

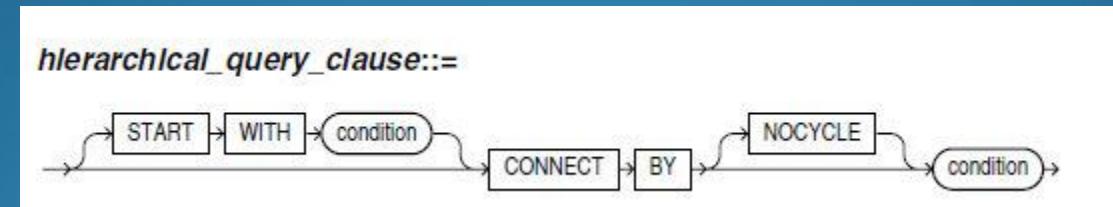
# Connect By 可以做什么？

By: Lastwinner  
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# 认识一下：

- DBA?
- Blog?
- 签名
- No, 一个对Oracle有点兴趣的开发者
- <http://lastwinner.itpub.net>  
<http://space.itpub.net/29867/>  
我不算懒，每年都有更新
- 春困秋乏，夏盹冬眠，年年如此

# Connect By 是什么？



CONNECT BY specifies the relationship between parent rows and child rows of the hierarchy.

# Connect By 可以：

- 列出上下级关系
- 构造序列
- 求排列组合
- 逆转求出下上级的关系路径

# 列出上下级关系

- select empno, ename, job, mgr, deptno, **level** from emp  
start with mgr is null connect by prior empno= mgr;

	EMPNO	ENAME	JOB	MGR	DEPTNO	LEVEL
	7839	KING	PRESIDENT		10	1
	7566	JONES	MANAGER	7839	20	2
	7788	SCOTT	ANALYST	7566	20	3
	7876	ADAMS	CLERK	7788	20	4
	7902	FORD	ANALYST	7566	20	3
	7369	SMITH	CLERK	7902	20	4
	7698	BLAKE	MANAGER	7839	30	2
	7499	ALLEN	SALESMAN	7698	30	3
	7521	WARD	SALESMAN	7698	30	3
▶	7654	MARTIN	SALESMAN	7698	30	3
	7844	TURNER	SALESMAN	7698	30	3
	7900	JAMES	CLERK	7698	30	3
	7782	CLARK	MANAGER	7839	10	2
	7934	MILLER	CLERK	7782	10	3

# 列出上下级关系——格式化

- select empno, lpad(' ', level\*2-1, ' ')||ename ename, job, mgr, deptno, level from emp start with mgr is null connect by prior empno= mgr;

EMPNO	ENAME	JOB	MGR	DEPTNO	LEVEL
7839	KING	PRESIDENT		10	1
7566	JONES	MANAGER	7839	20	2
7788	SCOTT	ANALYST	7566	20	3
7876	ADAMS	CLERK	7788	20	4
7902	FORD	ANALYST	7566	20	3
7369	SMITH	CLERK	7902	20	4
7698	BLAKE	MANAGER	7839	30	2
7499	ALLEN	SALESMAN	7698	30	3
7521	WARD	SALESMAN	7698	30	3
7654	MARTIN	SALESMAN	7698	30	3
7844	TURNER	SALESMAN	7698	30	3
7900	JAMES	CLERK	7698	30	3
7782	CLARK	MANAGER	7839	10	2
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# 构造序列

- select rownum rn from dual connect by rownum<5;

SCOTT@lw.lw> select rownum rn from dual connect by rownum<5;

RN
-----
1
2
3
4

已用时间: 00: 00: 00.23

# 构造序列——扩展

- 等差数列：
  - 起始不为1： select rownum+15 rn from dual connect by rownum<5;
  - 间隔不为1： select 3\*rownum-9 rn from dual connect by rownum<5;
- 等比数列：
  - select power(2, rownum) rn from dual connect by rownum<5;
- 假设 $y=f(x)$ , 只要构成 $f(x)$ 的函数oracle支持, 那就可以用 connect by构造出相应的序列

# 构造序列——应用举例

- 问题：
  - 有11种不同的方法可以将20表示成8个奇数之和。 $( ) + ( ) + ( ) + ( ) + ( ) + ( ) + ( ) + ( ) = 20$   
列出所有的可能性
- 解答：
  - with t as (select rownum\*2-1 r from dual connect by rownum<9)  
select \* from t t1, t t2, t t3, t t4, t t5, t t6, t t7, t t8 where t1.r+t2.r+t3.r+t4.r+t5.r+t6.r+t7.r+t8.r=20  
and t1.r<=t2.r and t3.r<=t4.r and t5.r<=t6.r and t7.r<=t8.r  
and t3.r>=t2.r and t5.r>=t4.r and t7.r>=t6.r

# Connect By 可以：

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- 求排列组合**
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# 排列组合

- 排列组合是组合学最基本的概念。所谓排列，就是指从给定个数的元素中取出指定个数的元素进行排序。组合则是指从给定个数的元素中仅仅取出指定个数的元素，不考虑排序。排列组合的中心问题是研究给定要求的排列和组合可能出现的情况总数。排列组合与古典概率论关系密切。
- 排列：Permutation 组合：Combination

$$P_n^r = n(n-1)\dots(n-r+1) = \frac{n!}{(n-r)!}$$

$$C_n^r = \frac{P_n^r}{r!} = \frac{n!}{r!(n-r)!}$$

$$C_n^r = C_n^{n-r}$$

# 排列组合——组合

- column xmlpath format a15

```
select rn, sys_connect_by_path(rn, ',') xmlpath from  
(select rownum rn from dual connect by level<4) connect  
by rn<prior rn;
```

RN	XMLPATH
3 ,3	
2 ,3,2	
1 ,3,2,1	
1 ,3,1	
2 ,2	
1 ,2,1	
1 ,1	

已选择7行。

# 排列组合——组合

- 更清晰的展现方式
- `select connect_by_root(rn) rrn, rn, level,  
sys_connect_by_path(rn, ',') xmlpath from (select rownum  
rn from dual connect by level<4) connect by rn<prior rn;`

RRN	RN	LEVEL	XMLPATH
3	3	1	,3
3	2	2	,3,2
3	1	3	,3,2,1
3	1	2	,3,1
2	2	1	,2
2	1	2	,2,1
1	1	1	,1

已选择7行。

# 排列组合——组合

- select connect\_by\_root(rn) rrn, rn, level,  
sys\_connect\_by\_path(rn, ',') xmlpath from (select rownum  
rn from dual connect by level<4) **where level=2** connect  
by rn<prior rn;

RRN	RN	LEVEL	XMLPATH
3	2	2	,3,2
3	1	2	,3,1
2	1	2	,2,1

# 排列组合——组合

- 从n个不同的元素里取r个元素，其可能的组合为：
  - select connect\_by\_root(rn) rrn, rn, level, sys\_connect\_by\_path(rn, ',') xmlpath from (select rownum rn from dual connect by level<(&n+1)) where level=&r connect by rn<prior rn;

# 排列组合——组合——应用

- 抽签.....
  - With **t** as (Select level lvl, rownum rn, sys\_connect\_by\_path(rn, ',') xmlpath from (select rownum rn from dual connect by level<(&n+1) where level=&r connect by rn<prior rn),  
**s** as (select count(\*) cnt from t),  
**rnd** as (select ceil(dbms\_random.value(0, (select cnt from s))) rnd\_val from dual))
  - Select xmlpath from t, rnd where rn=rnd\_val;
  - SELECT xmlpath FROM t WHERE rn = (select rnd\_val from rnd);

# 排列组合——排列

- column xmlpath format a15  
select level, sys\_connect\_by\_path(rn, ',') xmlpath from  
(select rownum rn from dual connect by level<4) connect  
by **NOCYCLE** rn<>prior rn order by level, 2;

LEVEL XMLPATH

---

1 ,1  
1 ,2  
1 ,3  
2 ,1,2  
2 ,1,3  
2 ,2,1  
2 ,2,3  
2 ,3,1  
2 ,3,2

---

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# 列出上下级关系路径

EMPNO	ENAME	JOB	MGR	DEPTNO	LV	C1	C2	ISLEAF
7839	KING	PRESIDENT		10	1	/7839	/KING	0
7566	JONES	MANAGER	7839	20	2	/7839/7566	/KING/JONES	0
7788	SCOTT	ANALYST	7566	20	3	/7839/7566/7788	/KING/JONES/SCOTT	0
7876	ADAMS	CLERK	7788	20	4	/7839/7566/7788/7876	/KING/JONES/SCOTT/ADAMS	1
7902	FORD	ANALYST	7566	20	3	/7839/7566/7902	/KING/JONES/FORD	0
7369	SMITH	CLERK	7902	20	4	/7839/7566/7902/7369	/KING/JONES/FORD/SMITH	1
7698	BLAKE	MANAGER	7839	30	2	/7839/7698	/KING/BLAKE	0
7499	ALLEN	SALESMAN	7698	30	3	/7839/7698/7499	/KING/BLAKE/ALLEN	1
7521	WARD	SALESMAN	7698	30	3	/7839/7698/7521	/KING/BLAKE/WARD	1
7654	MARTIN	SALESMAN	7698	30	3	/7839/7698/7654	/KING/BLAKE/MARTIN	1
7844	TURNER	SALESMAN	7698	30	3	/7839/7698/7844	/KING/BLAKE/TURNER	1
7900	JAMES	CLERK	7698	30	3	/7839/7698/7900	/KING/BLAKE/JAMES	1
7782	CLARK	MANAGER	7839	10	2	/7839/7782	/KING/CLARK	0
7934	MILLER	CLERK	7782	10	3	/7839/7782/7934	/KING/CLARK/MILLER	1

# 列出下上级关系路径

- select empno, ename, job, mgr, deptno, level lv, c1,c2,  
sys\_connect\_by\_path(empno,'/') a1,  
sys\_connect\_by\_path(ename,'/') a2, connect\_by\_isleaf  
isleaf2 from  
(select empno, ename, job, mgr, deptno, level lv,  
sys\_connect\_by\_path(empno,'/') c1,  
sys\_connect\_by\_path(ename,'/') c2, connect\_by\_isleaf  
isleaf from emp start with mgr is null connect by prior  
empno= mgr  
)  
start with isleaf=1 connect by lv=prior lv-1 and  
empno= prior mgr  
/

# 列出下上级关系路径

- 刚才的SQL, windows 2003/AIX 5.3下的Oracle 10.2.0.4, 结果均为“未选定行”
  - 但在11G上, 却能得到我们想要的结果
- 
- 采用以表代替视图的方式, 在10GR2上经测试没问题
  - 但从灵活的角度考虑, 转换了一个写法, O了

# 列出下上级关系路径

- with t as (select empno, ename, job, mgr, deptno, level lv, sys\_connect\_by\_path(empno,'') c1, sys\_connect\_by\_path(ename,'') c2, connect\_by\_isleaf isleaf from emp start with mgr is null connect by prior empno= mgr)  
select empno, ename, job, mgr, deptno, level lv, c1,c2, sys\_connect\_by\_path(empno,'') a1, sys\_connect\_by\_path(ename,'') a2, connect\_by\_isleaf isleaf2 from t start with isleaf=1  
connect by lv=prior lv-1 and empno= prior mgr  
/

# 列出下上级关系路径

EMPNO	ENAME	JOB	MGR	DEPTNO	LV	C1	C2	A1	A2	ISLEAF2
7369	SMITH	CLERK	7902	20	1	/7839/7566/7902/7369	/KING/JONES/FORD/...	/7369	/SMITH	0
7902	FORD	ANALYST	7566	20	2	/7839/7566/7902	/KING/JONES/FORD	/7369/7902	/SMITH/FORD	0
7566	JONES	MANAGER	7839	20	3	/7839/7566	/KING/JONES	/7369/7902/7566	/SMITH/FORD/JONES	0
7839	KING	PRESIDENT			10	4 /7839	/KING	/7369/7902/7566/7839	/SMITH/FORD/JONES/KING	1
7499	ALLEN	SALESMAN	7698	30	1	/7839/7698/7499	/KING/BLAKE/ALLEN	/7499	/ALLEN	0
7698	BLAKE	MANAGER	7839	30	2	/7839/7698	/KING/BLAKE	/7499/7698	/ALLEN/BLAKE	0
7839	KING	PRESIDENT			10	3 /7839	/KING	/7499/7698/7839	/ALLEN/BLAKE/KING	1
7521	WARD	SALESMAN	7698	30	1	/7839/7698/7521	/KING/BLAKE/WARD	/7521	/WARD	0
7698	BLAKE	MANAGER	7839	30	2	/7839/7698	/KING/BLAKE	/7521/7698	/WARD/BLAKE	0
7839	KING	PRESIDENT			10	3 /7839	/KING	/7521/7698/7839	/WARD/BLAKE/KING	1
7654	MAR...	SALESMAN	7698	30	1	/7839/7698/7654	/KING/BLAKE/MARTIN	/7654	/MARTIN	0
7698	BLAKE	MANAGER	7839	30	2	/7839/7698	/KING/BLAKE	/7654/7698	/MARTIN/BLAKE	0
7839	KING	PRESIDENT			10	3 /7839	/KING	/7654/7698/7839	/MARTIN/BLAKE/KING	1
7844	TUR...	SALESMAN	7698	30	1	/7839/7698/7844	/KING/BLAKE/TURNER	/7844	/TURNER	0
7698	BLAKE	MANAGER	7839	30	2	/7839/7698	/KING/BLAKE	/7844/7698	/TURNER/BLAKE	0
7839	KING	PRESIDENT			10	3 /7839	/KING	/7844/7698/7839	/TURNER/BLAKE/KING	1

# 列出下上级关系路径

- 其实用start with job='clerk'就可以了，但在对叶子节点无明确标识的时候，只能采用此法

# 特別注意：

- 不要给**connect by**安排较复杂的任务，**Oracle**采取的执行计划很可能导致结果的错误
- Oracle**的新特性，研究可以，但在未经历至少一个大版本考验的基础上，切勿轻易用到实际应用当中

# Q & A

别问太难的问题啊，我是数据库开发砖家，抛砖引玉的砖.....