

[Flag question](#)

- b. ORDER BY, but not in the GROUP BY.
- c. GROUP BY, but not in the ORDER BY.
- d. Not in GROUP BY or ORDER BY.



Andrei Tiution

**Question 3**

Complete

Mark 0 out of 1

[Flag question](#)

The projection list of a SELECT query can contains a table attribute and an SQL aggregation function only if:

- a. The attribute is included in the HAVING clause.
- b. The attribute is included in the GROUP by clause.
- c. The attribute is the primary key.
- d. The attribute is a candidate key.

**Question 4**

Complete

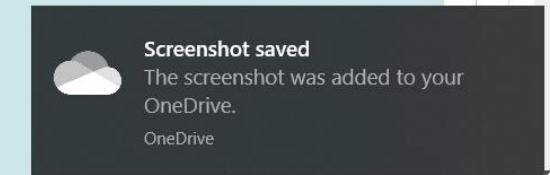
Mark 0 out of 1

[Flag question](#)

An SQL aggregation function cannot be used directly in:

- a. A Subquery.
- b. A WHERE clause.
- c. A projection list.
- d. A HAVING clause.

121 pg



**Question 6**

Complete

Mark 1 out of 1

Flag question

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT rank FROM Sailors WHERE rank > ALL ( SELECT rank FROM Sailors);
```

- a. 10
- b. empty result ✓
- c. 0
- d. NULL

**Question 7**

Complete

For a table containing a single row with all attributes excepting PK containing NULL values, the  
`SELECT COUNT(*) FROM Table;`



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Complete

Mark 0 out of 1

Flag question

- a. The same name for the primary key.
- b. The same attributes, with the same names and types, in the same order.
- c. The same set of indexes.
- d. The same number of attributes with corresponding types in the same order.



Andrei Tiution

Question 9

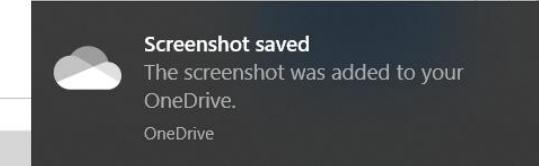
Complete

Mark 1 out of 1

Flag question

The full join operation can be implemented using the following operator:

- a. EXCEPT
- b. UNION ✓ pg 116
- c. INTERSECTION
- d. DIFFERENCE



DB Exam Part 2: Attempt review – Google Chrome

cv.upt.ro/mod/quiz/review.php?attempt=216559&cmid=169939

CV

Complete  
Mark 0 out of 1  
Flag question

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:  
SELECT rank FROM Sailors WHERE rank > ALL ( SELECT rank FROM Sailors);

a. 10  
 b. NULL  
 c. empty result ✓  
 d. 0

Question 5  
Complete  
Mark 1 out of 1  
Flag question

Considering the Harbor database used on the course, and the following query:  
SELECT sid, Sailors.rank FROM Sailors WHERE  
age > (SELECT s.age  
FROM Sailors s INNER JOIN  
Reserves r ON s.sid=r.sid  
WHERE r.bid=103 AND  
r.date>'2014-11-23')

which clause of the query contain errors:

a. The projection list of the main query.  
 b. The WHERE clause of the main query. ✓  
 c. The WHERE clause of the subquery.  
 d. Neither clause, it is a valid query.

Activate Windows  
Go to Settings to activate Windows.

[Finish review](#)**Question 1**

Complete

Mark 1 out of 1

[Flag question](#)

Multiple criteria in the parameter list are interpreted in a hierarchical manner in:

- a. GROUP BY, but not in the ORDER BY.
- b. ORDER BY, but not in the GROUP BY. ✓
- c. Not in GROUP BY or ORDER BY.
- d. Both GROUP BY and ORDER BY.

**Question 2**

Complete

Mark 0 out of 1

[Flag question](#)

The DISTINCT parameter will not have any effect for just one of the following SQL aggregation functions:

- a. VARIANCE
- b. SUM
- c. MAX ✓
- d. AVG

**pg 128****Question 3**

Complete

Mark 0 out of 1

[Flag question](#)

The projection list of a SELECT query can contain a table attribute and an SQL aggregation function only if:

- a. The attribute is included in the HAVING clause.
- b. The attribute is included in the GROUP by clause. ✓
- c. The attribute is a candidate key.
- d. The attribute is the primary key.

**Question 4**

Complete

Mark 1 out of 1

A hash index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  can be used to match the selection:

- a.  $x_3 = 7$

**Question 6**

Complete

Mark 1 out of 1

Flag question

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT s.name FROM Sailors s  
WHERE NOT EXISTS (SELECT * FROM Sailors s1 WHERE s1.rank < s.rank)
```

- a. Rusty, Zorba
- b. all sailors' names
- c. empty result
- d. Brutus ✓?

**Question 7**

Complete

Mark 1 out of 1

Flag question

To be union compatible two relations must have:

- a. The same attributes, with the same names and types, in the same order.
- b. The same number of attributes with corresponding types in the same order. ✓
- c. The same set of indexes.
- d. The same name for the primary key.

**Question 8**

Complete

The cost of the query execution plan is not depending on:

**Question 8**

Complete

Mark 0 out of 1

Flag question

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.
- b. The number of attributes of the input relations. ✓?
- c. The cardinality of the input relations.
- d. The sizes of the relations representing intermediary results.

**Question 9**

Complete

Mark 0 out of 1

Flag question

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name
  FROM Sailors s, Boats b, Reserves r
 WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND
       s.sid IN
         (SELECT s1.sid
           FROM Sailors s1, Boats b1, Reserves r1
          WHERE s1.sid=r1.sid AND r1.bid=b1.bid
                AND b1.color='Green')
```

which of the following statements is false:

- a. The queries are uncorrelated.
- b. The queries are correlated. ✓
- c. It is a valid SQL query.
- d. The query implements the INTERSECTION operation.

[Finish review](#)

**Started on** Monday, 7 December 2020, 2:19 PM

**State** Finished

**Completed on** Monday, 7 December 2020, 2:33 PM

**Time taken** 13 mins 55 secs

**Grade** 3 out of 9 (33%)

**Question 1**

Complete

Mark 1 out of 1

Flag question

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. RADIUS.
- b. KERBEROS.
- c. DIAMETER. ✓
- d. PKI.

**Question 2**

Complete

Mark 1 out of 1

Flag question

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

SELECT rank FROM Sailors WHERE rank > ALL ( SELECT rank FROM Sailors);

- a. 0
- b. 10
- c. NULL
- d. empty result. ✓

**Question 3**

Complete

Mark 1 out of 1

Flag question

A subquery used as operand of the IN operator must return:

- a. A single scalar value.
- b. A set of tuples.
- c. A tuple.
- d. A set of scalar values. ✓

**Question 4**

Complete

Mark 0 out of 1

 Flag  
question

Considering the Harbor database used on the course, and the following query:

```
SELECT sid, Sailors.rank FROM Sailors WHERE
    age > (SELECT s.age
            FROM Sailors s INNER JOIN
                 Reserves r ON s.sid=r.sid
            WHERE r.bid=103 AND
                  r.date>'2014-11-23')
```

which clause of the query contain errors:

- a. The WHERE clause of the main query.
- b. The WHERE clause of the subquery.
- c. Neither clause, it is a valid query.
- d. The projection list of the main query.

**Question 5**

Complete

Mark 0 out of 1

 Flag  
question

Which of the following statements is not true about subqueries?

- a. A subquery can be included in a FROM clause.
- b. A subquery can be included in a projection list.
- c. A subquery can be included in a ORDER BY clause.
- d. A subquery can be included in a WHERE clause.

**Question 6**

Complete

Mark 0 out of 1

 Flag  
question

The DISTINCT parameter will not have any effect for just one of the following SQL aggregation functions:

- a. SUM
- b. AVG
- c. VARIANCE
- d. MAX

**Question 7**

Complete

Mark 0 out of 1

 Flag  
question

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_3 = 7$
- b.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$
- c.  $x_1 = 5$  and  $x_2 > 5$
- d.  $x_1 = 3$

**Question 8**

Complete

Mark 0 out of 1

 Flag  
question

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.
- b. The number of attributes of the input relations.
- c. The cardinality of the input relations.
- d. The sizes of the relations representing intermediary results.

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_3 = 7$
- b.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$
- c.  $x_1 = 5$  and  $x_2 > 5$
- d.  $x_1 = 3$

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.
- b. The number of attributes of the input relations.
- c. The cardinality of the *input* relations.
- d. The sizes of the relations representing intermediary results.

The projection list of a SELECT query can contains a table attribute and an SQL aggregation function only if:

- a. The attribute is a candidate key.
- b. The attribute is included in the HAVING clause.
- c. The attribute is included in the GROUP by clause.
- d. The attribute is the primary key.

8

**Question 1**

Not yet  
answered

Marked out of 1

Flag question

To be union compatible two relations must have:

- a. The same set of indexes.
- b. The same attributes, with the same names and types, in the same order.
- c. The same number of attributes with corresponding types in the same order. ✓
- d. The same name for the primary key.

**Question 2**

Not yet  
answered

Marked out of 1

 Flag question

Considering the following Sailors table:

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT s.name FROM Sailors s  
WHERE NOT EXISTS (SELECT * FROM Sailors s1 WHERE s1.rank < s.rank)
```

- a. all sailors' names
- b. Rusty, Zorba
- c. empty result
- d. Brutus

**Question 3**

Not yet  
answered

Marked out of 1

 Flag question

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_1 = 5$  and  $x_2 > 5$
- b.  $x_3 = 7$
- c.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$
- d.  $x_1 = 3$

**Next page**

**Question 4**

Not yet  
answered

Marked out of 1

 Flag question

Considering the Harbor database used on the course, and the following query:

```
SELECT sid, Sailors.rank FROM Sailors WHERE
    age > (SELECT s.age
        FROM Sailors s INNER JOIN
            Reserves r ON s.sid=r.sid
        WHERE r.bid=103 AND
            r.date>'2014-11-23')
```

which clause of the query contain errors:

- a. Neither clause, it is a valid query.
- b. The WHERE clause of the subquery.
- c. The projection list of the main query.
- d. The WHERE clause of the main query. ✓

**Question 5**

Not yet  
answered

Marked out of 1

 Flag question

For a table containing a single row with all attributes excepting PK containing NULL values, the

`SELECT COUNT(*) FROM Table;`  
will return:

- a. nothing
- b. 1 ✓
- c. NULL
- d. 0

[Next page](#)

Question **6**

Not yet  
answered

Marked out of 1

 Flag question

The projection list of a SELECT query can  
contains a table attribute and an SQL  
aggregation function only if:

- a. The attribute is included in the GROUP by clause. 
- b. The attribute is a candidate key.
- c. The attribute is the primary key.
- d. The attribute is included in the HAVING clause.

Next page

Question 7

Not yet  
answered

Marked out of 1

Flag question

Which of the following does not represents a authentication mechanism supported by Oracle:

- a. PKI.
- b. DIAMETER. ✓
- c. KERBEROS.
- d. RADIUS.

Next page

Question **8**

Not yet  
answered

Marked out of 1

 Flag question

An SQL aggregation function cannot be used directly in:

- a. A HAVING clause.
- b. A Subquery.
- c. A WHERE clause. ✓
- d. A projection list.

Question 1

Not yet  
answered

Marked out of 1

Flag  
question

Considering the following Sailors table:

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
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74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT s.name FROM Sailors s  
WHERE NOT EXISTS (SELECT * FROM Sailors s1 WHERE s1.rank < s.rank)
```

- a. all sailors' names
- b. empty result
- c. Rusty, Zorba
- d. Brutus

**Question 2**

Not yet  
answered

Marked out of 1

 Flag  
question

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$
- b.  $x_3 = 7$
- c.  $x_1 = 3$
- d.  $x_1 = 5$  and  $x_2 > 5$

**Question 3**

Not yet  
answered

Marked out of 1

Flag  
question

The full join operation can be implemented using the following operator:

- a. INTERSECTION
- b. EXCEPT
- c. UNION
- d. DIFFERENCE

[Clear my choice](#)

**Question 4**

Not yet  
answered

Marked out of 1

 Flag  
question

A hash index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  can be used to match the selection:

- a.  $x_1 = 3$
- b.  $x_1 = 5$  and  $x_2 > 5$
- c.  $x_3 = 7$
- d.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$



[Clear my choice](#)

**Question 5**

Not yet  
answered

Marked out of 1

Flag  
question

An SQL aggregation function cannot be used directly in:

- a. A Subquery.
- b. A WHERE clause. ✓
- c. A HAVING clause.
- d. A projection list.

[Clear my choice](#)

**Question 6**

Not yet  
answered

Marked out of 1

Flag  
question

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name
  FROM Sailors s, Boats b, Reserves r
 WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND
       s.sid IN
        (SELECT s1.sid
          FROM Sailors s1, Boats b1, Reserves r1
         WHERE s1.sid=r1.sid AND r1.bid=b1.bid
               AND b1.color='Green')
```

which of the following statements is false:

- a. The queries are correlated.
- b. The query implements the INTERSECTION operation.
- c. It is a valid SQL query.
- d. The queries are uncorrelated.

[Clear my choice](#)

Question 8

Not yet  
answered

Marked out of 1

Flag  
question

Multiple criteria in the parameter list are interpreted in a hierarchical manner in:

- a. Not in GROUP BY or ORDER BY.
- b. GROUP BY, but not in the ORDER BY.
- c. ORDER BY, but not in the GROUP BY. ✓
- d. Both GROUP BY and ORDER BY.

[Clear my choice](#)



## Question 3

Complete

Mark 0 out of 1

Flag question

- d.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.
- b. The cardinality of the input relations.
- c. The sizes of the relations representing intermediary results.
- d. The number of attributes of the input relations.

## Question 4

Complete

Mark 1 out of 1

Flag question

The full join operation can be implemented using the following operator:

- a. DIFFERENCE
- b. EXCEPT
- c. UNION
- d. INTERSECTION

## Question 5

Complete

Mark 0 out of 1

Considering the following Sailors table:

sid	sname	rating	age
so	so	so	so



Type here to search





- c. UNION
- d. INTERSECTION

## Question 5

Complete

Mark 0 out of 1

Flag question

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

SELECT rank FROM Sailors WHERE rank &gt; ALL ( SELECT rank FROM Sailors);

- a. NULL
- b. empty result ✓
- c. 0
- d. 10

## Question 6

Which of the following statements is not true about subqueries?



Type here to search





## Question 6

Complete

Mark 0 out of 1

Flag question

 d. 10

Which of the following statements is not true about subqueries?

- a. A subquery can be included in a ORDER BY clause.
- b. A subquery can be included in a FROM clause.
- c. A subquery can be included in a WHERE clause.
- d. A subquery can be included in a projection list.

## Question 7

Complete

Mark 1 out of 1

Flag question

To be union compatible two relations must have:

- a. The same name for the primary key.
- b. The same number of attributes with corresponding types in the same order.
- c. The same set of indexes.
- d. The same attributes, with the same names and types, in the same order.

## Question 8

Complete

Mark 1 out of 1

Flag question

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name  
FROM Sailors s, Boats b, Reserves r  
WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND
```



Mark 1 out of 1

Flag question

- a. The same name for the primary key.
- b. The same number of attributes with corresponding types in the same order.
- c. The same set of indexes.
- d. The same attributes, with the same names and types, in the same order.

Question 8

Complete

Mark 1 out of 1

Flag question

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name
  FROM Sailors s, Boats b, Reserves r
 WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND
       s.sid IN
         (SELECT s1.sid
  FROM Sailors s1, Boats b1, Reserves r1
 WHERE s1.sid=r1.sid AND r1.bid=b1.bid
       AND b1.color='Green')
```

which of the following statements is false:

- a. The query implements the INTERSECTION operation.
- b. The queries are correlated. ✓
- c. It is a valid SQL query.
- d. The queries are uncorrelated.



AND b1.color='Green')

which of the following statements is false:

- a. The query implements the INTERSECTION operation.
- b. The queries are correlated.
- c. It is a valid SQL query.
- d. The queries are uncorrelated.

Question **9**

Complete

Mark 0 out of 1

Flag question

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$  **Can be used**
- b.  $x_1 = 3$
- c.  $x_3 = 7$
- d.  $x_1 = 5$  and  $x_2 > 5$

Question 7

Complete

Mark 1 out of 1

Flag question

The full join operation can be implemented using the following operator:

- a. EXCEPT
- b. INTERSECTION
- c. UNION ✓
- d. DIFFERENCE

Question 8

Complete

Mark 1 out of 1

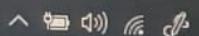
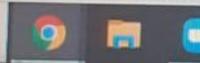
Flag question

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. RADIUS.
- b. KERBEROS.
- c. DIAMETER. ✓
- d. PKI.

Activate Window  
Go to Settings to ac

Question 9





SHOW ONE PAGE AT A TIME

[Finish review](#)**Question 1**

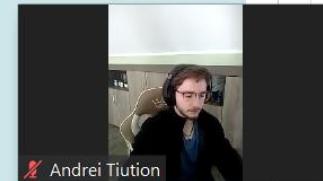
Complete

Mark 1 out of 1

[Flag question](#)

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. KERBEROS.
- b. RADIUS.
- c. PKI.
- d. DIAMETER.



Andrei Tiution

**Question 2**

Complete

Mark 0 out of 1

[Flag question](#)

Multiple criteria in the parameter list are interpreted in a hierarchical manner in:

- a. Both GROUP BY and ORDER BY.
- b. ORDER BY, but not in the GROUP BY. ✓
- c. GROUP BY, but not in the ORDER BY.
- d. Not in GROUP BY or ORDER BY.

**Question 3**

Complete

Mark 0 out of 1

[Flag question](#)

The projection list of a SELECT query can contain a table attribute and an SQL expression.

- a. The attribute is included in the HAVING clause.
- b. The attribute is included in the GROUP BY clause.



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- b. A WHERE clause.
- c. A projection list.
- d. A HAVING clause.



Andrei Tiution

**Question 5**

Complete

Mark 0 out of 1

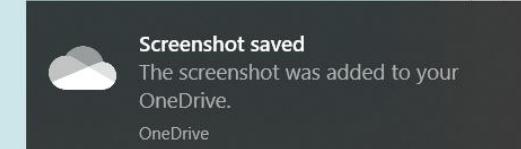
[Flag question](#)

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name  
FROM Sailors s, Boats b, Reserves r  
WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND  
      s.sid IN  
      (SELECT s1.sid  
       FROM Sailors s1, Boats b1, Reserves r1  
       WHERE s1.sid=r1.sid AND r1.bid=b1.bid  
             AND b1.color='Green')
```

which of the following statements is false:

- a. It is a valid SQL query.
- b. The queries are correlated. ✓
- c. The queries are uncorrelated.
- d. The query implements the INTERSECTION operation.





## Question 7

Complete

Mark 0 out of 1

Flag question

For a table containing a single row with all attributes excepting PK containing NULL values, the SELECT COUNT(\*) FROM Table; will return:

- a. 0
- b. NULL
- c. 1 ✓
- d. nothing



Andrei Tiution

## Question 8

Complete

Mark 0 out of 1

Flag question

To be union compatible two relations must have:

- a. The same name for the primary key.
- b. The same attributes, with the same names and types, in the same order.
- c. The same set of indexes.
- d. The same number of attributes with corresponding types in the same order. ✓

DB Exam Part 2: Attempt review – Google Chrome  
cv.upt.ro/mod/quiz/review.php?attempt=216559&cmid=169939

 CV

Quiz navigation

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**Started on** Monday, 7 December 2020, 2:19 PM  
**State** Finished  
**Completed on** Monday, 7 December 2020, 2:29 PM  
**Time taken** 9 mins 45 secs  
**Grade** 5 out of 9 (56%)

**Question 1**  
Complete  
Mark 1 out of 1  
[Flag question](#)

To be union compatible two relations must have:

a. The same number of attributes with corresponding types in the same order. ✓  
 b. The same name for the primary key.  
 c. The same attributes, with the same names and types, in the same order.  
 d. The same set of indexes.

**Question 2**  
Complete  
Mark 0 out of 1  
[Flag question](#)

The projection list of a SELECT query can contains a table attribute and an SQL aggregation function only if:

a. The attribute is included in the HAVING clause. ✓  
 b. The attribute is included in the GROUP by clause.  
 c. The attribute is the primary key.  
 d. The attribute is a candidate key.

**Question 3**  
Complete  
Mark 0 out of 1  
[Flag question](#)

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

a.  $x_3 = 7$   
 b.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$   
 c.  $x_1 = 5$  and  $x_2 > 5$   
 d.  $x_1 = 3$

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Type here to search          2:32 PM ENG 12/7/2020 4

DB Exam Part 2: Attempt review – Google Chrome

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CV

**Question 6**  
Complete  
Mark 0 out of 1  
Flag question

A subquery used as operand of the IN operator must return:

- a. A single scalar value.
- b. A tuple.
- c. A set of scalar values. ✓
- d. A set of tuples.

**Question 7**  
Complete  
Mark 1 out of 1  
Flag question

The full join operation can be implemented using the following operator:

- a. DIFFERENCE
- b. EXCEPT
- c. UNION ✓
- d. INTERSECTION

**Question 8**  
Complete  
Mark 1 out of 1  
Flag question

An SQL aggregation function cannot be used directly in:

- a. A projection list.
- b. A HAVING clause.
- c. A Subquery.
- d. A WHERE clause. ✓

**Question 9**  
Complete  
Mark 1 out of 1  
Flag question

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. RADIUS.

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Question 7  
Complete  
Mark 1 out of 1  
Flag question

The full join operation can be implemented using the following operator:

- a. DIFFERENCE
- b. EXCEPT
- c. UNION ✓
- d. INTERSECTION

Question 8  
Complete  
Mark 1 out of 1  
Flag question

An SQL aggregation function cannot be used directly in:

- a. A projection list.
- b. A HAVING clause.
- c. A Subquery.
- d. A WHERE clause ✓

Question 9  
Complete  
Mark 1 out of 1  
Flag question

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. RADIUS.
- b. KERBEROS.
- c. DIAMETER. ✓
- d. PKI.

Finish review

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**Question 4**

Complete

Mark 1 out of 1

Flag question

A hash index on the key <x1, x2, x3, x4> can be used to match the selection:

- a. x3 = 7
- b. x1 = 5 and x2 > 5
- c. x1= 6 and x2 = 9 and x3 = 2 and x4 = 25
- d. x1 = 3

**Question 5**

Complete

Mark 0 out of 1

Flag question

An SQL aggregation function cannot be used directly in:

- a. A Subquery.
- b. A WHERE clause.
- c. A projection list.
- d. A HAVING clause.

**Question 6**

Complete

Mark 1 out of 1

Flag question

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT s.name FROM Sailors s  
WHERE NOT EXISTS (SELECT * FROM Sailors s1 WHERE s1.rank < s.rank)
```

Question **9**

Not yet  
answered

Marked out of 1

 Flag question

The DISTINCT parameter will not have any effect for just one of the following SQL aggregation functions:

- a. SUM
- b. MAX ✓
- c. VARIANCE
- d. AVG

Question 7

Not yet  
answered

Marked out of 1

Flag  
question

To be union compatible two relations must have:

- a. The same name for the primary key.
- b. The same attributes, with the same names and types, in the same order.
- c. The same number of attributes with corresponding types in the same order. ✓
- d. The same set of indexes.

[Clear my choice](#)



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Time taken 11 mins 17 secs

Grade 5 out of 9 (56%)

## Question 1

Complete

Mark 1 out of 1

[Flag question](#)

Which of the following does not represent a authentication mechanism supported by Oracle:

- a. RADIUS.
- b. DIAMETER ✓
- c. PKI.
- d. KERBEROS.

## Question 2

Complete

Mark 1 out of 1

[Flag question](#)A hash index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  can be used to match the selection:

- a.  $x_1 = 3$
- b.  $x_3 = 7$
- c.  $x_1 = 5$  and  $x_2 > 5$
- d.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$  ✓

## Question 3

Complete

Mark 0 out of 1

[Flag question](#)

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.

Mark 1 out of 1  
Flag question

- b. KERBEROS.
- c. DIAMETER.
- d. PKI.

Question 9

Complete

Mark 0 out of 1

Flag question

The cost of the query execution plan is not depending on:

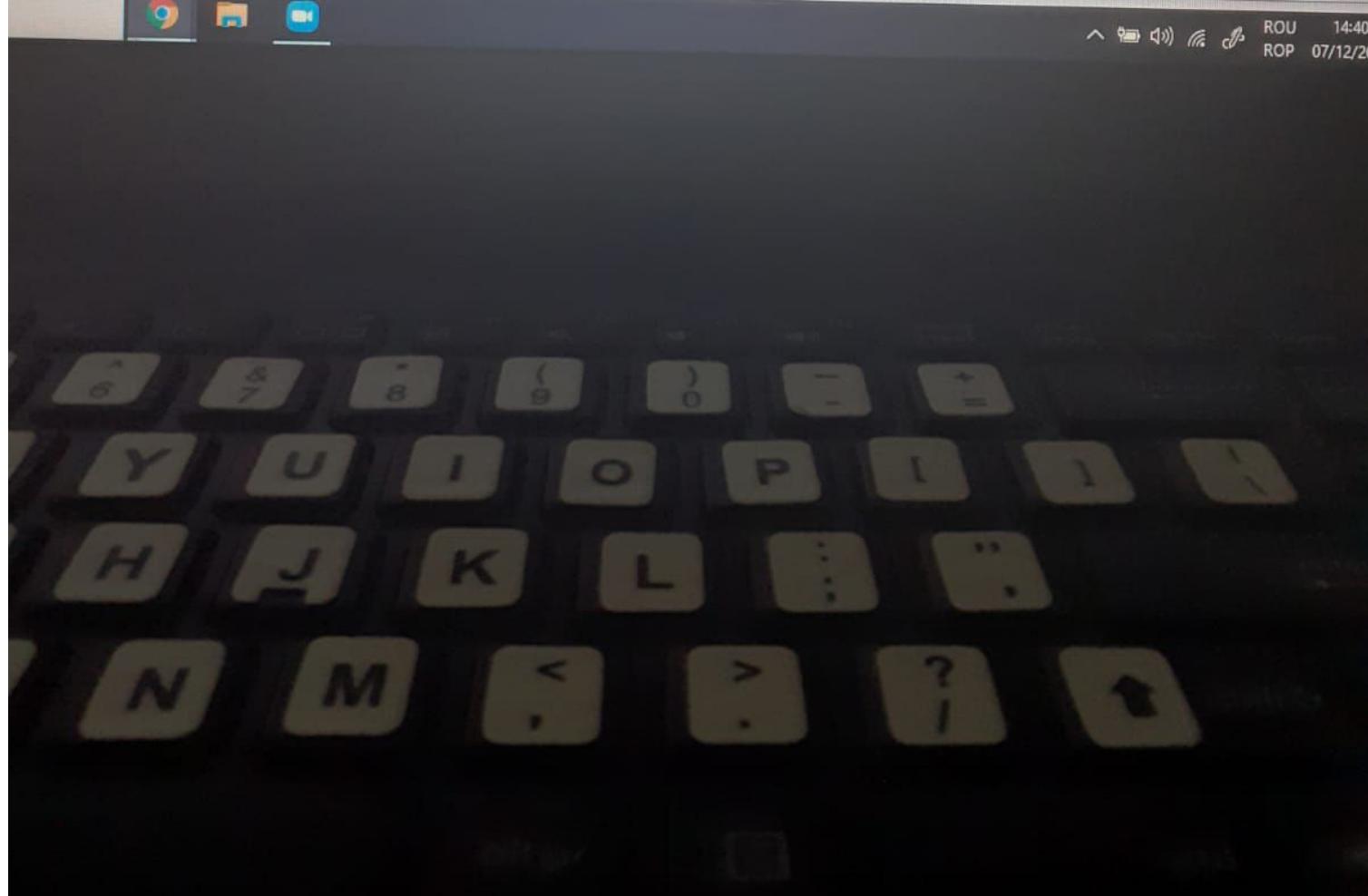
- a. The cardinality of the input relations.
- b. The number of attributes of the input relations. ✓
- c. The sizes of the relations representing intermediary results.
- d. The tuple sizes of the input relations.

Finish review

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ROP 07/12/20



**Question 4**

Complete

Mark 0 out of 1

Flag question

Multiple criteria in the parameter list are interpreted in a hierarchical manner in:

- a. ORDER BY, but not in the GROUP BY.
- b. GROUP BY, but not in the ORDER BY.
- c. Both GROUP BY and ORDER BY.
- d. Not in GROUP BY or ORDER BY.

**Question 5**

Complete

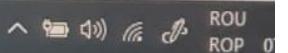
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A hash index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  can be used to match the selection:

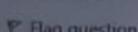
- a.  $x_1 = 5$  and  $x_2 > 5$
- b.  $x_3 = 7$
- c.  $x_1 = 3$
- d.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$

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ROU  
ROP 0

Mark 0 out of 1



Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name
  FROM Sailors s, Boats b, Reserves r
 WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND
       s.sid IN
        (SELECT s1.sid
          FROM Sailors s1, Boats b1, Reserves r1
         WHERE s1.sid=r1.sid AND r1.bid=b1.bid
               AND b1.color='Green')
```

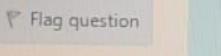
which of the following statements is false:

- a. The query implements the INTERSECTION operation.
  - b. It is a valid SQL query.
  - c. The queries are correlated. ✓
  - d. The queries are uncorrelated.

#### Question 4

### Complete

Mark 0 out of 1



Multiple criteria in the parameter list are interpreted in a hierarchical manner in:

- a. ORDER BY, but not in the GROUP BY.
  - b. GROUP BY, but not in the ORDER BY.

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**Question 6**

Complete

Mark 0 out of 1

[Flag question](#)

Considering the following Sailors table:

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

```
SELECT s.name FROM Sailors s  
WHERE NOT EXISTS (SELECT * FROM Sailors s1 WHERE s1.rank < s.rank)
```

- a. all sailors' names
- b. Brutus ✓
- c. empty result
- d. Rusty, Zorba

**Question 7**

Complete

The full join operation can be implemented using the following operator:

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ROP 07/12

To be union compatible two relations must have:

- a. The same number of attributes with corresponding types in the same order.
- b. The same name for the primary key.
- c The same attributes, with the same names and types, in the same order.
- d. The same set of indexes.

The projection list of a SELECT query can contain a table attribute and an SQL aggregation function only if

- a. The attribute is included in the HAVING clause.
- b. The attribute is included in the GROUP by clause.
- c. The attribute is the primary key.
- d. The attribute is a candidate key.

A tree index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  cannot be used to match the selection:

- a.  $x_3 = 7$
- b.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$
- c.  $x_1 = 5$  and  $x_2 > 5$
- d.  $x_1 = 3$

A hash index on the key  $\langle x_1, x_2, x_3, x_4 \rangle$  can be used to match the selection:

- a.  $x_3 = 7$
- b.  $x_1 = 6$  and  $x_2 = 9$  and  $x_3 = 2$  and  $x_4 = 25$  ✓
- c.  $x_1 = 5$  and  $x_2 > 5$
- d.  $x_1 = 3$

1  
ion

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
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64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

SELECT rank FROM Sailors WHERE rank > ALL (SELECT rank FROM Sailors):

- a. 10
- b. NULL
- c. empty result ✓
- d. 0

Considering the Harbor database used on the course, and the following query:

```
SELECT sid, Sailors.rank FROM Sailors WHERE
    aqe > (SELECT s.aqe FROM Sailors s INNER JOIN
        Reserves r ON s.u.rsid
        WHERE r.hid=103 AND r.date>'2014-11-24')
```

which clause of the query contain errors:

- a. The projection list of the main query.
- b. The WHERE clause of the main query. ✓
- c. The WHERE clause of the subquery.
- d. Neither clause, it is a valid query.

A subquery used as operand of the IN operator must return:

- a. A single scalar value.
- b. A tuple.
- c. A set of scalar values. 
- d. A set of tuples.

The full join operation can be implemented using the following operator:

- a. DIFFERENCE
- b. EXCEPT
- c. UNION 
- d. INTERSECTION

An SQL aggregation function cannot be used directly in:

- a. A projection list
- b. A HAVING clause.
- c. A Subquery
- d. A WHERE clause. 

Which of the following does not represent an authentication mechanism supported by Oracle:

- a. RADIUS
- b. KERBEROS.
- c. DIAMETER 
- d. PKI.

Considering the following Sailors table:

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

What result will return the following query:

SELECT rank FROM Sailors WHERE rank > ALL ( SELECT rank FROM Sailors):

- a. 0
- b. 10
- c. NULL
- d. empty result ✓

Which of the following statements is not true about subqueries?

- a. A subquery can be included in a FROM clause.
- b. A subquery can be included in a projection list
- c. A subquery can be included in a ORDER BY clause.
- d. A subquery can be included in a WHERE clause. ✓

The DISTINCT parameter will not have any effect for just one of the following SQL aggregation functions:

- a. SUM
- b. AVG
- c. VARIANCE
- d. MAX ✓

The cost of the query execution plan is not depending on:

- a. The tuple sizes of the input relations.
- b. The number of attributes of the input relations. ✓

- c. The cardinality of the input relations.
- d. The sizes of the relations representing intermediary results.

Multiple criteria in the parameter are interpreted in a hierarchical manner in:

- a. Both GROUP BY and ORDER BY.
- b. Not in GROUP BY or ORDER BY.
- c. ORDER BY, but not in the GROUP BY.**
- d. GROUP BY, but not in the ORDER BY.

Considering the Harbor database used on the course and the following query:

```
SELECT DISTINCT s.sid, s.name  
  FROM Sailors s, Boats b, Reserves r  
 WHERE s.sid=r.sid AND r.bid=b.bid AND b.color='Blue' AND  
       s.sid IN  
         (SELECT sl.sid  
          FROM Sailors s1, Boats b1, Reserves r1  
         WHERE stsid=r1.sid AND ribid=b1.bid AND bl.color.'Green')
```

which of the following statements is false:

- a. The query implements the INTERSECTION operation.
- b. The queries are correlated.
- c. It is a valid SQL query.
- d. The queries are uncorrelated.

For a table containing a single row with all attributes excepting PK containing NULL values,

The

```
SELECT COUNT(*) FROM Table;
```

will return:

- a. 0
- b. NULL

c. 1 ✓

d. nothing

Considering the following Sailors table:

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
22	Dustin	7	45.0
29	Brutus	1	33.0
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58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

a, all sailors' names

b. empty result

c. Brutus

d. Rusty, Zorba

# Databases

Cap. 2 Data Modeling. ER Model. Relational Model



Textbook: Ramakrishnan, Gehrke, "Database Management Systems", McGraw Hill, 2003

2022 UPT

Conf.Dr. Dan Pescaru

# **DB development**

---

- DB development steps:
  1. Requirement analysis
  2. Conceptual design – ER model
  3. Logical DB design – relational model
  4. DB Schema refinement – normalization
  5. Physical DB design – indexes etc.
  6. Client applications design
  7. Applications implementation
  8. DB deployment

# Requirement analysis

---

## 1. Result - requirements documentation including answers to the following questions

- What are the entities and relationships from the enterprise?
- What specific information about these entities have to be stored to the database? What are the domains of these information?
- What integrity constraints and domain rules that have to be considered?
- What data processing is necessary to support the business. What the users' roles?

# Database related models

---

**1. Conceptual models** are used to analyze and understand application data

- The **ER** model is a de-facto standard in DB field.  
Alternative: the **UML**

**2. Data models** are used to describe data

- A **schema** is a description of a particular collection of data, using the a given data model
- The relational model is the most widely used data model today

**3. Physical models** are representation of a data design which considers the facilities and constraints of a given **DBMS**

# **Conceptual model**

---

1. A high-level description of a business informational needs
2. A conceptual model identifies the general relationships between the different entities
3. Characteristics of conceptual data model
  - Include information of all important entities and the relationships among them
  - However, no data organization is specified
  - And just some constraints are specified

# The ER model

---

1. For basic applications, the DB schema results directly from requirements analysis
2. For complex applications conceptual design is required
3. ER model could be used for a graphical representation (ER diagrams) of DB
4. There is a direct mapping of ER diagram into relational data model

# The ER model. Definitions (I)

---

1. **Entity** = Real-world entity (object)  
distinguishable from other entities. An entity  
is described using a set of attributes
2. **Entity set** = A collection of similar entities
  - E.g., all employees from a company
  - ER representation: a rectangle
  - All entities in an entity set have the same set of  
attributes
  - Each entity set has a key
  - Each attribute has a domain (type)

# The ER model. Definitions (II)

---

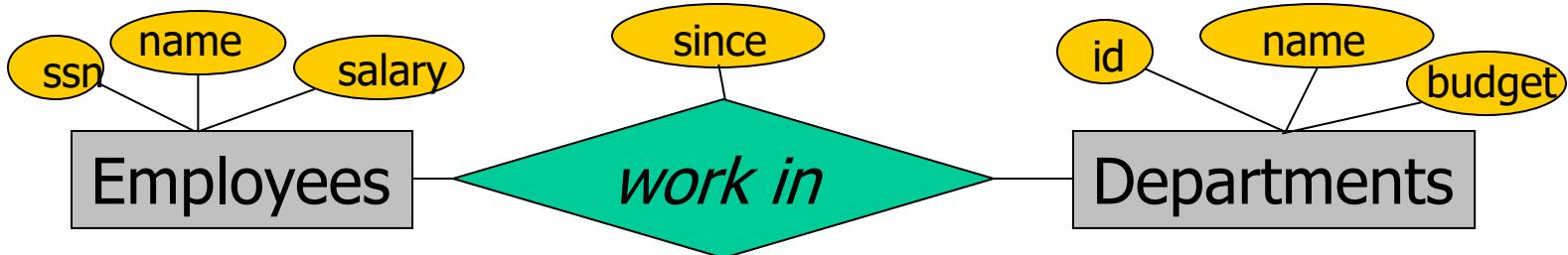
1. **Relationship** = association among two or more entities

- E.g., Anton *works in* Financial department

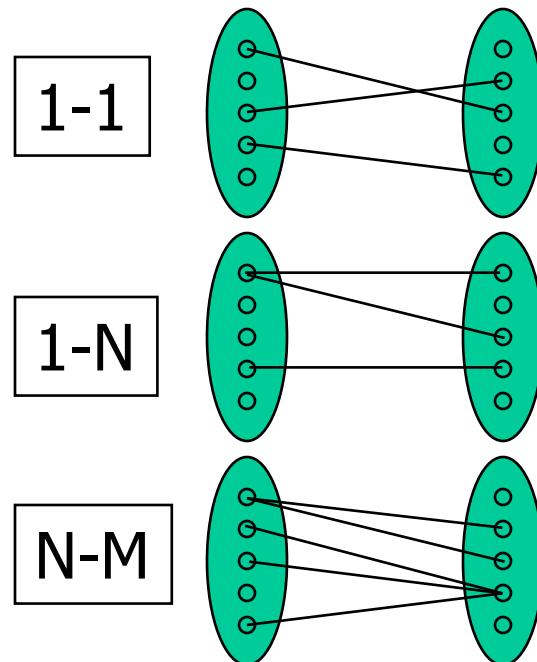
2. **Relationship set** = collection of similar relationships

- ER representation: a diamond
- An  $n$ -ary relationship set  $R$  relates  $n$  entity sets  $E_1 \dots E_n$ ; each relationship in  $R$  involves entities  $e_1 \in E_1, \dots, e_n \in E_n$
- Same entity set could participate in different relationship sets, or in different *roles* in same entity set (e.g. works-in, manages)

# Types of relationships

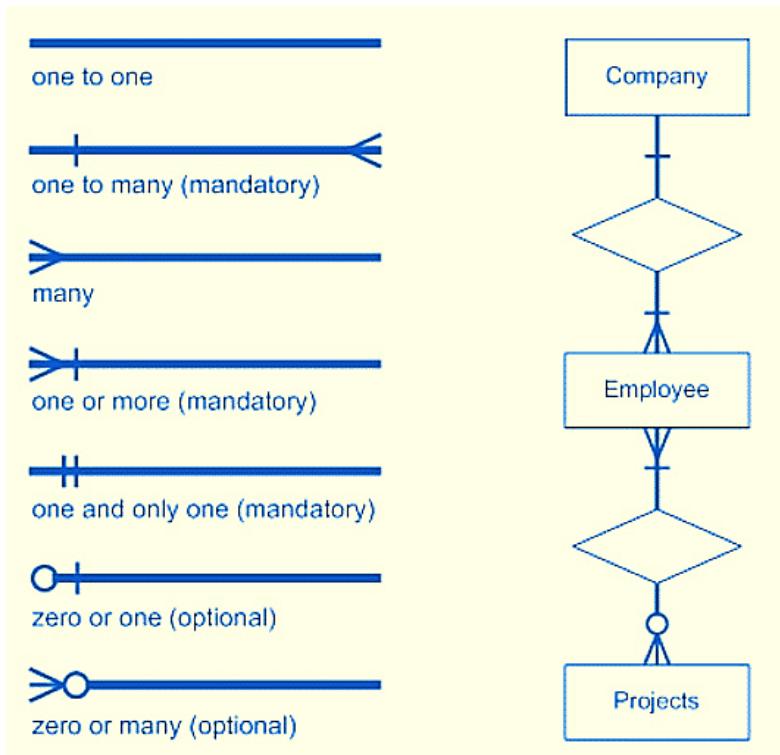


1. **1-1 relationship.** One Department has exactly one General Manager (*key constraint – an arrow to relationship*)
2. **1-N relationship.** One Department could have more than one Project managers. A Project manager works in one Department
3. **N-M relationship.** An Employee could work in more than one Department. One Department could have more than one Employee

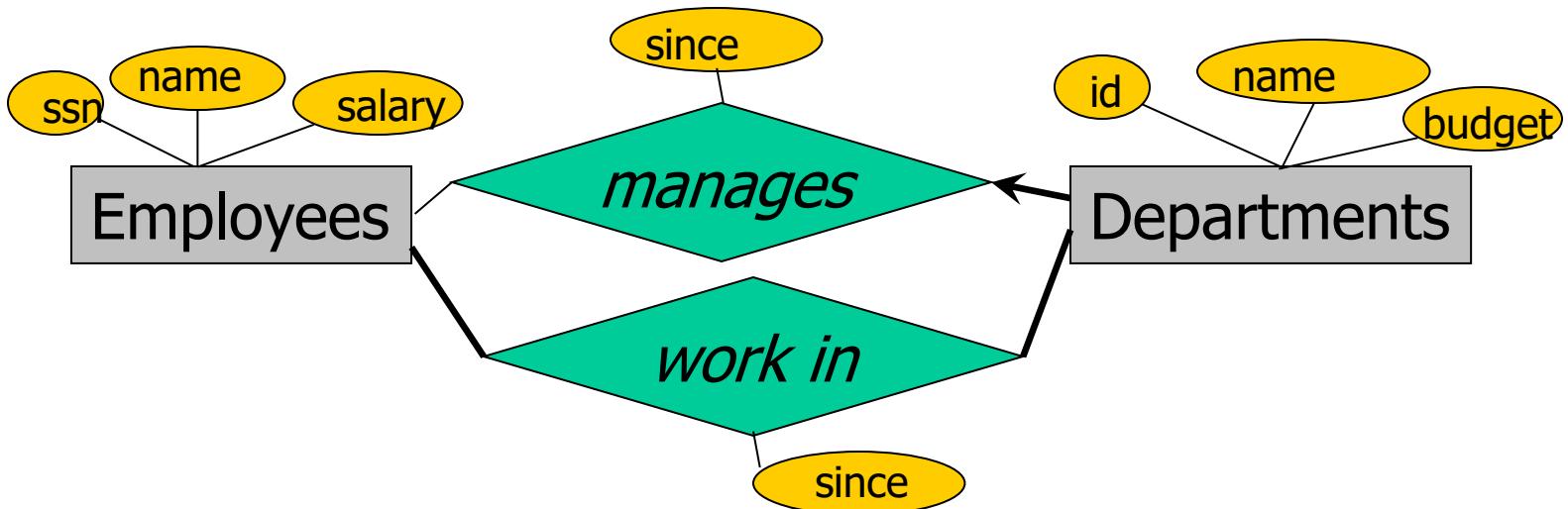


# Cardinality of relationships

- **Crow's foot notation (Information Engineering Style)**



# Participation constraints

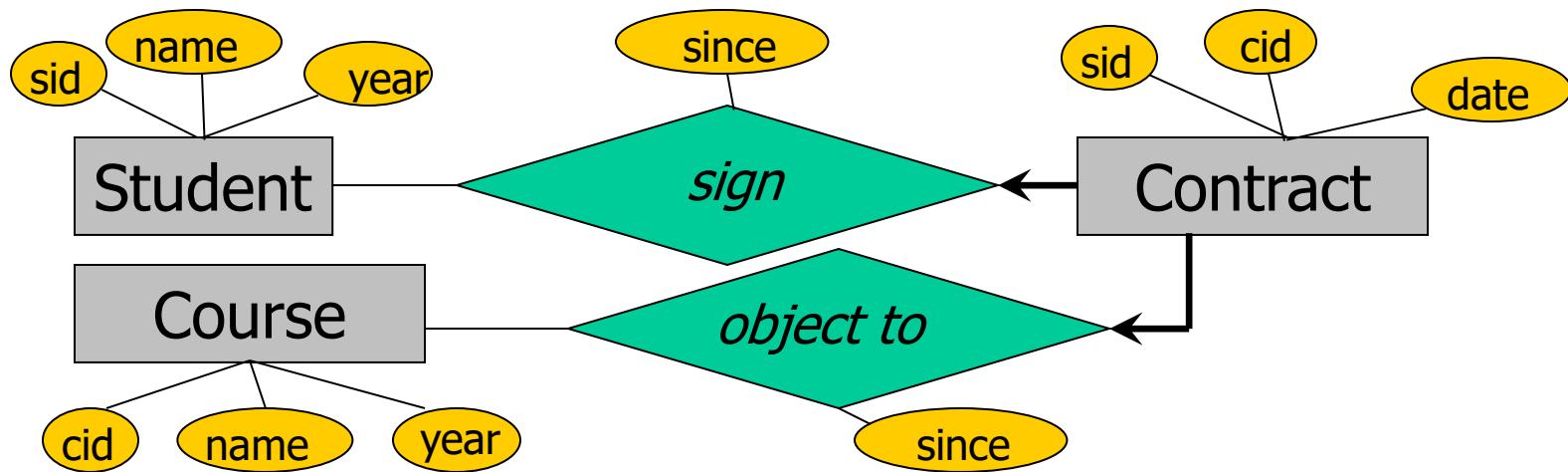


1. Does every Department have a manager? (in relationship with Employees) ?
2. Partial participation in the relationship – thin line (e.g. just some Employees are also managers)
3. Total participation in the relationship – thick line (e.g. all Departments have to have a corresponding manager in Employees)

# Weak entity

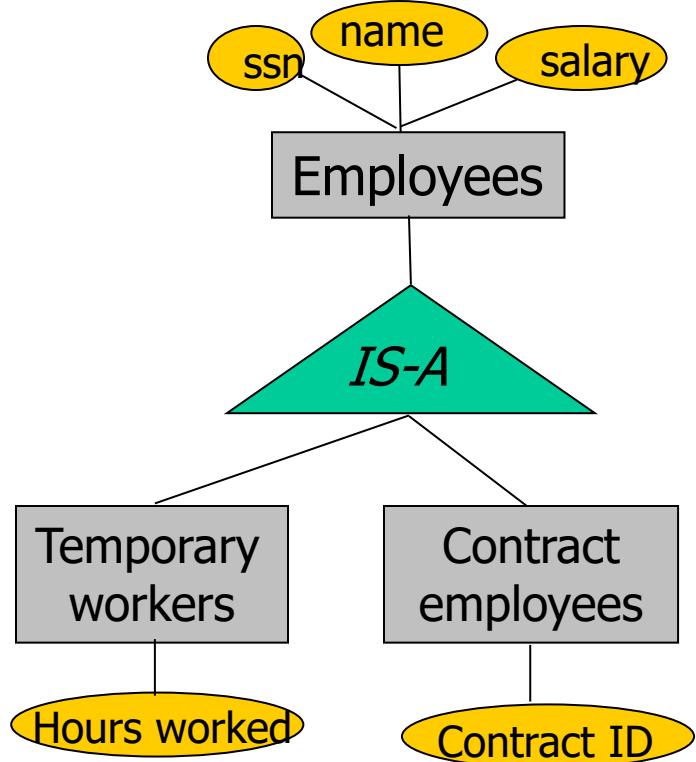
1. Weak entity set = a set of entities that can be identified uniquely only by considering the primary key of another (owner) entity

- Owner entity set and weak entity set must participate in a one-to-many relationship set (one owner, many weak entities)
- Weak entity set must have total participation in this identifying relationship set



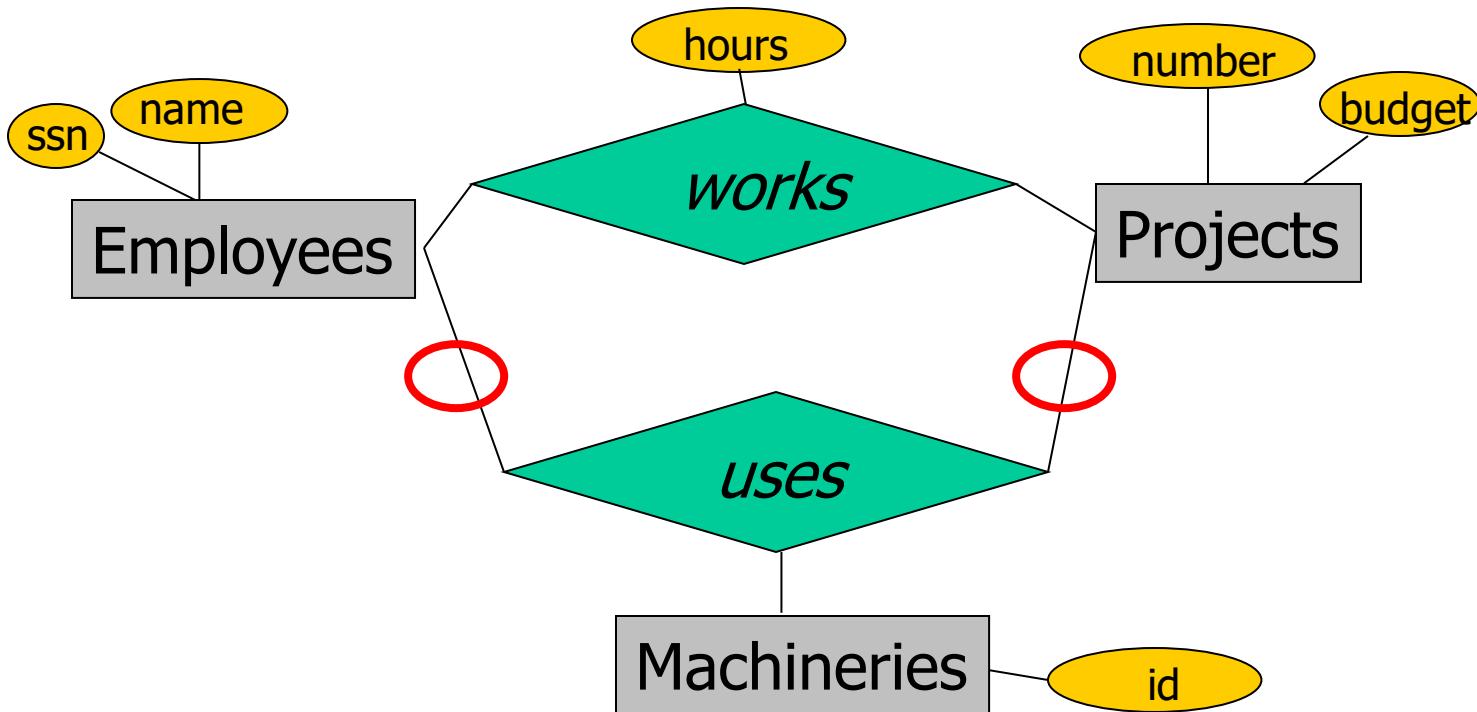
# IS-A hierarchies

1. IS-A imply attributes inheritance. It allows adding descriptive attributes specific to a subclass
2. If A *IS-A* B, every A entity is also considered to be a B entity
3. **Overlap constraints:** A *IS-A* C and B *IS-A* C,  $e \in A$  and  $e \in B$  (allowed/disallowed)
4. **Covering constraints:** does every C to be a A or B (yes/no)



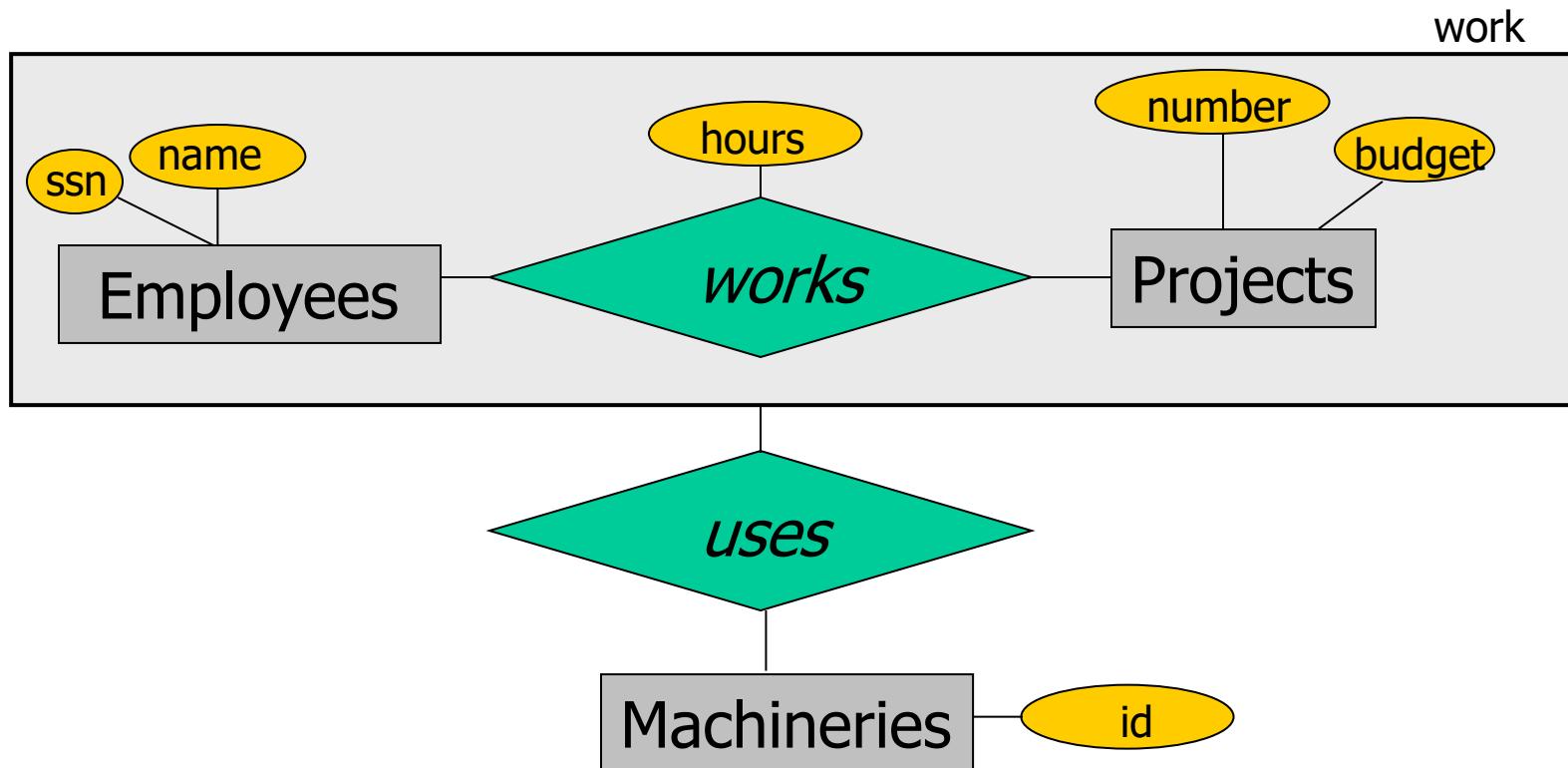
# Redundant relationships

1. The E-R model cannot express directly relationships among relationships. This could determine redundant relationships



# Aggregation

1. An abstraction through which relationships are treated as higher-level entities
  - E.g. the relationship set work and the entity set employee and project as a higher-level entity set "**work**"



# Conceptual Design Using the ER Model

---

## 1. Design choices:

- Should a concept be modeled as an entity or an attribute?
- Identifying relationships: Binary or ternary? Aggregation?

## 2. Constraints in the ER Model

- A lot of data semantics can (and should) be captured
- Some constraints cannot be captured in ER diagrams

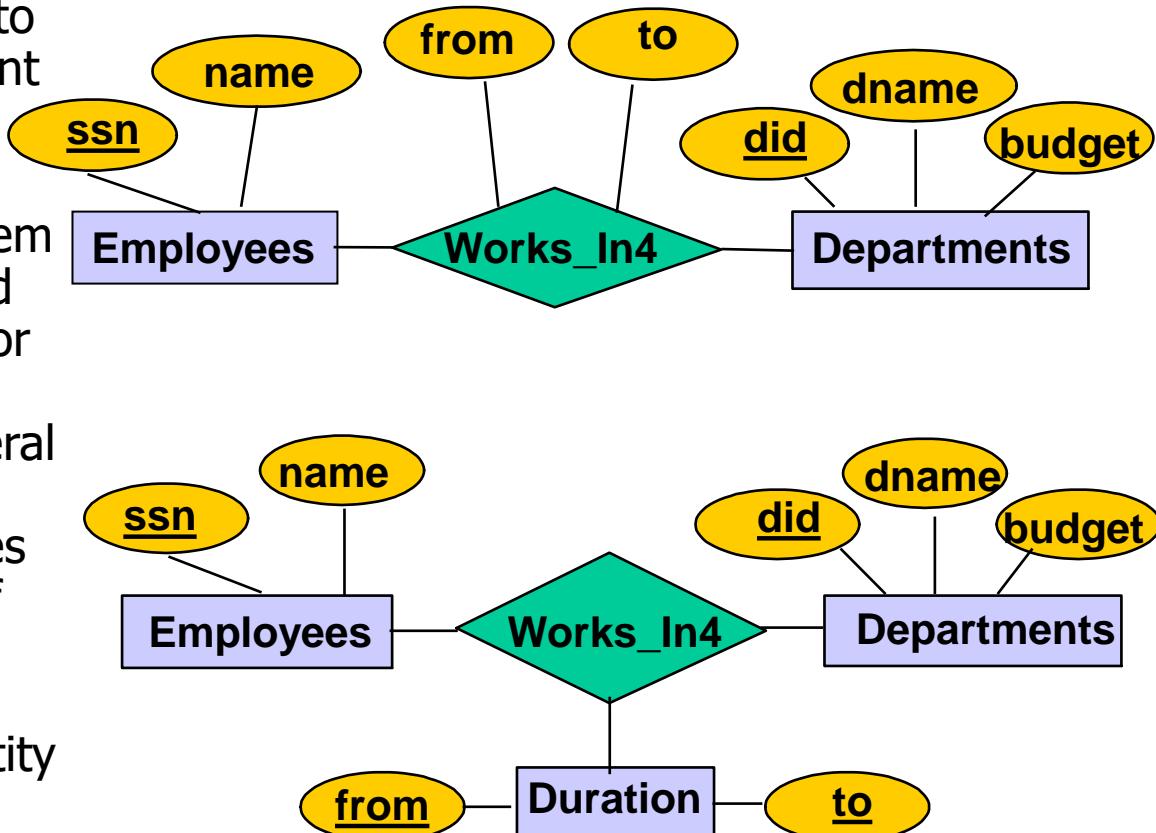
# Entity vs. Attribute

---

1. Should a concept be modeled as an entity or an attribute?
2. Should *Address* be an attribute of Employees or an entity (connected to Employees by a relationship)?  
Depends upon the use we want to make of address information, and the semantics of the data:
  - If we have several addresses per employee, address must be an entity (since attributes cannot be set-valued)
  - If the structure (city, street, etc.) is important, e.g., we want to retrieve employees in a given city, address must be modeled as an entity (since attribute values are atomic)

# Entity vs. Attribute

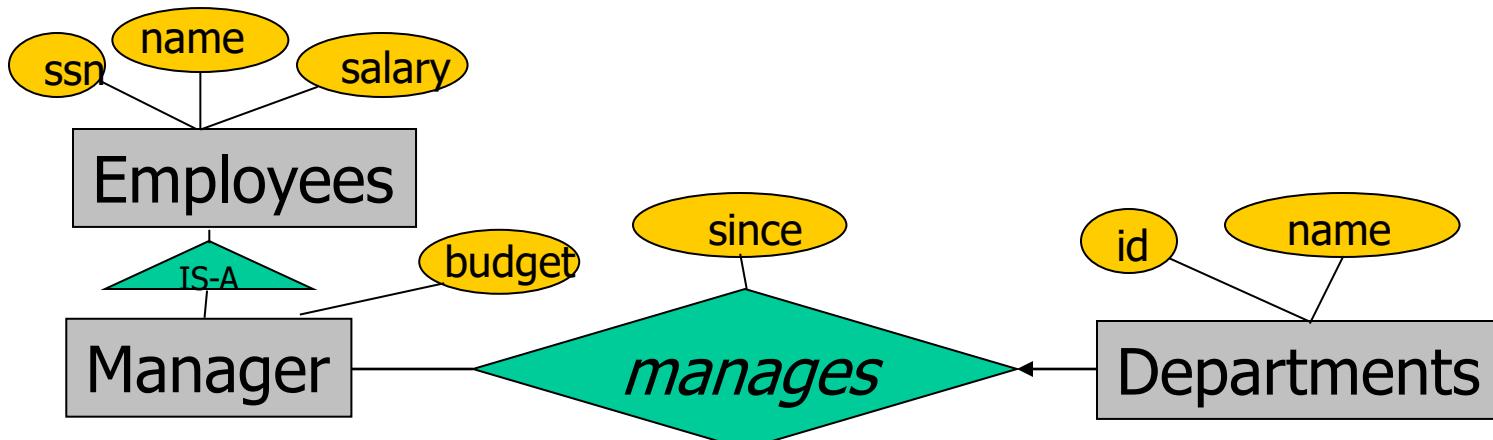
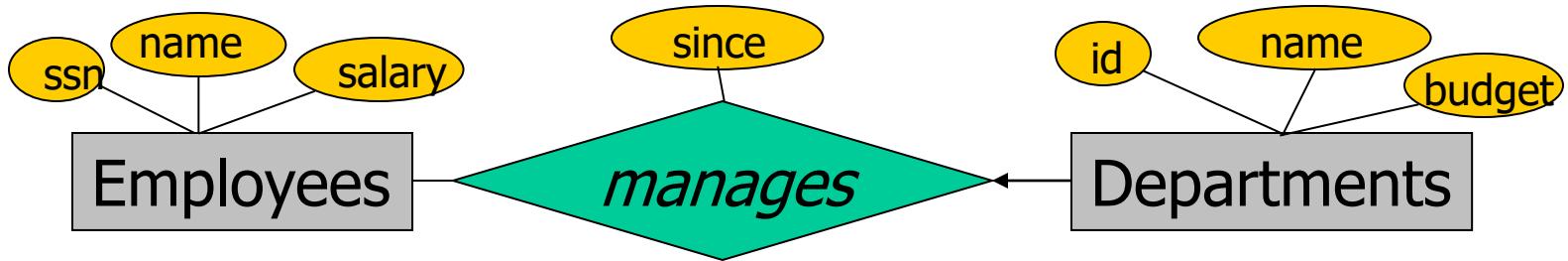
1. Works\_In4 does not allow an employee to work in a department for two or more periods
2. Similar to the problem of wanting to record several addresses for an employee: we want to record several values of the descriptive attributes for each instance of this relationship. Accomplished by introducing new entity set "Duration"



# Entity vs. Relationship

1. Should a concept be modeled as an entity or a relationship?

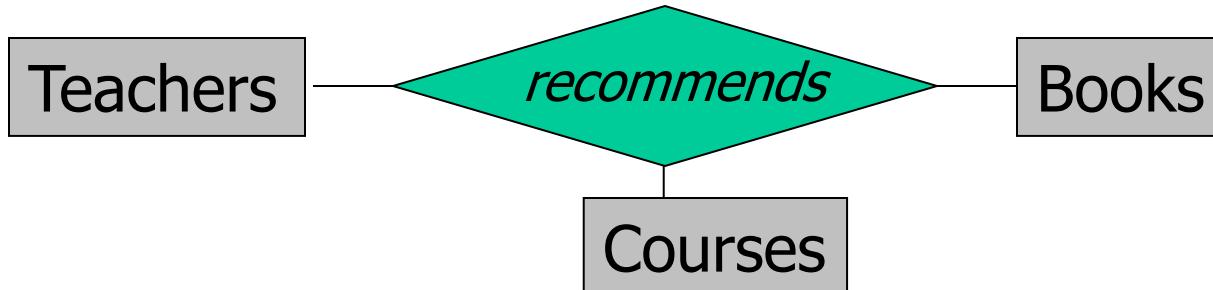
- Has each Department its own budget?
- Has each Manager its own budget (for all Depts)?



# Binary vs. Ternary Relationships

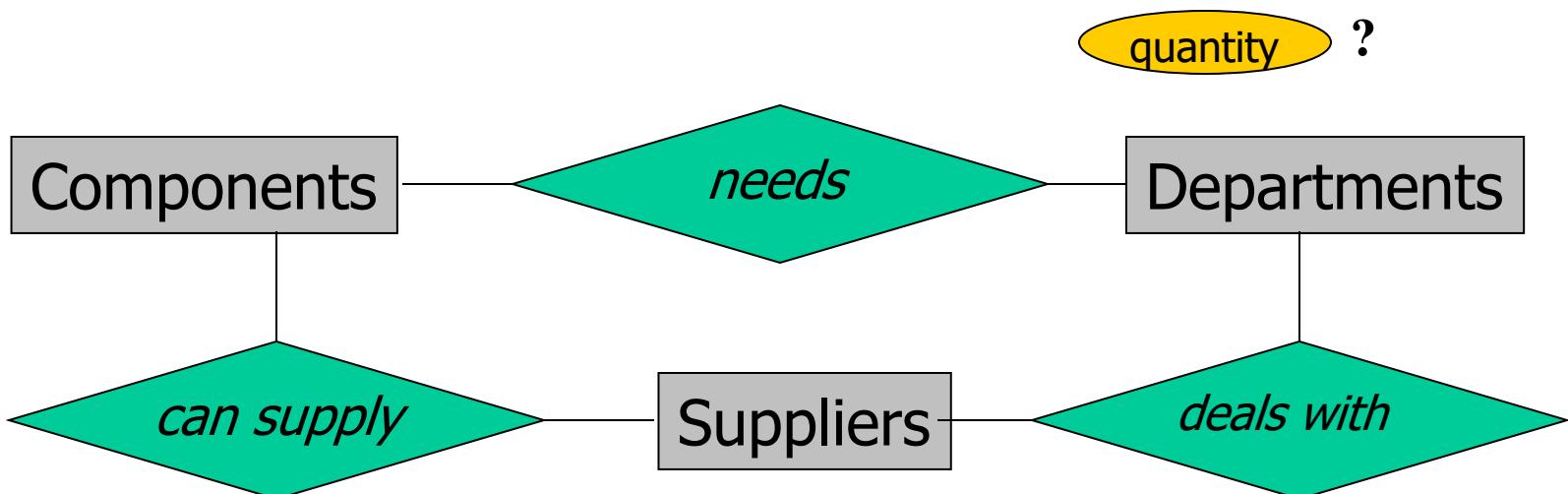
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1. Binary relationship: a link between two entities
2. Ternary relationship: a link between three entities
3. Binary relations are less complex (easy to be represented and easy to be understand)
4. Sometimes it is not possible to replace a ternary relationship with two corresponding binary ones
5. Always a ternary relationship could be replaced by an entity (through a “verb to noun” transform).



# Binary vs. ternary relationships

1. Where to place the quantity attribute?



# The relational data model

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1. First introduced in 1970 by E.F. Codd at IBM
2. Two early research projects on relational model
  - IBM System R (prototype RDBMS)
  - UC Berkeley's INGRES (academic project)
3. Today's dominant technology for DBMS
4. Hundreds of RDBMS products from PC to powerful servers

# Definitions

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1. Relational database: a set of **relations**
2. A **relation** is described by two parts:
  - **Instance:** a table, with rows and columns.  
(#Rows = cardinality, #fields = degree)
  - **Schema:** specifies name of relation, plus name and type of each attribute
3. E.g.: *Students* (sid: string, name: string, grade:real)
4. Can think of a relation as a set of rows or tuples  $\{a_1, a_2, \dots a_n\}$ 
  - All rows have to be distinct

# Primary Key

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1. A set of fields is a superkey for a relation if no two distinct tuples can have same values in all its fields (is unique)
2. A set of fields is a key if any subset of it is not unique
3. **Primary key** is a key selected by DBA to identify the relation
4. E.g.: SSN is a key for relation Person

# **Foreign Key**

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**1.** A **foreign key** is set of fields in one relation that is used to refer to a tuple in another relation

- Must correspond to primary key of the second relation
- Is like a logical pointer – implements logical links between two relations

**2. Referential integrity constraints – prevent broken links**

- all foreign key constraints are enforced

# **Advantages of the relational model**

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1. Simple and intuitive – currently the most widely used
2. Integrity constraints can be specified based on application semantics. DBMS checks for violations
3. Primary and foreign keys constraints plus domain constraints ensures data consistency
4. Powerful and natural query languages (e.g. SQL, QBE)
5. Rules to translate ER to relational model

# Transforming ER into relational model

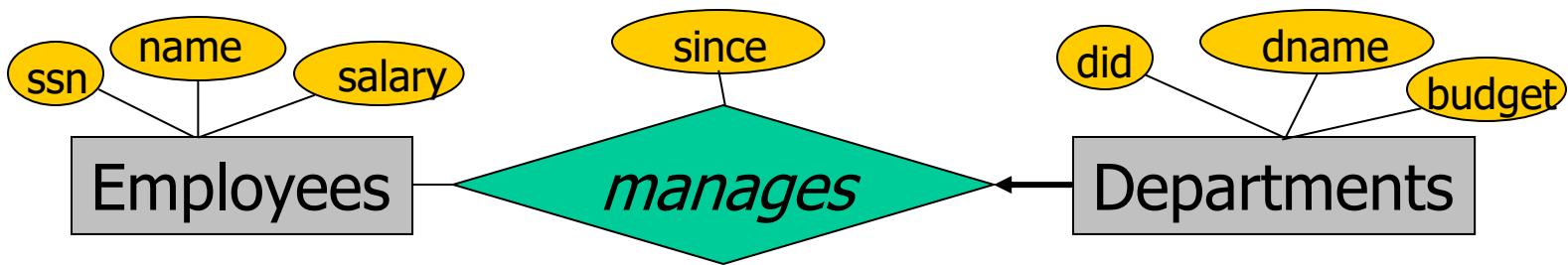
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## 1. General steps:

- Entities: each entity will be converted directly to a relation
- Attributes of the entity: become the attributes of the relation
- Identifier of the entity becomes a key in the relation
- Relationships will be mapped on relations or as Foreign Keys

# ER to Relational: key constraints (I)

1. E.g.: each dept has at most one manager, according to the key constraint on *manages*



# ER to Relational: key constraints (II)

## 1. Map relationship to a table:

- Note that *did* is the key now!
- Separate tables for *Employees* and *Departments*

## 2. Since each department has a unique manager, we could instead combine *Manages* and *Departments* into a single relation

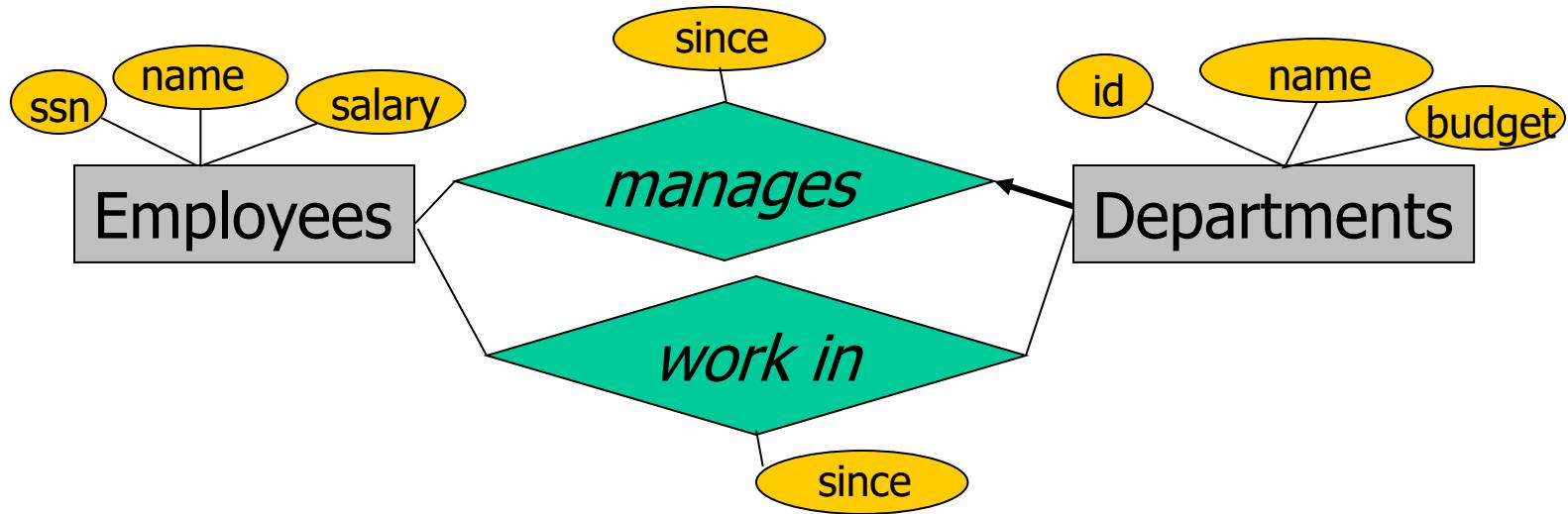
```
CREATE TABLE Manages (
    ssn CHAR(11),
    did INTEGER,
    since DATE,
    PRIMARY KEY (did),
    FOREIGN KEY (ssn) REFERENCES Employees,
    FOREIGN KEY (did) REFERENCES Departments
)
```

```
CREATE TABLE Departments (
    did INTEGER,
    dname CHAR(20),
    budget REAL,
    ssn CHAR(11),
    since DATE,
    PRIMARY KEY (did),
    FOREIGN KEY (ssn) REFERENCES Employees
)
```

# ER to Rel.: participation constraints (I)

## 1. Does every department have a manager?

- If so, this is a participation constraint: the participation of *Departments* in *manages* is said to be total (vs. partial)
- Every *did* value in *Departments* table must appear in a row of the *Manages* table (with a non-null *ssn* value!)



# ER to Rel.: participation constraints (II)

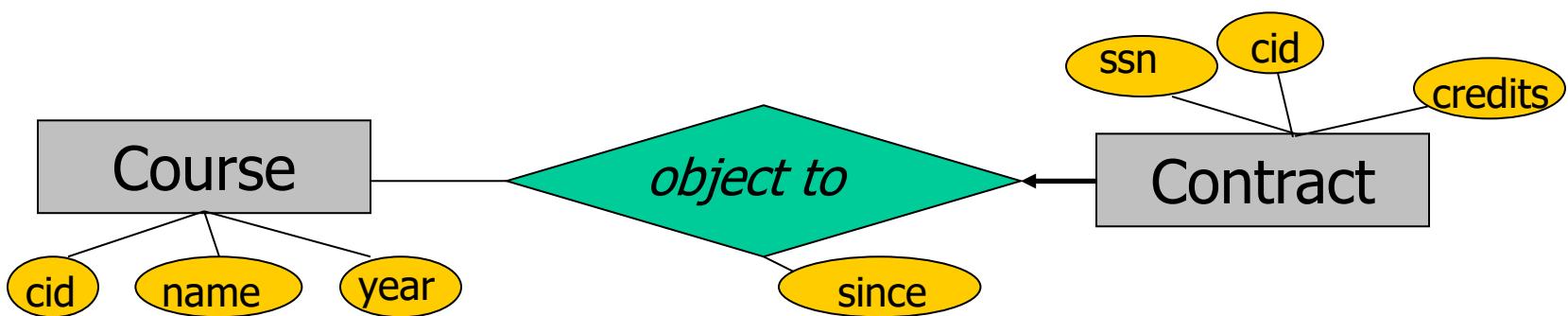
1. We can capture participation constraints involving one entity set in a binary relationship, but little else (only through additional assertions)
  - **ON DELETE NO ACTION** = cannot delete the manager of an existing department from Employees. Solution?

```
CREATE TABLE Departments (
    did INTEGER,
    dname CHAR(20),
    budget REAL,
    ssn CHAR(11) NOT NULL,
    since DATE,
    PRIMARY KEY (did),
    FOREIGN KEY (ssn) REFERENCES Employees, ON DELETE NO ACTION
)
```

# ER to Rel.: weak entities (I)

1. Weak entity set = a set of entities that can be identified uniquely only by considering the primary key of another (owner) entity

- Owner entity set and weak entity set must participate in a one-to-many relationship set (one owner, many weak entities)
- Weak entity set must have total participation in this identifying relationship set



# ER to Rel.: weak entities (II)

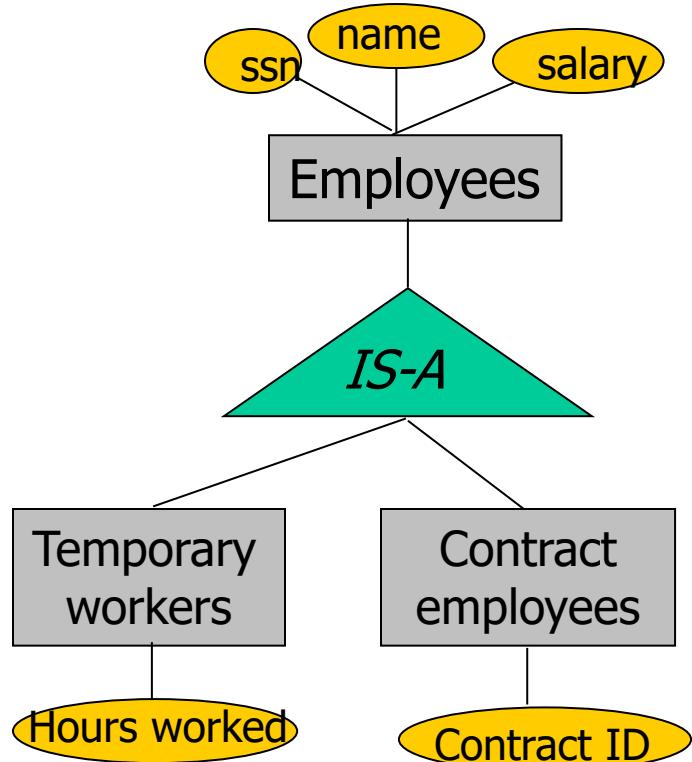
## 1. Weak entity set and identifying relationship set are translated into a single table

- When the owner entity is deleted, all owned weak entities must also be deleted
- **ON DELETE CASCADE** – when a referenced parent table row is removed all children are removed automatically

```
CREATE TABLE Contract (
    cid CHAR(3) NOT NULL,
    ssn INTEGER,
    credits INTEGER,
    since DATE,
    PRIMARY KEY (cid,ssn),
    FOREIGN KEY (cid) REFERENCES Courses, ON DELETE CASCADE
)
```

# ER to Rel.: IS-A hierarchies (I)

1. IS-A imply attributes inheritance. It allows adding descriptive attributes specific to a subclass
2. If A *IS-A* B, every A entity is also considered to be a B entity
3. **Overlap constraints:** A *IS-A* B and A *IS-A* C simultaneously (allowed/disallowed)
4. **Covering constraints:** does every A to be a B or A to be a C (yes/no)



# ER to Rel.: IS-A hierarchies (II)

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## 1. Two strategies:

- i. Map each entity sets to relations: Employees, TemporaryWorkers and ContractEmployees. The last two have to contain the primary key of the superclass – *ssn* (as primary key and foreign key in the child table). The rest of Employees attributes are “inherited” (stored in the superclass table). **ON DELETE CASCADE** is necessary for all children.
  - Queries involving all attributes are slowed down (join ops are needed).
- ii. Map just leafs as relations: TemporaryWorkers and ContractEmployees. The Employees’ attributes will be duplicated.
  - Problems if other kinds of employees exists (covering: no) or if overlapped is allowed.