

Spark Save到表和HDFS路径的性能对比

Spark version	Hadoop version	Hive version
3.3.2	3.3.0	3.1.3

前言

看到[一篇文章](#)说Spark写Hive慢，可以直接写到HDFS中，比较快。我不确定他的Spark版本，但为了验证的这个说法，我决定测试一下。

我计划编写三个Spark APP来分别使用DataFrame.insertInto(tableName: String)、DataFrame.save(path: String)和createTempView + sql(insert into select * from viewName)方法实现对同一张表的写入，写入数量都是100w条，各写10次，来测试这三个API的性能差异，同时抓包分析。

性能测试

APP源码

```
1  import com.wbx.entity.CallHistory
2  import com.wbx.utils.CallHistoryFactory
3  import org.apache.spark.SparkConf
4  import org.apache.spark.sql.types._
5  import org.apache.spark.sql.{DataFrame, Row, SaveMode, SparkSession}
6
7  import java.util
8
9  object SparkWriteHiveOrc {
10
11      def main(args: Array[String]): Unit = {
12          //spark设置
13          System.setProperty("HADOOP_USER_NAME", "root")
14          val conf = new SparkConf().setAppName("SparkWriteHiveOrc").setMaster("local[1]")
15          val spark = SparkSession.builder().config(conf).enableHiveSupport().getOrCreate()
16          //创建100w条数据
17          val list : util.ArrayList[Row] = new util.ArrayList[Row]()
18          for (_ <- 1 to 1000000) {
19              list.add(converter(CallHistoryFactory.build()))
20          }
```

```

21
22 //创建test.call_history_orc表
23 val df: DataFrame = spark.createDataFrame(list, callHistorySchema())
24 val sql = "CREATE TABLE IF NOT EXISTS test.call_history_orc (" +
25     "impi_from STRING," +
26     "impi_to STRING," +
27     "call_time BIGINT," +
28     "call_duration INT," +
29     "impi_from_location STRING)" +
30     "USING orc"
31 spark.sql(sql)
32 //写入
33 val startTime = System.currentTimeMillis()
34 df.write.mode(SaveMode.Append).format("orc").insertInto("test.call_his
tory_orc")
35 //另一个程序只有这一行不一样，就是将API替换一下，直接传表的HDFS地址
36 //df.write.mode(SaveMode.Append).format("orc").save("hdfs://192.168.13
7.104:9000/user/hive/warehouse/test.db/call_history_orc")
37 val endTime = System.currentTimeMillis()
38 System.out.println("执行时间为：" + (endTime - startTime) + "ms")
39 }
40
41 private def converter(callHistory: CallHistory): Row = {
42     val impiFrom = callHistory.getImpiFrom()
43     val impiTo = callHistory.getImpiTo
44     val callTime = callHistory.getCallTime
45     val callDuration = callHistory.getCallDuration
46     val impiFromLocation = callHistory.getImpiFromLocation
47     Row(impiFrom, impiTo, callTime, callDuration, impiFromLocation)
48 }
49
50 def callHistorySchema(): StructType = {
51     StructType(Array(StructField("impi_from", StringType),
52         StructField("impi_to", StringType),
53         StructField("call_time", LongType),
54         StructField("call_duration", IntegerType),
55         StructField("impi_from_location", StringType)))
56 }
57 }

```

时间结果

DataFrame.save(path: String)方法：

在不同的session中执行10次

该方法平均执行时间为：6685 ms

在同一个session中执行10次

该方法平均执行时间为： 4148.8 ms

DataFrame.insertInto(tableName: String)方法：

在不同的session中执行10次

该方法平均执行时间为： 7258.8 ms

在同一个session中执行10次

该方法平均执行时间为： 4317.8 ms

createTempView + .sql(insert into select * from viewName)方法：

在不同的session中执行10次

该方法平均执行时间为： 6860 ms

在同一个session中执行10次

该方法平均执行时间为： 4365.5 ms

抓包对比

只记录APP发的请求

save(path: String)	insertInto(tableName: String)	createTempView(viewName: String) .sql(insert into select * from viewName)
执行时间为： 127112ms	执行时间为： 132511ms	执行时间为： 132233ms
9083	9083	9083
CALL set_ugi	CALL set_ugi	CALL set_ugi
CALL get_database default	CALL get_database default	CALL get_database default
CALL get_table test.call_history_orc	CALL get_table test.call_history_orc	CALL get_table test.call_history_orc
	CALL get_database global_temp	CALL get_database global_temp
	CALL get_database test	CALL get_database test
	CALL get_table test.call_history_orc	CALL get_table test.call_history_orc

9000	9000	9000
	getFileInfo /user/hive/warehouse/test. db/call_history_orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc
	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_spark_ metadata	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_spark_ metadata
	getListing /user/hive/warehouse/test. db/call_history_orc	getListing /user/hive/warehouse/test. db/call_history_orc
mkdirs /user/hive/warehouse/test. db/call_history_orc/_tempo rary/	mkdirs /user/hive/warehouse/test. db/call_history_orc/_tempor ary/	mkdirs /user/hive/warehouse/test. db/call_history_orc/_tempo rary/
create /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0/part-00000- ad3face5-1c4c-4c22- a802-86e714baf7bc- c000.snappy.orc	create /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0/part-00000- 4af679a0-3ef8-412e- 9e76-010664abbb1d- c000.snappy.orc	create /test.db/call_history_orc/_t emporary/0/_temporary/att empt_20231012170322501 8414972358688901_0000_ m_000000_0/part-00000- ad3face5-1c4c-4c22- a802-86e714baf7bc- c000.snappy.orc
addBlock	addBlock	addBlock
getServerDefaults	getServerDefaults	getServerDefaults
9866	9866	9866
发送创建文件信息	发送创建文件信息	发送创建文件信息
发送数据	发送数据	发送数据
发送结束	发送结束	发送结束
9000	9000	9000
complete user/hive/warehouse/test.d b/call_history_orc/_tempor ary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0/part-00000- ad3face5-1c4c-4c22- a802-86e714baf7bc- c000.snappy.orc	complete /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0/part-00000- 4af679a0-3ef8-412e- 9e76-010664abbb1d- c000.snappy.orc	complete /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310151528127107865 54768966568_0000_m_00 0000_0/part-00000- f9cb2084-3a5f-4627- b464-98e3a57824a6- c000.snappy.orc
netFileInfo	netFileInfo	netFileInfo

getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0/part-00000- ad3face5-1c4c-4c22- a802-86e714baf7bc- c000.snappy.orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0/part-00000- 4af679a0-3ef8-412e- 9e76-010664abbb1d- c000.snappy.orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310151528127107865 54768966568_0000_m_00 0000_0/part-00000- f9cb2084-3a5f-4627- b464-98e3a57824a6- c000.snappy.orc
getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310151528127107865 54768966568_0000_m_00 0000_0
getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0	getFileInfo ~/user/hive/warehouse/test .db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310151528127107865 54768966568_0000_m_00 0000_0
getFileInfo o/user/hive/warehouse/tes t.db/call_history_orc/_temp orary/0/task_20231012170 322501841497235868890 1_0000_m_000000	getFileInfo /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/task_2023101216052 3731096253230854165_00 00_m_000000	getFileInfo n/user/hive/warehouse/tes t.db/call_history_orc/_temp orary/0/task_20231015152 812710786554768966568_ 0000_m_000000
rename /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310121703225018414 972358688901_0000_m_0 00000_0 /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310121703 225018414972358688901_ 0000_m_000000	rename /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/_temporary/attempt_ _2023101216052373109625 3230854165_0000_m_0000 00_0 /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/task_2023101216052 3731096253230854165_00 00_m_000000	rename /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/_temporary/attempt_ _202310151528127107865 54768966568_0000_m_00 0000_0 /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310151528 12710786554768966568_0 000_m_000000
getListing /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0	getListing /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0	getListing /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0

getFileInfo /user/hive/warehouse/test. db/call_history_orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc
getListing /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310121703 225018414972358688901_ 0000_m_000000	getListing /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/task_2023101216052 3731096253230854165_00 00_m_000000	getListing /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310151528 12710786554768966568_0 000_m_000000
getFileInfo /user/hive/warehouse/test. db/call_history_orc/part- 00000-ad3face5-1c4c- 4c22-a802- 86e714baf7bc- c000.snappy.orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc/part- 00000-4af679a0-3ef8- 412e-9e76- 010664abbb1d- c000.snappy.orc	getFileInfo /user/hive/warehouse/test. db/call_history_orc/part- 00000-f9cb2084-3a5f- 4627-b464- 98e3a57824a6- c000.snappy.orc
rename /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310121703 225018414972358688901_ 0000_m_000000/part- 00000-ad3face5-1c4c- 4c22-a802- 86e714baf7bc- c000.snappy.orc /user/hive/warehouse/test. db/call_history_orc/part- 00000-ad3face5-1c4c- 4c22-a802- 86e714baf7bc- c000.snappy.orc	rename /user/hive/warehouse/test. db/call_history_orc/_tempor ary/0/task_2023101216052 3731096253230854165_00 00_m_000000/part-00000- 4af679a0-3ef8-412e- 9e76-010664abbb1d- c000.snappy.orc /user/hive/warehouse/test. db/call_history_orc/part- 00000-4af679a0-3ef8- 412e-9e76- 010664abbb1d- c000.snappy.orc	rename /user/hive/warehouse/test. db/call_history_orc/_tempo rary/0/task_202310151528 12710786554768966568_0 000_m_000000/part- 00000-f9cb2084-3a5f- 4627-b464- 98e3a57824a6- c000.snappy.orc /user/hive/warehouse/test. db/call_history_orc/part- 00000-f9cb2084-3a5f- 4627-b464- 98e3a57824a6- c000.snappy.orc
delete /user/hive/warehouse/test. db/call_history_orc/_tempo rary	delete /user/hive/warehouse/test. db/call_history_orc/_tempor ary	delete /user/hive/warehouse/test. db/call_history_orc/_tempo rary
create /user/hive/warehouse/test. db/call_history_orc/_SUCC ESS	create /user/hive/warehouse/test. db/call_history_orc/_SUCCE SS	create /user/hive/warehouse/test. db/call_history_orc/_SUCC ESS
complete 6/user/hive/warehouse/tes t.db/call_history_orc/_SUC CESS	complete /user/hive/warehouse/test. db/call_history_orc/_SUCCE SS	complete /user/hive/warehouse/test. db/call_history_orc/_SUCC ESS
delete /user/hive/warehouse/test. db/call_history_orc/_tempo rary	delete /user/hive/warehouse/test. db/call_history_orc/_tempor ary	delete /user/hive/warehouse/test. db/call_history_orc/_tempo rary

a/user/hive/warehouse/test.db/call_history_orc/.spark-staging-ad3face5-1c4c-4c22-a802-86e714baf7bc	/user/hive/warehouse/test.db/call_history_orc/.spark-staging-4af679a0-3ef8-412e-9e76-010664abbb1d	a/user/hive/warehouse/test.db/call_history_orc/.spark-staging-f9cb2084-3a5f-4627-b464-98e3a57824a6
	getListing /user/hive/warehouse/test.db/call_history_orc	getListing /user/hive/warehouse/test.db/call_history_orc

总结

从请求次数来看：

- DataFrame.save(path: String)方法：共26次请求
- DataFrame.insertInto(tableName: String)方法：共33次请求
- createTempView + sql(insert into select * from viewName)方法：共33次请求与insertInto完全一样

从时间来看：

三个方法的运行时间基本一样，对于离线任务来说并无明显区别。

save(path: String)方法在请求次数上少了7次，剩下的26次请求与insertInto方法中一致，因此会有一定的时间优势，但是在不知道表对应的HDFS path的场景无法使用。

createTempView方法创建了一个临时表，内存再用更大，请求流程与insertInto方法完全一致，因此在不需要临时表的场景尽量使用save方法或insertInto。