

TPC-H ベンチマーク Query5 資料

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クエリ 5 の SQL 文

```
select
n_name,
sum(l_extendedprice*(1-l_discount)) as revenue
from
customer,
orders,
lineitem,
supplier,
nation,
region
where
c_custkey = o_custkey
and l_orderkey = o_orderkey
and l_suppkey = s_suppkey
and c_nationkey = s_nationkey
and s_nationkey = n_nationkey
and n_regionkey = r_regionkey
and r_name = 'ASIA'
and o_orderdate >= date '1994-01-01'
and o_orderdate < date '1994-01-01' + interval '1' year
group by
n_name
order by
revenue desc
;
```

POsgreSQL のクエリプラン (index なし)

QUERY PLAN(PosgreSQL[index なし] のクエリプラン)

```
-----
Sort  (cost=279560.73..279560.80 rows=25 width=120)
  Sort Key: (sum((lineitem.l_extendedprice * (1::numeric - lineitem.l_discount))))
  -> HashAggregate  (cost=279559.72..279560.15 rows=25 width=120)
```

```

-> Hash Join (cost=61327.18..279552.49 rows=1446 width=120)
    Hash Cond: ((orders.o_custkey = customer.c_custkey)
    AND (supplier.s_nationkey = customer.c_nationkey))
-> Hash Join (cost=53370.18..268948.26 rows=36158 width=132)
    Hash Cond: (lineitem.l_orderkey = orders.o_orderkey)
-> Hash Join (cost=373.94..203829.14 rows=240049 width=132)
    Hash Cond: (lineitem.l_suppkey = supplier.s_suppkey)
-> Seq Scan on lineitem
    (cost=0.00..178550.15 rows=6001215 width=24)
-> Hash (cost=368.94..368.94 rows=400 width=116)
    -> Hash Join (cost=2.44..368.94
    rows=400 width=116)
        Hash Cond: (supplier.s_nationkey
        = nation.n_nationkey)
    -> Seq Scan on supplier
        (cost=0.00..325.00 rows=10000 width=8)
    -> Hash (cost=2.43..2.43 rows=1 width=108)
        -> Hash Join (cost=1.07..2.43 rows=1 width=108)
            Hash Cond: (nation.n_regionkey
            = region.r_regionkey)
        -> Seq Scan on nation
            (cost=0.00..1.25 rows=25 width=112)
        -> Hash (cost=1.06..1.06 rows=1 width=4)
            -> Seq Scan on region
                (cost=0.00..1.06 rows=1 width=4)
            Filter: (r_name = 'ASIA'::bpchar)
-> Hash (cost=49289.00..49289.00 rows=225939 width=8)
    -> Seq Scan on orders (cost=0.00..49289.00 rows=225939 width=8)
        Filter: ((o_orderdate >= '1994-01-01'::date)
        AND (o_orderdate < '1995-01-01 00:00:00'::timestamp
        without time zone))
-> Hash (cost=5121.00..5121.00 rows=150000 width=8)
    -> Seq Scan on customer (cost=0.00..5121.00 rows=150000 width=8)

```

QUERY PLAN(PostgreSQL[index あり] のクエリプラン)

```

Sort (cost=91651.95..91652.01 rows=25 width=120)
    Sort Key: (sum((lineitem.l_extendedprice * (1::numeric - lineitem.l_discount))))
-> HashAggregate (cost=91650.93..91651.37 rows=25 width=120)
    -> Hash Join (cost=6295.94..91643.69 rows=1449 width=120)
        Hash Cond: ((lineitem.l_suppkey = supplier.s_suppkey)
        AND (customer.c_nationkey = supplier.s_nationkey))

```

```

-> Nested Loop (cost=5820.94..90062.23 rows=36399 width=132)
  -> Hash Join (cost=5820.94..56053.88 rows=9098 width=116)
      Hash Cond: (orders.o_custkey = customer.c_custkey)
      -> Seq Scan on orders (cost=0.00..49289.00 rows=227455 width=8)
          Filter: ((o_orderdate >= '1994-01-01'::date)
          AND (o_orderdate < '1995-01-01 00:00:00'::
          timestamp without time zone))
      -> Hash (cost=5745.94..5745.94 rows=6000 width=116)
          -> Hash Join (cost=2.44..5745.94 rows=6000 width=116)
              Hash Cond: (customer.c_nationkey = nation.n_nationkey)
              -> Seq Scan on customer
                  (cost=0.00..5121.00 rows=150000 width=8)
              -> Hash (cost=2.43..2.43 rows=1 width=108)
                  -> Hash Join (cost=1.07..2.43 rows=1 width=108)
                      Hash Cond:
                      (nation.n_regionkey = region.r_regionkey)
                      -> Seq Scan on nation
                          (cost=0.00..1.25 rows=25 width=112)
                      -> Hash (cost=1.06..1.06 rows=1 width=4)
                          -> Seq Scan on region
                              (cost=0.00..1.06 rows=1 width=4)
                          Filter:
                          (r_name = 'ASIA'::bpchar)
                  -> Index Scan using lineitem_pkey on lineitem
                      (cost=0.00..3.54 rows=16 width=24)
                      Index Cond: (lineitem.l_orderkey = orders.o_orderkey)
          -> Hash (cost=325.00..325.00 rows=10000 width=8)
              -> Seq Scan on supplier (cost=0.00..325.00 rows=10000 width=8)

```

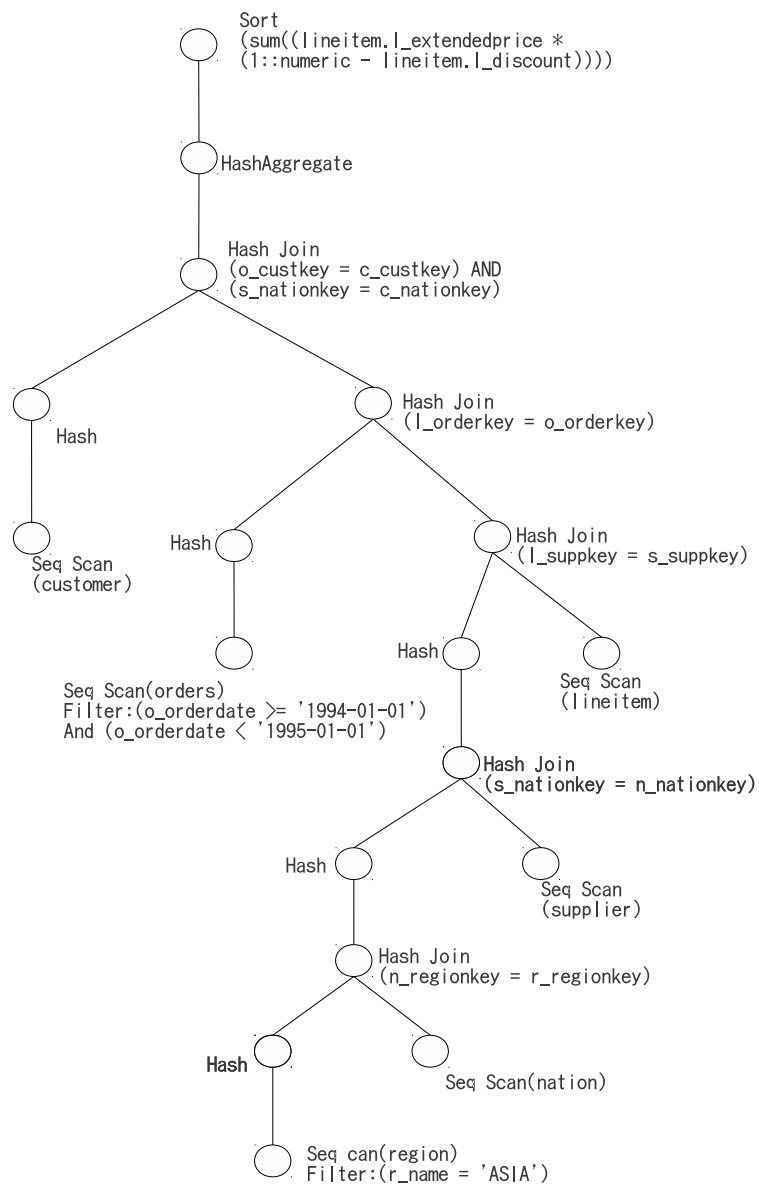


図 1: PostgreSQL (index なし) でのクエリ実行木

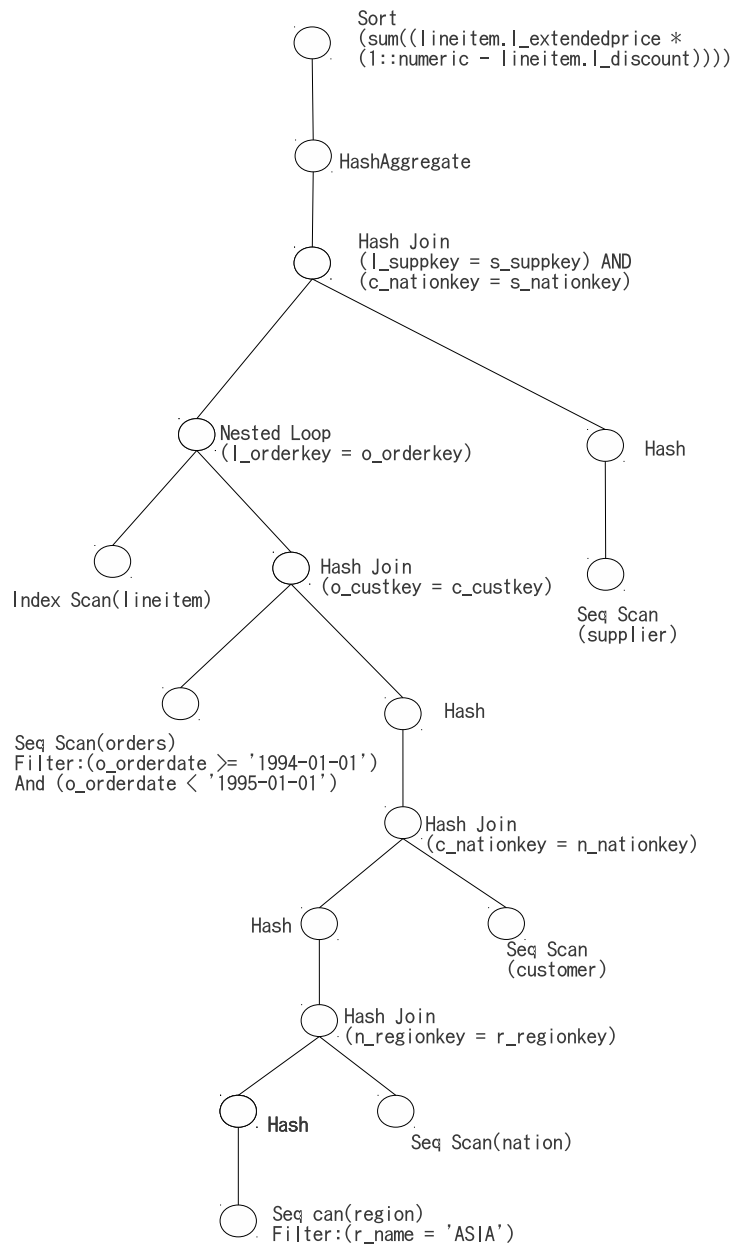


図 2: PostgreSQL (index あり) でのクエリ実行木

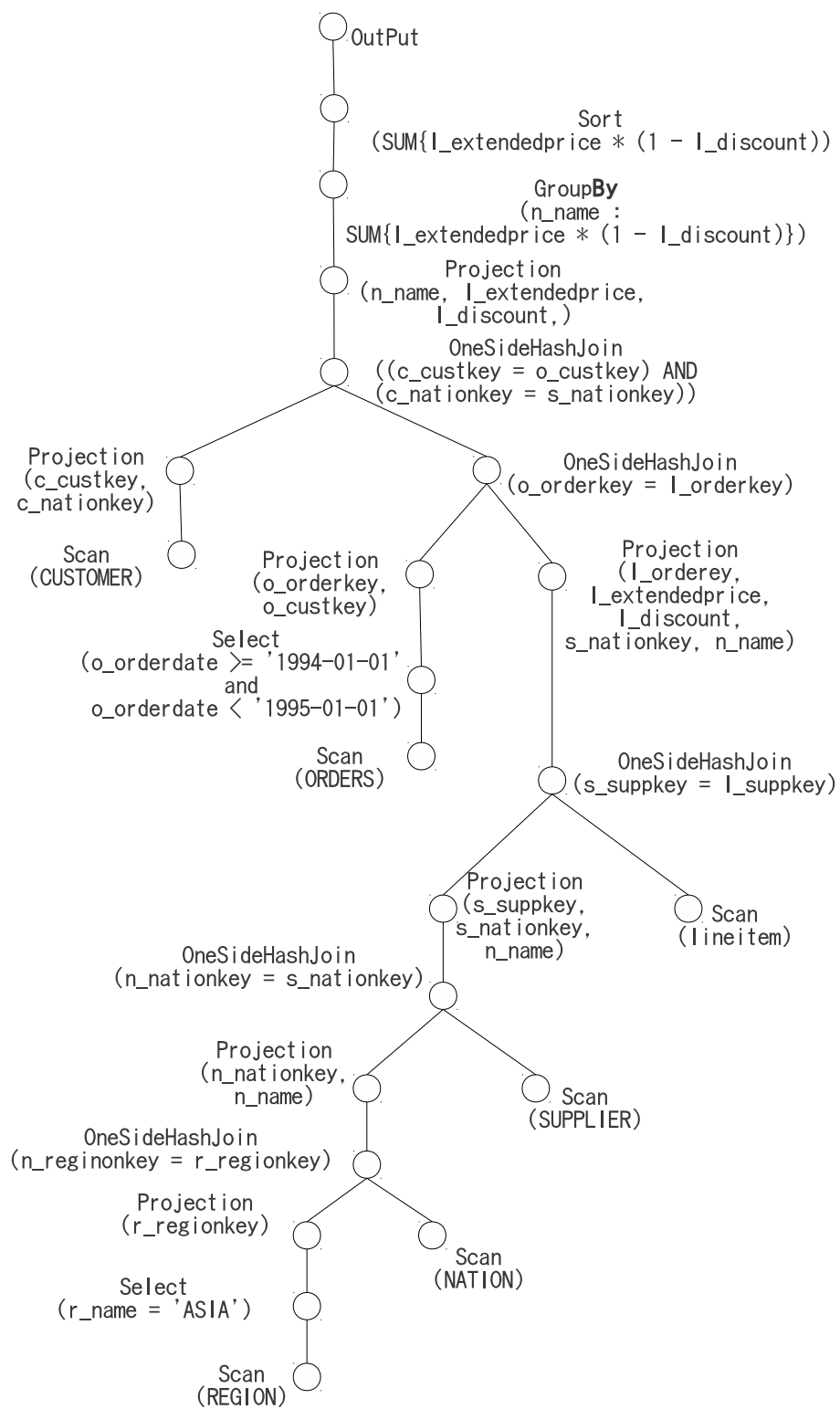


図 3: 行指向データに対するクエリ実行木

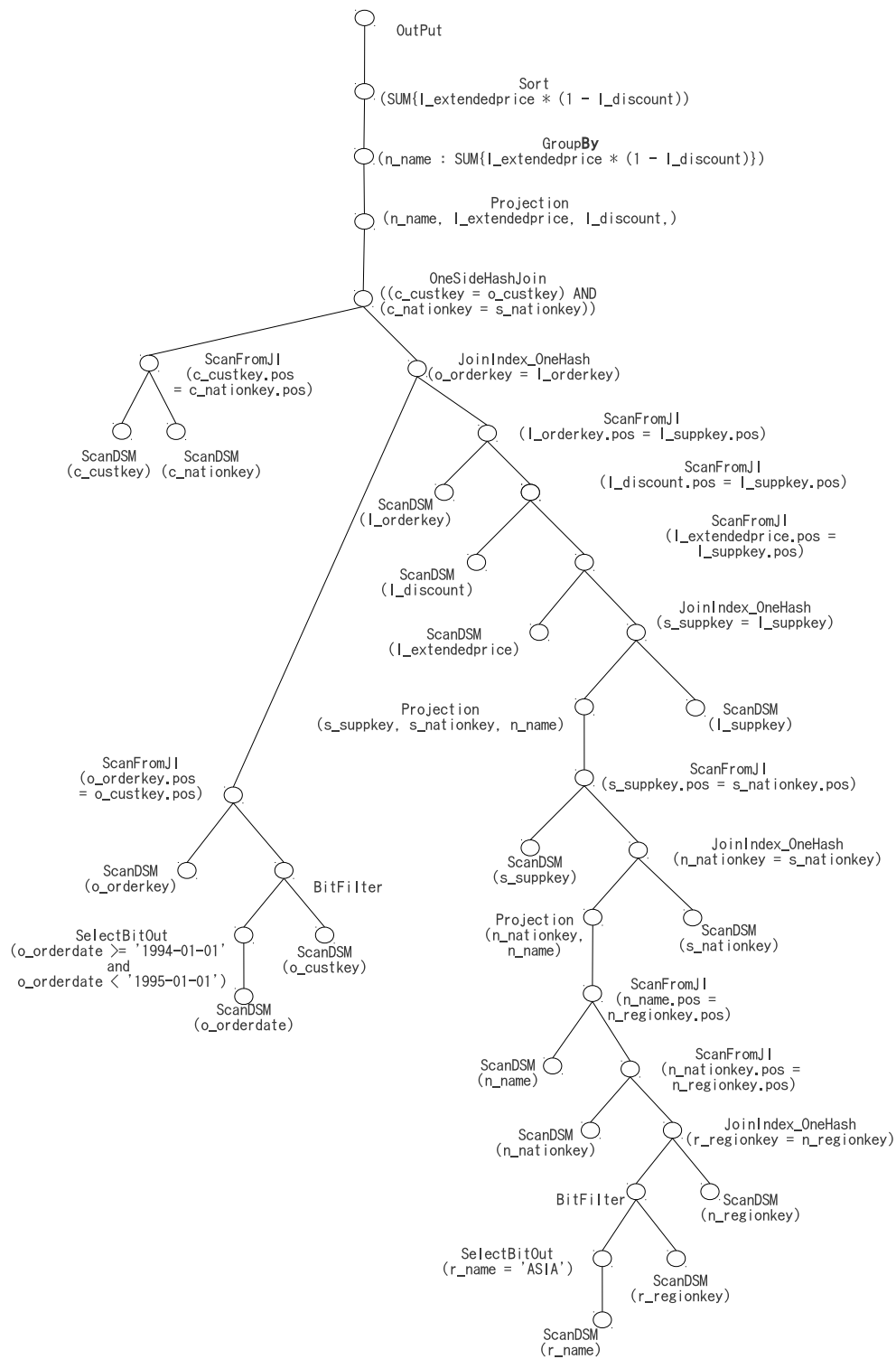


図 4: 列指向データに対するクエリ実行木

表 1: Query5 の実行時間

	Posgre(インデックスなし)			Posgre(インデックスあり)		
real	25.482	21.003	21.425	75.110	79.364	80.610
user	0.02	0.02	0.02	0.05	0.03	0.04
sys	0.02	0.02	0.02	0.00	0.01	0.00

	行指向			列指向		
real	34.897	34.975	34.685	23.227	23.490	23.218
user	29.68	30.26	29.60	19.53	20.00	19.72
sys	3.52	3.16	3.58	2.68	2.31	2.53