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## 1，测试环境

- 节点:  
1 台主节点, 5 台计算节点
- 机器配置:  
32 个物理核  
128G 内存  
12\*4T 磁盘
- 操作系统:  
redhat 6.4
- 版本:  
CDH 5.11.0

## 2，测试场景

主要关注两方面的测试：

1, 首先满足**精确查询**，比如查询身份证号码，找到和这个人相关的信息

2, 其次, **TPCH 数据集**，是用于评测决策支持系统（或数据仓库）的标准 SQL 测试集。这个测试集包含对大数据集的统计 / 报表生成 / 联机查询 / 数据挖掘等复杂应用, 测试用的数据和值是有倾斜的, 与真实数据一致。可以说 TPCH 是与真实场景非常接近的一个测试集, 也是难度较大的一个测试集。

本次测试生成了 100G 数据，函数如下：

表名	行数	行数
customer	15000000	1 千五百万

lineitem	600037902	6 亿
nation	25	--
orders	150000000	15 亿
part	20000000	2 千万
partsupp	80000000	8 千万
region	5	--
supplier	1000000	1 百万

后续会扩展到 1TB 的测试

### 3，精确查询

Customer：

Count	Sql	Time	说明
1 千五百万	select count(*) from customer;	0.23	
	select * from customer where c_name="Customer#013299353";	0.24s	非主键，string
	select * from customer where c_custkey=13299353;	0.26s	主键，int

Partsupp：

Count	Sql	Time	说明
8 千万	select count(*) from partsupp;	0.43s	
	select * from partsupp where ps_comment="riously pending packages eat furiously deposits. final braids sleep quick"	1.12s	非主键，string
	select * from partsupp where ps_partkey=8697341;	0.22s	主键，int

lineitem：

Count	Sql	Time	说明
6 亿	select count(*) from lineitem;	1.24s	
	select * from lineitem where l_comment="efully special accoun"	Fetches 577 row(s) in 8.16s	非主键，string

	select * from lineitem where ps_partkey=8697341;	0.27s	主键, int
--	---	-------	---------

lineitem :

Count	Sql	Time	说明
15 亿	select count(*) from orders;	0.42s	
	select * from orders where l_comment =" equests are furiously. carefu"	0.33s	非主键, string
	select * from orders where o_orderkey= 2946;	0.31s	主键, int

## 4, tpch 语句查询

### 1, tpch\_query1.sql

<pre> select     l_returnflag,     l_linestatus,     sum(l_quantity) as sum_qty,     sum(l_extendedprice) as sum_base_price,     sum(l_extendedprice * (1 - l_discount)) as sum_disc_price,     sum(l_extendedprice * (1 - l_discount) * (1 + l_tax)) as sum_charge,     avg(l_quantity) as avg_qty,     avg(l_extendedprice) as avg_price,     avg(l_discount) as avg_disc,     count(*) as count_order from     lineitem where     l_shipdate &lt;= '1998-09-16' group by     l_returnflag,     l_linestatus order by     l_returnflag, </pre>
--

```
l_linestatus;
```

## 2, tpch\_query5.sql

```
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 = 'AFRICA'
    and o_orderdate >= '1993-01-01'
    and o_orderdate < '1994-01-01'
group by
    n_name
order by
    revenue desc;
```

## 3, tpch\_query10.sql

```
select
    c_custkey,
    c_name,
    sum(l_extendedprice * (1 - l_discount)) as revenue,
    c_acctbal,
    n_name,
    c_address,
    c_phone,
    c_comment
from
    customer,
    orders,
    lineitem,
    nation
```

```
where
    c_custkey = o_custkey
and l_orderkey = o_orderkey
and o_orderdate >= '1993-07-01'
and o_orderdate < '1993-10-01'
and l_returnflag = 'R'
and c_nationkey = n_nationkey
group by
    c_custkey,
    c_name,
    c_acctbal,
    c_phone,
    n_name,
    c_address,
    c_comment
order by
    revenue desc
limit 20;
```

#### 4, tpch\_query3.sql

```
select
    l_orderkey,
    sum(l_extendedprice * (1 - l_discount)) as revenue,
    o_orderdate,
    o_shippriority
from
    customer,
    orders,
    lineitem
where
    c_mktsegment = 'BUILDING'
and c_custkey = o_custkey
and l_orderkey = o_orderkey
and o_orderdate < '1995-03-22'
and l_shipdate > '1995-03-22'
group by
    l_orderkey,
    o_orderdate,
    o_shippriority
order by
    revenue desc,
    o_orderdate
limit 10;
```

## 5, tpch\_query4.sql

```
select
    o_orderpriority,
    count(*) as order_count
from
    orders as o
where
    o_orderdate >= '1996-05-01'
    and o_orderdate < '1996-08-01'
    and exists (
        select
            *
        from
            lineitem
        where
            l_orderkey = o.o_orderkey
            and l_commitdate < l_receiptdate
    )
group by
    o_orderpriority
order by
    o_orderpriority;
```

## 6, tpch\_query6.sql

```
select
    sum(l_extendedprice * l_discount) as revenue
from
    lineitem
where
    l_shipdate >= '1993-01-01'
    and l_shipdate < '1994-01-01'
    and l_discount between 0.06 - 0.01 and 0.06 + 0.01
    and l_quantity < 25;
```

## 7, tpch\_query7.sql

```
select
    supp_nation,
    cust_nation,
    l_year,
    sum(volume) as revenue
from
```

```

(
    select
        n1.n_name as supp_nation,
        n2.n_name as cust_nation,
        year(l_shipdate) as l_year,
        l_extendedprice * (1 - l_discount) as volume
    from
        supplier,
        lineitem,
        orders,
        customer,
        nation n1,
        nation n2
    where
        s_suppkey = l_suppkey
        and o_orderkey = l_orderkey
        and c_custkey = o_custkey
        and s_nationkey = n1.n_nationkey
        and c_nationkey = n2.n_nationkey
        and (
            (n1.n_name = 'KENYA' and n2.n_name = 'PERU')
            or (n1.n_name = 'PERU' and n2.n_name = 'KENYA')
        )
        and l_shipdate between '1995-01-01' and '1996-12-31'
    ) as shipping
group by
    supp_nation,
    cust_nation,
    l_year
order by
    supp_nation,
    cust_nation,
    l_year;

```

## 8, tpch\_query8.sql

```

select
    o_year,
    sum(case
        when nation = 'PERU' then volume
        else 0
    end) / sum(volume) as mkt_share
from
    (
        select

```

```

        year(o_orderdate) as o_year,
        l_extendedprice * (1 - l_discount) as volume,
        n2.n_name as nation
    from
        part,
        supplier,
        lineitem,
        orders,
        customer,
        nation n1,
        nation n2,
        region
    where
        p_partkey = l_partkey
        and s_suppkey = l_suppkey
        and l_orderkey = o_orderkey
        and o_custkey = c_custkey
        and c_nationkey = n1.n_nationkey
        and n1.n_regionkey = r_regionkey
        and r_name = 'AMERICA'
        and s_nationkey = n2.n_nationkey
        and o_orderdate between '1995-01-01' and '1996-12-31'
        and p_type = 'ECONOMY BURNISHED NICKEL'
    ) as all_nations
group by
    o_year
order by
    o_year;

```

## 9, tpch\_query8.sql

```

select
    o_year,
    sum(case
        when nation = 'PERU' then volume
        else 0
    end) / sum(volume) as mkt_share
from
    (
        select
            year(o_orderdate) as o_year,
            l_extendedprice * (1 - l_discount) as volume,
            n2.n_name as nation
        from
            part,

```



```

supplier,
lineitem,
orders,
customer,
nation n1,
nation n2,
region
where
    p_partkey = l_partkey
    and s_suppkey = l_suppkey
    and l_orderkey = o_orderkey
    and o_custkey = c_custkey
    and c_nationkey = n1.n_nationkey
    and n1.n_regionkey = r_regionkey
    and r_name = 'AMERICA'
    and s_nationkey = n2.n_nationkey
    and o_orderdate between '1995-01-01' and '1996-12-31'
    and p_type = 'ECONOMY BURNISHED NICKEL'
) as all_nations
group by
    o_year
order by
    o_year;

```

#### 10, tpch\_query9.sql

```

select
    nation,
    o_year,
    sum(amount) as sum_profit
from
    (
        select
            n_name as nation,
            year(o_orderdate) as o_year,
            l_extendedprice * (1 - l_discount) - ps_supplycost *
l_quantity as amount
        from
            part,
            supplier,
            lineitem,
            partsupp,
            orders,
            nation
        where

```

```

        s_suppkey = l_suppkey
        and ps_suppkey = l_suppkey
        and ps_partkey = l_partkey
        and p_partkey = l_partkey
        and o_orderkey = l_orderkey
        and s_nationkey = n_nationkey
        and p_name like '%plum%'
    ) as profit
group by
    nation,
    o_year
order by
    nation,
    o_year desc;

```

Sql	Hive 时间	Kudu 时间 (impala)
<b>tpch_query1</b>	Time taken: 76.664 seconds, Fetched: 4 row(s)	Fetched 4 row(s) in 9.48s
<b>tpch_query5</b>	Time taken: 310.823 seconds, Fetched: 5 row(s)	Fetched 5 row(s) in 194.38s
<b>tpch_query3</b>	Time taken: 344.762 seconds, Fetched: 10 row(s)	Fetched 10 row(s) in 79.49s
<b>tpch_query4</b>	Time taken: 137.316 seconds, Fetched: 5 row(s)	Fetched 5 row(s) in 167.58s
<b>tpch_query6</b>	Time taken: 156.265 seconds, Fetched: 1 row(s)	Fetched 1 row(s) in 2.27s
<b>tpch_query7</b>	Time taken: 400.269 seconds, Fetched: 4 row(s)	Fetched 4 row(s) in 134.75s
<b>tpch_query8</b>	超过半小时	Fetched 2 row(s) in 219.91s
<b>tpch_query9</b>	超过半小时	Fetched 175 row(s) in 255.17s
<b>tpch_query10</b>	Time taken: 233.292 seconds, Fetched: 20 row(s)	Fetched 20 row(s) in 43.46s

## 5, kudu/impala 参数调整

1. Kudu : wal 日志和数据存放日志分开, wal 放在第一块磁盘上, 如果有条件可以放在 ssd 上, 数据目录放在第二块到第十二块上面

<b>Kudu Tablet Server WAL Directory</b> fs_wal_dir	<b>Tablet Server Default Group</b>
	<input type="text" value="/data1/twal"/>
<b>Kudu Tablet Server Data Directories</b> fs_data_dirs	<b>Tablet Server Default Group</b>
	<input type="text" value="/data2/tdata"/>
	<input type="text" value="/data3/tdata"/>
	<input type="text" value="/data4/tdata"/>
	<input type="text" value="/data5/tdata"/>
	<input type="text" value="/data6/tdata"/>
	<input type="text" value="/data7/tdata"/>
	<input type="text" value="/data8/tdata"/>
	<input type="text" value="/data9/tdata"/>
	<input type="text" value="/data10/tdata"/>

2. Kudu :memory\_limit\_hard\_bytes 参数调整为 32G, 默认是 4G, block\_cache\_capacity\_mb 参数调整为 4G, 默认是 512M

<b>Kudu Tablet Server Hard Memory Limit</b> memory_limit_hard_bytes	<b>Tablet Server Default Group</b>
	<input type="text" value="32"/>
<b>Kudu Tablet Server Block Cache Capacity</b> block_cache_capacity_mb	<b>Tablet Server Default Group</b>
	<input type="text" value="4"/>

- 3, impala 内存调整

<b>Catalog Server 的 Java 堆栈大小 (字节)</b>	<b>Impala Catalog Server Default Group</b>
	<input type="text" value="32"/>

  

<b>Impala Daemon 内存限制</b> mem_limit <a href="#">编辑单个值</a>	<b>Impala Daemon Default Group</b> ...和其他 4 个
	<input type="text" value="64"/>