Sqoop Incremental Import

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Delta Load

IMPORTANT

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Sqoop Incremental Import

Sqoop provides an incremental import mode which can be used to retrieve only rows newer than some previously-imported set of rows.

--check-column (col) char not supported
--incremental (mode) append , lastmodified
--last-value (value)

Sqoop supports two types of incremental imports: append and lastmodified. You can use the --incremental argument to specify the type of incremental import to perform.

Sqoop Incremental Import

You should specify **append mode** when importing a table where new rows are continually being added with increasing row id values. You specify the column containing the row's id with --check-column. Sqoop imports rows where the check column has a value greater than the one specified with --last-value.

An alternate table update strategy supported by Sqoop is called **lastmodified mode**. You should use this when rows of the source table may be updated, and each such update will set the value of a last-modified column to the current timestamp. Rows where the check column holds a timestamp more recent than the timestamp specified with --last-value are imported.

Visualize orders data in mysql

connect to mysql

use retail_db;

select * from orders;

We can see the last row of orders table has order_id 68883

```
|     68864 | 2014-06-18 00:00:00 |              9634 | ON_HOLD         |
|     68865 | 2014-06-19 00:00:00 |              4567 | SUSPECTED_FRAUD |
|     68866 | 2014-06-20 00:00:00 |              3890 | PENDING_PAYMENT |
|     68867 | 2014-06-23 00:00:00 |               869 | CANCELED        |
|     68868 | 2014-06-24 00:00:00 |             10184 | PENDING         |
|     68869 | 2014-06-25 00:00:00 |              7456 | PROCESSING      |
|     68870 | 2014-06-26 00:00:00 |              3343 | COMPLETE        |
|     68871 | 2014-06-28 00:00:00 |              4960 | PENDING         |
|     68872 | 2014-06-29 00:00:00 |              3354 | COMPLETE        |
|     68873 | 2014-06-30 00:00:00 |              4545 | PENDING         |
|     68874 | 2014-07-03 00:00:00 |              1601 | COMPLETE        |
|     68875 | 2014-07-04 00:00:00 |             10637 | ON_HOLD         |
|     68876 | 2014-07-06 00:00:00 |              4124 | COMPLETE        |
|     68877 | 2014-07-07 00:00:00 |              9692 | ON_HOLD         |
|     68878 | 2014-07-08 00:00:00 |              6753 | COMPLETE        |
|     68879 | 2014-07-09 00:00:00 |               778 | COMPLETE        |
|     68880 | 2014-07-13 00:00:00 |              1117 | COMPLETE        |
|     68881 | 2014-07-19 00:00:00 |              2518 | PENDING_PAYMENT |
|     68882 | 2014-07-22 00:00:00 |             10000 | ON_HOLD         |
|     68883 | 2014-07-23 00:00:00 |              5533 | COMPLETE        |
+-----------+---------------------+-------------------+-----------------+
68883 rows in set (0.04 sec)
```

Sqoop import - append mode

```
sqoop-import \
--connect jdbc:mysql://quickstart.cloudera:3306/retail_db \
--username root \
--password cloudera \
--table orders \
--warehouse-dir /data \
--incremental append \
--check-column order_id \
--last-value 0
```

Incremental mode is append

Check column is order_id

Last value is 0

When job is running we can see the below

```
d`
20/04/14 16:27:22 INFO tool.ImportTool: Lower bound value: 0
20/04/14 16:27:22 INFO tool.ImportTool: Upper bound value: 68883
20/04/14 16:27:22 WARN manager.MySQLManager: It looks like you are importing from m
ysql.
```

```
20/04/14 16:27:48 INFO mapreduce.ImportJobBase: Transferred 2.861 MB in 25.6311 sec
onds (114.3001 KB/sec)
20/04/14 16:27:48 INFO mapreduce.ImportJobBase: Retrieved 68883 records.
20/04/14 16:27:48 INFO util.AppendUtils: Creating missing output directory - orders
20/04/14 16:27:48 INFO tool.ImportTool: Incremental import complete! To run another
 incremental import of all data following this import, supply the following argumen
ts:
20/04/14 16:27:48 INFO tool.ImportTool:  --incremental append
20/04/14 16:27:48 INFO tool.ImportTool:   --check-column order_id
20/04/14 16:27:48 INFO tool.ImportTool:   --last-value 68883
20/04/14 16:27:48 INFO tool.ImportTool: (Consider saving this with 'sqoop job --cre
ate')
```

Check these

Insert new records in orders table

```
insert into orders values(68884,'2014-07-23 00:00:00',5522,'COMPLETE');
insert into orders values(68885,'2014-07-23 00:00:00',5522,'COMPLETE');
insert into orders values(68886,'2014-07-23 00:00:00',5522,'COMPLETE');
insert into orders values(68887,'2014-07-23 00:00:00',5522,'COMPLETE');
insert into orders values(68888,'2014-07-23 00:00:00',5522,'COMPLETE');
insert into orders values(68889,'2014-07-23 00:00:00',5522,'COMPLETE');

commit;
```

New records inserted successfully

```
mysql> insert into orders values(68884,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.01 sec)

mysql> insert into orders values(68885,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.00 sec)

mysql> insert into orders values(68886,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.00 sec)

mysql> insert into orders values(68887,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.01 sec)

mysql> insert into orders values(68888,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.00 sec)

mysql> insert into orders values(68889,'2014-07-23 00:00:00',5522,'COMPLETE');
Query OK, 1 row affected (0.01 sec)

mysql> commit;
Query OK, 0 rows affected (0.00 sec)
```

Run sqoop import to get the delta rows

```
sqoop-import \
--connect jdbc:mysql://quickstart.cloudera:3306/retail_db \
--username root \
--password cloudera \
--table orders \
--warehouse-dir /data \
--incremental append \
--check-column order_id \
--last-value 68883
```

Incremental mode is append

Check column is order_id

Last value is 68883

When import is running we can see boundary query and split size.

```
d`
20/04/14 16:30:18 INFO tool.ImportTool: Lower bound value: 68883
20/04/14 16:30:18 INFO tool.ImportTool: Upper bound value: 68889
20/04/14 16:30:18 WARN manager.MySQLManager: It looks like you are importi
ysql.
```

```
20/04/14 16:30:20 INFO db.DBInputFormat: Using read commited transaction isolation
20/04/14 16:30:20 INFO db.DataDrivenDBInputFormat: BoundingValsQuery: SELECT MIN(`o
rder_id`), MAX(`order_id`) FROM `orders` WHERE ( `order_id` > 68883 AND `order_id`
<= 68889 )
20/04/14 16:30:20 INFO db.IntegerSplitter: Split size: 1; Num splits: 4 from: 68884
 to: 68889
20/04/14 16:30:21 INFO mapreduce.JobSubmitter: number of splits:4
20/04/14 16:30:21 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_15863
88936914 0022
```

When import is running we can see the last value fetched

```
                Bytes Written=252
20/04/14 16:30:41 INFO mapreduce.ImportJobBase: Transferred 252 bytes in 23.1813 se
conds (10.8708 bytes/sec)
20/04/14 16:30:41 INFO mapreduce.ImportJobBase: Retrieved 6 records.
20/04/14 16:30:41 INFO util.AppendUtils: Appending to directory orders
20/04/14 16:30:41 INFO util.AppendUtils: Using found partition 4
20/04/14 16:30:41 INFO tool.ImportTool: Incremental import complete! To run another
 incremental import of all data following this import, supply the following argumen
ts:
20/04/14 16:30:41 INFO tool.ImportTool:  --incremental append
20/04/14 16:30:41 INFO tool.ImportTool:   --check-column order_id
20/04/14 16:30:41 INFO tool.ImportTool:   --last-value 68889
20/04/14 16:30:41 INFO tool.ImportTool: (Consider saving this with 'sqoop job --cre
ate')
```

What are counters?

```
20/04/14 16:30:41 INFO mapreduce.Job: Job job_1586388936914_0022 completed succes
ully
20/04/14 16:30:41 INFO mapreduce.Job: Counters: 30
        File System Counters
                FILE: Number of bytes read=0
                FILE: Number of bytes written=688492
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=473
                HDFS: Number of bytes written=252
                HDFS: Number of read operations=16
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=8
        Job Counters
                Launched map tasks=4
                Other local map tasks=4
                Total time spent by all maps in occupied slots (ms)=29883
                Total time spent by all reduces in occupied slots (ms)=0
                Total time spent by all map tasks (ms)=29883
                Total vcore-milliseconds taken by all map tasks=29883
                Total megabyte-milliseconds taken by all map tasks=30600192
        Map-Reduce Framework
                Map input records=6
```

Counters are stats related to the job. For example bytes read, bytes written etc.

Sqoop import - lastmodified mode

Before proceeding delete the orders directory inside data.
hadoop fs -rm -R /data/orders

```
sqoop-import \
--connect jdbc:mysql://quickstart.cloudera:3306/retail_db \
--username root \
--password cloudera \
--table orders \
--warehouse-dir /data \
--incremental lastmodified \
--check-column order_date \
--last-value 0 \
--append
```

Incremental mode is lastmodified

Check column is order_date

Last value is 0

When import is running we can see boundary query and split size.

```
20/04/14 16:41:02 INFO tool.ImportTool: Lower bound value: '0'
20/04/14 16:41:02 INFO tool.ImportTool: Upper bound value: '2020-04-14 16:41:02.0'
20/04/14 16:41:03 INFO db.DBInputFormat: Using read commited transaction isolation
20/04/14 16:41:03 INFO db.DataDrivenDBInputFormat: BoundingValsQuery: SELECT MIN(`o
rder_id`), MAX(`order_id`) FROM `orders` WHERE ( `order_date` >= '0' AND `order_dat
e` < '2020-04-14 16:41:02.0' )
20/04/14 16:41:03 INFO db.IntegerSplitter: Split size: 17222; Num splits: 4 from: 1
 to: 68889
20/04/14 16:41:03 INFO mapreduce.JobSubmitter: number of splits:4
```

```
20/04/14 16:41:27 INFO mapreduce.ImportJobBase: Retrieved 68889 records.
20/04/14 16:41:27 INFO util.AppendUtils: Creating missing output directory - orders
20/04/14 16:41:27 INFO tool.ImportTool: Incremental import complete! To run another
 incremental import of all data following this import, supply the following argumen
ts:
20/04/14 16:41:27 INFO tool.ImportTool:  --incremental lastmodified
20/04/14 16:41:27 INFO tool.ImportTool:   --check-column order_date
20/04/14 16:41:27 INFO tool.ImportTool:   --last-value 2020-04-14 16:41:02.0
20/04/14 16:41:27 INFO tool.ImportTool: (Consider saving this with 'sqoop job --cre
ate')
```

Add a few new records & update few records in orders table

```
insert into orders values(68890,current_timestamp,5523,'COMPLETE');
insert into orders values(68891,current_timestamp,5523,'COMPLETE');
insert into orders values(68892,current_timestamp,5523,'COMPLETE');
insert into orders values(68893,current_timestamp,5523,'COMPLETE');
insert into orders values(68894,current_timestamp,5523,'COMPLETE');

update orders set order_status='COMPLETE' and order_date =
current_timestamp WHERE ORDER_ID = 68862;

commit;
```

Sqoop import - lastmodified mode

Run sqoop import again

```
sqoop-import \
--connect jdbc:mysql://quickstart.cloudera:3306/retail_db \
--username root \
--password cloudera \
--table orders \
--warehouse-dir /data \
--incremental lastmodified \
--check-column order_date \
--last-value '2020-04-14 16:41:02' \
--append
```

Incremental mode is lastmodified

Check column is order_date

Last value is 2020-04-14 16:41:02

When import is running we can see boundary query and split size.

```
20/04/14 16:56:17 INFO tool.ImportTool: Incremental import based on column `order_d
ate`
20/04/14 16:56:17 INFO tool.ImportTool: Lower bound value: '2020-04-14 16:41:02'
20/04/14 16:56:17 INFO tool.ImportTool: Upper bound value: '2020-04-14 16:56:17.0'
20/04/14 16:56:17 WARN manager.MySQLManager: It looks like you are importing from m
ysql.
```

```
20/04/14 16:56:19 INFO db.DBInputFormat: Using read commited transaction isolation
20/04/14 16:56:19 INFO db.DataDrivenDBInputFormat: BoundingValsQuery: SELECT MIN(`o
rder_id`), MAX(`order_id`) FROM `orders` WHERE ( `order_date` >= '2020-04-14 16:41:
02' AND `order_date` < '2020-04-14 16:56:17.0' )
20/04/14 16:56:19 INFO db.IntegerSplitter: Split size: 1; Num splits: 4 from: 68890
 to: 68894
```

When import is running we can see the last value

```
20/04/14 16:56:41 INFO mapreduce.ImportJobBase: Transferred 210 bytes in 23.7956 se
conds (8.8252 bytes/sec)
20/04/14 16:56:41 INFO mapreduce.ImportJobBase: Retrieved 5 records.
20/04/14 16:56:41 INFO util.AppendUtils: Appending to directory orders
20/04/14 16:56:41 INFO util.AppendUtils: Using found partition 4
20/04/14 16:56:41 INFO tool.ImportTool: Incremental import complete! To run another
 incremental import of all data following this import, supply the following argumen
ts:
20/04/14 16:56:41 INFO tool.ImportTool:  --incremental lastmodified
20/04/14 16:56:41 INFO tool.ImportTool:   --check-column order_date
20/04/14 16:56:41 INFO tool.ImportTool:   --last-value 2020-04-14 16:56:17.0
20/04/14 16:56:41 INFO tool.ImportTool: (Consider saving this with 'sqoop job --cre
ate')
```

Sqoop import - lastmodified mode

Sqoop import with last modified, supplied with

--append will result in duplicate records in HDFS directory.

What if we just want the latest records in HDFS?

Then in that case we need to use

----merge-key <merge-column>

Incremental merge-key

The merge tool allows you to combine two datasets where entries in one dataset should overwrite entries of an older dataset. For example, an incremental import run in last-modified mode will generate multiple datasets in HDFS where successively newer data appears in each dataset. The merge tool will "flatten" two datasets into one, taking the newest available records for each primary key.

The merge tool is typically run after an incremental import with the date-last-modified mode (sqoop import --incremental lastmodified …).

Incremental lastmodified merge-key

Run sqoop import again

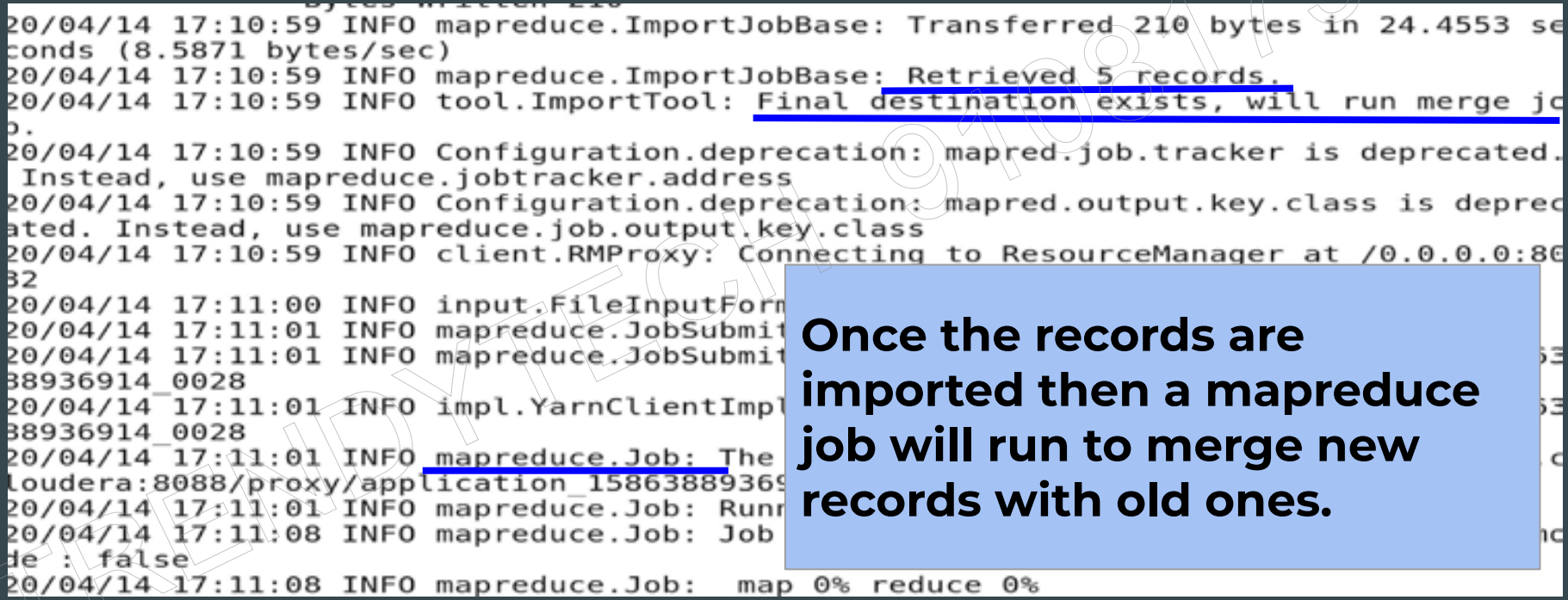
```
sqoop-import \
--connect jdbc:mysql://quickstart.cloudera:3306/retail_db \
--username root \
--password cloudera \
--table orders \
--warehouse-dir /data \
--incremental lastmodified \
--check-column order_date \
--last-value '2020-04-14 16:41:02' \
--merge-key order_id
```

Incremental mode is lastmodified

Check column is order_date

Last value is 2020-04-14 16:41:02

Incremental lastmodified merge-key



Once the records are imported then a mapreduce job will run to merge new records with old ones.

Incremental lastmodified merge-key

```
[cloudera@quickstart ~]$ hadoop fs -ls /data/orders
Found 2 items
-rw-r--r--   1 cloudera cloudera          0 2020-04-14 17:12 /data/orders/_SUCCESS
-rw-r--r--   1 cloudera cloudera    3000406 2020-04-14 17:12 /data/orders/part-r-00
000
[cloudera@quickstart ~]$
```


We can see that all the files in output folder are now merged in just one single file.

We have learnt Sqoop incremental import

Happy Learning!!!

Follow US

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