School of Computer Science and IT, RMIT

ISYS1055/1057 Tutorial/Lab Sheet

The Relational Model (1)

With respect to the Rocky Concrete database whose description is attached at the end, Discuss and answer questions using SQL*Plus under your Oracle account.

1. Initially the Rocky Concrete database schema does not have any primary key or foreign key data integrity constraints. The SQL DDL for the database is in rocky-basics.sql. Complete the following tasks in SQL*Plus.
   a) Define all relations in the Rocky Concrete database by downloading rocky-basics.sql from the Blackboard and run the file.
   b) Given the following INSERT statements, explain the content (data) in the database after the insertions, and discuss if the database instance after these insertions represents any sensible real-world situation.

```
INSERT into Customers
    VALUES (1066, 'Nev''s Nursery', 'White Hart Lane', 'Bundoora', 3083, 500, 450);
INSERT INTO Products VALUES('MOO', 'Medium Cattle Trough', 'A', 150, 6, 3, 5);
INSERT INTO Orders VALUES(1, '01-07-1993', 13144);
INSERT INTO Order_details VALUES(1, 'STAND', 10, 45);
```

2. For each relation, discuss
 (a) Likely candidate keys,
 (b) primary keys,
 (c) Any foreign keys.

3. Edit the file rocky-basics.sql to add the primary key and foreign key constraints derived for Question 2. Run rocky-basics.sql in SQL*Plus again to define relations in the Rocky Concrete database. Run each INSERT statement of Question 1(b) again in SQL*Plus. Explain the execution result using the primary key and foreign key constraints on the corresponding relations.

4. For each of the following queries, can the query be answered with the current database schema? If so, what relations are used to answer the query?

(a) For each day, what is the total ordered quantity of each product?
(b) Is the product "MOO" out of stock?

5. If the Orders and the Order_details relations are combined into a relation

Orders_and_Details(order_no, prod_cod, order_qty, order_price, order_date, cust_no)

   (1) What should be the condition for combining tuples from the two relations? Draw a table for the resultant Orders_and_Details relation.
   (2) What are the candidate keys of Orders_and_Details?
   (3) Discuss the potential benefits and problems with the combined relation.

The "Rocky Concrete" Database

The Rocky Concrete Company makes a range of concrete products from laundry tubs through park benches to garden gnomes. Rocky's regular customers include hardware shops, local councils, nurseries, farmers and other small businesses. These customers are considered to be the company's "bread and butter" and Rocky likes to satisfy their orders as quickly as possible. To this end the company tries to keep an adequate level of stock for each product made. Whenever the stock in hand falls below some predetermined level then another batch is made.

```
Customers(cust_no, cust_name, street, town, post_code, cr_limit, curr_balance)
Products(prod_cod, description, prod_group, list_price, qty_on_hand,
remake_level, remake_qty)
Orders(order_no, order_date, cust_no)
Order_details(order_no, prod_cod, order_qty, order_price)
```

Some columns, such as cust_name, are self explanatory; however, others need some definition:

cr_limit: The maximum that a customer is allowed to owe Rocky Concrete; this may be exceeded at the manager's discretion.

curr_bal: The amount currently owed by the customer.

prod_group: A code that indicates whether a product is grouped as agricultural (A), council (C), or domestic (D).

list_price: The advertised price for a single unit of a particular product; the price charged to a customer might vary from this.

remake_level: The level to which the quantity on hand is compared; if qty_on_hand falls below this level then Rocky will usually make another batch to avoid stockout.

remake_qty: The quantity usually made in any new batch.

order_price: The unit price charged on this order for this product.

order_date: The date on which the order was taken. This is held as 6 digits in DDMMYY form, so 31st March 1998 is held as 310398. (Note that this date format reflects poor design!)