Department of Higher Education
University of Computer Studies, Yangon
Third Year (B.C.Sc.)
Final Examination
Database Management System (CS-304)
September, 2018

Answer all questions.   **Time Allowed: 3 hours**

I. Choose the correct answer from the followings.   **(10 Marks)**

(a) The operation of a relation X produces Y, such that Y contains only selected attributes of X, Such operation is:
   A. Projection   B. Intersection   C. Union   D. Difference

(b) In unary relational operations, SELECT operation is partition of relation usually classified as
   A. Vertical partition   B. Horizontal partition   C. insert partition   D. delete Partition

(c) The fundamental feature of the calculus is
   A. Tuple   B. Domain   C.Relvar   D. Range Variable

(d) Which calculus is based on specifying a number of domain variables?
   A. Tuple calculus   B. Domain calculus   C. Both   D. None

(e) Which of the following creates a virtual relation for storing the query?
   A. Function   B. View   C. Procedure   D. None

(f) SQL view is said to be updatable (that is, inserts, updates or deletes can be applied on the view) if which of the following conditions are satisfied by the query defining the view?
   A. The from clause has only one database relation
   B. The query does not have a group by or having clause.
   C. The select clause contains only attribute names of the relation, and does not have any expressions, aggregates, or distinct specification
   D. All of the above

(g) Which in the database which is a software component in the RDBMS that carries out analysis of SQL statement for finding the best way for its execution:
   A. Query execution   B. Query Process
   C. Query Optimizer   D. Query transaction

(h) A technique for direct search is
   A. Binary Search B. Linear Search

   C. Tree Search D. Hashing

(i) Which operator is used to check whether the expression is "NULL"?
   A. IS NULL

   B. NOT NULL

   C.ON

   D. None

(j) Which integrity allows the database must not contain any unmatched foreign key values?
   A. Entity integrity
   B. Referential integrity
   C. Security
   D. None

II. Consider the following Glossary Store database: **(30 Marks)**

        Customer (<u>Cno</u>, Name, Address)
        Employee (<u>Eno</u>, Name, Address, Salary)
        Product (<u>Pno,</u> Name, AQty, Weight, Color, Price)
        Order (<u>OrdNo</u>, Date, Eno, Cno, Shipadd)
        OrderDetails (<u>OrdNo,Pno</u>,Qty)

Write the following queries in Relational algebra and Relational calculus (tuple-oriented & domain oriented) statements.

  (a) Get the detail customer information for the order number "OR-100".
  (b) Get the employee in detail who sells the product color "red".
  (c) Get the total numbers of orders that was received by each employee.
  (d) Get the all product information that the order quantity is greater than 100.

III. Answer all following questions.

(a) Why views are used for the security purpose of the database? **(4 Marks)**

(b) Create the following View on the above Glossary Store database in Problem II. **(6 Marks)**
  (i) CuView that includes the customer information who made the order to store.
  (ii) SCView that includes the customer name, address and shipment address for the date
     25-09-2018.

(c) Let the base Relvar: **(10 Marks)**

Relvar	Number of tuples
S(<u>Sno</u>,Sname,Status,City)	5
P(<u>Pno</u>,Pname,Color,Weight,City)	6
SP(<u>Sno,Pno</u>,Qty)	30

Let View SSP be define as S Join SP

S#	SName	Status	City	P#	Qty
S1	Smith	20	London	P1	300
S1	Smith	20	London	P2	200
S1	Smith	20	London	P3	400
S1	Smith	20	London	P4	200
S1	Smith	20	London	P5	100
S1	Smith	20	London	P6	100
S2	Jones	10	Paris	P1	300
S2	Jones	10	Paris	P2	400
S3	Blake	30	Paris	P2	200
S4	Clark	20	London	P2	200
S4	Clark	20	London	P3	300
S4	Clark	20	London	P3	400

Check the following operations are fail or successful. Why?
  (i) To insert the tuple(S4,Clark,20,Athens,P6,100) into SSP
  (ii) To insert the tuple(S4,Clark,20,London,P6,100) into SSP
  (iii)To delete the tuple(S3,Blake,30,Paris,P2,200) from SSP
  (iv)To delete the tuple(S1,Smith,20,London,P1,300) into SSP
  (v) To update the SSP tuple (S1,Smith,20,London,P2,200) to (S1,Smith,20,Athen,P2,200).

IV. Answer the following questions.

(a) Define Query Decomposition, Detachment and Tuple Substitution **(4 Marks)**

(b) Write the equivalent expression of the following using appropriate transformation law on supplier-part-project database. **(6 Marks)**

      S (S#, SNAME, STATUS, CITY)
      P (P#, PNAME, COLOR, WEIGHT, CITY)
      J (J#, JNAME, CITY)
      SPJ (S#, P#, J#, QTY)

  (i) (S MINUS ((S JOIN SPJ) WHERE P# = 'P2')) { S#, SNAME, STATUS, CITY }) {S#,CITY}

  (ii) (S JOIN P{City}) MINUS (S JOIN J{City})

  (iii) (S WHERE City = 'London') WHERE Status > 20

(c) Perform the optimization steps for query "Get name of supplier who supply part P2" using the supplier-part-shipment database schema and draw the query tree for each query". Assume that the database contains 100 Suppliers, 10,000 shipments of only 50 tuples are for P2. Assume for simplicity that relvars S and SP are presented directly on the disk as two separate stored files with one stored per tuple. Assume that 50 tuples at most, which can stay in main memory. **(10 Marks)**

V. Answer the questions.

(a) Describe the effect of UNKs on the operators of the relational algebra: Project, Restriction, Join, Union with the suitable examples. **(10 Marks)**

(b) If A = 6, B = 5, and C = 4 and D is UNK, state the truth values of the following expression. **(5 Marks)**

  (i) A=B OR (B>C AND A>D)
  (ii) A>B AND (B<C OR IS_UNK(A-D)
  (iii) B<D OR B=D OR B>D
  (iv) MAYBE(IS_UNK(D))
  (v) MAYBE(IS_UNK(A+B))

(c) Let relation r contain exactly the following tuples: **(5 Marks)**

        (6,   5,   4   )
        (UNK, 5,   4   )
        (6,   UNK, 4   )
        (UNK, UNK, 4   )
        (UNK, UNK, UNK)

If V is a arrange variable that ranges over r, state the truth values of the following expressions:

  (i) EXISTS V(V.B > 5)
  (ii) EXISTS V(V.B > 2 AND V.C>5)
  (iii) EXISTS V(MAYBE(V.C>3)
  (iv) FORALL V(V.A>1)
  (v) FORALL V(MAYBE(V.A>V.B))