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Hierarchical Queries

Let Us Understand JOINS in Oracle

HIERARCHICAL OR RECURSIVE QUERIES

- Hierarchical Queries Are Queries That Are Executed Upon Tables That Contain Hierarchical Data.
- To Execute The Hierarchical Data We Need The Following Clauses.

START WITH:

- START WITH Identifies The Root Rows Of The Hierarchy.

CONNECT BY :

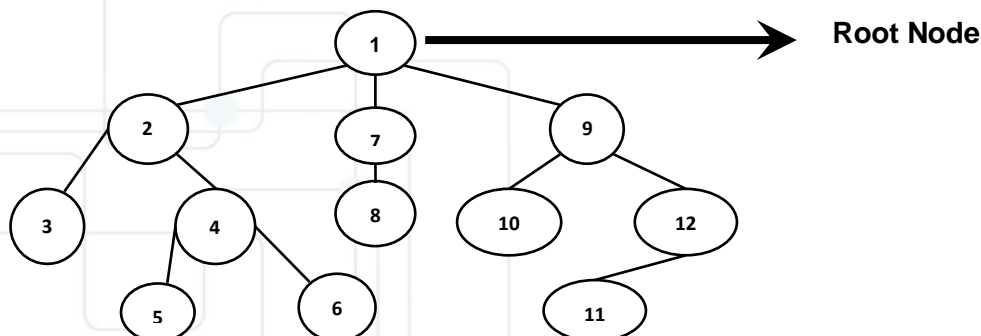
- It Is Used To Specify The Relationship Between Parent Rows And Child Rows of The Hierarchy.

WHERE:

- It is Used To Restrict The Rows Returned By The Query Without Affecting Other Rows Of The Hierarchy.

Steps Followed By Oracle:

- ORACLE Selects The ROOT ROW(s) of The Hierarchy, Which Satisfy The Condition of The START WITH Clause.
- Then ORACLE Selects The Child Rows of Each ROOT ROW.
- Each Child Row Must Satisfy The Condition of The CONNECT BY Clause, With Respect To One of The ROOT ROWS.
- ORACLE Selects Successive Generations Of Child Rows By Identifying the Relation in the CONNECT BY Clause.
- ORACLE Selects Children By Evaluating The CONNECT BY Condition With Respect To The Current Parent Row Selected.
- If The Query Contains a WHERE Clause, ORACLE Removes All Rows From The Hierarchy That Do Not Satisfy The Condition of The WHERE Clause.
- General Representation:



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- **Restrictions:**

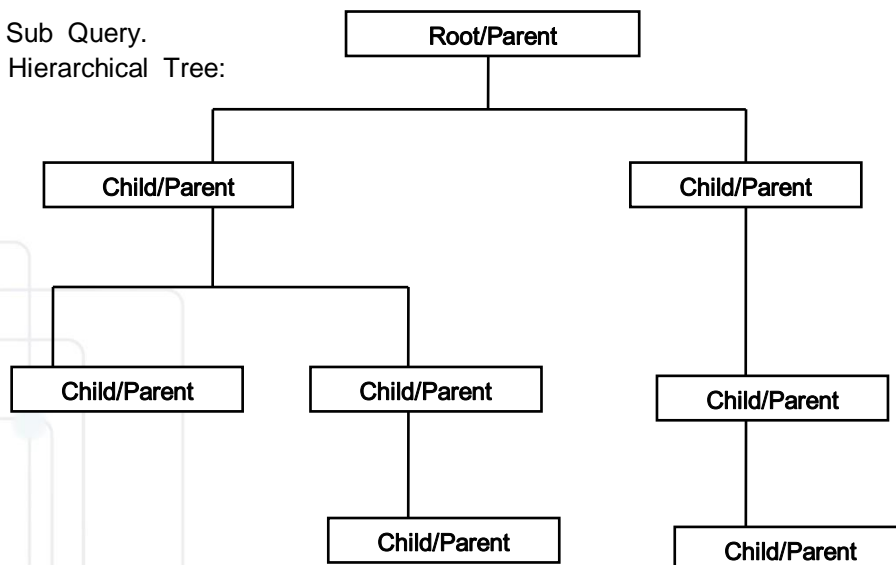
- They Cannot Be Used To Perform Joins.
- They Cannot Select Data From a View, Whose Query Performs a Join.
- If ORDER BY Clause is Used, Then The Rows Are Returned As Per The Specification in The ORDER BY Clause.
- To Define Hierarchical Queries Properly We Must Use The Following Clauses.
 - START WITH Clause.
 - CONNECT BY Clause.

- **START WITH Clause**

- It Identifies To Be Used As The ROOT(s) of a Hierarchical Query.
- It Specifies a Condition That The Roots Must Specify.
- If START WITH is Omitted, Oracle Uses All Rows in The Table As ROOT Rows.
- A START WITH Condition Can Contain a SubQuery.

CONNECT By Clause:

- This Clause Specifies The Relationship Between Parent and Child Rows, in a Hierarchical Query.
- This Clause Contains a Condition That Defines a Relationship.
- This Condition can Be Any Condition As Defined By The Syntax Description.
- Within The Condition, Some Part of The Condition Must Use The PRIOR Operator, Which Refers to The Parent Row.
- The Format of PRIOR Operators Is
 - PRIOR Expr Comparison Operator Expr.
 - Expr Comparison Operator PRIOR Expr.
- The Clause Can Contain Other Conditions To Further Filter The Rows Selected By The Query.
- It Cannot Contain a Sub Query.
- General Structure of Hierarchical Tree:



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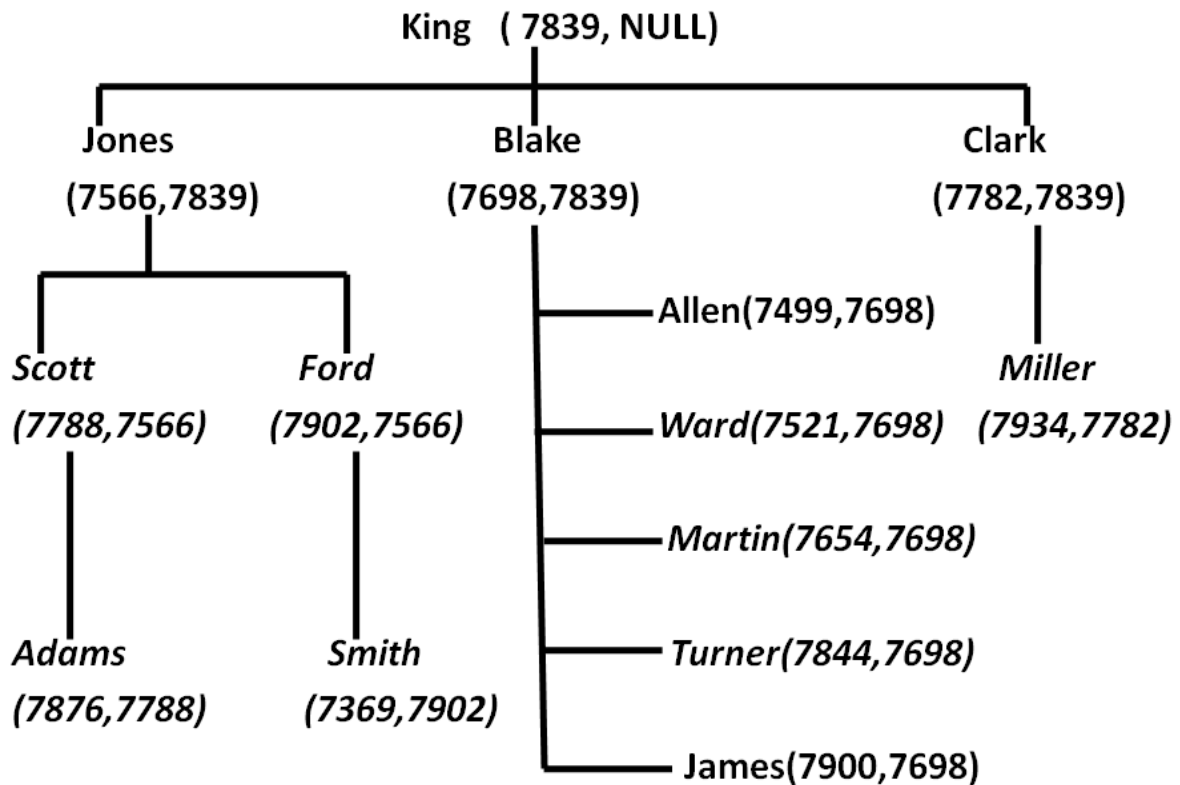


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```
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp CONNECT BY PRIOR Empno=
MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Job= 'PRESIDENT'
CONNECT BY PRIOR Empno= MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Ename= 'KING'
CONNECT BY PRIOR Empno= MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Sal=5000
CONNECT BY PRIOR Empno= MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Sal=(
SELECT MAX(Sal) FROM Emp) CONNECT BY PRIOR Empno= MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Sal=(
SELECT MAX(Sal) FROM Emp WHERE Deptno= (SELECT Deptno FROM
Dept WHERE Dname='ACCOUNTING')) CONNECT BY PRIOR Empno= MGR;
SQL>SELECT Ename, Empno, Mgr, Job, FROM Emp START WITH Ename= 'KING'
CONNECT BY PRIOR Empno= MGR AND Job= 'MANAGER';
```



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New Features In Hierarchical Queries Oracle 10g

1. New Operator:

- CONNECT_BY_ROOT

2. New Pseudo Columns:

- CONNCET_BY_ISCYCLE
- CONNECT_BY_ISLEAF

3. New Function

- SYS_CONNECT_BY_PATH(Oracle 9i)

4. New Keywords

- NOCYCLE
- SIBLINGS(Oracle 9i)

CONNECT_BY_ROOT Operator:

- CONNECT_BY_ROOT is a UNARY Operator That is a Valid Only in Hierarchical Queries.
- We Should Qualify a Column With This Operator. Then Oracle Returns The Column Value Using Data From The ROOT Row.
- It Extends The Functionality of The CONNECT BY [PRIOR] Condition of Hierarchical Queries.

Restiction:

- We Cannot Specify This Operator in The START WITH Condition or The CONNECT BY Condition.

```
SQL> SELECT ENAME Name, CONNECT_BY_ROOT(ENAME) Boss FROM EMP START  
WITH EMPNO =7839 CONNECT BY PRIOR EMPNO=MGR;
```

SYS_CONNECT_BY_PATH Function:

- The Function Returns The Path of a Column Value From Root To Node, With Column Values Separated By 'Char' For Each Row Returned By CONNECT BY Condition.
- Can Work on Any Datatype CHAR, VARCHAR2, NCHAR, or NVARCHAR2.

```
SQL> SELECT Ename, SYS_CONNECT_BY_PATH(ENAME, '/') "Path" FROM Emp  
START WITH Ename='KING' CONNECT BY PRIOR Empno=MGR;
```



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NOCYCLE Keyword:

- Cycles Are Not Allowed in a True Tree Structure. But Some Hierarchical Data May Contain Cycles.
- In a Hierarchical Structure, if a Descendant is Also an Ancestor, It is Called a CYCLE.
- To Allow The "START WITH... CONNECT BY... PRIOR" Construct To Work Properly Even if Cycles Are Present in The Data NOCYCLE is Used.
- The NOCYCLE Parameter in The CONNECT BY Condition Causes ORACLE to Return the Rows in Spite of The Recursive Loop.

```
SQL> SELECT Ename, SYS_CONNECT_BY_PATH (Sal, '/') "Path" FROM Emp START WITH Ename='KING' CONNECT BY NOCYCLE PRIOR Empno=MGR;
```

SIBLINGS Keyword:

- The Keyword is Valid Only When We Specify The Hierarchical Query Using CONNECT BY Clause.
- ORDER SIBLINGS BY Clause Preserves Any Ordering Specified in The Hierarchical Query Clause.
- The ORDER BY Clause Finally Gets Applied on The Query.
- ORDER SIBLINGS BY Clause is Generally Used When We Want To Order Rows of Siblings of The Same Parent.

```
SQL>SELECT Ename, Empno, MGR FROM Emp START WITH Empno=7839 CONNECT BY PRIOR Empno=MGR;  
SQL>SELECT Ename, Empno, MGR FROM Emp START WITH Empno=7839 CONNECT BY PRIOR Empno=MGR ORDER BY Ename;  
SQL>SELECT Ename, Empno, MGR FROM Emp START WITH Empno=7839 CONNECT BY PRIOR Empno=MGR ORDER SIBLINGS BY Ename;
```



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