Apache Hive Subqueries Views & Indexs

by Sumit Mittal

TRENDYTECH
UPLIFT YOUR CAREER!

IMPORTANT

Copyright Infringement and Illegal Content Sharing Notice

Subqueries in Hive

TRENDYTECH

UPLIFT YOUR CAREER!

Subqueries

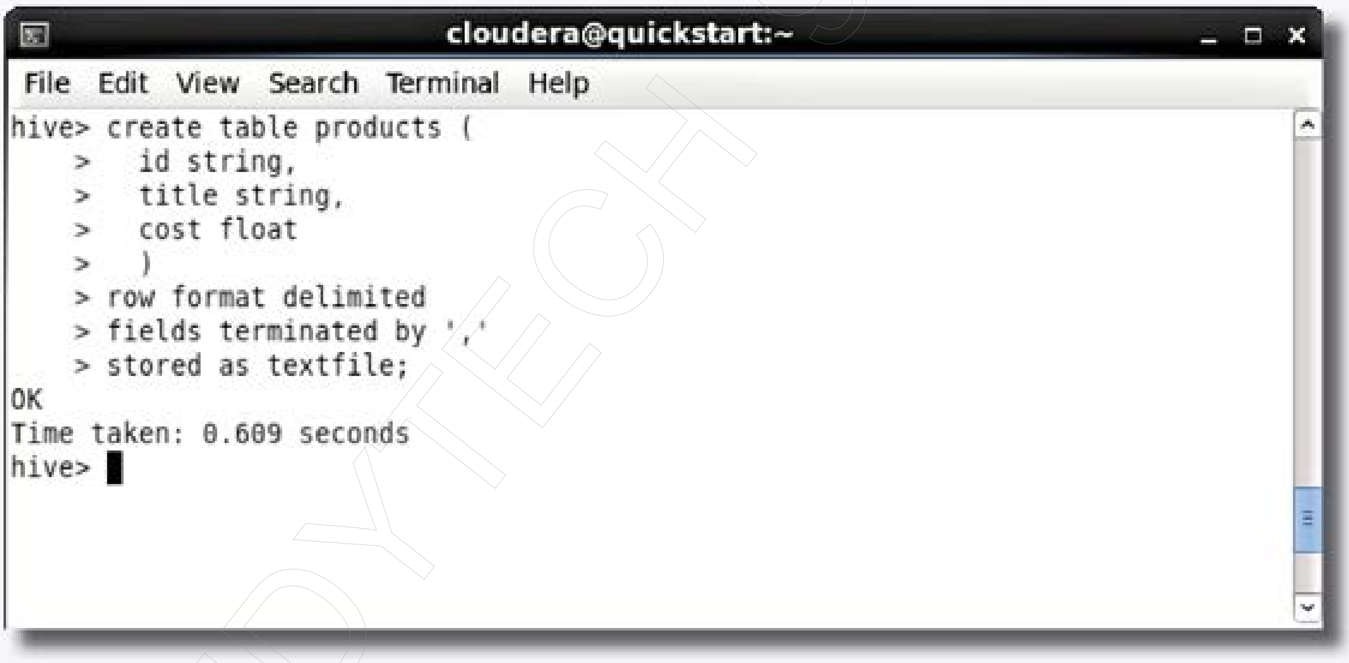
Subqueries are queries which return a result set which are nested within other queries.

Subqueries in Hive can be used:

- FROM clause
- WHERE clause.

Create a table named *products* inside trendytech database:

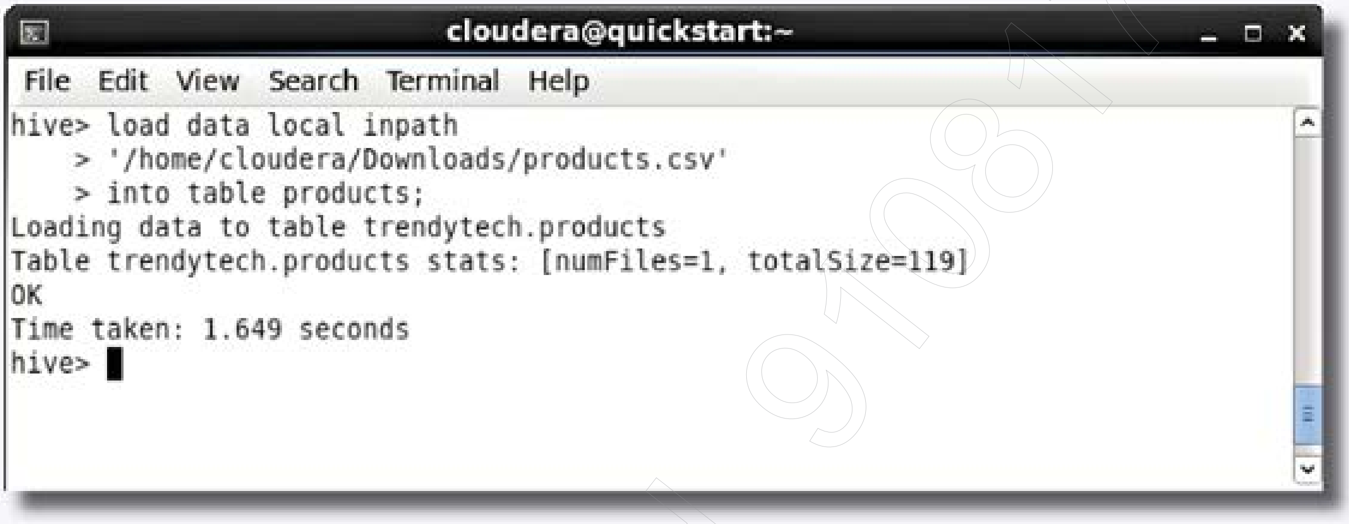
```
create table products (
  id string,
  title string,
  cost float
  )
row format delimited
fields terminated by ','
stored as textfile;
```



```
hive> create table products (
    >   id string,
    >   title string,
    >   cost float
    >   )
    > row format delimited
    > fields terminated by ','
    > stored as textfile;
OK
Time taken: 0.609 seconds
hive> 
```

Load data into *products* table:

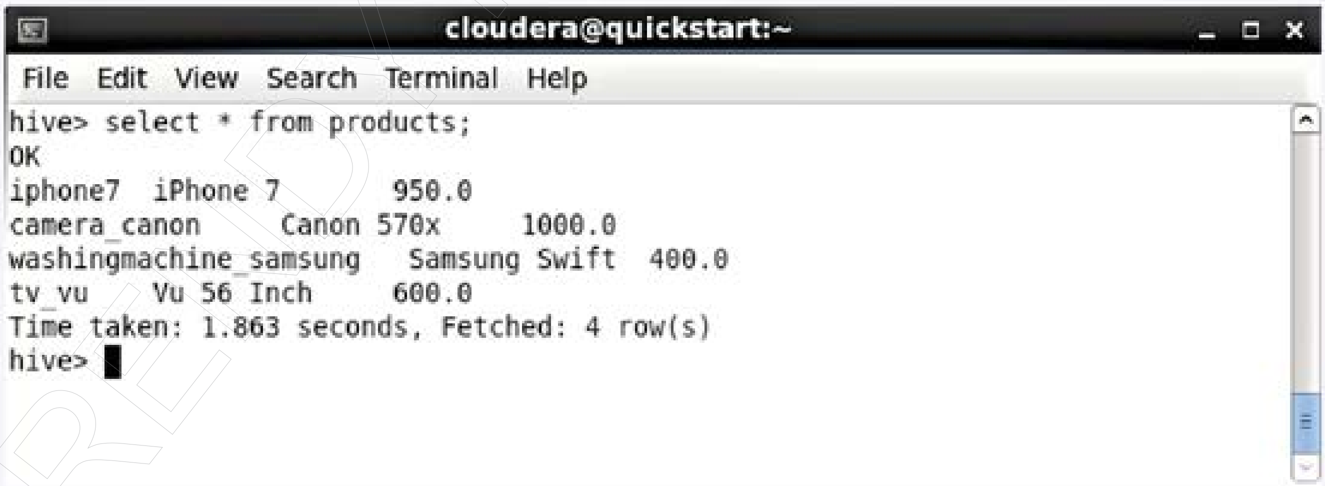
```
load data local inpath
'/home/cloudera/Downloads/products.csv'
into table products;
```



```
hive> load data local inpath
    > '/home/cloudera/Downloads/products.csv'
    > into table products;
Loading data to table trendytech.products
Table trendytech.products stats: [numFiles=1, totalSize=119]
OK
Time taken: 1.649 seconds
hive> 
```

Display all records of *products* table:

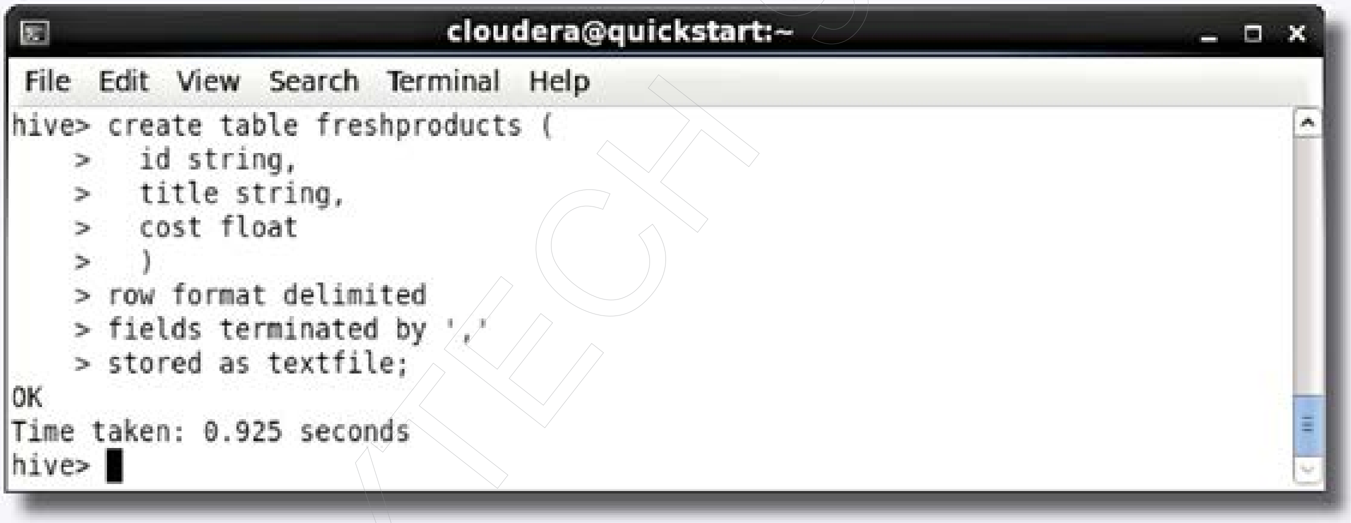
```
select * from products;
```



```
hive> select * from products;
OK
iphone7   iPhone 7       950.0
camera_canon      Canon 570x     1000.0
washingmachine_samsung   Samsung Swift  400.0
tv_vu     Vu 56 Inch     600.0
Time taken: 1.863 seconds, Fetched: 4 row(s)
hive> 
```

Create another table named *freshproducts* inside trendytech database:

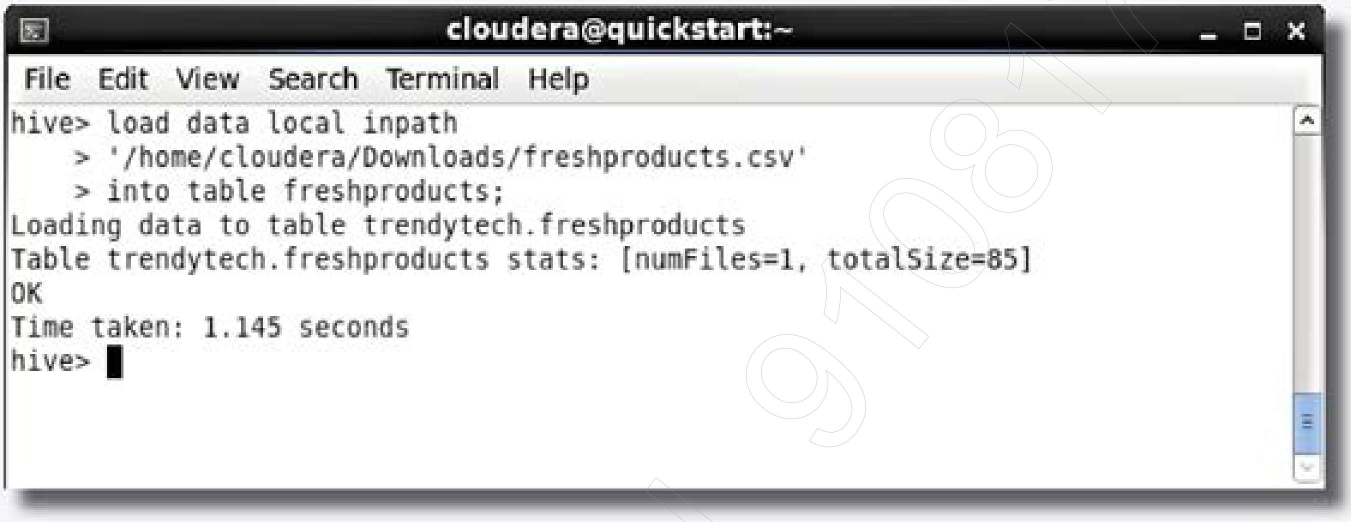
```
create table freshproducts (
  id string,
  title string,
  cost float
  )
row format delimited
fields terminated by ','
stored as textfile;
```



```
hive> create table freshproducts (
    >   id string,
    >   title string,
    >   cost float
    >   )
    > row format delimited
    > fields terminated by ','
    > stored as textfile;
OK
Time taken: 0.925 seconds
hive> 
```

Load data into *freshproducts* table:

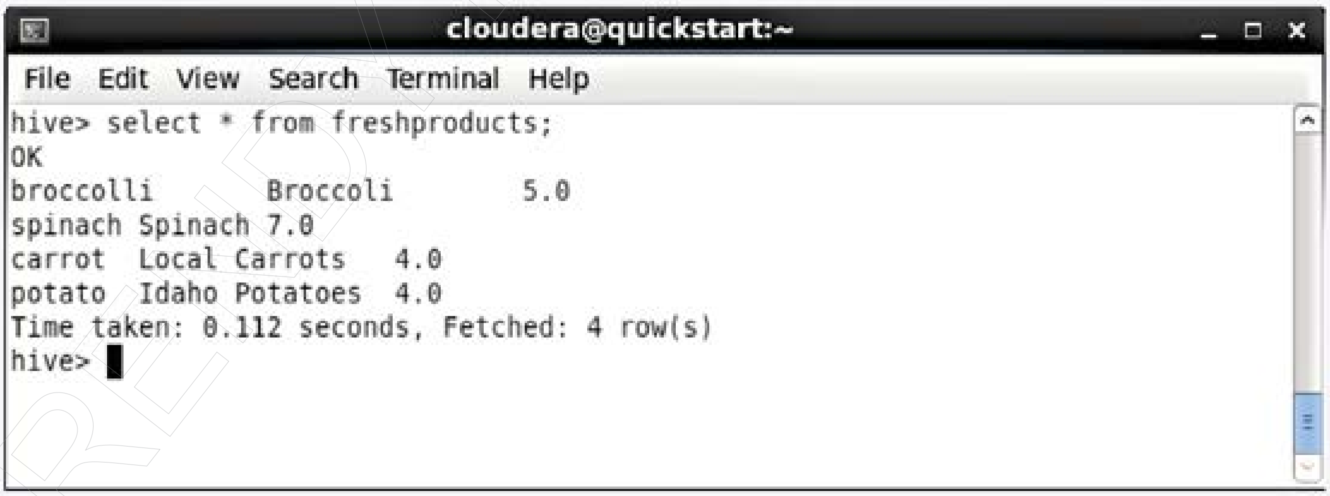
```
load data local inpath
'/home/cloudera/Downloads/freshproducts.csv'
into table freshproducts;
```



```
hive> load data local inpath
    > '/home/cloudera/Downloads/freshproducts.csv'
    > into table freshproducts;
Loading data to table trendytech.freshproducts
Table trendytech.freshproducts stats: [numFiles=1, totalSize=85]
OK
Time taken: 1.145 seconds
hive>
```

Display all records of *freshproducts* table:

```
select * from products;
```

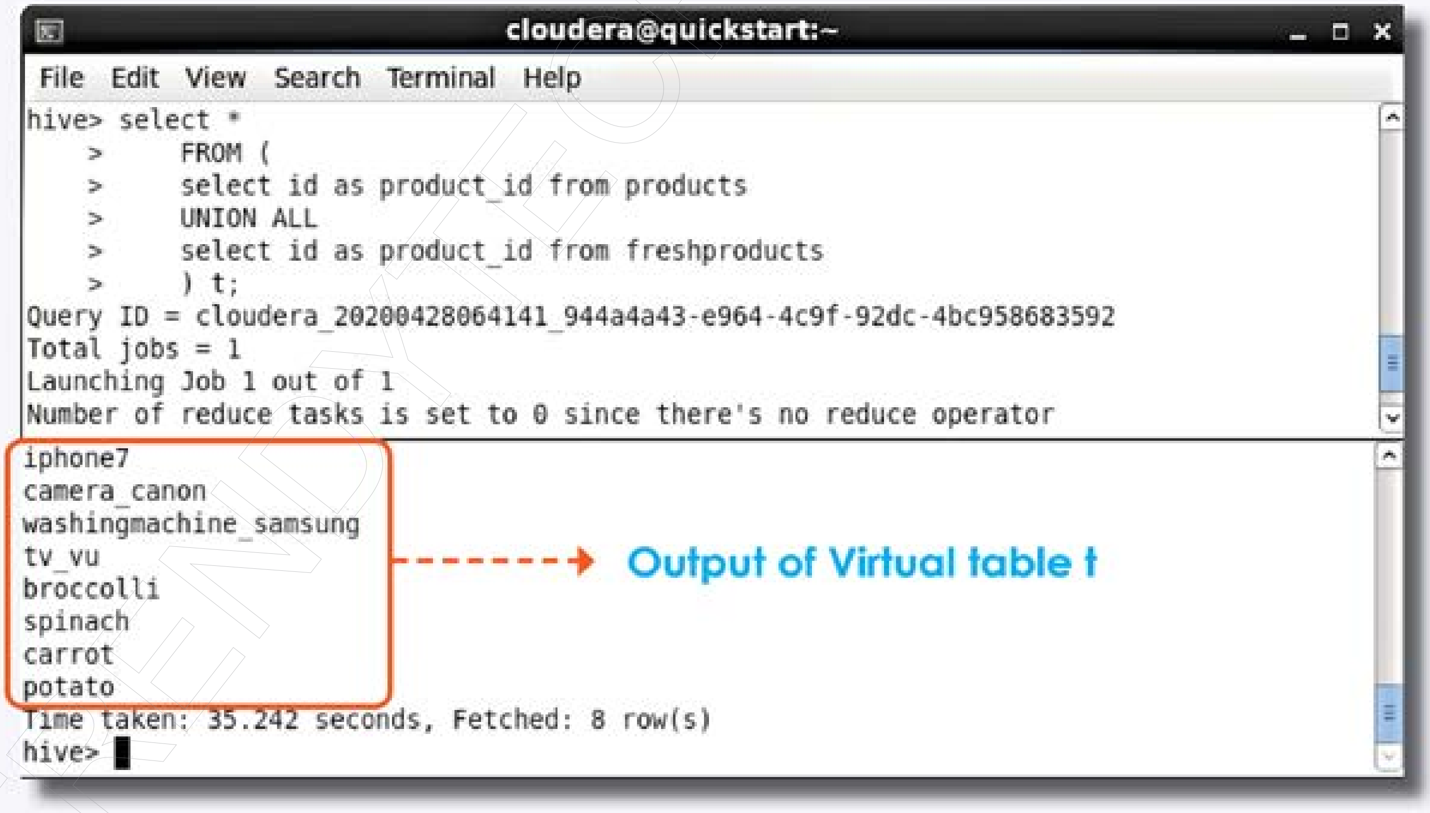


```
hive> select * from freshproducts;
OK
broccoli        Broccoli        5.0
spinach Spinach 7.0
carrot  Local Carrots   4.0
potato  Idaho Potatoes  4.0
Time taken: 0.112 seconds, Fetched: 4 row(s)
hive>
```

Subqueries in the FROM clause:

Display records using Subqueries using FROM clause:

```
select *
    FROM (
    select id as product_id from products
    UNION ALL
    select id as product_id from freshproducts
    ) t;
```

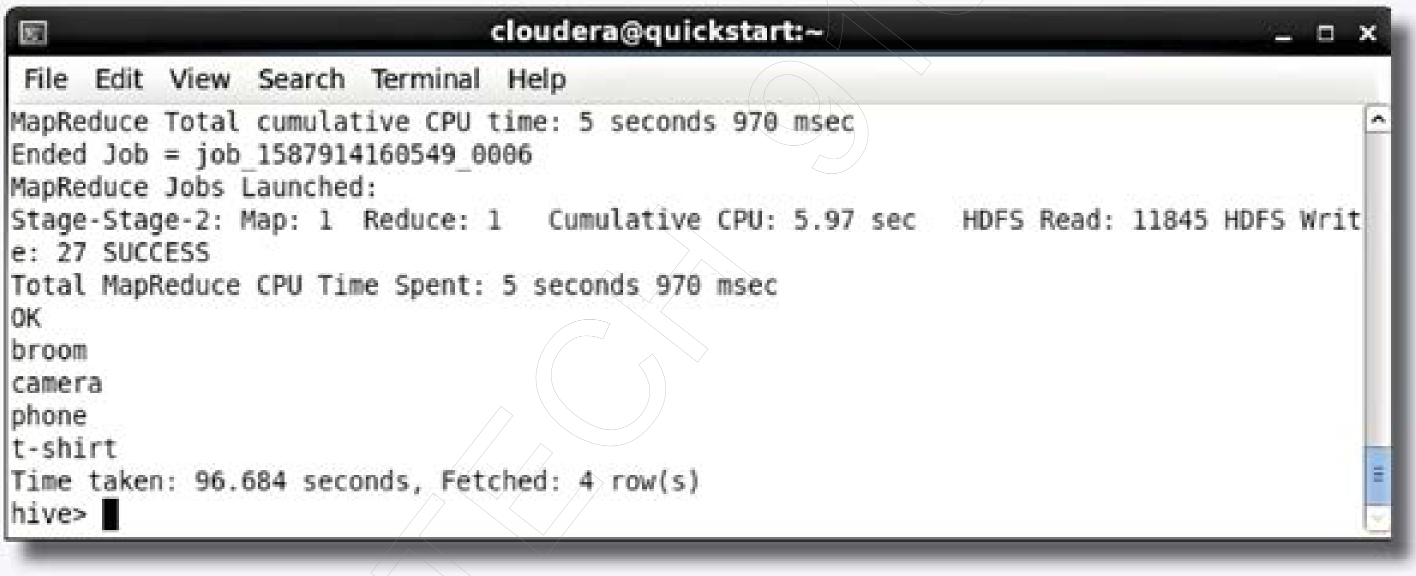


```
hive> select *
    >     FROM (
    >     select id as product_id from products
    >     UNION ALL
    >     select id as product_id from freshproducts
    >     ) t;
Query ID = cloudera_20200428064141_944a4a43-e964-4c9f-92dc-4bc958683592
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks is set to 0 since there's no reduce operator
iphone7
camera_canon
washingmachine_samsung
tv_vu
broccolli
spinach
carrot
potato
Time taken: 35.242 seconds, Fetched: 8 row(s)
hive> 
```

Output of Virtual table t

One more example of Subqueries using FROM clause:

```
select distinct(t.product_id)
    FROM (
    select product_id from customers
    JOIN
    orders where customers.id=orders.customer_id
    ) t;
```



```
MapReduce Total cumulative CPU time: 5 seconds 970 msec
Ended Job = job_1587914160549_0006
MapReduce Jobs Launched:
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 5.97 sec   HDFS Read: 11845 HDFS Writ
e: 27 SUCCESS
Total MapReduce CPU Time Spent: 5 seconds 970 msec
OK
broom
camera
phone
t-shirt
Time taken: 96.684 seconds, Fetched: 4 row(s)
hive> 
```

Subqueries in the WHERE clause:

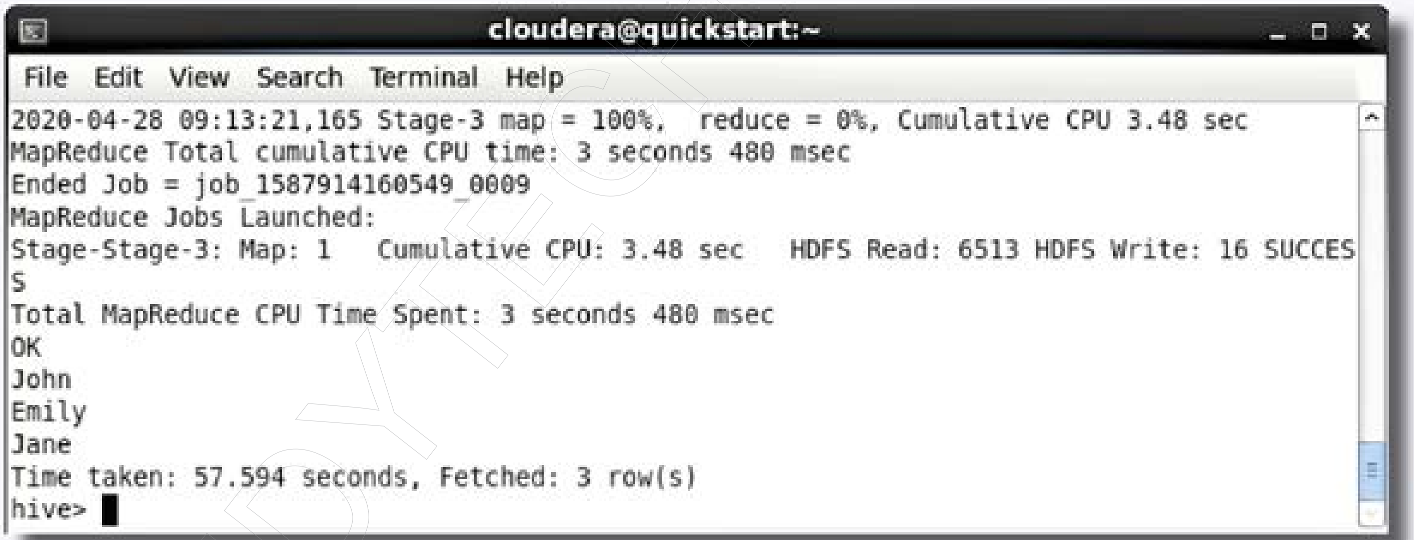
Hive Supports two types of Subqueries in WHERE clause:

- IN / NOT IN
- EXISTS / NOT EXISTS

Subqueries with "IN & NOT IN" in the WHERE clause:

Subquery with "IN" clause within WHERE clause:

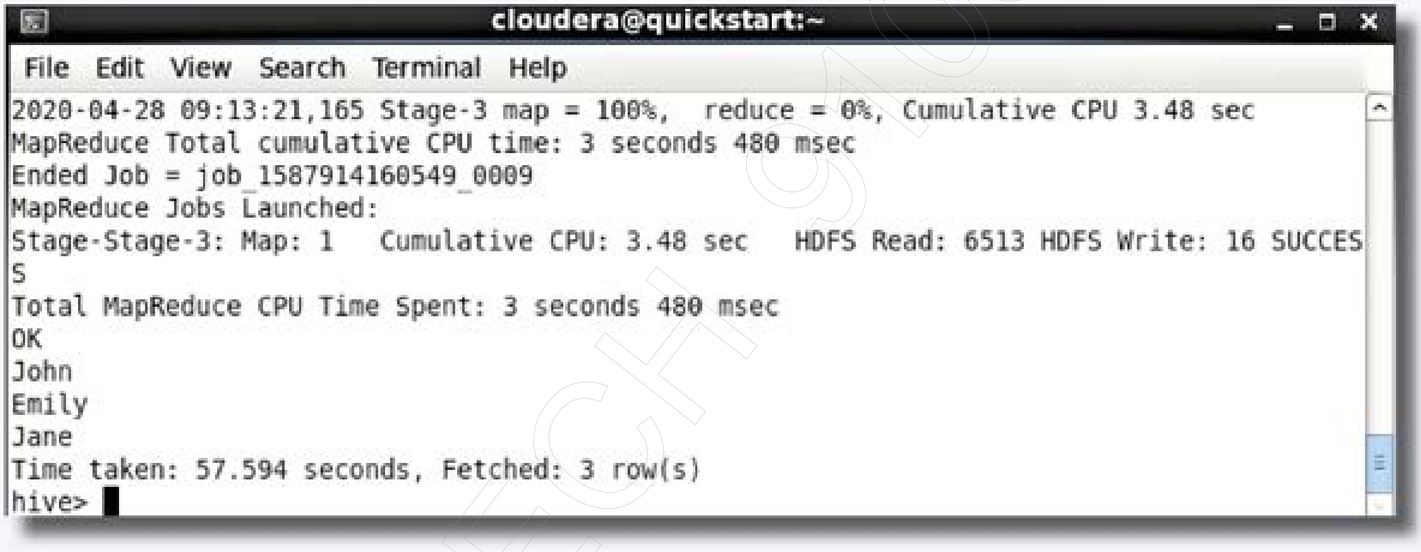
```
select name from customers
    WHERE customers.id IN
    (
    select customer_id from orders
    );
```



```
2020-04-28 09:13:21,165 Stage-3 map = 100%,  reduce = 0%, Cumulative CPU 3.48 sec
MapReduce Total cumulative CPU time: 3 seconds 480 msec
Ended Job = job_1587914160549_0009
MapReduce Jobs Launched:
Stage-Stage-3: Map: 1   Cumulative CPU: 3.48 sec   HDFS Read: 6513 HDFS Write: 16 SUCCES
S
Total MapReduce CPU Time Spent: 3 seconds 480 msec
OK
John
Emily
Jane
Time taken: 57.594 seconds, Fetched: 3 row(s)
hive>
```

Subquery with "NOT IN" clause within WHERE clause:

```
select name from customers
    WHERE customers.id NOT IN
    (
    select customer_id from orders
    );
```

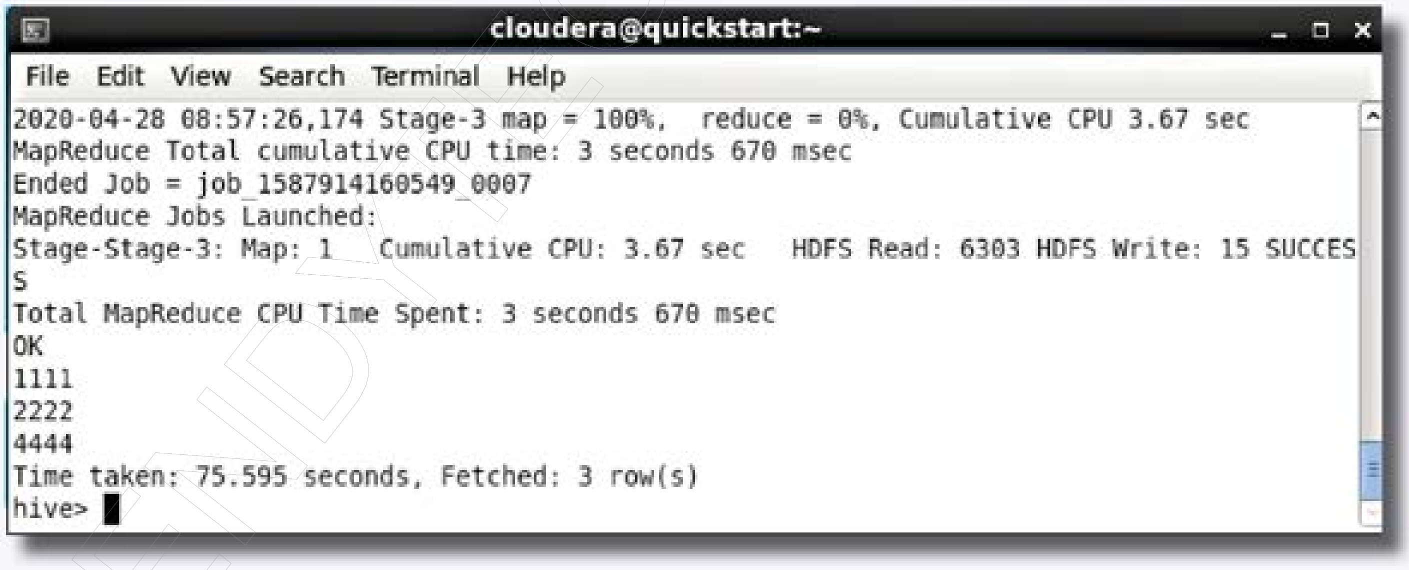


```
2020-04-28 09:13:21,165 Stage-3 map = 100%,  reduce = 0%, Cumulative CPU 3.48 sec
MapReduce Total cumulative CPU time: 3 seconds 480 msec
Ended Job = job_1587914160549_0009
MapReduce Jobs Launched:
Stage-Stage-3: Map: 1   Cumulative CPU: 3.48 sec   HDFS Read: 6513 HDFS Write: 16 SUCCES
S
Total MapReduce CPU Time Spent: 3 seconds 480 msec
OK
John
Emily
Jane
Time taken: 57.594 seconds, Fetched: 3 row(s)
hive> 
```

Subqueries with "EXIST & NOT EXIST" in the WHERE clause:

Subquery with EXISTS clause within WHERE clause:

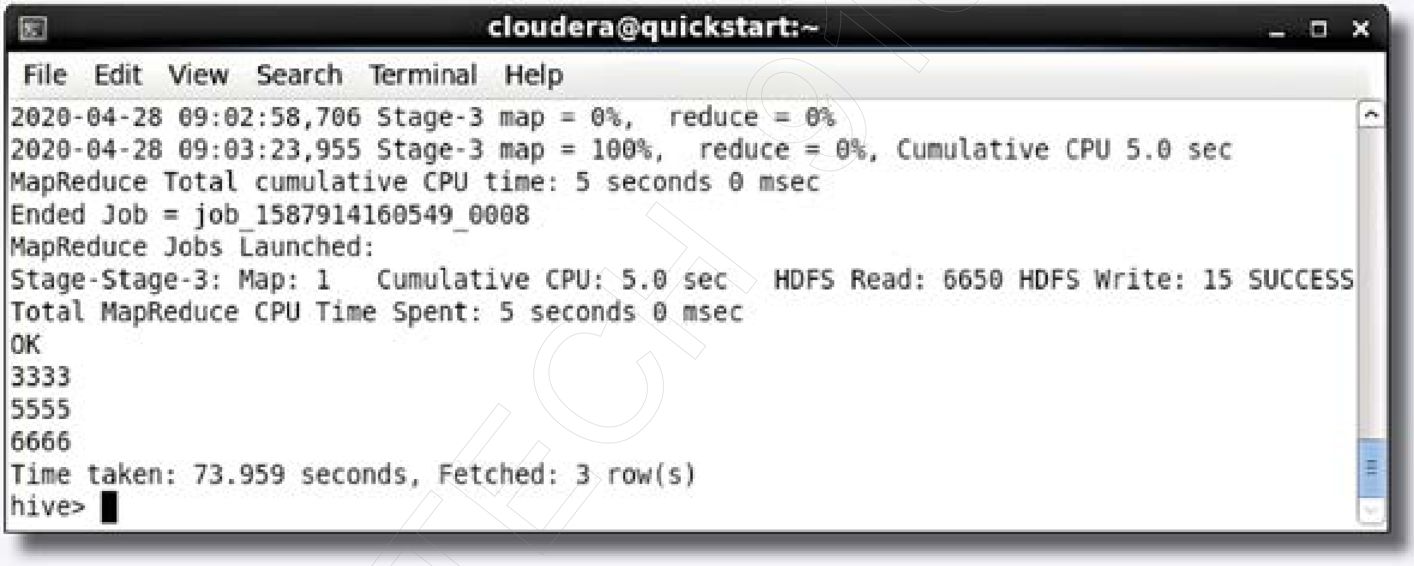
```
select id from customers
   WHERE EXISTS
   (
   select customer_id from orders
   where orders.customer_id = customers.id
   );
```



```
2020-04-28 08:57:26,174 Stage-3 map = 100%,  reduce = 0%, Cumulative CPU 3.67 sec
MapReduce Total cumulative CPU time: 3 seconds 670 msec
Ended Job = job_1587914160549_0007
MapReduce Jobs Launched:
Stage-Stage-3: Map: 1   Cumulative CPU: 3.67 sec   HDFS Read: 6303 HDFS Write: 15 SUCCES
S
Total MapReduce CPU Time Spent: 3 seconds 670 msec
OK
1111
2222
4444
Time taken: 75.595 seconds, Fetched: 3 row(s)
hive>
```

Subquery with NOT EXISTS clause within WHERE clause:

```
select id from customers
   WHERE NOT EXISTS
   (
   select customer_id from orders
   where orders.customer_id = customers.id
   );
```



```
2020-04-28 09:02:58,706 Stage-3 map = 0%,  reduce = 0%
2020-04-28 09:03:23,955 Stage-3 map = 100%,  reduce = 0%, Cumulative CPU 5.0 sec
MapReduce Total cumulative CPU time: 5 seconds 0 msec
Ended Job = job_1587914160549_0008
MapReduce Jobs Launched:
Stage-Stage-3: Map: 1   Cumulative CPU: 5.0 sec   HDFS Read: 6650 HDFS Write: 15 SUCCESS
Total MapReduce CPU Time Spent: 5 seconds 0 msec
OK
3333
5555
6666
Time taken: 73.959 seconds, Fetched: 3 row(s)
hive> 
```

Views in Hive

TRENDYTECH

UPLIFT YOUR CAREER!

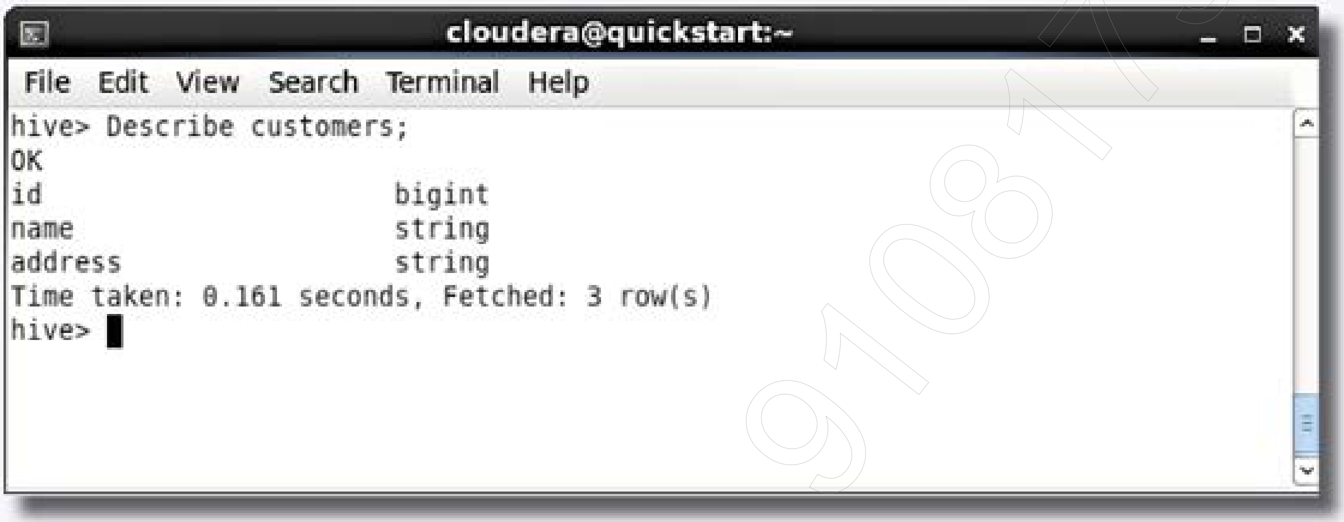
Views

A view is a virtual table, which provides access to a subset of data from one or more table.

- Stored as a query in Hive's metastore
- Executed when used
- Updated when data in the underlying table changes
- Contains data from single or multiple tables
- Frozen in time, not affected by table changes.

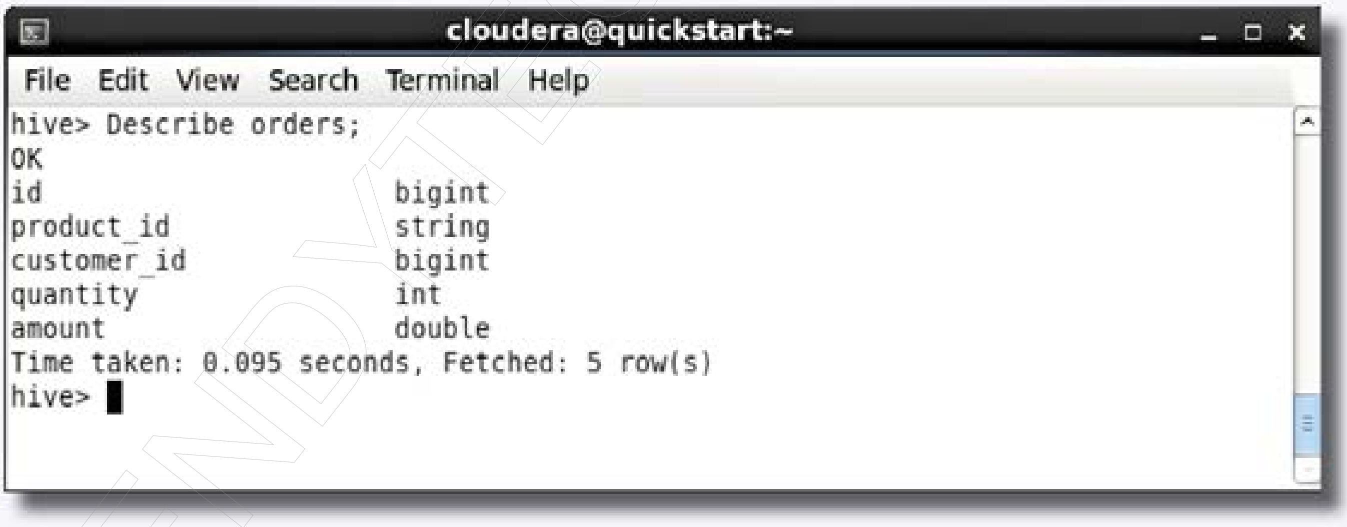
Before creating a view describe the *customers* and *orders* table to display schema informations:

```
describe customers;
```



```
hive> Describe customers;
OK
id                      bigint
name                    string
address                 string
Time taken: 0.161 seconds, Fetched: 3 row(s)
hive> 
```

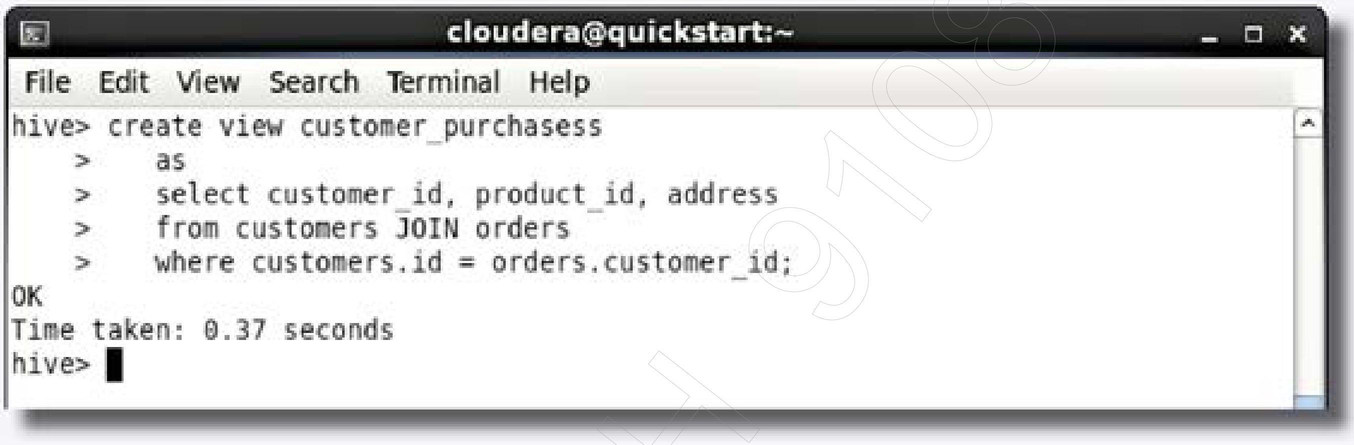
```
describe orders;
```



```
hive> Describe orders;
OK
id                      bigint
product_id              string
customer_id             bigint
quantity                int
amount                  double
Time taken: 0.095 seconds, Fetched: 5 row(s)
hive> 
```

Create a view on *customers* and *orders* table:

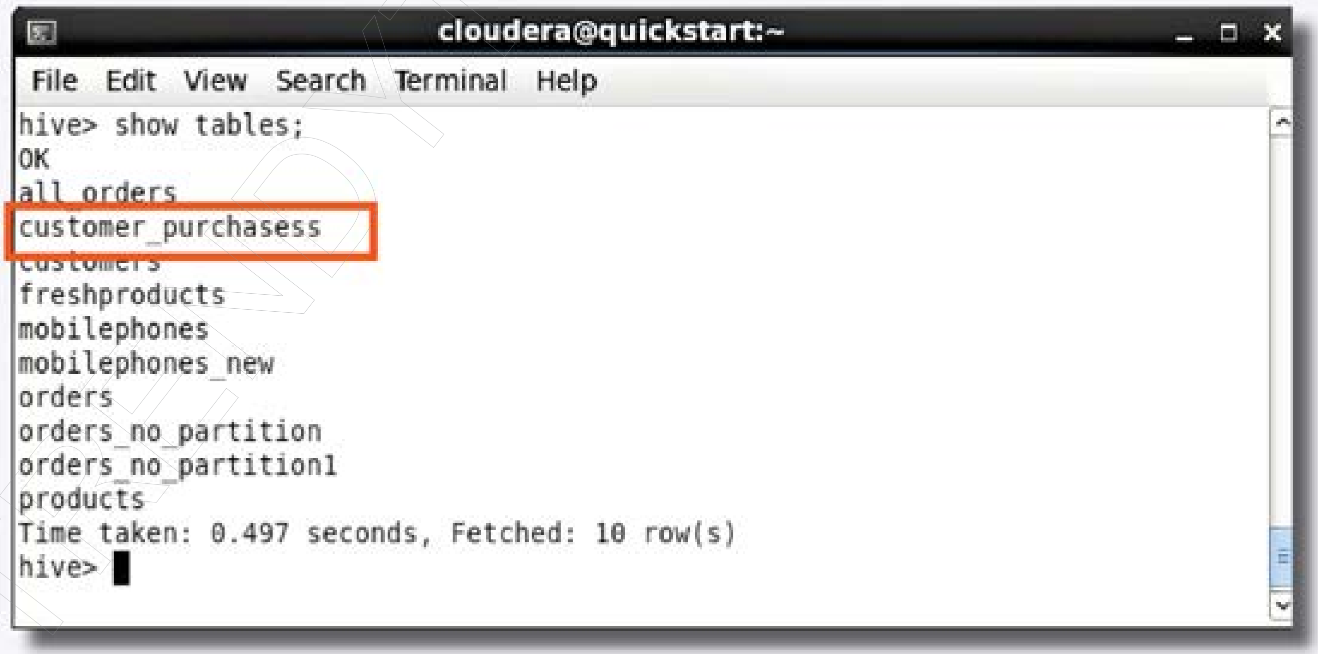
```
create view customer_purchasess
   as
   select customer_id, product_id, address
   from customers JOIN orders
   where customers.id = orders.customer_id;
```



```
hive> create view customer_purchasess
    >    as
    >    select customer_id, product_id, address
    >    from customers JOIN orders
    >    where customers.id = orders.customer_id;
OK
Time taken: 0.37 seconds
hive> 
```

To display the view (virtual) table:

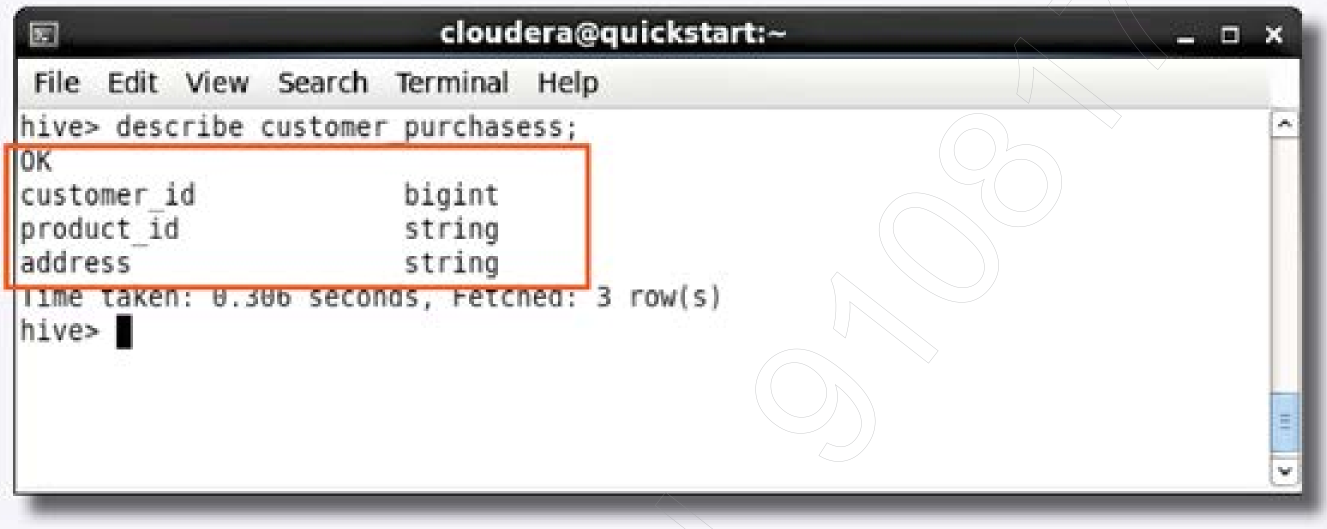
```
show tables;
```



```
hive> show tables;
OK
all_orders
customer_purchasess
customers
freshproducts
mobilephones
mobilephones_new
orders
orders_no_partition
orders_no_partition1
products
Time taken: 0.497 seconds, Fetched: 10 row(s)
hive> 
```

Describe the view table to display schema informations:

```
describe customer_purchasess;
```

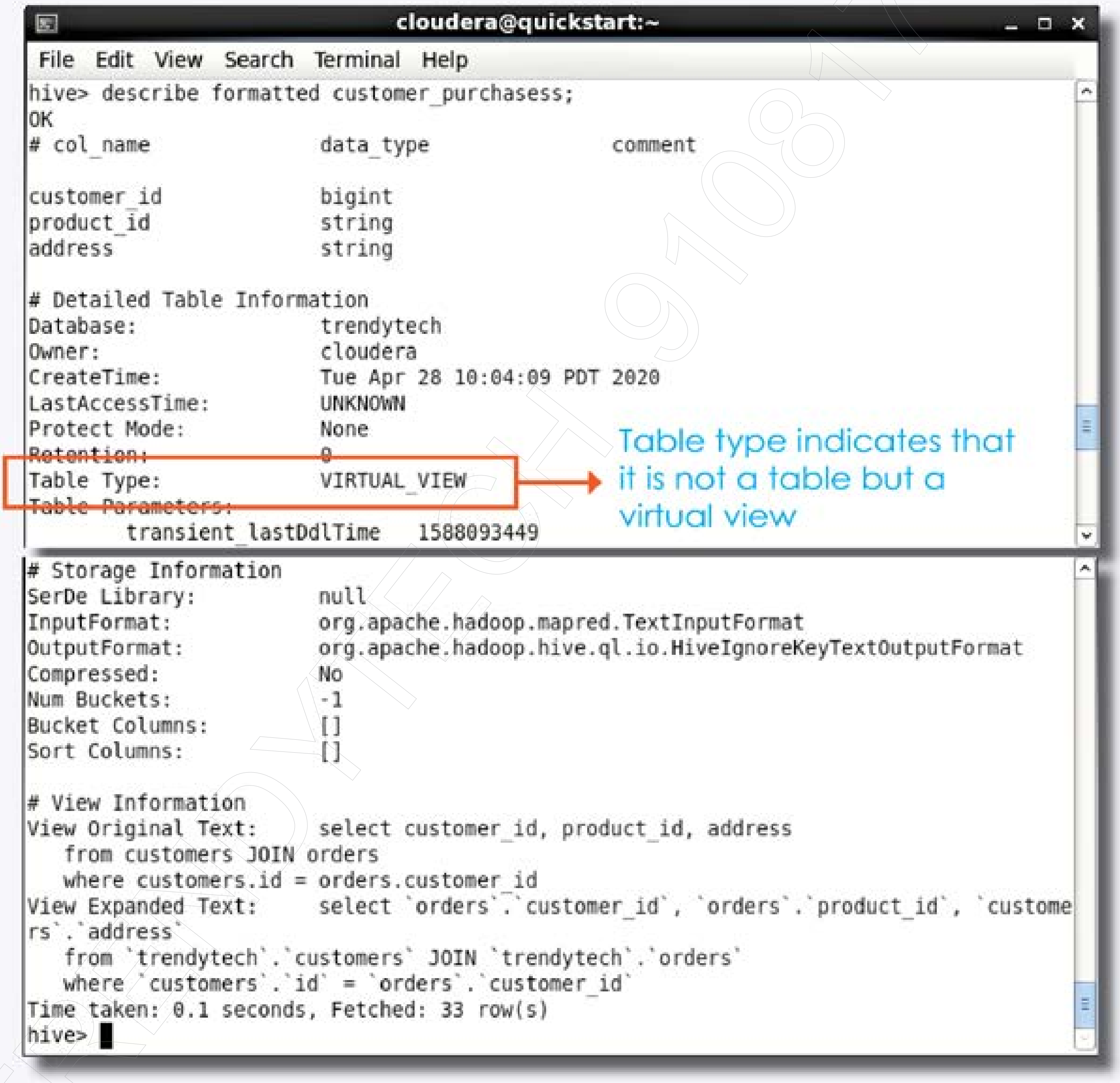


```
hive> describe customer_purchasess;
OK
customer_id             bigint
product_id              string
address                 string
Time taken: 0.306 seconds, Fetched: 3 row(s)
hive> 
```

Note: datatypes are taken from their original tables

Run *describe formatted* to display detailed view table informations:

```
describe formatted customer_purchasess;
```



```
hive> describe formatted customer_purchasess;
OK
# col_name              data_type               comment

customer_id             bigint
product_id              string
address                 string

# Detailed Table Information
Database:               trendytech
Owner:                  cloudera
CreateTime:             Tue Apr 28 10:04:09 PDT 2020
LastAccessTime:         UNKNOWN
Protect Mode:           None
Retention:              0
Table Type:             VIRTUAL_VIEW
Table Parameters:
        transient_lastDdlTime   1588093449
```

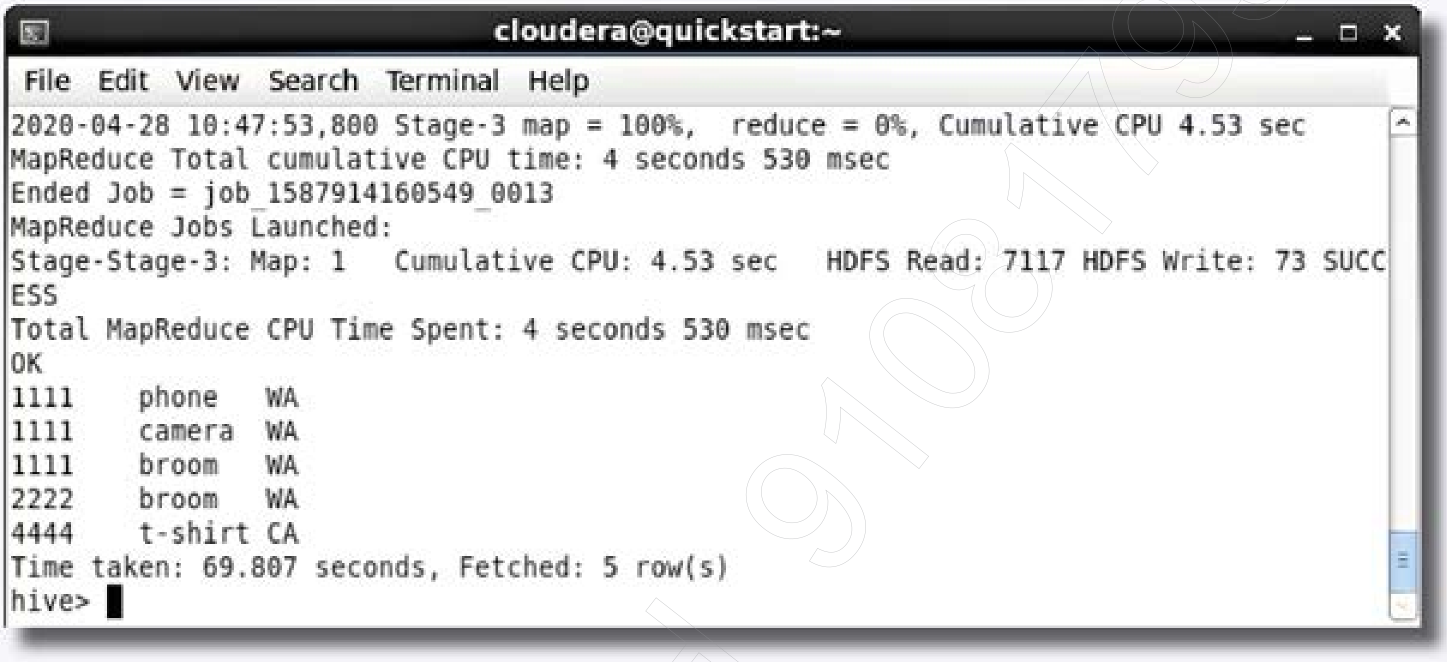
Table type indicates that it is not a table but a virtual view

```
# Storage Information
SerDe Library:          null
InputFormat:            org.apache.hadoop.mapred.TextInputFormat
OutputFormat:           org.apache.hadoop.hive.ql.io.HiveIgnoreKeyTextOutputFormat
Compressed:             No
Num Buckets:            -1
Bucket Columns:         []
Sort Columns:           []

# View Information
View Original Text:     select customer_id, product_id, address
   from customers JOIN orders
   where customers.id = orders.customer_id
View Expanded Text:     select `orders`.`customer_id`, `orders`.`product_id`, `custome
rs`.`address`
   from `trendytech`.`customers` JOIN `trendytech`.`orders`
   where `customers`.`id` = `orders`.`customer_id`
Time taken: 0.1 seconds, Fetched: 33 row(s)
hive>
```

Run select query to display records of a view:

```
select * from customer_purchasess;
```



```
2020-04-28 10:47:53,800 Stage-3 map = 100%,  reduce = 0%, Cumulative CPU 4.53 sec
MapReduce Total cumulative CPU time: 4 seconds 530 msec
Ended Job = job_1587914160549_0013
MapReduce Jobs Launched:
Stage-Stage-3: Map: 1   Cumulative CPU: 4.53 sec   HDFS Read: 7117 HDFS Write: 73 SUCC
ESS
Total MapReduce CPU Time Spent: 4 seconds 530 msec
OK
1111    phone   WA
1111    camera  WA
1111    broom   WA
2222    broom   WA
4444    t-shirt CA
Time taken: 69.807 seconds, Fetched: 5 row(s)
hive> 
```

Note: It will trigger a MapReduce job because it expands the select operation as a subquery in background.

Hive Index

Index

Hive index is used to speed up the performance of queries on certain columns of a table.

Without an index, queries with predicates like 'WHERE tab1.col1 = 10' load the entire table or partition and process all the rows. But if an index exists for col1, then only a portion of the file needs to be loaded and processed.

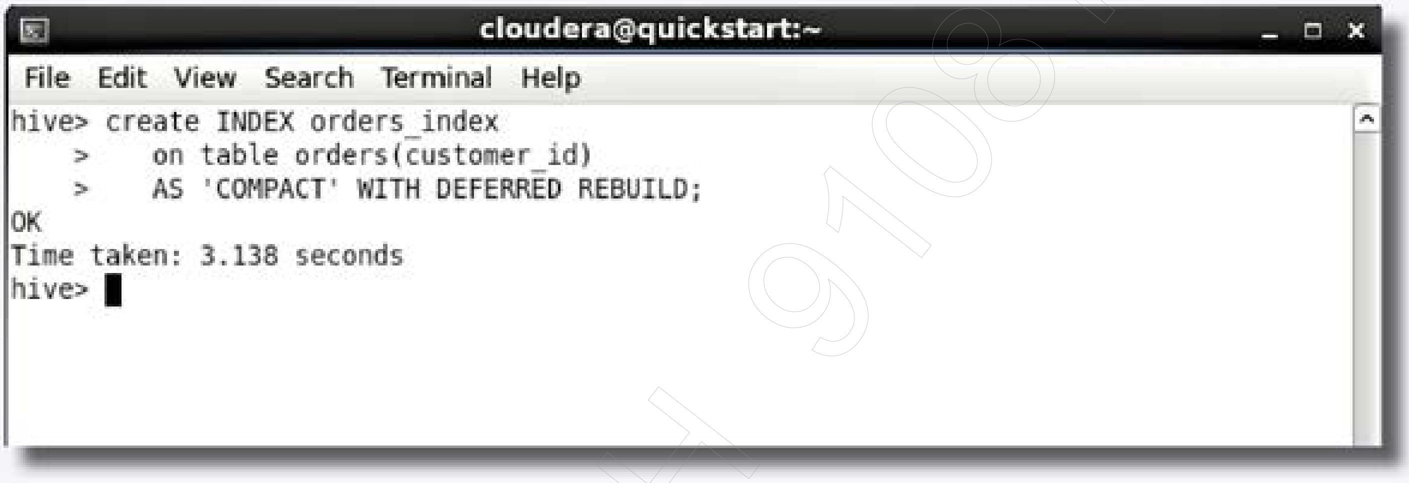
Indexing can be used:

- When the dataset is very large.
- When the query execution is taking more amount of time than expected.
- When a fast query execution is required.

Note: Indexing Is Removed since Hive version 3.0

Create an Index on *customer_id* column of *orders* table:

```
create INDEX orders_index
    on table orders(customer_id)
    AS 'COMPACT' WITH DEFERRED REBUILD;
```



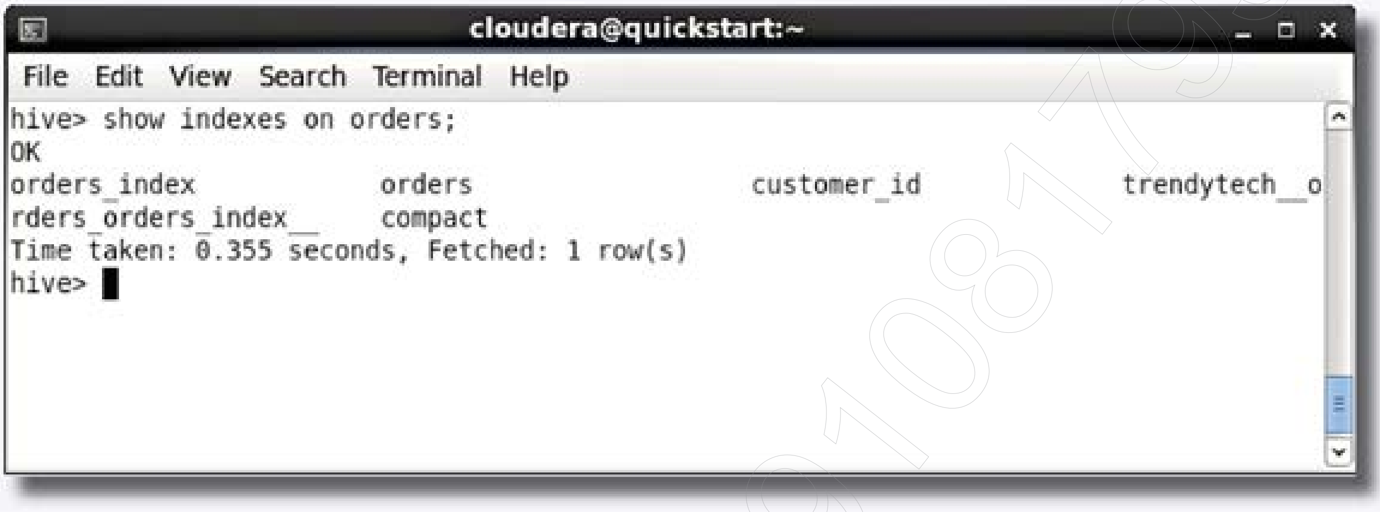
```
hive> create INDEX orders_index
    >    on table orders(customer_id)
    >    AS 'COMPACT' WITH DEFERRED REBUILD;
OK
Time taken: 3.138 seconds
hive> 
```

Note: Here COMPACT means we are creating a compact index for the table.

The WITH DEFERRED REBUILD statement is because we need to alter the index in later stages using this statement.

Show the Index which we have created on *orders* table:

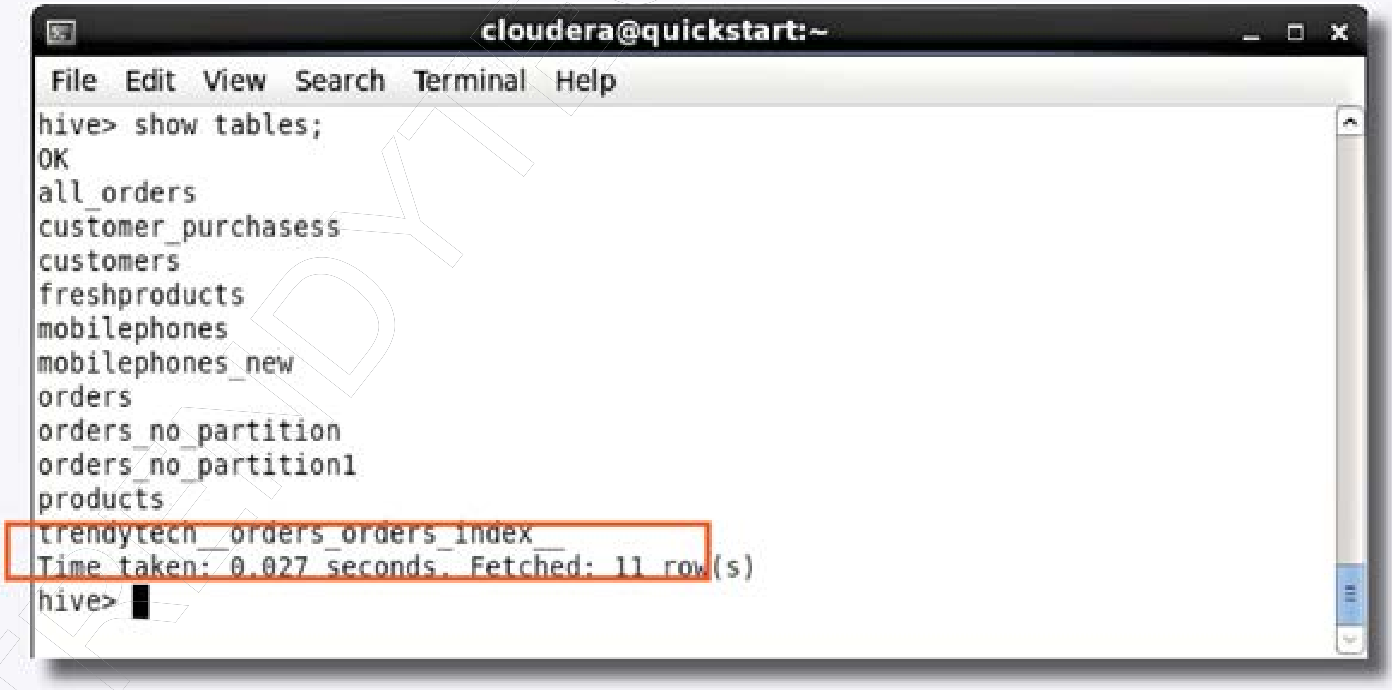
```
show indexes on orders;
```



```
hive> show indexes on orders;
OK
orders_index            orders                  customer_id             trendytech__o
rders_orders_index__    compact
Time taken: 0.355 seconds, Fetched: 1 row(s)
hive> █
```

Show table display index table:

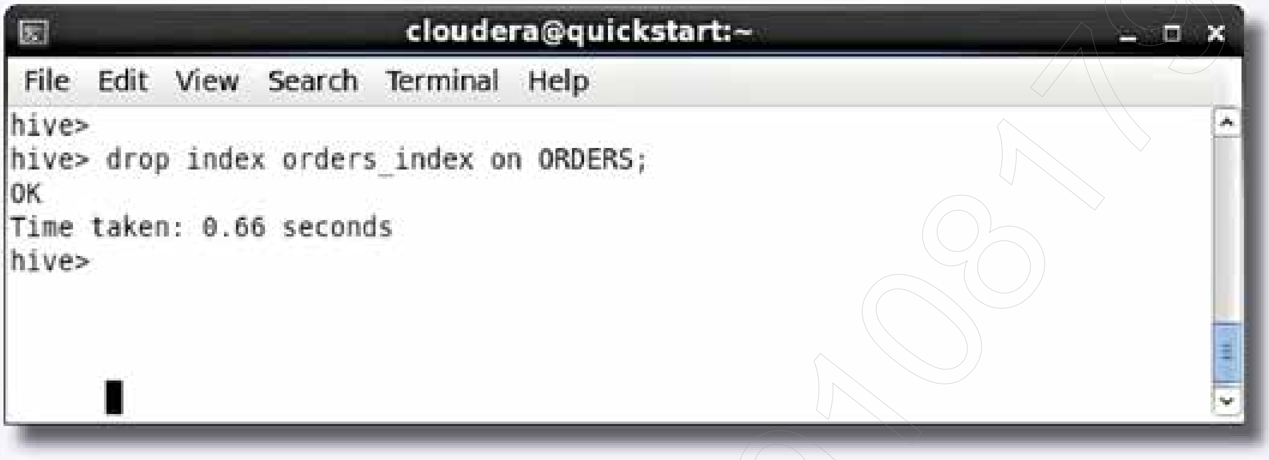
```
show tables;
```



```
hive> show tables;
OK
all_orders
customer_purchasess
customers
freshproducts
mobilephones
mobilephones_new
orders
orders_no_partition
orders_no_partition1
products
trendytech__orders_orders_index__
Time taken: 0.027 seconds, Fetched: 11 row(s)
hive> █
```

Drop an Index:

```
drop index orders_index on ORDERS;
```



```
hive>
hive> drop index orders_index on ORDERS;
OK
Time taken: 0.66 seconds
hive>
```

Google REVIEWS

5 Star Google Rated Big Data Course

LEARN FROM THE EXPERT

TRENDYTECH - TRENDYTECH - TRENDYTECH - TRENDYTECH - TRENDYTECH

9108179578

Call for more details

Follow US

Trainer	Mr. Sumit Mittal
LinkedIn	https://www.linkedin.com/in/bigdatabysumit/
Website	https://trendytech.in/courses/big-data-online-training/
Phone	9108179578
Email	trendytech.sumit@gmail.com
Youtube	TrendyTech
Twitter	@BigdataBySumit
Instagram	bigdatabysumit
Facebook	https://www.facebook.com/trendytech.in/

TRENDY TECH

UPLIFT YOUR CAREER!