hour

INSTRUCTIONS: **Please, download the template based on your ID number and answer all the questions in the provided template. Attempt all the questions and upload your complete document. The table structure is provided in page 2.**

If your Student ID number ends with 3, 4, 5, 6, use this template. Otherwise, download the right template.

Save your file by replacing the last four digits of the file name of this document 3456 with your eight digit ID number. See example below for a student with id 20000004
CA218_Template_20000004

Name:

ID: (Enter your DCU Student ID number in the right box below)

							3

2	0	4	1	0	9	7	4

							5

							6

Survey database

questionnaire

qnrNo	title	description	pubYear	autNo
1	New Student Survey	Survey conducted about the perception of new students towards covid	2021	1
2	Usability survey	Survey conducted to evaluate the usability of a new product	2014	3
3	Building permission	Survey conducted to collect building permission	2009	2
4	Transportation	Accessibility of public transport to TCD students	2020	2
5	Transportation	Accessibility of public transport to DCC students	1980	2
6	Transportation	Accessibility of public transport in Ireland	2000	10

question

qstNo	qstText	qnrNo
1	Where do you live?	1
2	What mode of transportation do you use??	1
3	How long do you spend on the road?	1
4	With how many passengers do you share the service?	1
5	Are you happy with the facilities in the vicinity?	4
6	Do you get the major services in a walking distance?	3
7	How often do you use the tool?	2
8	Is the tool responsive?	2
9	Are you happy with the planning permission?	3
10	Does this construction cause a problem?	3
11	For what purpose do you use the tool?	2

author

autNo	fname	lname	sex	instNo	street	city	country
1	Daniel	Messerman	Male	1	Main street	Leixlip	Ireland
2	Thomas	Greg	Male	1	Main street	Kildare	Ireland
10	Anne	Stewart	Female	1	Albert road	Alberta	Canada

institution

instNo	instName	instAddress	description
1	DCU	Dublin, Ireland	Higher education
2	TCD	Dublin, Ireland	Higher education
3	UCC	Cork, Ireland	Higher education
4	OPW	Trim, Ireland	Public organisation
5	Facebook	Dublin, Ireland	Social media company

Part 1. Relational Model (10 Marks each, total 40 Marks)

1. List all the attributes of the **institution** relation.

instNo, instName, instAddress, description

2. What is the cardinality of **question** relation?

11

3. Identify the foreign keys in the **questionnaire** relation and **institution** relation.

questionnaire: qnrNo

institution: instNo, instName

4. What would be the degree and the cardinality of the cartesian product of **questionnaire** and **author** relations?

Degree: 12

Cardinality: 6

Part 2. Relational Algebra (10 Marks each, total 60 Marks)

Write the relational algebra representation of the following queries based on the table structures provided for the Survey database.

1. Show the details of all questionnaires.

σ(questionnaires)

2. Show the details of questionnaires that are published in year 2000.

$\sigma_{\text{pubYear} = 2000}$(questionnaires)

3. List the question number and questionnaire number of all questions.

$\Pi_{\text{qstNo, qntNo}}$(question)

4. Show the qrnNo, title, Author's fname, lname, and sex for all questionnaires that are published by male authors.

(questionnaires) ⋈ questionnaires.autNo = author.autNo ($\sigma_{\text{sex}='\text{Male}'}$(author))

5. Show me all the questionnaires that are published in 1980 but that do not have any question associated with them.

$AllQuestionares \leftarrow \sigma_{pubYear=1980}(questionnaires)$

$QuestionaresWithQuestionsAssigned \leftarrow (\sigma_{pubYear=1980}(questionnaires)) \bowtie questionnaires.qnrNo = question.qnrNo\ (question))$

$Result \leftarrow AllQuestionares - QuestionaresWithQuestionsAssigned$

6. Retrieve all the qstNo, and qstText of the questions along with their questionnaire number, title, author's fname and lname (only those questions that have full author details). Think of joining the three tables with intermediate results.

$Questions \leftarrow \sigma(question)$

$Questionnaire \leftarrow \sigma(questionnaire)$

$Authors \leftarrow \sigma(author)$

$JoinQuestionAndQuestionaire \leftarrow \sigma question.qnrNo = questionnaire.qnrNo (\Pi_{qstNo,\ qstText}(\sigma(Questions)) \times \Pi_{qnrNo,\ title}(\sigma(Questionnaire)))$

$JoinAllTables \leftarrow \sigma questionnaire.autNo = author.autNo(JoinQuestionQuestionaire \times \Pi_{fname,\ lname}(\sigma(Authors)))$

$Result \leftarrow \Pi_{qstNo,\ qstText,\ qnrNo,\ fname,\ lname}(\sigma(JoinAllTables))$