Nested Queries, Tuples, and Set/Multiset Comparisons
IN Vs. Exists

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Nested Queries, Tuples, and Set/Multiset Comparisons

Nested queries

Complete select-from-where blocks within WHERE clause of another query or the FROM clause or the SELECT clause or other

SQL clauses as needed.

Outer query and nested subqueries

SQL Correlated Subqueries: are used to select data from a table referenced in the outer query.

The subquery is known as a correlated because the subquery is related to the outer query.

In this type of queries, a table alias (also called a correlation name) must be used to specify which table reference is to be used.

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Agent Table

AGENT_CODE	AGENT_NAME	WORKING_AREA	COMMISSION	PHONE_NO
A007	Ramasundar	Bangalore	0.15	077-25814763
A003	Alex	London	0.13	075-12458969
A008	Alford	New York	0.12	044-25874365
A011	Ravi Kumar	Bangalore	0.15	077-45625874
A010	Santakumar	Chennai	0.14	007-22388644
A012	Lucida	San Jose	0.12	044-52981425
			0.13	045-21447739

```
SELECT agent_name, agent_code, phone_no
FROM agents
WHERE agent_code = 'A003';
```

```
SELECT agent_name, agent_code, phone_no
FROM agents
WHERE
agent_code =
        (SELECT agent_code
        FROM agents
        WHERE agent_name = 'Alex');
```

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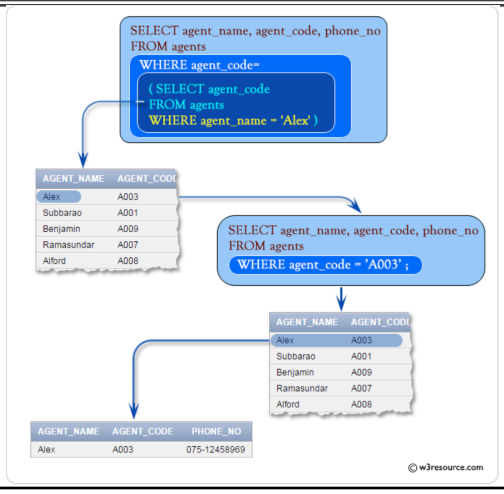
Nested Query walk through

```
SELECT agent_name, agent_code, phone_no
FROM agents
WHERE agent_code =
        (SELECT agent_code x
        FROM agents
        WHERE agent_name = 'Alex');
```

AGENT_CODE	AGENT_NAME	WORKING_AREA	COMMISSION	PHONE_NO	COUNTRY
A007	Ramasundar	Bangalore	0.15	077-25814763	
A003	Alex	London	0.13	075-12458969	
A008	Alford	New York	0.12	044-25874365	
A011	Ravi Kumar	Bangalore	0.15	077-45625874	
A010	Santakumar	Chennai	0.14	007-22388644	
A012	Lucida	San Jose	0.12	044-52981425	
A005	Anderson	Brisban	0.13	045-21447739	
A001	Subbarao	Bangalore	0.14	077-12346674	



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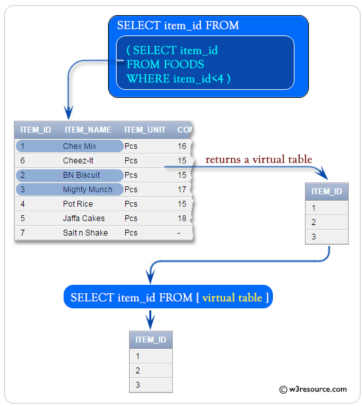
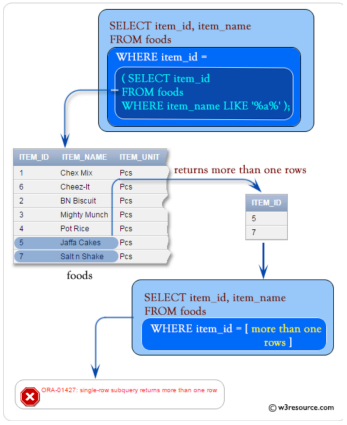



```
+---------+--------------+-----------+------------+
| ITEM_ID | ITEM_NAME    | ITEM_UNIT | COMPANY_ID |
+---------+--------------+-----------+------------+
| 1       | Chex Mix     | Pcs       | 16         |
| 6       | Cheez-It     | Pcs       | 15         |
| 2       | BN Biscuit   | Pcs       | 15         |
| 3       | Mighty Munch | Pcs       | 17         |
| 4       | Pot Rice     | Pcs       | 15         |
| 5       | Jaffa Cakes  | Pcs       | 18         |
| 7       | Salt n Shake | Pcs       |            |
+---------+--------------+-----------+------------+
```



Nested Queries- More Examples

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IN and Not IN

- IN operator is used to checking a value within a ***set of values***. The list of values may come from the results returned by a subquery.
- Not IN operator is used to checking a value that is not in a ***set of values***. The list of values may come from the results returned by a subquery.

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Example | Nested Query - Using IN

Retrieve 'ord_num', 'ord_amount', 'ord_date', 'cust_code' and 'agent_code' where working area of agents must be 'Bangalore'

Agent Table

AGENT_CODE	AGENT_NAME	WORKING_AREA	COMMISSION	PHONE_NO
A007	Ramasundar	Bangalore	0.15	077-25814763
A003	Alex	London	0.13	075-12458969
A008	Alford	New York	0.12	044-25874365
A011	Ravi Kumar	Bangalore	0.15	077-45625874
A010	Santakumar	Chennai	0.14	007-22388644
A012	Lucida	San Jose	0.12	044-52981425
A005	Anderson	Brisban	0.13	045-21447739

Order Table

ORD_NUM	ORD_AMOUNT	ADVANCE_AMOUNT	ORD_DATE	CUST_CODE	AGENT_CODE
200114	3500	2000	15-AUG-08	C00002	A008
200122	2500	400	16-SEP-08	C00003	A004
200118	500	100	20-JUL-08	C00023	A006
200119	4000	700	16-SEP-08	C00007	A010
200121	1500	600	23-SEP-08	C00008	A004
200130	2500	400	30-JUL-08	C00025	A011
200134	4200	1800	25-SEP-08	C00004	A005
200108	4000	600	15-FEB-08	C00008	A004

Thinking process

'agent_code' of 'orders' table must be in the list within in inner query :

in inner query:

'working_area' of 'agents' table must be 'Bangalore',

→ IN operator

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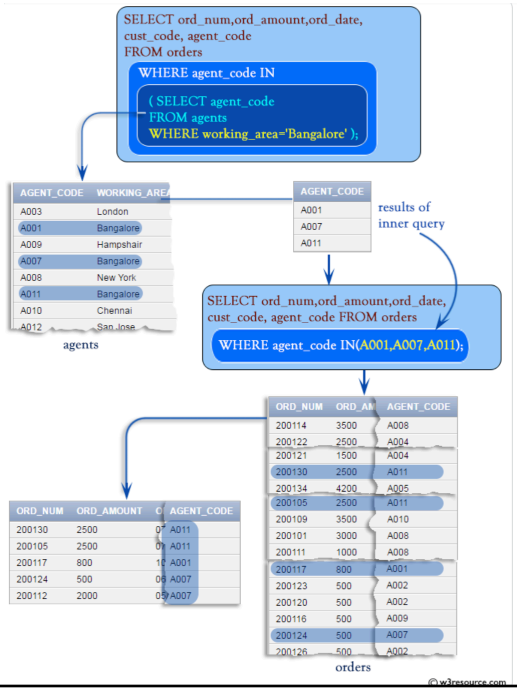
IN

Retrieve 'ord_num', 'ord_amount', 'ord_date', 'cust_code' and 'agent_code' where working area of agents ***must be*** 'Bangalore'



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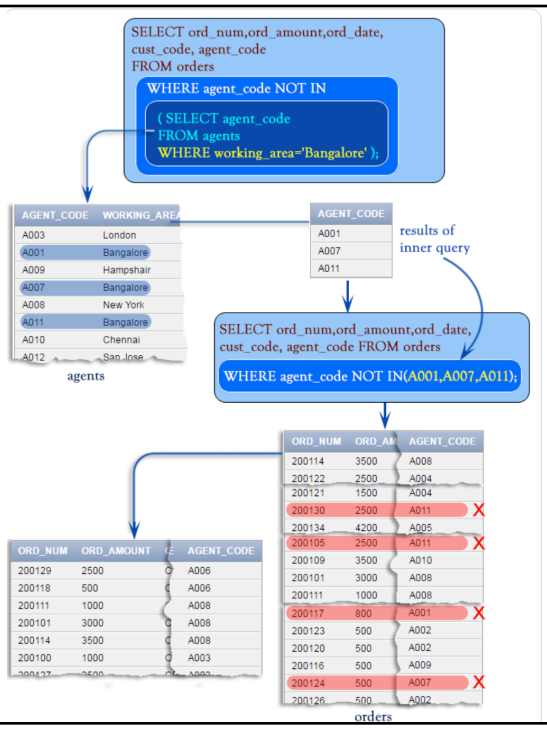
NOT IN

- Retrieve 'ord_num', 'ord_amount', 'ord_date', 'cust_code' and 'agent_code' where working area of agents ***must not*** be 'Bangalore



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EXISTS

- EXISTS operator to check the existence of a result of a subquery.
- EXISTS operator can be used in correlated subqueries also.
- Exists Returns Boolean

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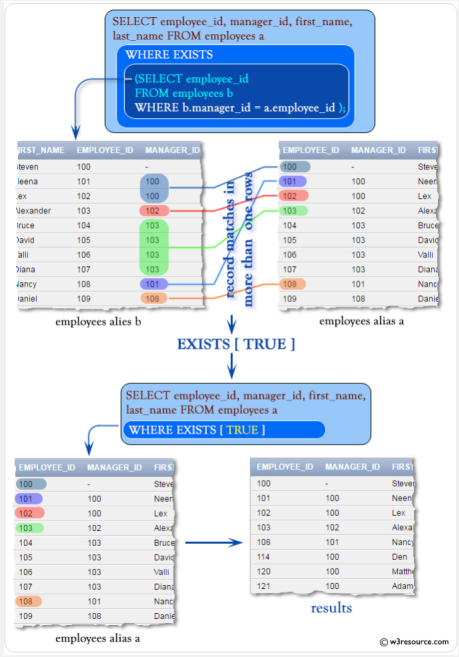
Using EXISTS

Display the employee_id, manager_id, first_name and last_name of those employees who manage other employees.

employee_id	first_name	last_name	email	phone_number	hire_date	job_id	salary	commission_pct	manager_id	department_id
100	Steven	King	SKING	515.123.4567	6/17/1987	AD_PRES	24000			90
101	Neena	Kochhar	NKOCHHAR	515.123.4568	6/18/1987	AD_VP	17000		100	90
102	Lex	De Haan	LDEHAAN	515.123.4569	6/19/1987	AD_VP	17000		100	90
103	Alexander	Hunold	AHUNOLD	590.423.4567	6/20/1987	IT_PROG	9000		102	60
104	Bruce	Ernst	BERNST	590.423.4568	6/21/1987	IT_PROG	6000		103	60
105	David	Austin	DAUSTIN	590.423.4569	6/22/1987	IT_PROG	4800		103	60
106	Valli	Pataballa	VPATABAL	590.423.4560	6/23/1987	IT_PROG	4800		103	60
107	Diana	Lorentz	DLORENTZ	590.423.5567	6/24/1987	IT_PROG	4200		103	60



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Not EXISTS

- NOT EXISTS is logically opposite of EXISTS operator.
- NOT EXISTS is used when we need to check if rows do not exist in the results returned by a subquery.
- NOT EXISTS returns Boolean

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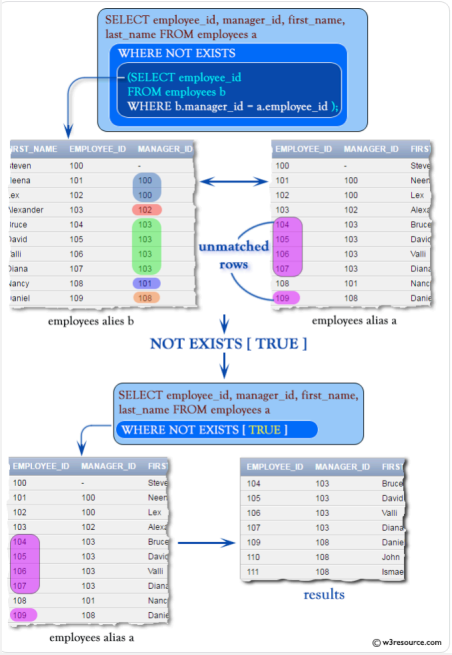
Using NOT EXISTS

Display the employee_id, manager_id, first_name and last_name of those employees who have no manager status.

This query is opposite to the previous one.

employee_id	first_name	last_name	email	phone_number	hire_date	job_id	salary	commission_pct	manager_id	department_id
100	Steven	King	SKING	515.123.4567	6/17/1987	AD_PRES	24000			90
101	Neena	Kochhar	NKOCHHAR	515.123.4568	6/18/1987	AD_VP	17000		100	90
102	Lex	De Haan	LDEHAAN	515.123.4569	6/19/1987	AD_VP	17000		100	90
103	Alexander	Hunold	AHUNOLD	590.423.4567	6/20/1987	IT_PROG	9000		102	60
104	Bruce	Ernst	BERNST	590.423.4568	6/21/1987	IT_PROG	6000		103	60
105	David	Austin	DAUSTIN	590.423.4569	6/22/1987	IT_PROG	4800		103	60
106	Valli	Pataballa	VPATABAL	590.423.4560	6/23/1987	IT_PROG	4800		103	60
107	Diana	Lorentz	DLORENTZ	590.423.5567	6/24/1987	IT_PROG	4200		103	60



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USE of EXISTS

- **Q7: List the names of managers who have at least one dependent.**

```
SELECT Fname, Lname
FROM Employee
WHERE EXISTS (SELECT *
              FROM DEPENDENT
              WHERE Ssn= Essn)

      AND EXISTS (SELECT   *
                  FROM Department
                  WHERE Ssn= Mgr_Ssn)
```

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Any, All and Some

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Nested Queries (cont'd.)

- Use other comparison operators to compare a single value *v*
  - = **ANY** (or = **SOME**) operator
    - Returns TRUE if the value *v* is equal to some value in the set *V* and is hence equivalent to IN
  - **Other operators** that can be ***combined with*** *ANY* (or SOME): >, >=, <, <=, and <>
  - **ALL:** value must exceed all values from nested query

```
SELECT   Lname, Fname
FROM     EMPLOYEE
WHERE    Salary > ALL ( SELECT   Salary
                        FROM     EMPLOYEE
                        WHERE    Dno=5 );
```

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