**hLab Manual**

**Exercise I**

Consider an Employee with a social security number (SSN) working on multiple projects with definite hours for each. Each Employee belongs to a Department. Each project is associated with some domain areas such as Database, Cloud and so on. Each Employee will be assigned to some project. Assume the attributes for Employee and Project relations.

1. Mention the constraints neatly.

Constraints to be written

1. Design the ER diagram for the problem statement

Draw ER diagram

1. State the schema diagram for the ER diagram.

Draw the scheme diagram

1. Create the tables, insert suitable tuples and perform the following operations in SQL

create table employee

(

ssn varchar(6),

name varchar(10),

deptno int,

primary key(ssn)

);

Table created.

create table project

(

projectno varchar(10),

projectarea varchar(20),

primary key(projectno)

);

Table created.

create table app

(

usn varchar(6),

projectno varchar(10),

foreign key(usn)references employee(ssn),

foreign key(projectno)references project(projectno)

);

Table created.

insert into employee values('01','abc',10);

1 row updated

insert into employee values('02','xyz',20);

1 row updated

insert into employee values('03','pqr',30);

1 row updated

insert into employee values('04','lmn',40);

1 row updated

insert into project values('100','database');

1 row updated

insert into project values('200','network');

1 row updated

insert into project values('300','android');

1 row updated

insert into app values('01','100');

1 row updated

insert into app values('02','200');

1 row updated

insert into app values('03','300');

1 row updated

insert into app values('01','200');

1 row updated

select \* from employee;

SSN NAME DEPTNO

01 abc 10

02 xyz 20

03 pqr 30

04 lmn 40

select \* from project;

PROJECTNO PROJECTAREA

100 database

200 network

300 android

select \* from app;

USN PROJECTNO

01 100

02 200

03 300

01 200

1. Obtain the SSN of employees assigned to database projects.

select ssn from employee

where ssn=(select usn

from app

where projectno=(select projectno from project

where projectarea='database'));

SSN

01

2. Find the number of employees working in each department.

select count(ssn),deptno from employee group by deptno;

COUNT(SSN) DEPTNO

1 30

1 20

1 40

1 10

3. Update the Project details of Employee bearing SSN = #SSN to ProjectNo = #Project\_No

update app set projectno='200' where usn='03';

1 row updated

select \* from app;

usn projectno

01 100

02 200

03 200

04 200

1. Create the table, insert suitable tuples and perform the following operations using MongoDB

Solution

Create the collection:

db.createCollection("EMPLOYEE")

Inserting the values:

>db.EMPLOYEE.insert({"SSN":4567,"Name":'James',"DeptNo":'XYZ',"ProjectNo":101})

>db.EMPLOYEE.insert({"SSN":3256,"Name":'Jack',"DeptNo":'XYZ',"ProjectNo":102})

>db.EMPLOYEE.find().pretty()

1. List all the employees of Department named #Dept\_name.

> db.EMPLOYEE.find({"DeptNo":'XYZ'}).pretty()

2. Name the employees working on Project Number :#Project\_No

> db.EMPLOYEE.find({"ProjectNo":104}).pretty()

g) Write a program that gives all employees in Department #number a 15% pay increase. Display a message displaying how many employees were awarded the increase.

set serveroutput on

begin

update employee1

set salary=(1.15\*salary) where deptno=10;

dbms\_output.put\_line('number of rows updated are'||sql%rowcount);

end;

/

**Exercise II**

Consider the relations: PART, SUPPLIER and SUPPLY. The Supplier relation holds information about suppliers. The SID attribute identifies the supplier, while the other attributes each hold one piece of information about the supplier. The Part relation holds information about parts. Likewise, the PID attribute identifies the part, while the other attributes hold information about the part. The Shipment relation holds information about shipments. The SID and PID attributes identify the supplier of the shipment and the part shipped, respectively. The remaining attribute indicates how many parts where shipped.

1. Mention the constraints neatly.

Write the constraints

1. Design the ER diagram for the problem statement

Design the ER diagram

1. State the schema diagram for the ER diagram.

Write the schema diagram for the ER diagram.

1. Create the above tables, insert suitable tuples and perform the following operations in Oracle SQL:

create table part  
 (  
 pno number(10),  
 pname varchar(20),  
 colour varchar(20),  
 primary key(pno)  
 );  
 Table created.  
  
 Create table supplier  
 (  
 sno number(10),  
 sname varchar(20),  
 address varchar(20),  
 primary key(sno)  
 );  
Table created.  
  
 create table supply  
 (  
 pno number(10),  
 sno number(10),  
 quantity varchar(20),  
 primary key(pno,sno),  
 foreign key(pno) references part(pno)on delete cascade,  
 foreign key(sno) references supplier(sno)on delete cascade  
 );  
 Table created.  
  
 insert into part values(1,'plug','black');  
 1 row(s) inserted.  
 insert into part values(2,'bolt','blue');  
 1 row(s) inserted.  
 insert into part values(3,'nut','green');  
 1 row(s) inserted.  
 insert into supplier values(10,'Anoop','udupi');  
1 row(s) inserted.

insert into supplier values(15,'Bharath','mangalore');

1 row(s) inserted.

insert into supplier values(20,'Ram','bangalore');

1 row(s) inserted.

insert into supply values(1,10,50);

1 row(s) inserted.  
 insert into supply values(2,10,30);

1 row(s) inserted.  
 insert into supply values(1,15,70);

1 row(s) inserted.

insert into supply values(3,15,40);  
1 row(s) inserted.  
 insert into supply values(1,20,55);

1 row(s) inserted.  
 insert into supply values(2,20,65);

1 row(s) inserted.  
 insert into supply values(3,20,75);

1 row(s) inserted.

select \* from part;

PNO PNAME COLOUR

1 plug black

2 bolt blue

3 nut green

select \* from supply ;  
 PNO SNO QUANTITY  
  1 10 50   
 2 10 30   
 1 15 70  
 3 15 40  
 1 20 55  
 2 20 65  
 3 20 75  
  
 select\* from supplier ;  
 SNO    SNAME   ADDRESS  
 10       Anoop            udupi  
 15      Bharath          mangalore  
 20      Ram               Bangalore

1. Obtain the part identifiers of parts supplied by supplier #supplier\_name.

select pno from supply

where sno IN(select sno from

supplier where sname='Ram');

PNO  
 1  
 2  
 3

1. Obtain the Names of suppliers who supply #part\_name.

select sname,pname

from supplier,supply,part

where pname='bolt' AND supply.sno=supplier.sno AND part.pno=supply.pno;

SNAME PNAME

Anoop bolt

Ram bolt

1. Delete the parts which are in #colour.

delete from part where colour='green';

1. Create the table, insert suitable tuples and perform the following operations using MongoDB

Create the collection:

>db.createCollection("WAREHOUSE")

Inserting the values:

>db.WAREHOUSE.insert({"PNO":1947,"Pname":'bolts',"Colour":'Black',"SNO":1234,"Sname":'ABC',"Address":'blore'})

>db.WAREHOUSE.insert({"PNO":1950,"Pname":'chain',"Colour":'Blue',"SNO":4567,"Sname":'DEF',"Address":'chen'})

Update the parts identifier

>db.WAREHOUSE.update({"PNO":1950},{$set:{"PNO":2017}},{multi:true})

>db.WAREHOUSE.find().pretty()

Display all suppliers who supply the part with part identifier: #Part\_No.

> db.WAREHOUSE.find({"PNO":2017}).pretty()

1. Write a PL/SQL program to display the contents of the above tables and then update the quantity of parts shipped by 5%.

create table part1(pno int,pname char(20),colour char(20),primary key(pno));

create table copy\_part1(pno int,pname char(20),colour char(20),primary key(pno));

insert into part1 values(10,'nuts','black');

insert into part1 values(20,'bolts','grey');

insert into part1 values(30,'screw','green');

set serveroutput on

declare

cursor curr is select \*from part1;

counter int;

rows part1%rowtype;

begin

open curr;

loop

fetch curr into rows ;

exit when curr%notfound;

insert into copy\_part1 values(rows.pno,rows.pname,rows.colour);

end loop;

counter := curr%rowcount;

close curr;

dbms\_output.put\_line(counter||' rows inserted into the table copy\_part1 ');

end;

/

**Exercise III**

Consider the relations BOAT, SAILOR and RESERVES. The relation BOAT identifies the features of a boat such as unique identifier, color and a name. The list of sailors with attributes such as SailorID, name, age etc., are stored in the relation Sailor. The sailors are allowed to reserve any number of boats on any day of the week.

1. Mention the constraints neatly.

Write the constraints.

1. Design the ER diagram for the problem statement

Design the ER diagram

1. State the schema diagram for the ER diagram.

Write the schema diagram for the ER diagram.

1. Create the tables, insert suitable tuples and perform the following operations in SQL:

Create table BOAT

(

BID varchar(6) NOT NULL,

BNAME varchar(20),

COLOUR varchar(10),

PRIMARY KEY(BID)

);

Create table SAILOR

(

SID varchar(6)NOT NULL,

SNAME varchar(20),

AGE varchar(3),

RATING varchar(2),

PRIMARY KEY(SID)

);

Create table RESERVES

(

BID varchar(6),

SID varchar(6),

DAY varchar(10),

FOREIGN KEY(BID) references BOAT(BID) ON DELETE CASCADE,

FOREIGN KEY(SID) references SAILOR(SID) ON DELETE CASCADE

);

INSERT INTO BOAT VALUES('01','ABC','RED');

INSERT INTO BOAT VALUES('02','XYZ','YELLOW');

INSERT INTO BOAT VALUES('03','PQR','GREEN');

INSERT INTO BOAT VALUES('04','LMN','BLACK');

INSERT INTO BOAT VALUES('05','DEF','BLUE');

INSERT INTO SAILOR VALUES('10','RAM','30','5');

INSERT INTO SAILOR VALUES('20','RAVI','25','4');

INSERT INTO SAILOR VALUES('30','MISHRA','22','3');

INSERT INTO SAILOR VALUES('40','CHANDRA','24','2');

INSERT INTO SAILOR VALUES('50','SHIVA','36','1');

INSERT INTO SAILOR VALUES('60','KRISHNA','40','6');

INSERT INTO RESERVES VALUES('01','20','MONDAY');

INSERT INTO RESERVES VALUES('02','30','TUESDAY');

INSERT INTO RESERVES VALUES('03','50','WEDNESDAY');

INSERT INTO RESERVES VALUES('04','10','THURSDAY');

INSERT INTO RESERVES VALUES('05','20','FRIDAY');

SELECT \* FROM RESERVES ;

BID SID DAY

01 20 MONDAY

02 30 TUESDAY

03 50 WEDNESDAY

04 10 THURSDAY

05 20 FRIDAY

SELECT \* FROM SAILOR;

SID SNAME AGE RATING

10 RAM 30 5

20 RAVI 25 4

30 MISHRA 22 3

40 CHANDRA 24 2

50 SHIVA 36 1

60 KRISHNA 40 6

SELECT \* FROM BOAT ;

BID BNAME COLOUR

01 ABC RED

02 XYZ YELLOW

03 PQR GREEN

04 LMN BLACK

05 DEF BLUE

1. Obtain the bid of the boats reserved by ‘#Sailor\_Name’.

SELECT BID

FROM RESERVES

WHERE SID IN( SELECT SID FROM

SAILOR WHERE SNAME='RAM');

BID

04

1. Retrieve the bid of the boats reserved by all the sailors.

SELECT BID,SNAME

FROM RESERVES r join SAILOR s

on (r.SID=s.SID);

select bid from

BID SNAME

04 RAM

05 RAVI

01 RAVI

02 MISHRA

03 SHIVA

1. Find the number of boats reserved by each sailor

SELECT COUNT(BID),SID  
 FROM RESERVES   
 GROUP BY SID;

COUNT(BID) SID  
 1 50  
 2 20

1 10  
 1 30

1. Create the table, insert suitable tuples and perform the following operations using MongoDB.

Create the collection:db.createCollection("BOATRES")

Insert the values:

>db.BOATRES.insert({"BID":9988,"BNAME":'ABC',"COLOUR":'Black',"SNAME":'John',"SID":1234,"DAY":'2017-12-25'})

>db.BOATRES.insert({"BID":8877,"BNAME":'DEF',"COLOUR":'Black',"SNAME":'Smith',"SID":4567,"DAY":'2017-11-24'})

1. Obtain the number of boats obtained by sailor :#Sailor\_Name

> db.BOATRES.find({"SNAME":'Sucre'}).count()

1. Retrieve boats of color :”#color”

> db.BOATRES.find({"COLOUR":'Black'}).pretty()

1. Write a PL/SQL program to check whether a given number is prime or not.

SET SERVEROUTPUT ON

DECLARE

n number:=&n;

j number:=2;

counter number:=0;

BEGIN

WHILE(j<=n/2) loop

if mod(n,j)=0 then

dbms\_output.put\_line(n ||' is not prime number');

counter:=1;

exit ;

else

j:=j+1;

end if;

end loop;

if counter=0 then

dbms\_output.put\_line( n || ' is a prime number');

**Exercise IV**

Consider the Banking database – customer, branch, account, and transaction. An account can be a savings account or a current account. Customers can have both types of accounts. The transactions can be a deposit or a withdrawal. Mention the constraints neatly.

a) Design the ER diagram for the problem statement.

b) State the schema diagram for the ER diagram.

c) Create the above tables, insert suitable tuples and perform the following operations in SQL:

Create Table Customer

(

Cid VARCHAR(3),

fname varchar(15),

lname varchar(15),

color varchar(15),

Phone varchar(10),

PRIMARY KEY(CID)

);

City varchar(10),

CREATE TABLE BRANCH

(

BID VARCHAR(3),

BNAME VARCHAR(10),

CITY VARCHAR(10),

PRIMARY KEY(BID)

);

CREATE TABLE ACCOUNT

(

ACC\_ID VARCHAR(6),

CID VARCHAR(6),

BID VARCHAR (3),

BALANCE NUMBER(10),

ATYPE VARCHAR(2),

PRIMARY KEY(ACC\_ID),

FOREIGN KEY(CID) REFERENCES CUSTOMER(CID),

FOREIGN KEY(BID) REFERENCES BRANCH(BID)

);

CREATE TABLE TRANSACTION

(

TID VARCHAR(6),

ACCID VARCHAR(6),

TTypeVARCHAR (3),

Amount NUMBER(10),

ATYPE VARCHAR(2),

PRIMARY KEY(TID),

FOREIGN KEY(ACCID) REFERENCES ACCOUNT(ACC\_ID),

);

INSERT INTO Customer VALUES('C01','AAA','YYY', ‘DELHI’, 9886066466);

INSERT INTO Customer VALUES('C02','BBB','XXX’, ‘DELHI’, 9886166466);

INSERT INTO Customer VALUES('C03','CCC','ZZZ', ‘DELHI’, 9886466466);

INSERT INTO Customer VALUES('C04','DDD','PPP', ‘DELHI’, 9886366466);

INSERT INTO Customer VALUES('C05',EEE','SSS', ‘DELHI’, 9886266466);

INSERT INTO BRANCH VALUES('B01',’MSR Nagar’, Bangalore);

INSERT INTO BRANCH VALUES('B02',’NSR Nagar’, Bangalore);

INSERT INTO BRANCH VALUES('B03',’OSR Nagar’, Bangalore);

INSERT INTO BRANCH VALUES('B04',’PSR Nagar’, Bangalore);

INSERT INTO BRANCH VALUES('B05',’QSR Nagar’, Bangalore);

INSERT INTO ACCOUNT VALUES('A01','C01','B01', 3000,S);

INSERT INTO ACCOUNT VALUES('A02','C01','B01', 3000,S);

INSERT INTO ACCOUNT VALUES('A03','C02','B02', 3000,C);

INSERT INTO ACCOUNT VALUES('A04','C01','B01', 3000,S);

INSERT INTO ACCOUNT VALUES('A05','C04','B03', 3000,C);

INSERT INTO TRANSACTION VALUES('T01','A01,'Credit’, 3000);

INSERT INTO TRANSACTION VALUES('T02','A01,'Credit’, 2000);

INSERT INTO TRANSACTION VALUES('T03','A02,'Debit’, 7000);

INSERT INTO TRANSACTION VALUES('T04','A01,'Credit’, 6000);

INSERT INTO TRANSACTION VALUES('T05','A03,'Debit’, 4000);

1. Obtain the details of customers who have both savings and current accounts.

SELECT \*

FROM Customer

WHERE CID IN (

SELECT CID

FROM ACCOUNT

WHERE ATYPE = 'C'

AND CID IN (

SELECT CID

FROM ACCOUNT

WHERE ATYPE = 'S'

)

);

1. Retrieve the details of branches and the number of accounts in each branch.

select BID, BNAME, Count(BID)

from BRANCH

group by BID, BNAME.

1. Obtain the details of customers who have performed at least 3 transactions.

Select \* from Customers

where CID IN ( select CID from ACCOUNT

where ACC\_ID IN ( select ACC\_ID

from TRANSACTION

group by ACC\_ID

having count( TID) >=3) );

1. List the details of branches where the number of accounts is less than the average number of accounts in all branches.

select BNAME, sum(BALANCE)

from ACCOUNT

group by BNAME having sum(BALANCE)

(select avg(totbalance)

from (select BNAME, sum(BALANCE)

from ACCOUNT

group by BNAME ) as BRANCHTOTAL (BNAME, BALANCE))

1. Create the table, insert suitable tuples and perform the following operations using MongoDB

Create the collection:

>db.createCollection("SHIPMENT")

Insert the values:

>db.SHIPMENT.insert({"PNO":11,"PNAME":'bolts',"COLOUR":'Black',"WNO":99,"WNAME":'ABC',"QUANTITY":45,"DATE":'2017-09-25'})

>db.SHIPMENT.insert({"PNO":12,"PNAME":'nuts',"COLOUR":'Black',"WNO":99,"WNAME":'ABC',"QUANTITY":38,"DATE":'2017-09-28'})

1. Find the parts shipped from warehouse :Wname”

>db.SHIPMENT.find().pretty() >db.SHIPMENT.find({"WNAME":'ABC'}).pretty()

1. List the total quantity supplied from each warehouse

>db.SHIPMENT.aggregate([{ $group:{\_id:"$WNAME",total:{$sum:"$QUANTITY"}}}])

1. Using cursors demonstrate the process of copying the contents of one table to a new table.

create table part1(pno int,pname char(20),colour char(20),primary key(pno));

create table copy\_part1(pno int,pname char(20),colour char(20),primary key(pno));

insert into part1 values(10,'nuts','black');

insert into part1 values(20,'bolts','grey');

insert into part1 values(30,'screw','green');

set serveroutput on

declare

cursor curr is select \*from part1;

counter int;

rows part1%rowtype;

begin

open curr;

loop

fetch curr into rows ;

exit when curr%notfound;

insert into copy\_part1 values(rows.pno,rows.pname,rows.colour);

end loop;

counter := curr%rowcount;

close curr;

dbms\_output.put\_line(counter||' rows inserted into the table copy\_part1 ');

end;

**Exercise 5:** Consider the Book Lending system from the library. The students are allowed borrow any number of books on a given date from the library. The details of the book should include ISBN, Title of the Book, author and publisher. All students need not compulsorily borrow books.

1. Mention the constraints neatly.

Write the constraints

1. Design the ER diagram for the problem statement

Design the ER diagram

1. State the schema diagram for the ER diagram.

Write the Schema diagram for the ER diagram.

1. Create the above tables, insert suitable tuples and perform the following operations in SQL:

create table books

(

ISBN varchar(10),

Title varchar(10),

Author varchar(10),

Publisher varchar(10),

primary key(ISBN)

);

Insert into books values(

ISBN TITLE AUTHOR PUBLISHER

123 T1 A1 P1

002 DB A2 P2

003 T3 A3 P3

004 T4 A4 P4

005 T5 A5 P5

create table student1

(

usn varchar(10),

name varchar(10),

sem int,

dept varchar(3),

primary key(usn)

);

Insert into student1 values(

SN NAME SEM DEPT

111 aaa 3 ISE

222 bbb 4 CSE

333 ccc 3 CSE

444 ddd 4 ISE

555 eee 4 ISE

create table borrow

(

ISBN varchar(10),

usn varchar(10),

dates varchar(10),

foreign key(ISBN) references books(ISBN),

foreign key(usn) references student1(usn)

);

insert into borrow values(

ISBN USN DATES

123 222 1/2/13

002 333 2/2/13

003 111 3/2/13

005 444 4/2/13

003 555 5/2/13

1. Obtain the name of the student who has borrowed the book bearing ISBN ‘123’

select NAME from student1

where USN=(select USN from borrow where ISBN='123');

NAME

Bbb

1. Obtain the Names of students who have borrowed database books.

select NAME from student1

where USN=(select USN from borrow where ISBN=(select ISBN from books where TITLE='DB'));

NAME

Ccc

1. Find the number of books borrowed by each student.

select count(ISBN) from borrow

group by USN;

COUNT(ISBN)

1

1

1

1

1

1. Create the table, insert suitable tuples and perform the following operations using MongoDB

Create the collection:

>db.createCollection("LIBRARY")

Insert the values:

>db.LIBRARY.insert({"ISBN":1122,"TITLE":'datbase',"AUTHOR":'ABC',"PUBLISHER":'selina',"SSN":2015,"date":'2017-05-29'})

>db.LIBRARY.insert({"ISBN":2233,"TITLE":'datbase',"AUTHOR":'DEF',"PUBLISHER":'mcgraw',"SSN":2016,"date":'2017-06-29' })

1. Obtain the name of the student who has borrowed the book bearing ISBN ‘123’.

>db.LIBRARY.find().pretty() >db.LIBRARY.find({"ISBN":1122},{"SSN":1,\_id:0}).pretty()

1. Obtain the Names of students who have borrowed database books.

>db.LIBRARY.find({"TITLE":'datbase'},{"SSN":1,\_id:0}).pretty()

l) Write a PL/SQL procedure to print the first 8 Fibonacci numbers and a program to call the same.

SET SERVEROUTPUT ON

declare

a number;

b number;

c number;

n number;

i number;

begin

n:=8;

a:=0;

b:=1;

dbms\_output.put\_line(a);

dbms\_output.put\_line(b);

for i in 1..n-2

loop

c:=a+b;

dbms\_output.put\_line(c);

a:=b;

b:=c;

end loop;

end;

/