

DATABASE SYSTEMS COURSE 2021/2022

SESSION 8

SESSION 8

- **CARTESIAN PRODUCT**
- SQL JOINS
- SETS OPERATIONS

CARTESIAN PRODUCT

MySQL

```
CREATE TABLE T1 (T1_C1 INTEGER, T1_C2 INTEGER) ;  
INSERT INTO T1 VALUES (1,2) ;  
INSERT INTO T1 VALUES (3,4) ;  
  
CREATE TABLE T2 (T2_C1 INTEGER, T2_C2 INTEGER) ;  
INSERT INTO T2 VALUES (5,6) ;  
INSERT INTO T2 VALUES (7,8) ;
```

Oracle

```
CREATE TABLE T1 (T1_C1 NUMBER, T1_C2 NUMBER) ;  
INSERT INTO T1 VALUES (1,2) ;  
INSERT INTO T1 VALUES (3,4) ;  
  
CREATE TABLE T2 (T2_C1 NUMBER, T2_C2 NUMBER) ;  
INSERT INTO T2 VALUES (5,6) ;  
INSERT INTO T2 VALUES (7,8) ;
```

CARTESIAN PRODUCT

MySQL/Oracle

```
SELECT * FROM T1
```

T1_C1	T1_C2
1	2
3	4

MySQL/Oracle

```
SELECT * FROM T2
```

T2_C1	T2_C2
5	6
7	8

MySQL/Oracle

```
SELECT * FROM T1 , T2
```

T1_C1	T1_C2	T2_C1	T2_C2
1	2	5	6
1	2	7	8
3	4	5	6
3	4	7	8

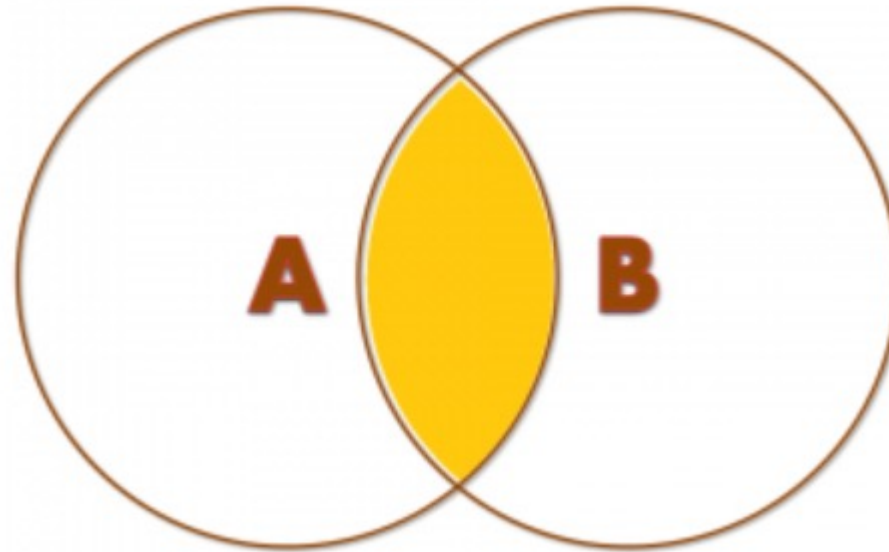
SESSION 8

- CARTESIAN PRODUCT
- **SQL JOINS**
- SETS OPERATIONS

SQL JOINS

INNER JOIN Concept

INNER JOIN. Records included in both tables only.



SQL JOINS

INNER JOIN Example

**People
Table**

PERSONID	NAME	LASTNAME	DOCID
1	Peter	Castle	6865433
2	Vicky	April	7353156
3	Paul	Churchs	37920013
4	Isabelle	Days	83171232
5	Henry	Churchs	68310019

**PeopleJob
Table**

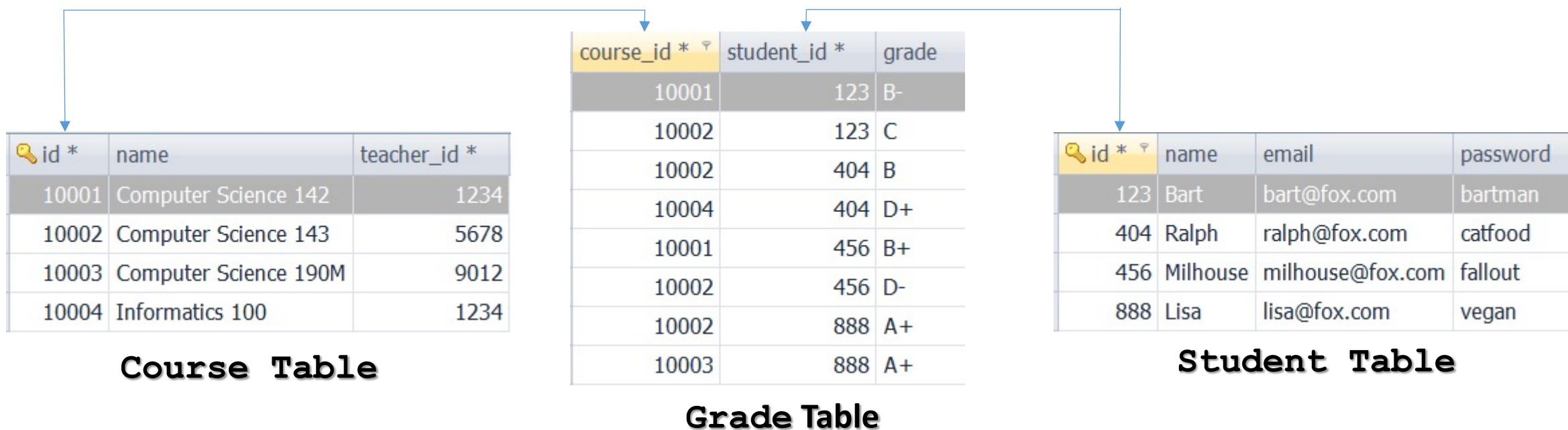
JOB	PERSONID	HIRINGDATE	ENDOFWORKDATE
CEO	3	01/03/18	01/03/20
Vice President	5	01/03/19	01/05/19
Director	1	01/02/18	(null)
Manager	2	01/05/18	31/12/18
Contributor	4	01/08/20	(null)

MySQL/Oracle

```
SELECT t1.job, t2.name, t2.lastname, t1.hiringdate, t1.endofworkdate
FROM peoplejob t1 INNER JOIN people t2 ON (t1.personid = t2.personid);
```

SQL JOINS

INNER JOIN Example



MySQL/Oracle

```
SELECT t3.name, t1.name, t2.grade
FROM course t1 INNER JOIN grade t2 ON (t1.id = t2.course_id)
        INNER JOIN student t3 ON (t2.student_id = t3.id);
```


SQL JOINS

INNER JOIN Example

Country Table

CODE	NAME	CONTINENT
PER	Peru	South America
ATF	French Southern territories	Antarctica
BVT	Bouvet Island	Antarctica
ESP	Spain	Europe
ITA	Italy	Europe

City Table

ID	NAME	COUNTRYCODE	DISTRICT	POPULATION
684	Fuenlabrada	ESP	Madrid	171173
710	Santiago de Compostela	ESP	Galicia	93745
1466	Napoli	ITA	Campania	1002619
1467	Torino	ITA	Piemonte	903705
2895	Iquitos	PER	Loreto	367000
2909	Puno	PER	Puno	101578

MySQL/Oracle

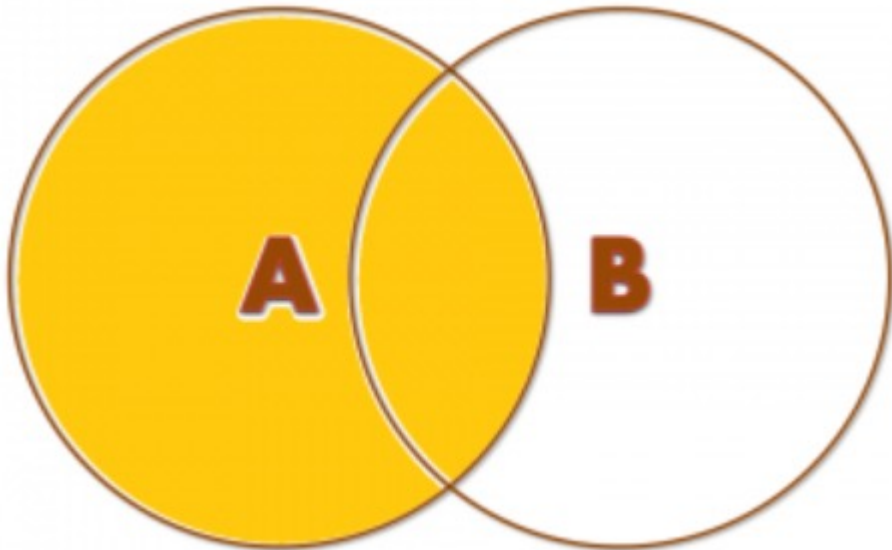
```
SELECT t2.code, t2.name, t2.continent, t1.name AS cityname, t1.countrycode, t1.population
FROM country t2 INNER JOIN city t1
ON (t1.countrycode = t2.code);
```

¿Should Countries: "French Southern territories" and "Bouvet Island" appear in above query?

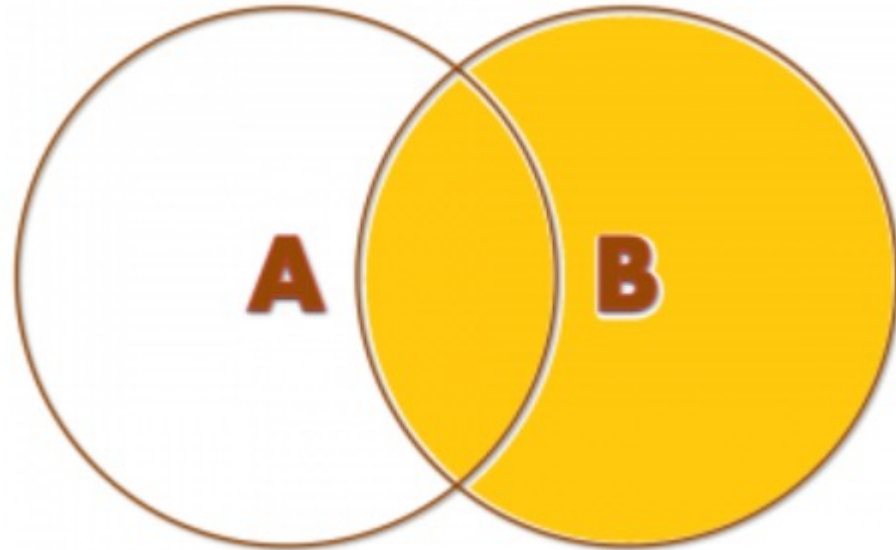
SQL JOINS

LEFT/RIGHT JOIN Concept

LEFT JOIN. All records from the table at the "left"



RIGHT JOIN. All records from the table at the "right"



LEFT/RIGHT JOIN Example

MySQL/Oracle

```
SELECT t2.code, t2.name, t2.continent, t1.name AS cityname, t1.countrycode, t1.population
FROM country t2 LEFT JOIN city t1
ON (t1.countrycode = t2.code);
```

CODE	NAME	CONTINENT	CITYNAME	COUNTRYCODE	POPULATION
ESP	Spain	Europe	Fuenlabrada	ESP	171173
ESP	Spain	Europe	Santiago de Compostela	ESP	93745
ITA	Italy	Europe	Napoli	ITA	1002619
ITA	Italy	Europe	Torino	ITA	903705
PER	Peru	South America	Iquitos	PER	367000
PER	Peru	South America	Puno	PER	101578
BVT	Bouvet Island	Antarctica	(null)	(null)	(null)
ATF	French Southern territories	Antarctica	(null)	(null)	(null)

MySQL/Oracle

```
SELECT t2.code, t2.name, t2.continent, t1.name AS cityname, t1.countrycode, t1.population
FROM city1 t1 RIGHT JOIN country1 t2
ON (t1.countrycode = t2.code);
```

SQL JOINS

RIGHT JOIN Example

Incident Table

CASE_NUMBER	INCDATE	SUBJECT_STATUSES
125236B	24/05/14	Shoot and Miss
191609Z	03/08/12	Injured
203505V	27/06/08	Other
199351X	16/07/10	Injured
62683Z	15/03/12	Injured

Subject Table

CASE_NUMBER	FIRST_NAME	LAST_NAME
125236B	Richard	Calderon
191609Z	Robeto	Gabaldon

MySQL/Oracle

```
SELECT t1.case_number, t1.incdates,
t1.subject_statuses, t2.first_name, t2.last_name
FROM subject t2 INNER JOIN incident t1 ON
t1.case_number = t2.case_number;
```

CASE_NUMBER	INCDATE	SUBJECT_STATUSES	FIRST_NAME	LAST_NAME
125236B	24/05/14	Shoot and Miss	Richard	Calderon
191609Z	03/08/12	Injured	Robeto	Gabaldon

MySQL/Oracle

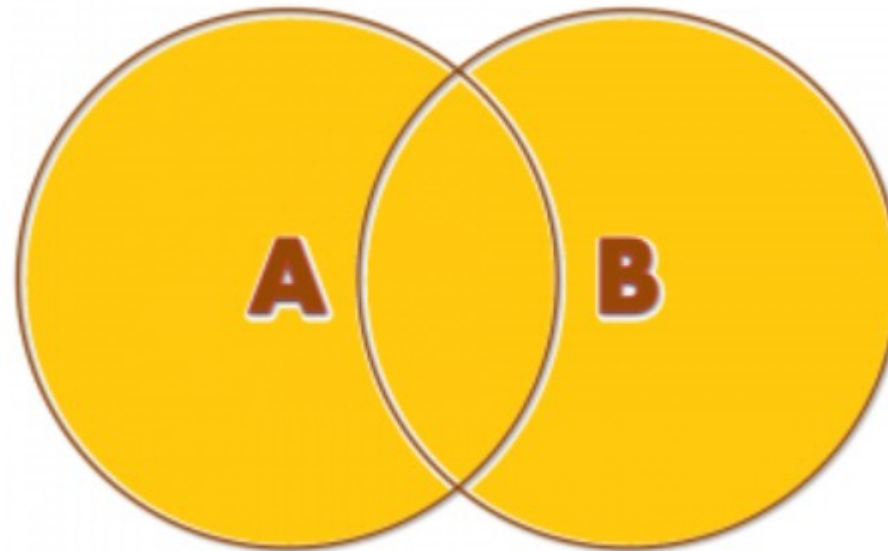
```
SELECT t1.case_number, t1.incdates,
t1.subject_statuses, t2.first_name, t2.last_name
FROM subject t2 RIGHT JOIN incident t1 ON
t1.case_number = t2.case_number;
```

CASE_NUMBER	INCDATE	SUBJECT_STATUSES	FIRST_NAME	LAST_NAME
125236B	24/05/14	Shoot and Miss	Richard	Calderon
191609Z	03/08/12	Injured	Robeto	Gabaldon
203505V	27/06/08	Other	(null)	(null)
62683Z	15/03/12	Injured	(null)	(null)
199351X	16/07/10	Injured	(null)	(null)

SQL JOINS

FULL OUTER JOIN Concept

FULL OUTER JOIN. All records in both tables



SQL JOINS

FULL OUTER JOIN Example

Project Table

PROJECT_ID	PROJECT_NAME
1	ERP
2	Sales CRM

Member Table

MEMBER_ID	MEMBER_NAME	PROJECT_ID
1	John Doe	1
2	Jane Doe	1
3	Jack Daniel	(null)



Oracle

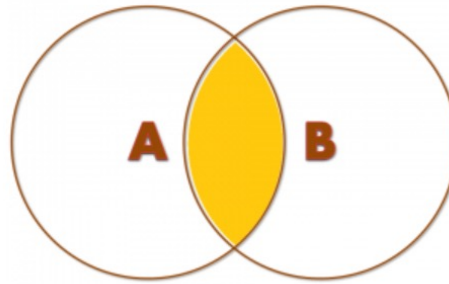
```
SELECT member_name, project_name  
FROM member m FULL OUTER JOIN project p ON p.project_id = m.project_id;
```

MEMBER_NAME	PROJECT_NAME
John Doe	ERP
Jane Doe	ERP
Jack Daniel	(null)
(null)	Sales CRM

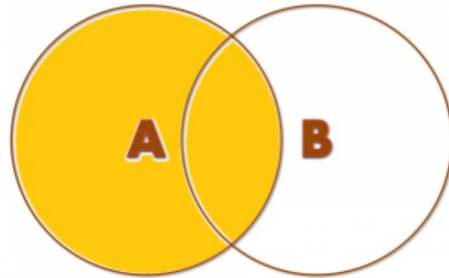
SQL JOINS

JOINS Summary

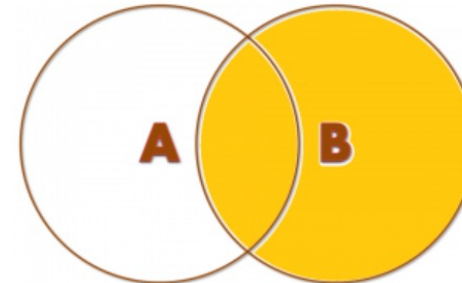
INNER JOIN



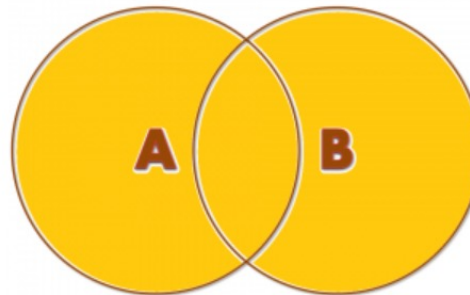
LEFT JOIN



RIGHT JOIN



FULL OUTER JOIN



SESSION 8

- CARTESIAN PRODUCT
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- **SETS OPERATIONS**

UNION, UNION ALL, MINUS INTERSECT Example

MySQL

```
CREATE TABLE TX1 ( TX1C1 INTEGER, TX1C2 INTEGER, TX1C3 VARCHAR(50) );  
CREATE TABLE TX2 ( TX2C1 INTEGER, TX2C2 INTEGER, TX2C3 VARCHAR(50) );
```

Oracle

```
CREATE TABLE TX1 ( TX1C1 NUMBER, TX1C2 NUMBER, TX1C3 VARCHAR2(50) );  
CREATE TABLE TX2 ( TX2C1 NUMBER, TX2C2 NUMBER, TX2C3 VARCHAR2(50) );
```

MySQL/Oracle

```
INSERT INTO TX1 VALUES (1,1,'11');  
INSERT INTO TX1 VALUES (1,2,'12');
```

MySQL/Oracle

```
INSERT INTO TX2 VALUES (1,2,'12');  
INSERT INTO TX2 VALUES (1,3,'13');
```

SETS OPERATIONS

UNION, UNION ALL, MINUS INTERSECT Example

TX1

TX1C1	TX1C2	TX1C3
1	1	11
1	2	12

TX2

TX2C1	TX2C2	TX2C3
1	2	12
1	3	13

MySQL/Oracle

```
SELECT TX1C1, TX1C2 FROM TX1
UNION ALL
SELECT TX2C1, TX2C2 FROM TX2;
```

TX1C1	TX1C2
1	1
1	2
1	2
1	3

MySQL/Oracle

```
SELECT TX1C1, TX1C2 FROM TX1
UNION
SELECT TX2C1, TX2C2 FROM TX2;
```

TX1C1	TX1C2
1	1
1	2
1	3

SETS OPERATIONS

UNION, UNION ALL, MINUS INTERSECT Example

TX1

TX1C1	TX1C2	TX1C3
1	1	11
1	2	12

TX2

TX2C1	TX2C2	TX2C3
1	2	12
1	3	13

Oracle

```
SELECT TX1C1, TX1C2 FROM TX1  
MINUS  
SELECT TX2C1, TX2C2 FROM TX2;
```

TX1C1	TX1C2
1	1

Oracle

```
SELECT TX1C1, TX1C2 FROM TX1  
INTERSECT  
SELECT TX2C1, TX2C2 FROM TX2;
```

TX1C1	TX1C2
1	2