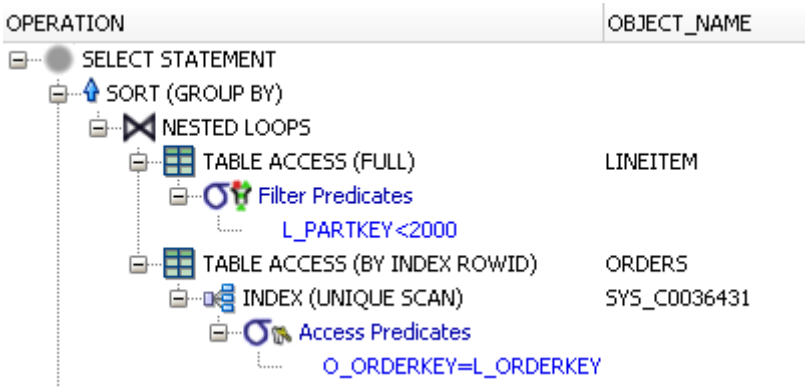
Soluzione

```
CREATE TABLE RICETTA
    (R_IDRicetta NUMBER(5,0),
     R_Nome VARCHAR2(20 BYTE),
       R_Descrizione VARCHAR2(200 BYTE),
       R_Tipo VARCHAR2(20 BYTE),
       R_Tempo NUMBER(5,0),
       R_Costo NUMBER(5,0),
       R_Calorie NUMBER(5,0),
       PRIMARY KEY (R_IDRicetta)
);

CREATE TABLE INGREDIENTE
    (I_IDIng NUMBER(5,0),
     I_Nome VARCHAR2(20 BYTE),
       I_CostoUnitario NUMBER(5,0),
       I_Calorie NUMBER(5,0),
       PRIMARY KEY (I_IDIng)
);

CREATE TABLE LISTAINGREDIENTI
    (L_IDRicetta NUMBER(5,0),
     L_IDIng NUMBER(5,0),
     L_Quantità NUMBER(5,0),
       PRIMARY KEY (L_IDRicetta, L_IDIng),
       FOREIGN KEY (L_IDRicetta) REFERENCES RICETTA (R_IDRicetta),
       FOREIGN KEY (L_IDIng) REFERENCES INGREDIENTE (I_IDIng)
);

CREATE TABLE DISPENSA
    (D_IDIng NUMBER(5,0),
     D_Quantità NUMBER(5,0),
       PRIMARY KEY (D_IDIng),
       FOREIGN KEY (D_IDIng) REFERENCES INGREDIENTE (I_IDIng)
);


--soluzione con una sola query
create or replace procedure RicettePossibili(vTipo varchar) is

cursor curRicette is
  Select * from Ricetta where R_Tipo=vTipo and NOT EXISTS
      (select * from LISTAINGREDIENTI where L_IDRicetta=R_IDRicetta and not
exists
            (select * from DISPENSA where D_IDIng=L_IDIng and
L_Quantità<=D_Quantità))
  order by R_Tempo ;

begin

for vRic in curRic loop
            dbms_output.put_line('Ricetta '||vRic.R_Nome || ' tempo:
'||vRic.R_Tempo);
end loop;
end;

--soluzione con 2 cursori + una query
create or replace procedure RicettePossibili1(vTipo varchar) is

cursor curRic is
  Select * from Ricetta where R_Tipo=vTipo
```

```
  order by R_Tempo ;

cursor curIng (vRic number) is
      select * from LISTAINGREDIENTI where L_IDRicetta=vRic;

vQta INT;
vOK INT;
begin

for vRic in curRic loop
      vOK:=1;
      for vIng in curIng(vRic.R_IDRicetta) loop
            vQta:=0;
            select count(*) into vQta
            from DISPENSA where D_IDIng=vIng.L_IDIng and
vIng.L_Quantità<=D_Quantità;
            if (vQta<1) then
                  vOK:=0;
                  exit;
            end if;
      end loop ;
      if (vOK=1) then
            dbms_output.put_line('Ricetta '||vRic.R_Nome || ' tempo:
'||vRic.R_Tempo);
      end if;
end loop;
end;

--soluzione con 1 cursore + 2 query
create or replace procedure RicettePossibili2(vTipo varchar) is

cursor curRic is
  Select * from Ricetta where R_Tipo=vTipo
  order by R_Tempo ;


vIng int;
vIngD int;

begin

for vRic in curRic loop
      select count(*) into vIng from LISTAINGREDIENTI where
L_IDRicetta=vRic.R_IDRicetta;

      select count(*) into vIngD from LISTAINGREDIENTI,DISPENSA where
L_IDRicetta=vRic.R_IDRicetta and
      D_IDIng=L_IDIng and L_Quantità<=D_Quantità;


      if (vIng=vIngD) then
            dbms_output.put_line('Ricetta '||vRic.R_Nome || ' tempo:
'||vRic.R_Tempo);
      end if;
end loop;
end;
```

```
SELECT O_CLERK,SUM(L_QUANTITY)
FROM TPCD.ORDERS, TPCD.LINEITEM
WHERE O_ORDERKEY=L_ORDERKEY AND L_PARTKEY< 2000
GROUP BY O_CLERK;
```



$NP_{LI} = \lceil 6{,}001{,}215 \times 116 / (4096 \times 0{,}69) \rceil = 246.314$
$NP_{O} = \lceil 1\,500\,000 \times 106 / (4096 \times 0{,}69) \rceil = 56.259$

Sel(L_PARTKEY< 2000)= 1999/200.000= 0,0099

$NL_{ORDERS} = \lceil (1.500.000 \times 4 + 1.500.000 \times 4) / (4096 \times 0{,}69) \rceil = 4.246$

$CostoAccesso_{LI} = 2 + \lceil 1/1.500.000 \times 4.246 \rceil + \lceil 1/1.500.000 \times 56.259 \rceil = 4$

Costo Nested Loop Join $_{LI\text{-}O} = 246.314 + \lceil 6.001.215 \times 0{,}0099 \rceil \times 4 = 246.314 + 237.652 =$ **483.966**
$NT_{O\text{-}LI} = \lceil 6.001.215 \times 0.0099 \rceil = 59.413$
$NP_{P\_PS} = \lceil 59.413 \times (106+116) / (4096 \times 0{,}69) \rceil = 4.667$

Costo del group by $2 \times 4.667 \times (\lceil \log_{100} 4.667 \rceil + 1) =$ **28.002**
Costo Totale = 483.966 + 28.002= 511.968