

①

$$RS \leftarrow R * S$$

$$\text{Result} \leftarrow \pi_{A, D}(RS)$$

RS

A	B	C	D
a	b	c	1
b	e	f	1

Result

A	D
a	1
b	1

2 Right Outer Join

Result $\leftarrow (R \bowtie_{c=c} S)$

RESULT

A	B	c	D
a	b	c	1
b	e	f	1
null	null	g	2

Outer Union

Result $\leftarrow R \text{ OUTER UNIONS}$

RESULT

A	B	c	D
a	b	c	1
a	b	d	null
b	e	f	1
null	null	g	2

3)

$$\{ p.Pname \mid PROJECT(p) \text{ AND } (\exists f)(\exists g) \text{ (Employee}(e) \\ \text{ AND WORKS_ON}(p) \text{ AND WORKS_ON}(f) \text{ AND} \\ \text{ WORKS_ON}(g) \text{ AND } p.ESSN = e.ESSN \text{ AND} \\ f.ESSN = e.ESSN \text{ AND } g.ESSN = e.ESSN \text{ AND} \\ \text{ NOT}(p.PNO = f.PNO) \text{ AND } \text{ NOT}(f.PNO = g.PNO) \\ \text{ AND } \text{ NOT}(p.PNO = g.PNO) \} \text{ AND } p.PNO = PNUMBER \}$$

④ } x | (∃y) (∃z) (∃w) (∃a) (∃c) (∃d) (∃f)
(∃g) (∃i)

(∃y) PROJECTS (x y z w) AND

(∃b) WORKS_ON (a b c) AND

(∃e) WORKS_ON (d e f) AND

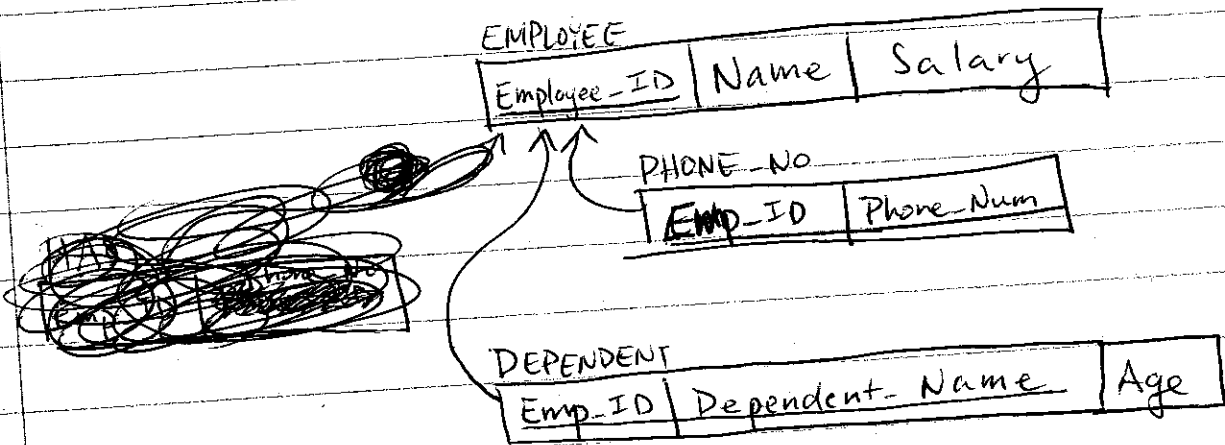
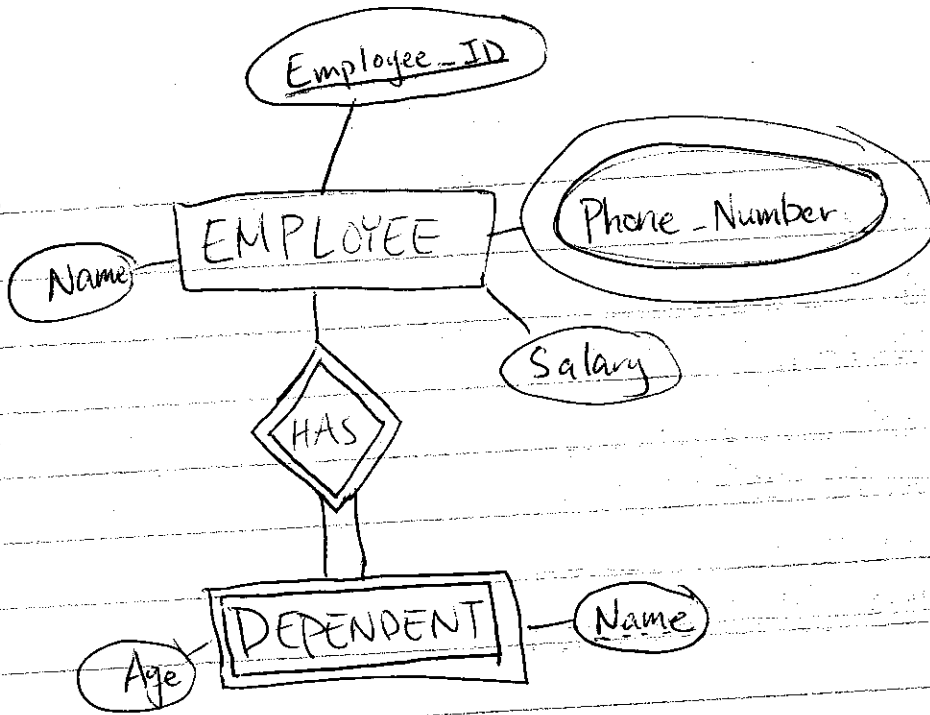
(∃h) WORKS_ON (g h i) AND

a = d and a = g and y = b

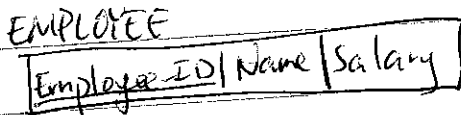
and e <> h and b <> e and b <> e

}

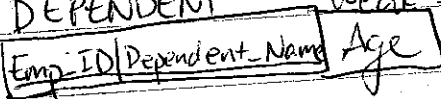
5.



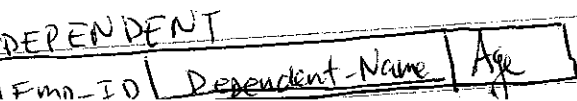
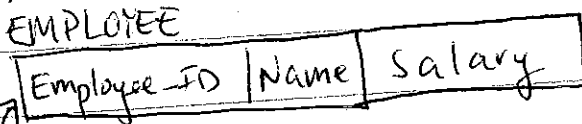
1. draw entity types



2. DEPENDENT weak entity types



4.



⑨ SELECT DNAME, M.FNAME, M.LNAME, COUNT(*)
FROM EMPLOYEE E, EMPLOYEE M, DEPARTMENT D
WHERE M.SSN = D.MGRSSN AND E.DNO = D.DNUMBER
GROUP BY DNO
HAVING COUNT(*) > 10;

⑩ CREATE SCHEMA COMPANY AUTHORIZATION JSMITH;
- creates a schema named COMPANY with JSMITH
as the owner

CREATE TABLE EMPLOYEE (FNAME VARCHAR(15), LNAME
VARCHAR(15), ADDRESS VARCHAR(30), SALARY INT);
- creates a new relation within the current schema
with the name EMPLOYEE with the listed attributes

CREATE TYPE SSN-TYPE AS OBJECT (SSN NUMBER(9));
- creates a new datatype called SSN-TYPE that
is a 9-digit number

CREATE ASSERTION SAL_CONSTRAINT CHECK (NOT EXISTS
(SELECT * FROM EMPLOYEE E, EMPLOYEE M, DEPARTMENT
D WHERE E.SALARY > M.SALARY));
- this assertion makes sure that no employee
E makes more than an EMPLOYEE M

8) select P.PNAME FROM PROJECT P, WORKS_ON W1, WORKS_ON W2, WORKS_ON W3 where W1.ESSN = W2.ESSN AND W1.ESSN = W3.ESSN AND P.PNUMBER = W1.PNO AND W2.PNO != W3.PNO, W1.PNO != W2.PNO AND W1.PNO != W3.PNO ORDER BY P.PNAME DESC;

⑦ A REFERENTIALLY TRIGGERED ACTION IS A SPECIFIED ~~COURSE OF ACTION~~ COURSE OF ACTION THAT IS TO OCCUR WHEN THERE IS A REFERENTIAL INTEGRITY CONSTRAINT VIOLATION.

EX  i.e., Foreign key constraint violation

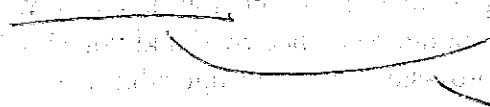
CREATE TABLE DEPT_LOCATION

(...

Primary Key (DNUMBER, DLOCATION),

Foreign Key (DNUMBER) REFERENCES DEPARTMENT (DNUMBER)

ON DELETE CASCADE ON UPDATE CASCADE);

 these are referentially triggered actions

10)

Device Manager register Driver

```
(new oracle.jdbc.OracleDriver());
```

```
DefaultContext cx = Oracle.getConnection(connect, login,  
password, autocommit);
```

```
DefaultContext.setDefaultContext(cx);
```

```
#sql iterator TableRIter(char colA, char colB);
```

```
TableRIter t = null;
```

```
#sql t =  $\epsilon$  select A, B from R3;
```

```
while (t.next())
```

```
 $\epsilon$  System.out.println("A:" + t.colA() + " B:" + t.colB());  $\exists$ 
```

```
t.close();
```