**جامعة طرابلس
كلية تقنية المعلومات**

قواعد البيانات المتقدمة **Advanced Databases**
ITSE312
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المحاضرة الرابعة – استرجاع البيانات **II**
Retrieving Data II
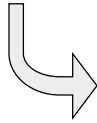
Advanced Database Lecture 3

Contents

▸ Retrieving Data
  ▸ SELECT
  ▸ JOINS   INNER, LEFT, RIGHT, FULL, CROSS
  ▸ UNION
  ▸ INTERSECT
  ▸ EXCEPT

Advanced Database Lecture 3

Select Statement - General Structure

SELECT ...... FROM ...... WHERE
......

SELECT [ALL / DISTINCT] *expr1* [AS *col1*], *expr2* [AS *col2*] ;
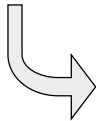
FROM *tablename* WHERE *condition*

Grouping

SELECT ...... FROM ...... WHERE *condition*
GROUP BY *groupexpr* [HAVING *requirement*]

Group functions:
  COUNT( ), SUM( ), AVG( ), MAX( ), MIN( )

– **groupexpr** specifies the related rows to be grouped as one entry. Usually it is a column.
– WHERE **condition** specifies the condition of individual rows before the rows are group. HAVING **requirement** specifies the condition involving the whole group.

Display Order

```
SELECT ...... FROM ...... WHERE ......
GROUP BY ..... ;
ORDER BY colname ASC / DESC
```

Tables Join

▶ By using joins, you can retrieve data from two or more tables based on logical relationships between the tables.

▶ Joins indicate how SQL Server should use data from one table to select the rows in another table.

▶ They are predominantly used when a user is trying to extract data from tables that have one-to-many or many-to-many relationships between them.

▶ Joins syntax
  ▶ INNER JOIN
  ▶ LEFT [OUTER] JOIN
  ▶ RIGHT [OUTER] JOIN
  ▶ FULL [OUTER] JOIN
  ▶ CROSS JOIN

Inner Join

‣ The Inner join will retrieve data from both tables where applicable.

‣ Inner joins is specified in the FROM clause.

‣ FROM first_table < join_type > second_table [ON (join_condition)]

‣ This type of join returns those records which have matching values in both tables.

```
SELECT *
    FROM Table1 t1
    INNER JOIN Table2 t2
        ON t1.fk = t2.id;
```

Table1   Table2

INNER JOIN

▸
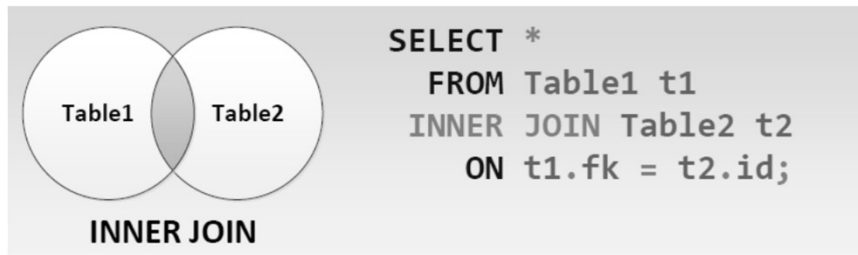
Inner Join

‣ Retrieve information of all students who enrolled in courses

```
SELECT * FROM [dbo].[Students] stu
    INNER JOIN [dbo].[Semesters] sem
ON stu.Id = sem.StudentId
```

‣ Retrieve the Id, name and course of all students who enrolled in courses

```
SELECT stu.Id, stu.Name, sem.CourseId, sem.Mark
   FROM [dbo].[Students] stu
       INNER JOIN [dbo].[Semesters] sem
   ON stu.Id = sem.StudentId
```

▸

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Inner Join

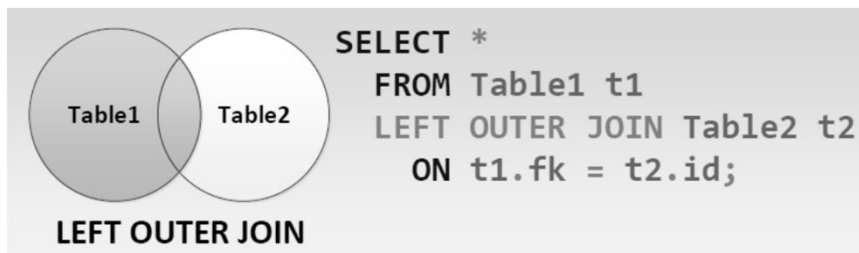▸ Retrieve the Id, name, courseId and marks of all students who enrolled in courses

```
SELECT stu.Id, stu.Name, sem.CourseId, sem.Mark
FROM [dbo].[Students] stu INNER JOIN [dbo].[Semesters] sem
ON stu.Id = sem.StudentId
```

Id	Name	CourseId	Mark
9223333	Ahmed Othman kalaf	ITSE313	90.5
9223333	Ahmed Othman kalaf	ITNE312	77
9223333	Ahmed Othman kalaf	ITWT212	50
9223333	Ahmed Othman kalaf	ITSE313	0
9223333	Ahmed Othman kalaf	ITNE312	0
9223333	Ahmed Othman kalaf	ITWT212	0
9223373	Alfirjani Adel Muftah	ITSE313	20.7
9223373	Alfirjani Adel Muftah	ITWT212	99
9223382	Asma Altaher Omar	ITNE312	84
9223382	Asma Altaher Omar	ITSE313	60.2
9223382	Asma Altaher Omar	ITWT212	22
9223382	Asma Altaher Omar	ITIS315	76.9

▸

Left outer Join

▸ The LEFT JOIN or the LEFT OUTER JOIN returns all the records from the left table and also those records which satisfy a condition from the right table. Also, for the records having no matching values in the right table, the output or the result-set will contain the NULL values.

```
SELECT *
    FROM Table1 t1
    LEFT OUTER JOIN Table2 t2
        ON t1.fk = t2.id;
```

Table1 Table2

LEFT OUTER JOIN

▸

Left outer Join

```
SELECT stu.Id, stu.Name, sem.CourseId, sem.Mark
FROM [dbo].[Students] stu
  LEFT OUTER JOIN [dbo].[Semesters] sem
ON stu.Id = sem.StudentId
WHERE Name LIKE 'A%'
```

Id	Name	CourseId	Mark
9223333	Ahmed Othman kalaf	ITSE313	90.5
9223333	Ahmed Othman kalaf	ITNE312	77
9223333	Ahmed Othman kalaf	ITWT212	50
9223333	Ahmed Othman kalaf	ITSE313	0
9223333	Ahmed Othman kalaf	ITNE312	0
9223333	Ahmed Othman kalaf	ITWT212	0
9223363	Ali Ahmed Salem	NULL	NULL
9223373	Alfirjani Adel Muftah	ITSE313	20.7
9223373	Alfirjani Adel Muftah	ITWT212	99
9223382	Asma Altaher Omar	ITNE312	84
9223382	Asma Altaher Omar	ITSE313	60.2
9223382	Asma Altaher Omar	ITWT212	22
9223382	Asma Altaher Omar	ITIS315	76.9

▸

Right outer Join

▸ The RIGHT JOIN or the RIGHT OUTER JOIN returns all the records from the right table and also those records which satisfy a condition from the left table. Also, for the records having no matching values in the left table, the output or the result-set will contain the NULL values.

Table1 Table2

```
SELECT *
   FROM Table1 t1
RIGHT OUTER JOIN Table2 t2
     ON t1.fk = t2.id;
```

RIGHT OUTER JOIN

▸

Right outer Join

```
SELECT sem.CourseId, sem.Mark,cou.Id,cou.Title
    FROM [dbo].[Semesters] sem
        RIGHT OUTER JOIN [dbo].[Courses] cou
    ON sem.CourseId = cou.Id
```

| CourseId	Mark	Id	Title
ITIS315	76.9	ITIS315	Information Retrieval
ITNE312	77	ITNE312	Introduction to Networking
ITNE312	0	ITNE312	Introduction to Networking
ITNE312	84	ITNE312	Introduction to Networking
ITSE313	90.5	ITSE313	Advanced Databases
ITSE313	0	ITSE313	Advanced Databases
ITSE313	20.7	ITSE313	Advanced Databases
ITSE313	60.2	ITSE313	Advanced Databases
NULL	NULL	ITSE412	System Design
ITWT212	50	ITWT212	Web Services
ITWT212	0	ITWT212	Web Services
ITWT212	99	ITWT212	Web Services
ITWT212	22	ITWT212	Web Services

▸

Full outer Join

▸ Full Join or the Full Outer Join returns all those records which either have a match in the left(Table1) or the right(Table2) table.


```
SELECT *
    FROM Table1 t1
    FULL OUTER JOIN Table2 t2
        ON t1.fk = t2.id;
```
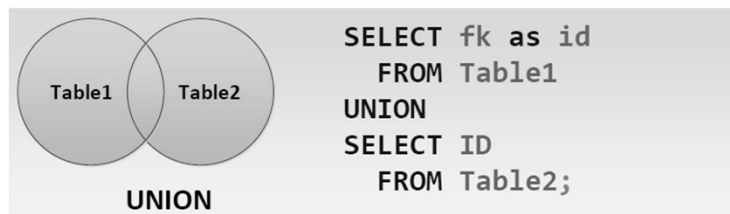
FULL OUTER JOIN

▸

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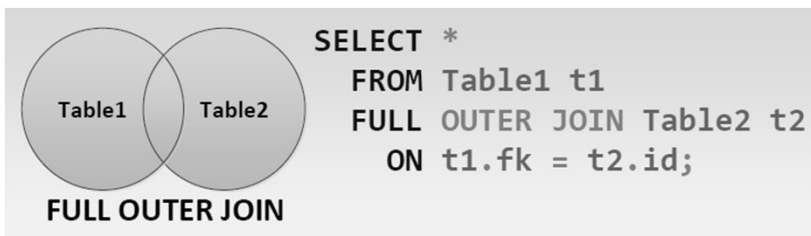
Cross Join

▸ Cross Join returns the Cartesian product of both tables.


```
SELECT *
    FROM Table1 t1
    CROSS JOIN Table2 t2;
```

CROSS JOIN, the Cartesian product

▸
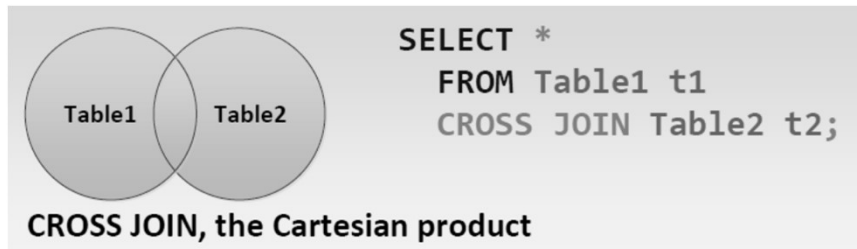
Tables Union

▸ The Union operation will merge two or more tables into one table eliminating the duplications.


```
SELECT fk as id
    FROM Table1
UNION
SELECT ID
    FROM Table2;
```

UNION

▸
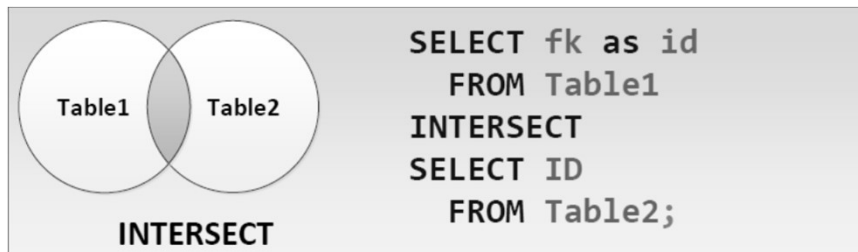
Tables Intersection

▶ The INTERSECT returns distinct rows that are output by both the left and right input queries operator.

Table1 Table2	`SELECT fk as id`
	`    FROM Table1`
	`INTERSECT`
	`SELECT ID`
	`    FROM Table2;`

INTERSECT	

▶

Tables Difference

▶ The EXCEPT returns distinct rows from the left input query that aren't output by the right input query.

Table1 Table2	`SELECT fk as id`
	`    FROM Table1`
	`EXCEPT`
	`SELECT ID`
	`    FROM Table2;`

EXCEPT	

▶

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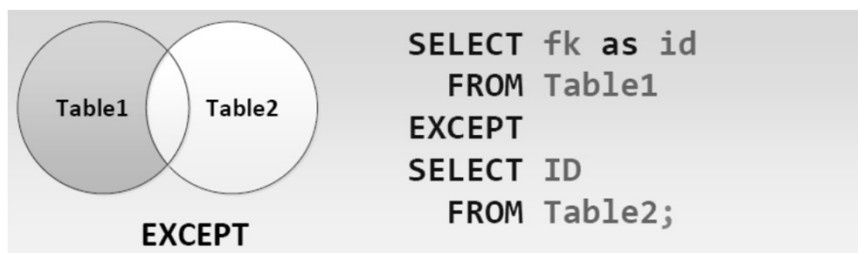
Natural Join

▸ The Natural join will retrieve data from both tables where applicable eliminating duplicate columns.(does not exists in the T-SQL)

▸