Linnéuniversitetet
Kalmar Växjö

Assignment 2 -

Database and datamodeling

Assignment 2

Author: Benoit Dervieux
Supervisor: Alisa Lincke
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Contents

1 - Answer to the task 1

a. The functional dependency for the question a is:

{Manufacturer, Serial_number } –> { Model, Batch, Capacity, Retailer}

b. The functional dependency for the question b is:

Manufacturer –> Model

c. The functional dependency for the question c is:

Batch –> Model

2 - Answer to the task 2

The table is not 1NF because we can have several sellers in the field Salesperson for every vehicle.

Car	Date_sold	Salesperson	Commission	Discount
N1	2/21/2013	Vendor A, Vendor B	5%	5%

To respect the 1NF rule, we would need to differentiate the tuples of salesperson such as:

Car	Date_sold	Salesperson	Commission	Discount
N1	2/21/2013	Vendor A	5%	5%
N1	2/21/2013	Vendor B	5%	5%

Here, the table respects the 2NF condition because every non-prime attribute is fully functionally dependant on the primary key which is car and salesperson. However, we can see that the 3NF is not respected because some non-prime attributes are transitively dependant on an element of a primary key but not others. For instance, date_sold is more dependant on the car tham on the salesperson. The same way, commission is more dependant on the salesperson

than on the car. Hence, to fix that, the new design can be:

Car	Date_sold	Discount
N1	2/21/2013	5%

Car	Salesperson	Commission
N1	Vendor A	5%
N1	Vendor B	3%

The discount field is a bit complex to place because we do not know if concerns the sale or the car but the most important is to differentiate the date_sold and the commission to respect the 3NF rule.

3 - Answer to the task 3

Query A:

```
select e.fname, e.minit, e.lname
from employee as e, project as p, works_on as w
where e.ssn = w.essn and w.pno = p.pnumber and p.pname = "Computerization";
/* A */
```

fname	minit	lname
Franklin	T	Wong
Ahmad	V	Jabbar
Alicia	J	Zelaya

Query B:

```
select p.pnumber, d.dnumber, e.lname, e.address, e.bdate
from project as p, department as d, employee as e
where d.mgrssn = e.ssn and d.dnumber = p.dnum and p.plocation = 'Houston';
/* B */
```

pnumber	dnumber	lname	address	bdate
3	5	Wong	638 Voss, Houston, TX	1945-12-08
20	1	Borg	450 Stone, Houston, TX	1927-11-10

Query C:

```
select e.fname, e.lname, b.fname, b.lname
from employee as e, employee as b
where e.superssn = b.ssn;
/* C */
```

fname	lname	fname	lname
Jon	Jones	Jared	James
Justin	Mark	Jared	James
Brad	Knight	Jared	James
John	Smith	Franklin	Wong
Josh	Zell	Evan	Wallis
Andy	Vile	Evan	Wallis
Tom	Brand	Evan	Wallis
Jenny	Vos	Josh	Zell
Chris	Carter	Josh	Zell
Jeff	Chase	Kim	Grace
Franklin	Wong	James	Borg
Bonnie	Bays	Alex	Freed
Alec	Best	Alex	Freed
Sam	Snedden	Alex	Freed
Joyce	English	Franklin	Wong
Nandita	Ball	John	James
Jill	Jarvis	Bob	Bender
Kate	King	Bob	Bender
Lyle	Leslie	Jill	Jarvis
Billie	King	Lyle	Leslie
Jon	Kramer	Lyle	Leslie
Ray	King	Billie	King
Gerald	Small	Kate	King
Arnold	Head	Kate	King
Helga	Pataki	Kate	King
Naveen	Drew	Gerald	Small
Carl	Reedy	Naveen	Drew
Sammy	Hall	Carl	Reedy
Red	Bacher	Sammy	Hall
Ramesh	Narayan	Franklin	Wong
Jennifer	Wallace	James	Borg
Ahmad	Jabbar	Jennifer	Wallace
Alicia	Zelaya	Jennifer	Wallace

Query D:

```
select *
from employee as e
where e.address like "%Atlanta, GA%";
/* D */
```

fname	minit	lname	ssn	bdate	address	sex	salary	superssn	dno
Jared	D	James	111111100	1966-10-10	123 Peachtree, Atlanta, GA	M	85000	NULL	6
Jon	C	Jones	111111101	1967-11-14	111 Allgood, Atlanta, GA	M	45000	111111100	6
Justin	NULL	Mark	111111102	1966-01-12	2342 May, Atlanta, GA	M	40000	111111100	6
Brad	C	Knight	111111103	1968-02-13	176 Main St., Atlanta, GA	M	44000	111111100	6
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Query E:

```
select *
from employee
where bdate like "____11___";
/* E */
```

fname	minit	lname	ssn	bdate	address	sex	salary	superssn	dno
Jon	C	Jones	111111101	1967-11-14	111 Allgood, Atlanta, GA	M	45000	111111100	6
Jenny	F	Vos	222222204	1967-11-11	263 Mayberry, Milwaukee, WI	F	61000	222222201	7
James	E	Borg	888665555	1927-11-10	450 Stone, Houston, TX	M	55000	NULL	1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Query F:

```
select d.dname, avg(e.salary)
from department as d, employee as e
where d.dnumber = e.dno
group by d.dname;
/* F */
```

dname	avg(e.salary)
Administration	31000.0000
Hardware	63450.0000
Headquarters	55000.0000
Research	33250.0000
Sales	40821.4286
Software	60000.0000

Query G:

```
select e.fname, e.minit, e.lname
from employee as e
where e.ssn not in
(select w.essn
from works_on as w);
/* G */
```

fname	minit	lname
Bob	B	Bender
Kate	W	King

Query H:

```
select e.fname, e.minit, e.lname
from employee as e, project as p
where e.dno = p.dnum and e.salary > 30000 and p.pname = "ProductZ";
/* H */
```

fname	minit	lname
Franklin	T	Wong
Ramesh	K	Narayan

Query I:

```
select e.fname, e.minit, e.lname
from employee as e, department as d
where e.dno = d.dnumber and d.mgrssn = '333445555' and e.address like "%Houston, TX%";
/* I */
```

fname	minit	lname
John	B	Smith
Franklin	T	Wong
Joyce	A	English

Query J:

```
select e.fname, e.minit, e.lname
from employee as e
inner join
    (select dno
    from employee
    group by dno
    order by avg(salary) desc
    limit 1) as e2
    on e.dno = e2.dno;
/* J */
```

fname	minit	lname
Evan	E	Wallis
Josh	U	Zell
Andy	C	Vile
Tom	G	Brand
Jenny	F	Vos
Chris	A	Carter
Alex	D	Freed
Bonnie	S	Bays
Alec	C	Best
Sam	S	Snedden

Query K:

```
select d.dnumber, d.dname, count(*)
from employee as e, department as d
where d.dnumber = e.dno
group by e.dno
order by avg(e.salary);
/* K */
```

dnumber	dname	count(*)
4	Administration	3
5	Research	4
8	Sales	14
1	Headquarters	1
6	Software	8
7	Hardware	10

Query L:

```
select d.dependent_name, d.relationship
from employee as e, dependent as d
where e.superssn = '333445555' and e.ssn = d.essn
order by d.dependent_name;
/* L */
```

```
select d.dependent_name, d.relationship
from employee as e, dependent as d
where e.superssn = '333445555' and e.ssn = d.essn
order by d.dependent_name;
/* L */
```