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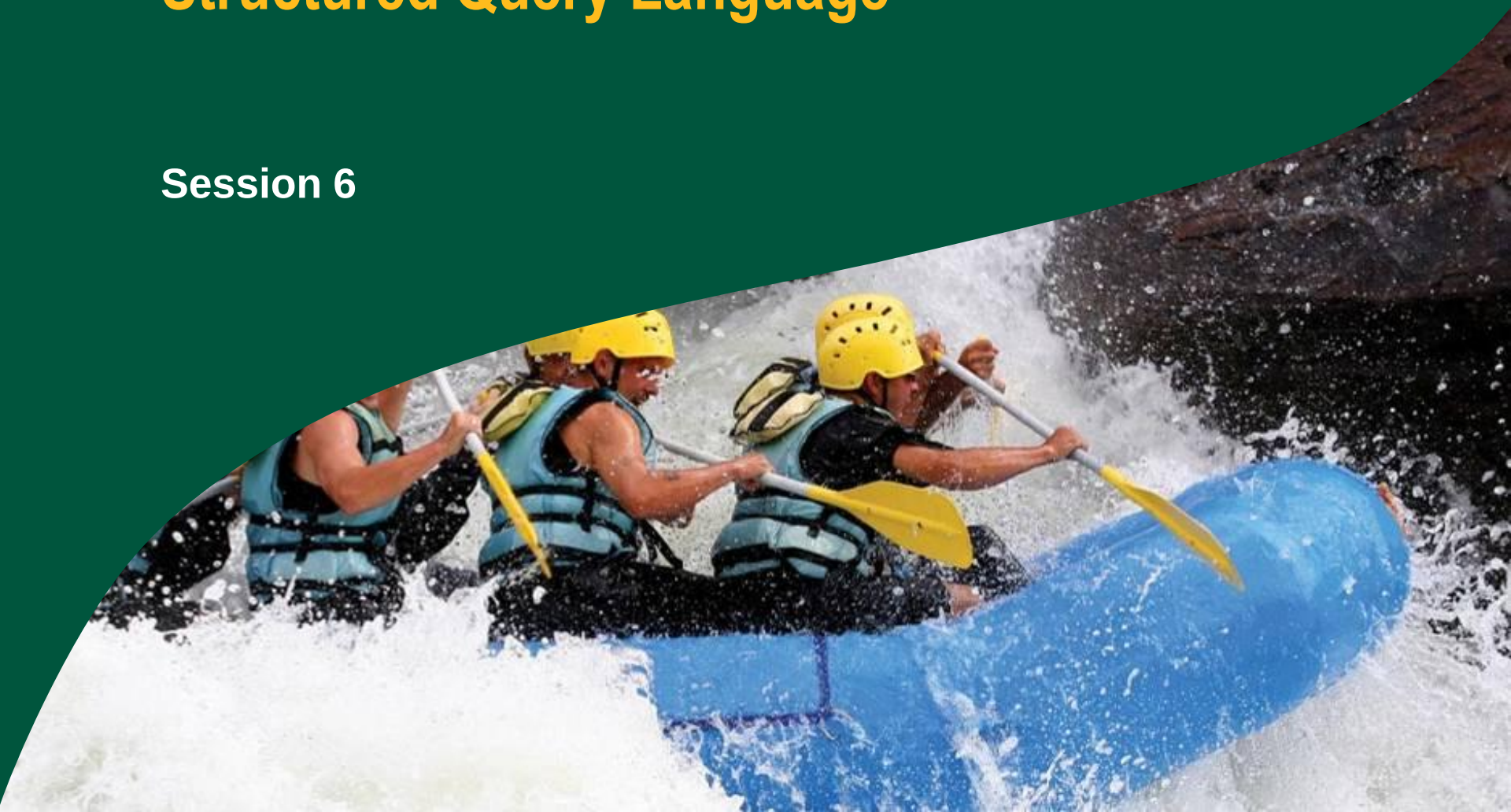
Structured Query Language

Session 6



Coverage

- Grouping Data
- Sub - Queries
- Nested Subquery
- Inline View
- Correlated query
- Top N Analysis

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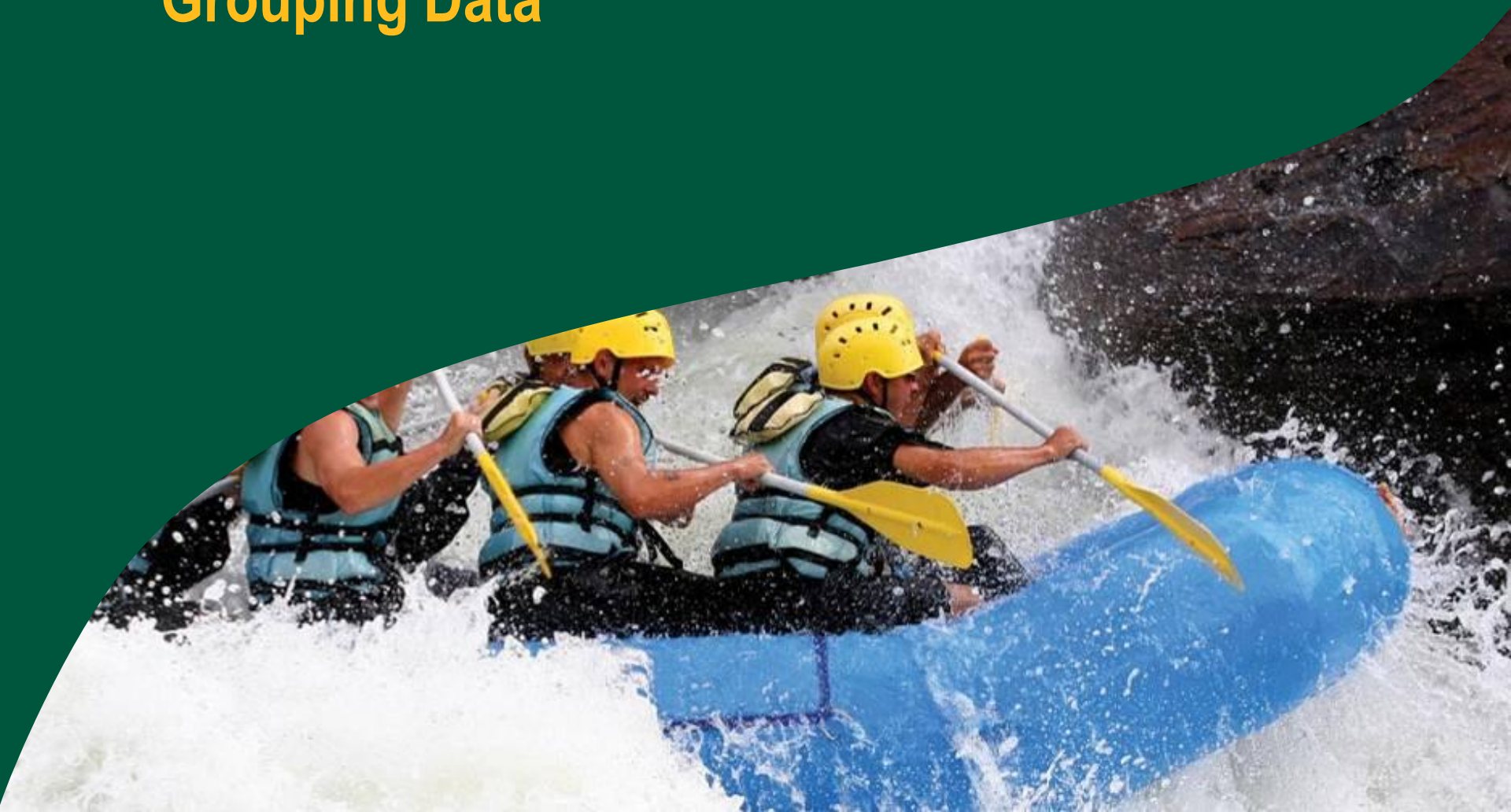
Grouping Data



Grouping Data

- Data can be grouped to obtain summary information for each group
- Aggregate/Group functions like - count,max,min - can be used to get summarized values for the group
- A **GROUP BY** clause of SELECT statement is used to group data
- A single row is returned for each group
- The largest group is the table itself
- The select column list can have only the columns used for grouping data and the aggregate function.
- Individual columns / single –row columns cannot be used in the select column list
- Group functions cannot be used in the WHERE clause

Grouping Data- Group by Deptno

Employee Table

EMPNO	ENAME	JOB	MGR	SAL	DEPTNO
7369	SMITH	CLERK	7902	800	10
7499	ALLEN	SALESMAN	7698	1600	10
7521	WARD	SALESMAN	7698	1250	10
7698	BLAKE	MANAGER	7839	2850	20
7566	JONES	MANAGER	7839	2975	20
7782	CLARK	MANAGER	7839	2450	20
7654	MARTIN	SALESMAN	7698	1250	20
7839	KING	PRESIDENT		5000	30
7844	TURNER	SALESMAN	7698	1500	30
7900	JAMES	CLERK	7698	950	30
7934	MILLER	CLERK	7782	1300	30

10

20

30

Examples of Group BY

- **Number of employees department wise**

```
select deptno,count(*) from emp
group by deptno;

select dname,count(*) from emp e, dept d
where d.deptno = e.deptno
group by dname;
```

Examples of Group BY

- **Department wise Job wise number of employees**

```
select dname,job,count(*) from emp e, dept d
where d.deptno = e.deptno
group by dname,job
```

- **Department wise Job wise employees having job as either clerk or salesman**

```
select dname,job,count(*) from emp e, dept d
where d.deptno = e.deptno
and  job in ('CLERK','SALESMAN')
group by dname,job;
```

Examples of Group BY

- **List the average pay jobwise where the employees are more than 1**

```
select job,count(*),avg(sal)
from emp
where count(*) > 1        ------- cannot be used
group by job;
```

- **HAVING clause is used for restricting data returned by the GROUP BY**
- **Group functions can be used in HAVING**

```
select job,count(*),avg(sal)
from emp
group by job
having count(*) > 1
```

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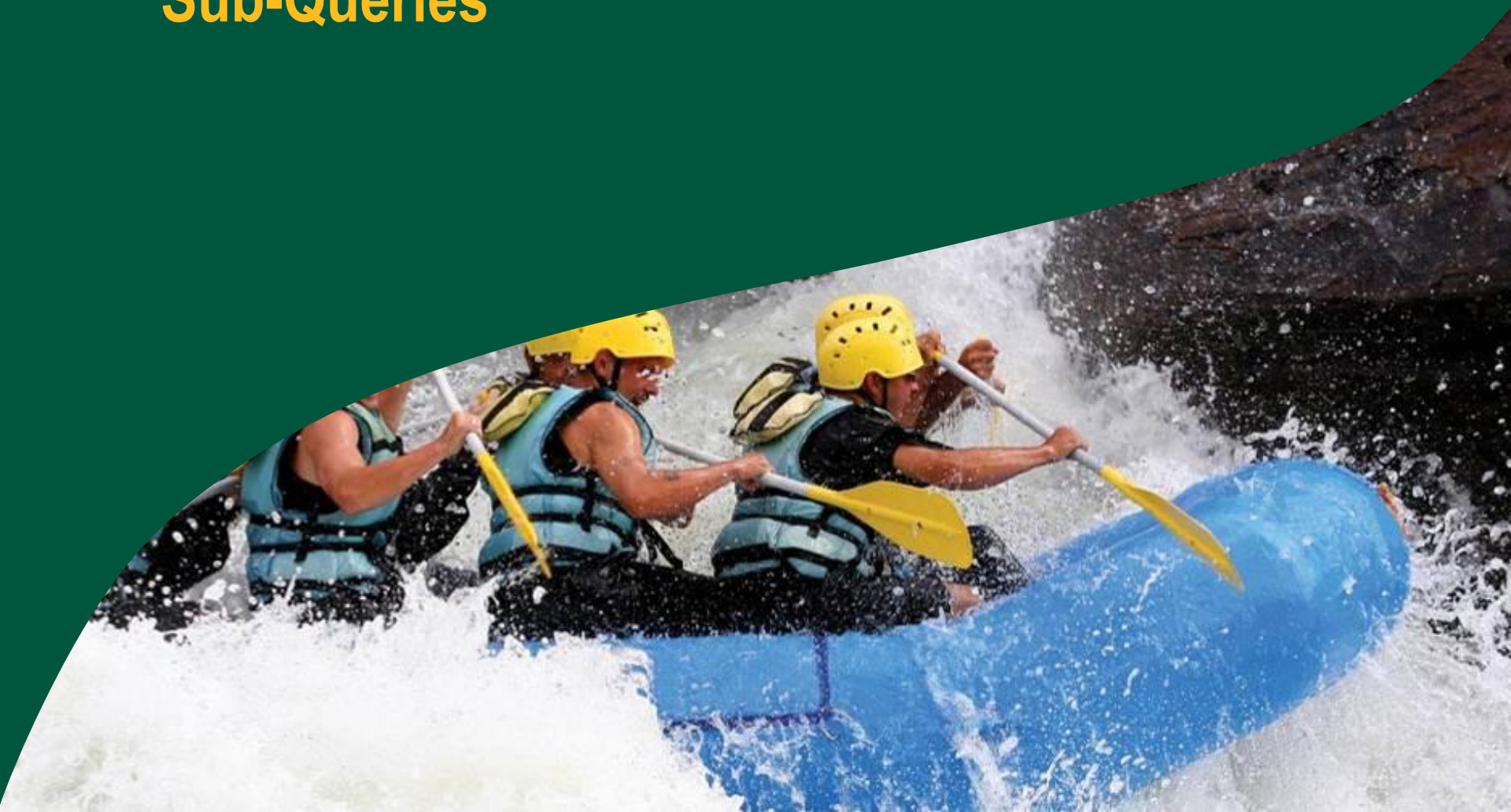
Sub-Queries



Sub - Queries

- A query nested within another SQL statement is known as Sub query
- The top level SELECT statement is known as query or outer query
- A subquery in the Where clause of the Select statement is known as nested subquery
- A subquery answers multi-part questions
- Types of Subqueries
  - Single row subquery
  - Multi-row subquery

Sub - Queries

- **To find out the employees working in same department as BLAKE**

  select * from emp
  where deptno = department of BLAKE

- **Find Blakes' department number**

  select deptno from emp where ename = 'BLAKE;

  DEPTNO
  30

- **Use the result in the query**

  select * from emp where deptno = 30;

Using subquery

- **List the employees working in same department as Blake**

```
select * from emp
where deptno =  (select deptno from emp
                 where ename = 'BLAKE');
```

- **List the employees working in Sales department**

```
select * from emp
where deptno =  (select deptno from dept where
                 dname='SALES')
```

Single-row Subquery examples

- **Find out the details of the employee who is earning the maximum salary**

```
select * from emp
where sal = (select max(sal) from emp);
```

- **List the employees who are earning more than the average salary**

```
select * from emp
where sal > (select avg(sal) from emp);
```

Single-row Subquery examples

Employees getting the same salary as Martin and in same job as Martin

```
select * from emp
where (job,sal) = (select job,sal from emp where ename
                   = 'MARTIN')
```

Multiple Row Subqueries

- Subqueries returns more than more row
- Use multi-row comparison operators to handle them

In	Equal to any value from the list of values returned by the subquery
Any	Matches any single value from the list of values returned by the subquery
All	Matches All values from the list of values returned by the subquery

Multiple Row Subqueries - Example

List the employees working in same department as either Smith or Allen

```
select empno,ename, sal from emp
where deptno in (select deptno from emp where ename in
  ('SMITH','ALLEN'))
```

List the employees who are earning the salary more than any SALESMAN

```
select empno,ename,job, sal from emp
where SAL > ANY   (select sal from emp where job =
  'SALESMAN')
```

Multiple Row Subqueries - Example

List the employees who are earning the salary more than all SALESMAN

```
Select empno,ename,job, sal from emp
where SAL > ALL   (select sal from emp where job =
                   'SALESMAN')
```

List the employees earning highest salary department wise

```
Select  * from emp
where  (deptno,sal) in (select deptno,max(sal) from emp
                        group by deptno)
```

Subquery in HAVING clause

List all the departments that have a minimum salary greater than the minimum salary of department 20

```
select   deptno, min(sal) from     emp
group by deptno
having   min(sal) >  (select min(sal)
                      from   emp
                      where  deptno = 20)
```

Subquery in Update and Delete

- **Make JAMES salary same as ADAMS**

```
Update emp
set sal = (select sal from emp where ename = 'ADAMS')
where ename = 'JAMES‘
```

- **Remove the department which does not have employees**

```
Delete from dept
where deptno not in (select deptno from emp)
```

NULL values in Subquery

- **List the employees who are not managers**

select empno,ename,job, sal from emp
where empno not in (select mgr from emp)

- **What's wrong ???**

select empno,ename,job, sal from emp
where empno not in (select mgr from emp where mgr is not null)

Subquery examples

- Sub queries can contain another subquery
- **Display the leave balances of employees working in Sales department**

```
select empno,cl,sl,pl from leave_balance
where empno in (select empno from emp
where deptno = (select deptno from dept
where dname = 'SALES'));

select ename,cl,sl,pl from leave_balance l, emp e
where l.empno = e.empno
and l.empno in (select empno from emp
where deptno = (select deptno from dept
where dname = 'SALES'));

select ename,cl,sl,pl from leave_balance l, emp e
where l.empno = e.empno
and e.deptno = (select deptno from dept
where dname = 'SALES');
```

Correlated Query

- When a sub query references a column from the table referred to in the parent query it is known as correlated query

- A correlated subquery answers a multiple-part question whose answer depends on the value in each row processed by the parent statement

Correlated Query Example

List the employees earning more than average salaries in their own department

```
select ename,sal,deptno
from emp a
where sal > [ A query which returns the avg salary
  of the department in which the employee of the
  outer query is working]

select ename,sal,deptno
from emp a
where sal > (select avg(sal) from emp b
where b.deptno = a.deptno)
order by deptno
```

Using Exists and Not Exists

Exists	Returns TRUE if the subquery returns a single row satisfying the condition
Not Exists	Returns TRUE if the subquery does not return any row

Example

List the departments without employees

```
select * from dept d
where not exists  (select 1 from emp e where
  e.deptno=d.deptno)
```

List the departments with employees

```
select * from dept d
where  exists  (select 1 from emp e where
  e.deptno=d.deptno)
```

Inline view

- A subquery in the FROM or column list clause of the Select statement is known as inline view
- Columns of inline view can be used in the outer query

Examples of inline view

List the employees earning more than the average salary. Also display the average salary

```
select ename, sal, average_salary
from emp , (select avg(sal) average_salary from emp )
where sal > average_salary;
```

List the employees earning more than BLAKE. Display blake's salary also in the output.

```
select e.ename, e.sal, b.blake_sal
from emp e, (select sal blake_sal from emp where ename
                    ='BLAKE')  b
where  e.sal > b.blake_sal
```

Top-N Analysis

- **Top-N queries ask for the *n* largest or smallest values of a column.**

For example:

– What are the ten best selling products?

- **Both largest values and smallest values sets are considered Top-N queries.**

Top-N Analysis

Typical Top-N queries contain –

- A subquery or an inline view to generate the sorted list of data. The subquery or the inline view includes the ORDER BY clause to ensure that the ranking is in the desired order.

- An outer query to limit the number of rows in the final result set. The outer query includes –

  - The ROWNUM pseudocolumn, which assigns a sequential value starting with 1 to each of the rows returned from the subquery.

  - A WHERE clause, which specifies the *n* rows to be returned.

Example of Top-N Analysis

```
Select rownum, name, salary
   from (select name,salary from employee
            order by salary Desc)
   where rownum < =5
```

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Thank You !!!