Swansea University College of Science

Prifysgol Abertawe Coleg Gwyddoniaeth

January 2018

CSCM59

Relational and Object-Oriented Database Systems

Time Available: 2 hours

Coordinator: Mr C J Whyley

Queries: The Exams Office hold contact details for this paper

Dictionaries Allowed? Available on Request

Calculators Allowed? Not Required

Attempt all questions.

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Some questions refer to the following **Suppliers and Parts** database. (Bold underlined headers represent the primary key.)

S

SNumber	SName	Status	City
S1	Smith	20	London
S2	Jones	10	Paris
S3	Blake	30	Paris
S4	Clark	20	London
S5	Adams	30	Athens

SP

SNumber	**PNumber**	Qty
S1	P1	300
S1	P2	200
S1	P3	400
S1	P4	200
S1	P5	100
S1	P6	100
S2	P1	300
S2	P2	400
S3	P2	200
S4	P2	200
S4	P4	300
S4	P5	500

P

PNumber	PName	Colour	Weight	City
P1	Nut	Red	12.0	City
P2	Bolt	Green	17.0	Paris
P3	Screw	Blue	17.0	Oslo
P4	Screw	Red	14.0	London
P5	Cam	Blue	12.0	Paris
P6	Cog	Red	19.0	London

1. You need the name and status of suppliers who supply part P1.

   (a) Give an expression in **Relation Algebra** to achieve this. (Use the format used in lectures). **[3 marks]**

   (b) Give an expression in **Relational Calculus** to achieve this. (Use the format used in lectures) **[3 marks]**

2. Explain, using a diagram, what happens with the **Uncommited Dependency Problem**

[6 marks]

3. Give a **Relational Integrity Predicate** for the table **S** above stating that all suppliers must have a status between 10 and 50 **[5 marks]**

4. Explain - with the help of a diagram - a problem which might arise if an Object Oriented database allows **Multiple Inheritance**

[7 marks]

5. Give an SQL statement which would create the table **P** above. You must think carefully about the attribute types. **[10 marks]**

6. Suppose a table **R** in a database contains attributes A, B, C, D and E. As the DBA you wish to decompose it into **T**{A, B, C} and **U**{A, D, E}. You know that many users have written programs or queries using table R.

   (a) Give a potential problem with your plan.

   [2 marks]

   (b) Explain how you could use a view to ensure that the user's programs don't break.

   [6 marks]

7. - Who or what is responsible for a **Database**? **[2 marks]**
   - Who or what is responsible for **Database security**? **[2 marks]**

8. In database design it is necessary to remove any **Transitive Dependencys**. Explain formally (i.e. with a mathematical expression) and in English what is meant by a transitive dependency. **[4 marks]**

End of Paper