Spark 2.2.0 (/)

Spark shell application UI

Jobs (/history/application_1519504339627_0143/jobs/)   Stages (/history/application_1519504339627_0143/stages/)

Storage (/history/application_1519504339627_0143/storage/)   Environment (/history/application_1519504339627_0143/environment/)

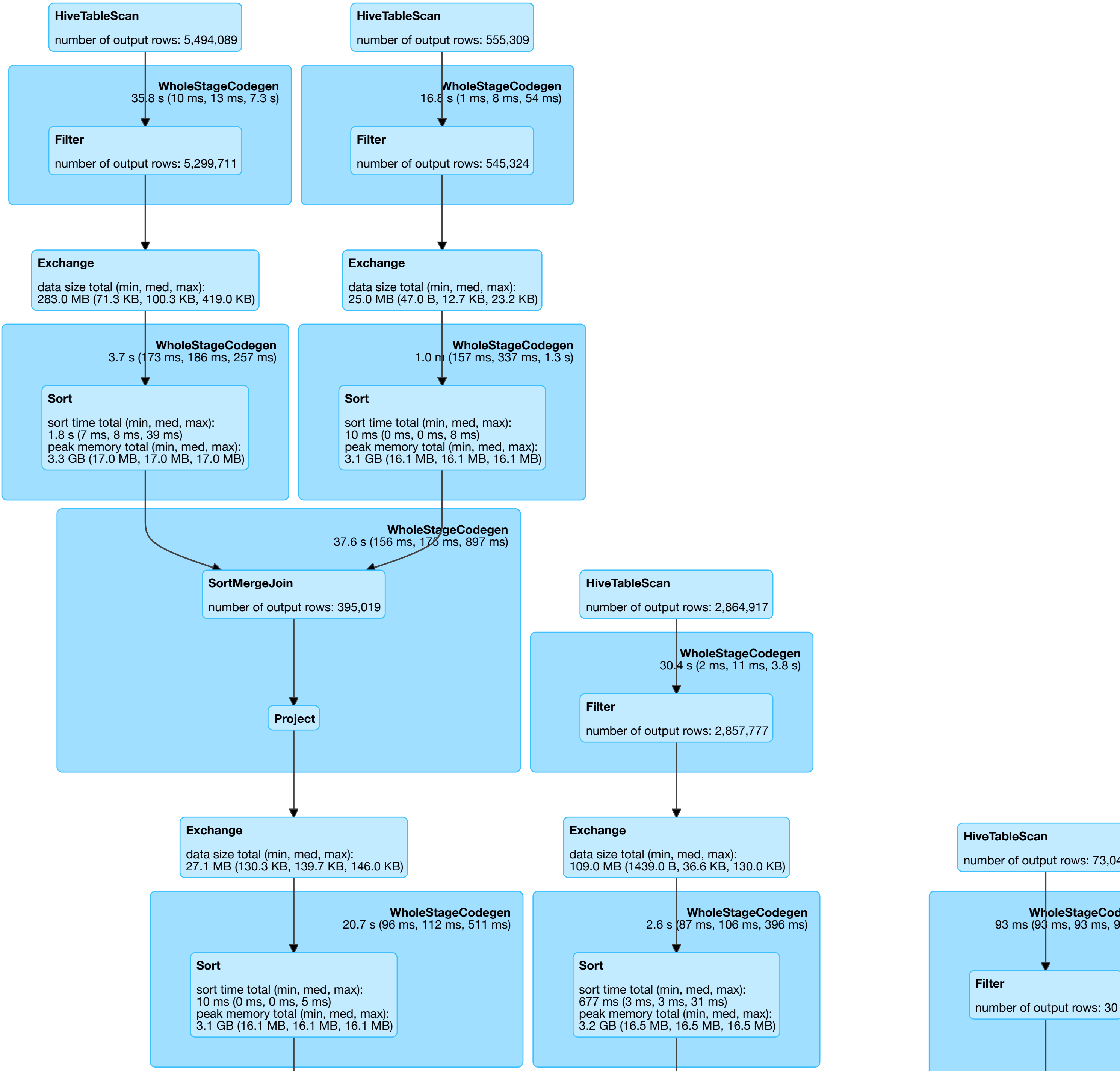Executors (/history/application_1519504339627_0143/executors/)   SQL (/history/application_1519504339627_0143/SQL/)
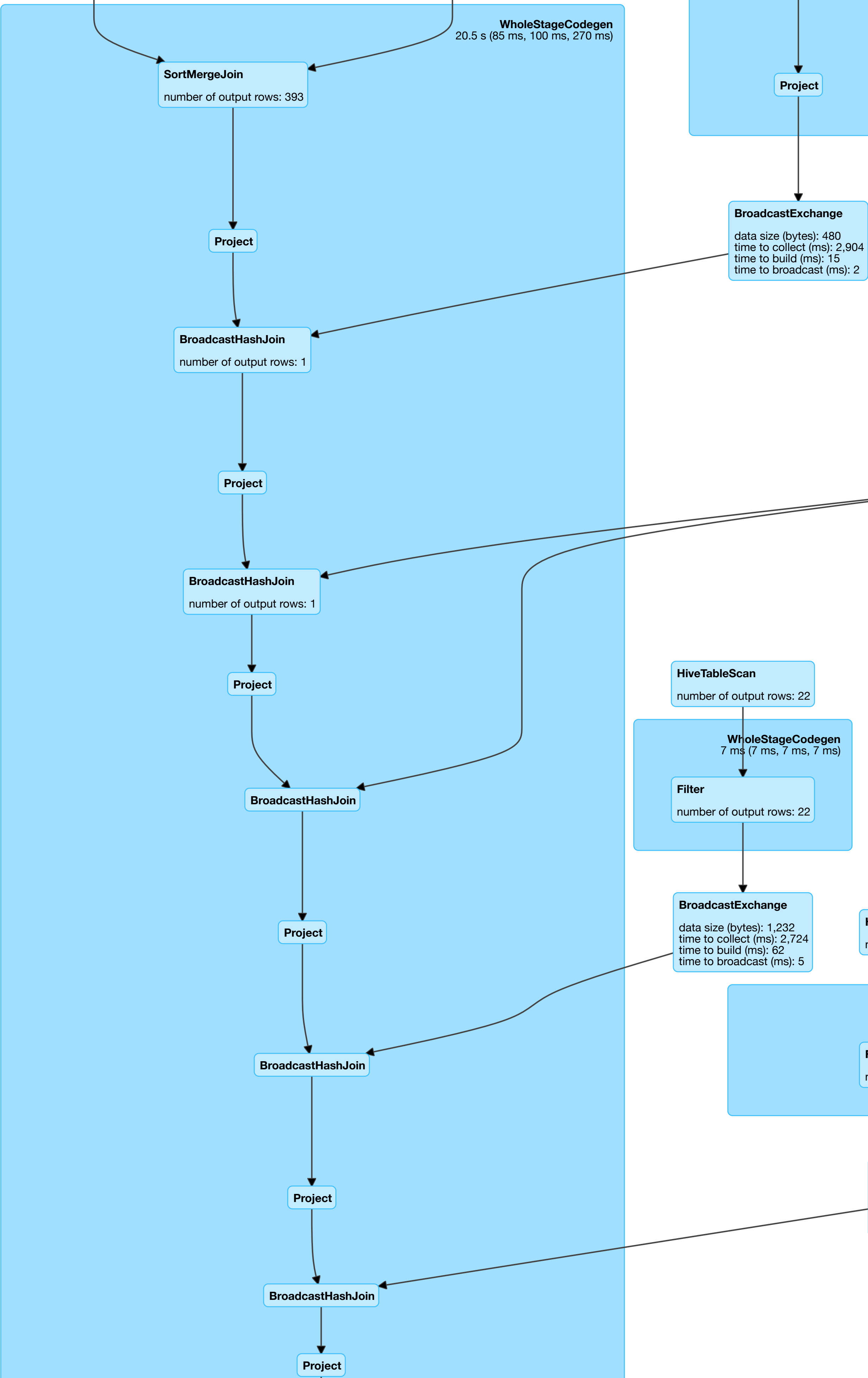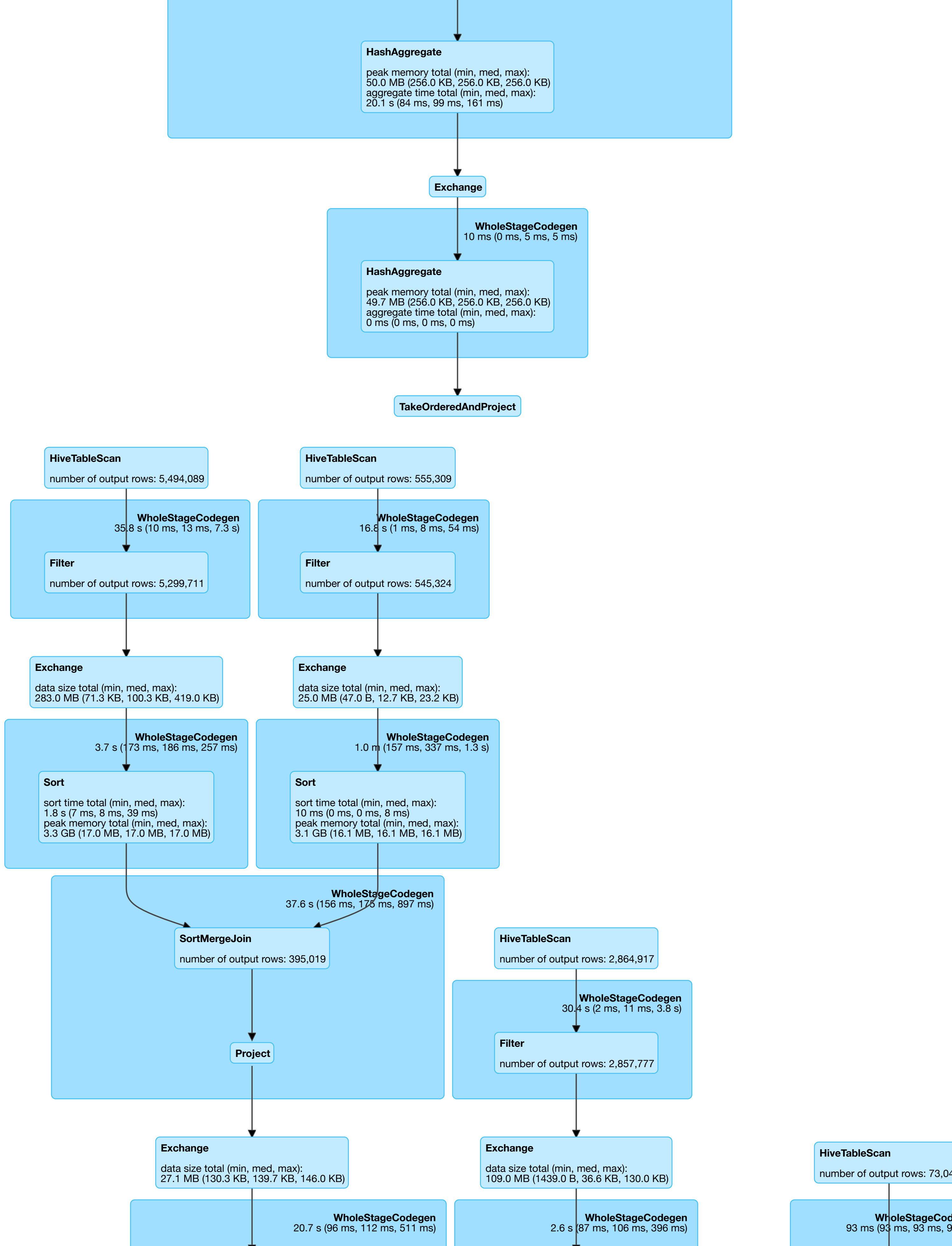
Details for Query 1

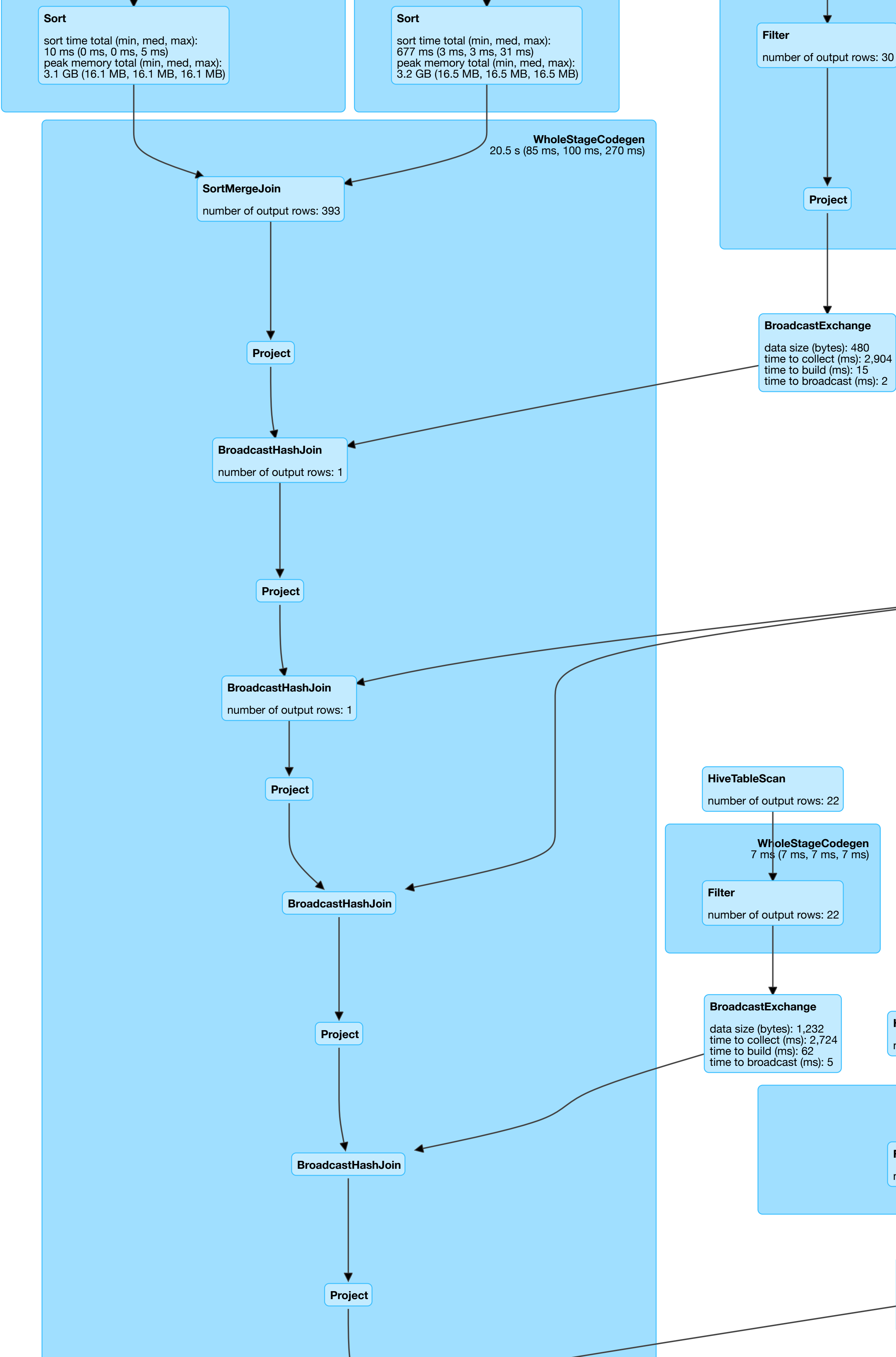**Submitted Time:** 2018/02/25 23:46:46
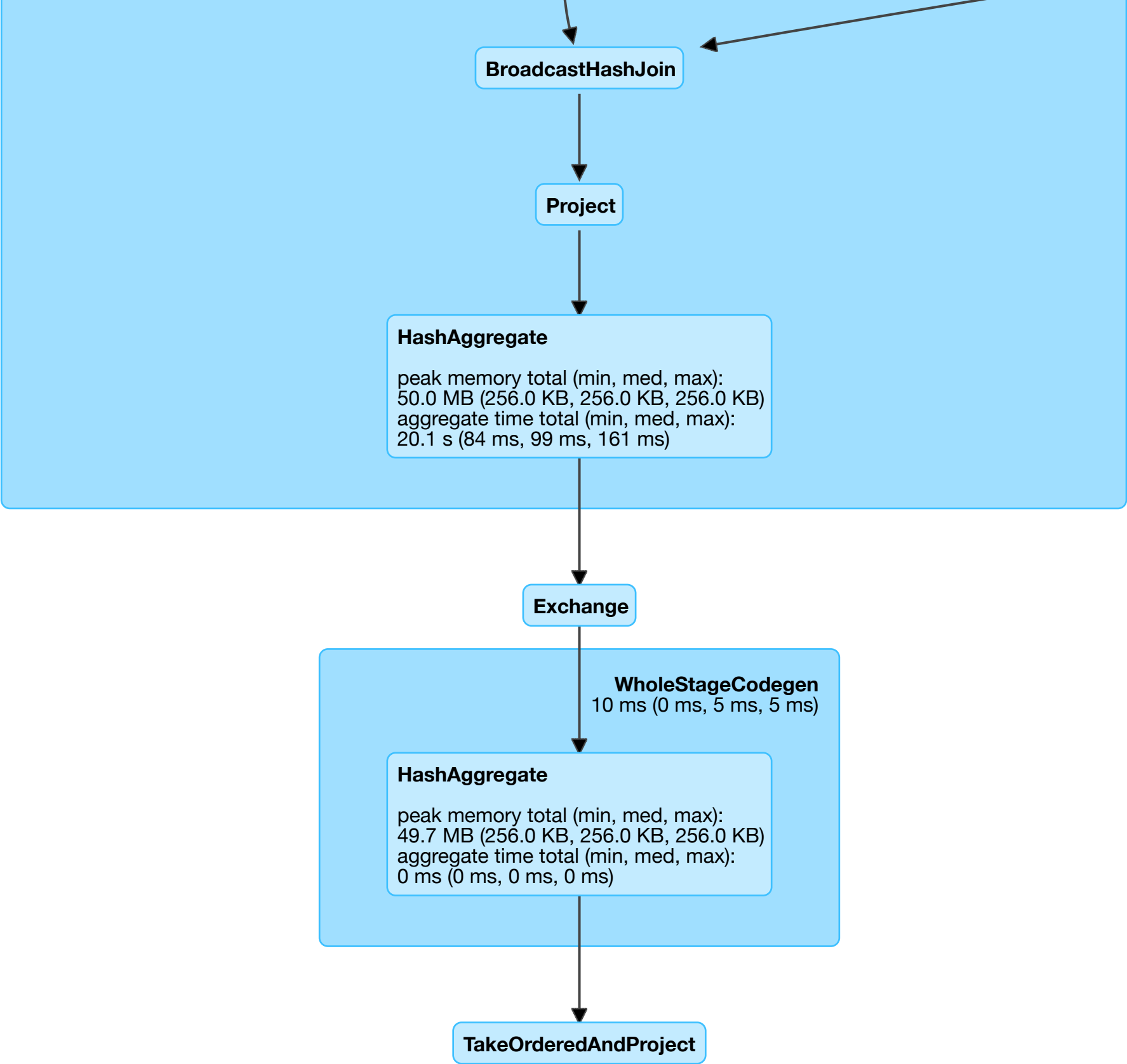
Duration: 4.8 min

Succeeded Jobs: 0 (/history/application_1519504339627_0143/jobs/job?id=0) 1 (/history/application_1519504339627_0143/jobs/job?id=1) 2 (/history/application_1519504339627_0143/jobs/job?id=2) 3 (/history/application_1519504339627_0143/jobs/job?id=3) 4 (/history/application_1519504339627_0143/jobs/job?id=4)

WholeStageCodegen
20.5 s (85 ms, 100 ms, 270 ms)

Project

SortMergeJoin

number of output rows: 393

Project

BroadcastExchange

data size (bytes): 480
time to collect (ms): 2,904
time to build (ms): 15
time to broadcast (ms): 2

BroadcastHashJoin

number of output rows: 1

Project

BroadcastHashJoin

number of output rows: 1

HiveTableScan

number of output rows: 22

Project

WholeStageCodegen
7 ms (7 ms, 7 ms, 7 ms)

Filter

number of output rows: 22

BroadcastHashJoin

BroadcastExchange

data size (bytes): 1,232
time to collect (ms): 2,724
time to build (ms): 62
time to broadcast (ms): 5

Project

BroadcastHashJoin

Project

BroadcastHashJoin

Project

HashAggregate

peak memory total (min, med, max):
50.0 MB (256.0 KB, 256.0 KB, 256.0 KB)
aggregate time total (min, med, max):
20.1 s (84 ms, 99 ms, 161 ms)

Exchange

WholeStageCodegen
10 ms (0 ms, 5 ms, 5 ms)

HashAggregate

peak memory total (min, med, max):
49.7 MB (256.0 KB, 256.0 KB, 256.0 KB)
aggregate time total (min, med, max):
0 ms (0 ms, 0 ms, 0 ms)

TakeOrderedAndProject

HiveTableScan

number of output rows: 5,494,089

WholeStageCodegen
35.8 s (10 ms, 13 ms, 7.3 s)

Filter

number of output rows: 5,299,711

HiveTableScan

number of output rows: 555,309

WholeStageCodegen
16.8 s (1 ms, 8 ms, 54 ms)

Filter

number of output rows: 545,324

Exchange

data size total (min, med, max):
283.0 MB (71.3 KB, 100.3 KB, 419.0 KB)

WholeStageCodegen
3.7 s (173 ms, 186 ms, 257 ms)

Sort

sort time total (min, med, max):
1.8 s (7 ms, 8 ms, 39 ms)
peak memory total (min, med, max):
3.3 GB (17.0 MB, 17.0 MB, 17.0 MB)

Exchange

data size total (min, med, max):
25.0 MB (47.0 B, 12.7 KB, 23.2 KB)

WholeStageCodegen
1.0 m (157 ms, 337 ms, 1.3 s)

Sort

sort time total (min, med, max):
10 ms (0 ms, 0 ms, 8 ms)
peak memory total (min, med, max):
3.1 GB (16.1 MB, 16.1 MB, 16.1 MB)

WholeStageCodegen
37.6 s (156 ms, 175 ms, 897 ms)

SortMergeJoin

number of output rows: 395,019

Project

HiveTableScan

number of output rows: 2,864,917

WholeStageCodegen
30.4 s (2 ms, 11 ms, 3.8 s)

Filter

number of output rows: 2,857,777

Exchange

data size total (min, med, max):
27.1 MB (130.3 KB, 139.7 KB, 146.0 KB)

Exchange

data size total (min, med, max):
109.0 MB (1439.0 B, 36.6 KB, 130.0 KB)

HiveTableScan

number of output rows: 73,04

WholeStageCodegen
20.7 s (96 ms, 112 ms, 511 ms)

WholeStageCodegen
2.6 s (87 ms, 106 ms, 396 ms)

WholeStageCodegen
93 ms (93 ms, 93 ms, 9

Sort

sort time total (min, med, max):
10 ms (0 ms, 0 ms, 5 ms)
peak memory total (min, med, max):
3.1 GB (16.1 MB, 16.1 MB, 16.1 MB)

Sort

sort time total (min, med, max):
677 ms (3 ms, 3 ms, 31 ms)
peak memory total (min, med, max):
3.2 GB (16.5 MB, 16.5 MB, 16.5 MB)

Filter

number of output rows: 30

WholeStageCodegen
20.5 s (85 ms, 100 ms, 270 ms)

SortMergeJoin

number of output rows: 393

Project

Project

BroadcastExchange

data size (bytes): 480
time to collect (ms): 2,904
time to build (ms): 15
time to broadcast (ms): 2

BroadcastHashJoin

number of output rows: 1

Project

BroadcastHashJoin

number of output rows: 1

Project

HiveTableScan

number of output rows: 22

WholeStageCodegen
7 ms (7 ms, 7 ms, 7 ms)

Filter

number of output rows: 22

BroadcastHashJoin

Project

BroadcastExchange

data size (bytes): 1,232
time to collect (ms): 2,724
time to build (ms): 62
time to broadcast (ms): 5

BroadcastHashJoin

Project

```
BroadcastHashJoin
```

```
Project
```

HashAggregate

peak memory total (min, med, max):
50.0 MB (256.0 KB, 256.0 KB, 256.0 KB)
aggregate time total (min, med, max):
20.1 s (84 ms, 99 ms, 161 ms)

```
Exchange
```

WholeStageCodegen
10 ms (0 ms, 5 ms, 5 ms)

HashAggregate

peak memory total (min, med, max):
49.7 MB (256.0 KB, 256.0 KB, 256.0 KB)
aggregate time total (min, med, max):
0 ms (0 ms, 0 ms, 0 ms)

```
TakeOrderedAndProject
```

▼ Details

```
== Parsed Logical Plan ==
GlobalLimit 21
+- LocalLimit 21
   +- GlobalLimit 100
      +- LocalLimit 100
         +- Project [i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172, store_sales_profit#3, store_returns_loss#4,
catalog_sales_profit#5]
            +- Sort [i_item_id#197 ASC NULLS FIRST, i_item_desc#200 ASC NULLS FIRST, s_store_id#168 ASC NULLS FIRST, s_store_name#172 ASC NULLS FIRST],
true
               +- Aggregate [i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172], [i_item_id#197, i_item_desc#200, s_store_id#168,
s_store_name#172, sum(cast(ss_net_profit#27 as double)) AS store_sales_profit#3, sum(cast(sr_net_loss#47 as double)) AS store_returns_loss#4,
sum(cast(cs_net_profit#81 as double)) AS catalog_sales_profit#5]
                  +- Filter (((((d_moy#91 = 4) && (d_year#89 = 1998)) && ((d_date_sk#83 = ss_sold_date_sk#28) && (i_item_sk#196 = ss_item_sk#7))) &&
(((s_store_sk#167 = ss_store_sk#12) && (ss_customer_sk#8 = sr_customer_sk#31)) && ((ss_item_sk#7 = sr_item_sk#30) && (ss_ticket_number#14L =
sr_ticket_number#37L)))) && ((((sr_returned_date_sk#48 = d_date_sk#111) && ((d_moy#119 >= 4) && (d_moy#119 <= 10))) && ((d_year#117 = 1998) &&
(sr_customer_sk#31 = cs_bill_customer_sk#51))) && (((sr_item_sk#30 = cs_item_sk#63) && (cs_sold_date_sk#82 = d_date_sk#139)) && (((d_moy#147 >= 4) &&
(d_moy#147 <= 10)) && (d_year#145 = 1998)))))
                     +- Join Inner
                        :- Join Inner
                        :  :- Join Inner
                        :  :  :- Join Inner
                        :  :  :  :- Join Inner
                        :  :  :  :  :- Join Inner
                        :  :  :  :  :  :- Join Inner
                        :  :  :  :  :  :  :- SubqueryAlias store_sales
                        :  :  :  :  :  :  :  +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_sales`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[ss_sold_time_sk#6, ss_item_sk#7, ss_customer_sk#8, ss_cdemo_sk#9, ss_hdemo_sk#10, ss_addr_sk#11, ss_store_sk#12, ss_promo_sk#13, ss_ticket_number#14L,
ss_quantity#15, ss_wholesale_cost#16, ss_list_price#17, ss_sales_price#18, ss_ext_discount_amt#19, ss_ext_sales_price#20, ss_ext_wholesale_cost#21,
ss_ext_list_price#22, ss_ext_tax#23, ss_coupon_amt#24, ss_net_paid#25, ss_net_paid_inc_tax#26, ss_net_profit#27], [ss_sold_date_sk#28]
                        :  :  :  :  :  :  +- SubqueryAlias store_returns
                        :  :  :  :  :  :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_returns`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [sr_return_time_sk#29, sr_item_sk#30, sr_customer_sk#31, sr_cdemo_sk#32, sr_hdemo_sk#33, sr_addr_sk#34,
sr_store_sk#35, sr_reason_sk#36, sr_ticket_number#37L, sr_return_quantity#38, sr_return_amt#39, sr_return_tax#40, sr_return_amt_inc_tax#41, sr_fee#42,
sr_return_ship_cost#43, sr_refunded_cash#44, sr_reversed_charge#45, sr_store_credit#46, sr_net_loss#47], [sr_returned_date_sk#48]
                        :  :  :  :  :  +- SubqueryAlias catalog_sales
                        :  :  :  :  :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`catalog_sales`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[cs_sold_time_sk#49, cs_ship_date_sk#50, cs_bill_customer_sk#51, cs_bill_cdemo_sk#52, cs_bill_hdemo_sk#53, cs_bill_addr_sk#54, cs_ship_customer_sk#55,
cs_ship_cdemo_sk#56, cs_ship_hdemo_sk#57, cs_ship_addr_sk#58, cs_call_center_sk#59, cs_catalog_page_sk#60, cs_ship_mode_sk#61, cs_warehouse_sk#62,
cs_item_sk#63, cs_promo_sk#64, cs_order_number#65L, cs_quantity#66, cs_wholesale_cost#67, cs_list_price#68, cs_sales_price#69, cs_ext_discount_amt#70,
cs_ext_sales_price#71, cs_ext_wholesale_cost#72, ... 9 more fields], [cs_sold_date_sk#82]
                        :  :  :  :  +- SubqueryAlias d1
                        :  :  :  :     +- SubqueryAlias date_dim
                        :  :  :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#83, d_date_id#84, d_date#85, d_month_seq#86, d_week_seq#87, d_quarter_seq#88, d_year#89, d_dow#90, d_moy#91, d_dom#92, d_qoy#93,
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d_fy_year#94, d_fy_quarter_seq#95, d_fy_week_seq#96, d_day_name#97, d_quarter_name#98, d_holiday#99, d_weekend#100, d_following_holiday#101,
d_first_dom#102, d_last_dom#103, d_same_day_ly#104, d_same_day_lq#105, d_current_day#106, ... 4 more fields]
                :  :  :  +- SubqueryAlias d2
                :  :  :     +- SubqueryAlias date_dim
                :  :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#111, d_date_id#112, d_date#113, d_month_seq#114, d_week_seq#115, d_quarter_seq#116, d_year#117, d_dow#118, d_moy#119, d_dom#120, d_qoy#121,
d_fy_year#122, d_fy_quarter_seq#123, d_fy_week_seq#124, d_day_name#125, d_quarter_name#126, d_holiday#127, d_weekend#128, d_following_holiday#129,
d_first_dom#130, d_last_dom#131, d_same_day_ly#132, d_same_day_lq#133, d_current_day#134, ... 4 more fields]
                :  :  +- SubqueryAlias d3
                :  :     +- SubqueryAlias date_dim
                :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#139, d_date_id#140, d_date#141, d_month_seq#142, d_week_seq#143, d_quarter_seq#144, d_year#145, d_dow#146, d_moy#147, d_dom#148, d_qoy#149,
d_fy_year#150, d_fy_quarter_seq#151, d_fy_week_seq#152, d_day_name#153, d_quarter_name#154, d_holiday#155, d_weekend#156, d_following_holiday#157,
d_first_dom#158, d_last_dom#159, d_same_day_ly#160, d_same_day_lq#161, d_current_day#162, ... 4 more fields]
                :  +- SubqueryAlias store
                :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [s_store_sk#167,
s_store_id#168, s_rec_start_date#169, s_rec_end_date#170, s_closed_date_sk#171, s_store_name#172, s_number_employees#173, s_floor_space#174,
s_hours#175, s_manager#176, s_market_id#177, s_geography_class#178, s_market_desc#179, s_market_manager#180, s_division_id#181, s_division_name#182,
s_company_id#183, s_company_name#184, s_street_number#185, s_street_name#186, s_street_type#187, s_suite_number#188, s_city#189, s_county#190, ... 5
more fields]
                +- SubqueryAlias item
                   +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`item`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [i_item_sk#196,
i_item_id#197, i_rec_start_date#198, i_rec_end_date#199, i_item_desc#200, i_current_price#201, i_wholesale_cost#202, i_brand_id#203, i_brand#204,
i_class_id#205, i_class#206, i_category_id#207, i_category#208, i_manufact_id#209, i_manufact#210, i_size#211, i_formulation#212, i_color#213,
i_units#214, i_container#215, i_manager_id#216, i_product_name#217]

== Analyzed Logical Plan ==
i_item_id: string, i_item_desc: string, s_store_id: string, s_store_name: string, store_sales_profit: double, store_returns_loss: double,
catalog_sales_profit: double
GlobalLimit 21
+- LocalLimit 21
   +- GlobalLimit 100
      +- LocalLimit 100
         +- Project [i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172, store_sales_profit#3, store_returns_loss#4,
catalog_sales_profit#5]
            +- Sort [i_item_id#197 ASC NULLS FIRST, i_item_desc#200 ASC NULLS FIRST, s_store_id#168 ASC NULLS FIRST, s_store_name#172 ASC NULLS FIRST],
true
               +- Aggregate [i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172], [i_item_id#197, i_item_desc#200, s_store_id#168,
s_store_name#172, sum(cast(ss_net_profit#27 as double)) AS store_sales_profit#3, sum(cast(sr_net_loss#47 as double)) AS store_returns_loss#4,
sum(cast(cs_net_profit#81 as double)) AS catalog_sales_profit#5]
                  +- Filter (((((d_moy#91 = 4) && (d_year#89 = 1998)) && ((d_date_sk#83 = ss_sold_date_sk#28) && (i_item_sk#196 = ss_item_sk#7))) &&
(((s_store_sk#167 = ss_store_sk#12) && (ss_customer_sk#8 = sr_customer_sk#31)) && ((ss_item_sk#7 = sr_item_sk#30) && (ss_ticket_number#14L =
sr_ticket_number#37L)))) && ((((sr_returned_date_sk#48 = d_date_sk#111) && ((d_moy#119 >= 4) && (d_moy#119 <= 10))) && ((d_year#117 = 1998) &&
(sr_customer_sk#31 = cs_bill_customer_sk#51))) && (((sr_item_sk#30 = cs_item_sk#63) && (cs_sold_date_sk#82 = d_date_sk#139)) && (((d_moy#147 >= 4) &&
(d_moy#147 <= 10)) && (d_year#145 = 1998)))))
                     +- Join Inner
                        :- Join Inner
                        :  :- Join Inner
                        :  :  :- Join Inner
                        :  :  :  :- Join Inner
                        :  :  :  :  :- Join Inner
                        :  :  :  :  :  :- Join Inner
                        :  :  :  :  :  :  :- SubqueryAlias store_sales
                        :  :  :  :  :  :  :  +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_sales`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[ss_sold_time_sk#6, ss_item_sk#7, ss_customer_sk#8, ss_cdemo_sk#9, ss_hdemo_sk#10, ss_addr_sk#11, ss_store_sk#12, ss_promo_sk#13, ss_ticket_number#14L,
ss_quantity#15, ss_wholesale_cost#16, ss_list_price#17, ss_sales_price#18, ss_ext_discount_amt#19, ss_ext_sales_price#20, ss_ext_wholesale_cost#21,
ss_ext_list_price#22, ss_ext_tax#23, ss_coupon_amt#24, ss_net_paid#25, ss_net_paid_inc_tax#26, ss_net_profit#27], [ss_sold_date_sk#28]
                        :  :  :  :  :  :  +- SubqueryAlias store_returns
                        :  :  :  :  :  :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_returns`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [sr_return_time_sk#29, sr_item_sk#30, sr_customer_sk#31, sr_cdemo_sk#32, sr_hdemo_sk#33, sr_addr_sk#34,
sr_store_sk#35, sr_reason_sk#36, sr_ticket_number#37L, sr_return_quantity#38, sr_return_amt#39, sr_return_tax#40, sr_return_amt_inc_tax#41, sr_fee#42,
sr_return_ship_cost#43, sr_refunded_cash#44, sr_reversed_charge#45, sr_store_credit#46, sr_net_loss#47], [sr_returned_date_sk#48]
                        :  :  :  :  :  +- SubqueryAlias catalog_sales
                        :  :  :  :  :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`catalog_sales`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[cs_sold_time_sk#49, cs_ship_date_sk#50, cs_bill_customer_sk#51, cs_bill_cdemo_sk#52, cs_bill_hdemo_sk#53, cs_bill_addr_sk#54, cs_ship_customer_sk#55,
cs_ship_cdemo_sk#56, cs_ship_hdemo_sk#57, cs_ship_addr_sk#58, cs_call_center_sk#59, cs_catalog_page_sk#60, cs_ship_mode_sk#61, cs_warehouse_sk#62,
cs_item_sk#63, cs_promo_sk#64, cs_order_number#65L, cs_quantity#66, cs_wholesale_cost#67, cs_list_price#68, cs_sales_price#69, cs_ext_discount_amt#70,
cs_ext_sales_price#71, cs_ext_wholesale_cost#72, ... 9 more fields], [cs_sold_date_sk#82]
                        :  :  :  :  +- SubqueryAlias d1
                        :  :  :  :     +- SubqueryAlias date_dim
                        :  :  :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#83, d_date_id#84, d_date#85, d_month_seq#86, d_week_seq#87, d_quarter_seq#88, d_year#89, d_dow#90, d_moy#91, d_dom#92, d_qoy#93,
d_fy_year#94, d_fy_quarter_seq#95, d_fy_week_seq#96, d_day_name#97, d_quarter_name#98, d_holiday#99, d_weekend#100, d_following_holiday#101,
d_first_dom#102, d_last_dom#103, d_same_day_ly#104, d_same_day_lq#105, d_current_day#106, ... 4 more fields]
                        :  :  :  +- SubqueryAlias d2
                        :  :  :     +- SubqueryAlias date_dim
                        :  :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#111, d_date_id#112, d_date#113, d_month_seq#114, d_week_seq#115, d_quarter_seq#116, d_year#117, d_dow#118, d_moy#119, d_dom#120, d_qoy#121,
d_fy_year#122, d_fy_quarter_seq#123, d_fy_week_seq#124, d_day_name#125, d_quarter_name#126, d_holiday#127, d_weekend#128, d_following_holiday#129,
d_first_dom#130, d_last_dom#131, d_same_day_ly#132, d_same_day_lq#133, d_current_day#134, ... 4 more fields]
                        :  :  +- SubqueryAlias d3
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                    :  :     +- SubqueryAlias date_dim
                    :  :        +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#139, d_date_id#140, d_date#141, d_month_seq#142, d_week_seq#143, d_quarter_seq#144, d_year#145, d_dow#146, d_moy#147, d_dom#148, d_qoy#149,
d_fy_year#150, d_fy_quarter_seq#151, d_fy_week_seq#152, d_day_name#153, d_quarter_name#154, d_holiday#155, d_weekend#156, d_following_holiday#157,
d_first_dom#158, d_last_dom#159, d_same_day_ly#160, d_same_day_lq#161, d_current_day#162, ... 4 more fields]
                    :  +- SubqueryAlias store
                    :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [s_store_sk#167,
s_store_id#168, s_rec_start_date#169, s_rec_end_date#170, s_closed_date_sk#171, s_store_name#172, s_number_employees#173, s_floor_space#174,
s_hours#175, s_manager#176, s_market_id#177, s_geography_class#178, s_market_desc#179, s_market_manager#180, s_division_id#181, s_division_name#182,
s_company_id#183, s_company_name#184, s_street_number#185, s_street_name#186, s_street_type#187, s_suite_number#188, s_city#189, s_county#190, ... 5
more fields]
                    +- SubqueryAlias item
                       +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`item`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [i_item_sk#196,
i_item_id#197, i_rec_start_date#198, i_rec_end_date#199, i_item_desc#200, i_current_price#201, i_wholesale_cost#202, i_brand_id#203, i_brand#204,
i_class_id#205, i_class#206, i_category_id#207, i_category#208, i_manufact_id#209, i_manufact#210, i_size#211, i_formulation#212, i_color#213,
i_units#214, i_container#215, i_manager_id#216, i_product_name#217]

== Optimized Logical Plan ==
GlobalLimit 21
+- LocalLimit 21
   +- Sort [i_item_id#197 ASC NULLS FIRST, i_item_desc#200 ASC NULLS FIRST, s_store_id#168 ASC NULLS FIRST, s_store_name#172 ASC NULLS FIRST], true
      +- Aggregate [i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172], [i_item_id#197, i_item_desc#200, s_store_id#168,
s_store_name#172, sum(cast(ss_net_profit#27 as double)) AS store_sales_profit#3, sum(cast(sr_net_loss#47 as double)) AS store_returns_loss#4,
sum(cast(cs_net_profit#81 as double)) AS catalog_sales_profit#5]
         +- Project [ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, s_store_id#168, s_store_name#172, i_item_id#197, i_item_desc#200]
            +- Join Inner, (i_item_sk#196 = ss_item_sk#7)
               :- Project [ss_item_sk#7, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, s_store_id#168, s_store_name#172]
               :  +- Join Inner, (s_store_sk#167 = ss_store_sk#12)
               :     :- Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81]
               :     :  +- Join Inner, (cs_sold_date_sk#82 = d_date_sk#139)
               :     :     :- Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, cs_sold_date_sk#82]
               :     :     :  +- Join Inner, (sr_returned_date_sk#48 = d_date_sk#111)
               :     :     :     :- Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, sr_returned_date_sk#48, cs_net_profit#81,
cs_sold_date_sk#82]
               :     :     :     :  +- Join Inner, (d_date_sk#83 = ss_sold_date_sk#28)
               :     :     :     :     :- Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, ss_sold_date_sk#28, sr_net_loss#47,
sr_returned_date_sk#48, cs_net_profit#81, cs_sold_date_sk#82]
               :     :     :     :     :  +- Join Inner, ((sr_customer_sk#31 = cs_bill_customer_sk#51) && (sr_item_sk#30 = cs_item_sk#63))
               :     :     :     :     :     :- Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, ss_sold_date_sk#28, sr_item_sk#30,
sr_customer_sk#31, sr_net_loss#47, sr_returned_date_sk#48]
               :     :     :     :     :     :  +- Join Inner, (((ss_customer_sk#8 = sr_customer_sk#31) && (ss_item_sk#7 = sr_item_sk#30)) &&
(ss_ticket_number#14L = sr_ticket_number#37L))
               :     :     :     :     :     :     :- Project [ss_item_sk#7, ss_customer_sk#8, ss_store_sk#12, ss_ticket_number#14L, ss_net_profit#27,
ss_sold_date_sk#28]
               :     :     :     :     :     :     :  +- Filter (((((isnotnull(ss_item_sk#7) && isnotnull(ss_ticket_number#14L)) &&
isnotnull(ss_customer_sk#8)) && isnotnull(ss_sold_date_sk#28)) && isnotnull(ss_store_sk#12))
               :     :     :     :     :     :     :     +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_sales`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [ss_sold_time_sk#6, ss_item_sk#7, ss_customer_sk#8, ss_cdemo_sk#9, ss_hdemo_sk#10, ss_addr_sk#11,
ss_store_sk#12, ss_promo_sk#13, ss_ticket_number#14L, ss_quantity#15, ss_wholesale_cost#16, ss_list_price#17, ss_sales_price#18, ss_ext_discount_amt#19,
ss_ext_sales_price#20, ss_ext_wholesale_cost#21, ss_ext_list_price#22, ss_ext_tax#23, ss_coupon_amt#24, ss_net_paid#25, ss_net_paid_inc_tax#26,
ss_net_profit#27], [ss_sold_date_sk#28]
               :     :     :     :     :     :     +- Project [sr_item_sk#30, sr_customer_sk#31, sr_ticket_number#37L, sr_net_loss#47,
sr_returned_date_sk#48]
               :     :     :     :     :     :        +- Filter ((((isnotnull(sr_customer_sk#31) && isnotnull(sr_item_sk#30)) &&
isnotnull(sr_ticket_number#37L)) && isnotnull(sr_returned_date_sk#48))
               :     :     :     :     :     :           +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_returns`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [sr_return_time_sk#29, sr_item_sk#30, sr_customer_sk#31, sr_cdemo_sk#32, sr_hdemo_sk#33, sr_addr_sk#34,
sr_store_sk#35, sr_reason_sk#36, sr_ticket_number#37L, sr_return_quantity#38, sr_return_amt#39, sr_return_tax#40, sr_return_amt_inc_tax#41, sr_fee#42,
sr_return_ship_cost#43, sr_refunded_cash#44, sr_reversed_charge#45, sr_store_credit#46, sr_net_loss#47], [sr_returned_date_sk#48]
               :     :     :     :     :     +- Project [cs_bill_customer_sk#51, cs_item_sk#63, cs_net_profit#81, cs_sold_date_sk#82]
               :     :     :     :     :        +- Filter ((isnotnull(cs_item_sk#63) && isnotnull(cs_bill_customer_sk#51)) &&
isnotnull(cs_sold_date_sk#82))
               :     :     :     :     :           +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`catalog_sales`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [cs_sold_time_sk#49, cs_ship_date_sk#50, cs_bill_customer_sk#51, cs_bill_cdemo_sk#52, cs_bill_hdemo_sk#53,
cs_bill_addr_sk#54, cs_ship_customer_sk#55, cs_ship_cdemo_sk#56, cs_ship_hdemo_sk#57, cs_ship_addr_sk#58, cs_call_center_sk#59, cs_catalog_page_sk#60,
cs_ship_mode_sk#61, cs_warehouse_sk#62, cs_item_sk#63, cs_promo_sk#64, cs_order_number#65L, cs_quantity#66, cs_wholesale_cost#67, cs_list_price#68,
cs_sales_price#69, cs_ext_discount_amt#70, cs_ext_sales_price#71, cs_ext_wholesale_cost#72, ... 9 more fields], [cs_sold_date_sk#82]
               :     :     :     :     +- Project [d_date_sk#83]
               :     :     :     :        +- Filter (((((isnotnull(d_moy#91) && isnotnull(d_year#89)) && (d_moy#91 = 4)) && (d_year#89 = 1998)) &&
isnotnull(d_date_sk#83))
               :     :     :     :           +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#83, d_date_id#84, d_date#85, d_month_seq#86, d_week_seq#87, d_quarter_seq#88, d_year#89, d_dow#90, d_moy#91, d_dom#92, d_qoy#93,
d_fy_year#94, d_fy_quarter_seq#95, d_fy_week_seq#96, d_day_name#97, d_quarter_name#98, d_holiday#99, d_weekend#100, d_following_holiday#101,
d_first_dom#102, d_last_dom#103, d_same_day_ly#104, d_same_day_lq#105, d_current_day#106, ... 4 more fields]
               :     :     :     +- Project [d_date_sk#111]
               :     :     :        +- Filter ((((((isnotnull(d_moy#119) && isnotnull(d_year#117)) && (d_moy#119 >= 4)) && (d_moy#119 <= 10)) &&
(d_year#117 = 1998)) && isnotnull(d_date_sk#111))
               :     :     :           +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[d_date_sk#111, d_date_id#112, d_date#113, d_month_seq#114, d_week_seq#115, d_quarter_seq#116, d_year#117, d_dow#118, d_moy#119, d_dom#120, d_qoy#121,
d_fy_year#122, d_fy_quarter_seq#123, d_fy_week_seq#124, d_day_name#125, d_quarter_name#126, d_holiday#127, d_weekend#128, d_following_holiday#129,
d_first_dom#130, d_last_dom#131, d_same_day_ly#132, d_same_day_lq#133, d_current_day#134, ... 4 more fields]
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          :        :        +- Project [d_date_sk#139]
          :        :           +- Filter (((((isnotnull(d_moy#147) && isnotnull(d_year#145)) && (d_moy#147 >= 4)) && (d_moy#147 <= 10)) && (d_year#145 =
1998)) && isnotnull(d_date_sk#139))
          :        :              +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [d_date_sk#139,
d_date_id#140, d_date#141, d_month_seq#142, d_week_seq#143, d_quarter_seq#144, d_year#145, d_dow#146, d_moy#147, d_dom#148, d_qoy#149, d_fy_year#150,
d_fy_quarter_seq#151, d_fy_week_seq#152, d_day_name#153, d_quarter_name#154, d_holiday#155, d_weekend#156, d_following_holiday#157, d_first_dom#158,
d_last_dom#159, d_same_day_ly#160, d_same_day_lq#161, d_current_day#162, ... 4 more fields]
          :        +- Project [s_store_sk#167, s_store_id#168, s_store_name#172]
          :           +- Filter isnotnull(s_store_sk#167)
          :              +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`store`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [s_store_sk#167,
s_store_id#168, s_rec_start_date#169, s_rec_end_date#170, s_closed_date#171, s_store_name#172, s_number_employees#173, s_floor_space#174,
s_hours#175, s_manager#176, s_market_id#177, s_geography_class#178, s_market_desc#179, s_market_manager#180, s_division_id#181, s_division_name#182,
s_company_id#183, s_company_name#184, s_street_number#185, s_street_name#186, s_street_type#187, s_suite_number#188, s_city#189, s_county#190, ... 5
more fields]
          +- Project [i_item_sk#196, i_item_id#197, i_item_desc#200]
             +- Filter isnotnull(i_item_sk#196)
                +- CatalogRelation `tpcds_bin_partitioned_orc_2`.`item`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [i_item_sk#196, i_item_id#197,
i_rec_start_date#198, i_rec_end_date#199, i_item_desc#200, i_current_price#201, i_wholesale_cost#202, i_brand_id#203, i_brand#204, i_class_id#205,
i_class#206, i_category_id#207, i_category#208, i_manufact_id#209, i_manufact#210, i_size#211, i_formulation#212, i_color#213, i_units#214,
i_container#215, i_manager_id#216, i_product_name#217]

== Physical Plan ==
TakeOrderedAndProject(limit=21, orderBy=[i_item_id#197 ASC NULLS FIRST,i_item_desc#200 ASC NULLS FIRST,s_store_id#168 ASC NULLS FIRST,s_store_name#172
ASC NULLS FIRST], output=
[i_item_id#197,i_item_desc#200,s_store_id#168,s_store_name#172,store_sales_profit#3,store_returns_loss#4,catalog_sales_profit#5])
+- *HashAggregate(keys=[i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172], functions=[sum(cast(ss_net_profit#27 as double)),
sum(cast(sr_net_loss#47 as double)), sum(cast(cs_net_profit#81 as double))], output=[i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172,
store_sales_profit#3, store_returns_loss#4, catalog_sales_profit#5])
   +- Exchange hashpartitioning(i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172, 200)
      +- *HashAggregate(keys=[i_item_id#197, i_item_desc#200, s_store_id#168, s_store_name#172], functions=[partial_sum(cast(ss_net_profit#27 as
double)), partial_sum(cast(sr_net_loss#47 as double)), partial_sum(cast(cs_net_profit#81 as double))], output=[i_item_id#197, i_item_desc#200,
s_store_id#168, s_store_name#172, sum#245, sum#246, sum#247])
         +- *Project [ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, s_store_id#168, s_store_name#172, i_item_id#197, i_item_desc#200]
            +- *BroadcastHashJoin [ss_item_sk#7], [i_item_sk#196], Inner, BuildRight
               :- *Project [ss_item_sk#7, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, s_store_id#168, s_store_name#172]
               :  +- *BroadcastHashJoin [ss_store_sk#12], [s_store_sk#167], Inner, BuildRight
               :     :- *Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81]
               :     :  +- *BroadcastHashJoin [cs_sold_date_sk#82], [d_date_sk#139], Inner, BuildRight
               :     :     :- *Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, cs_net_profit#81, cs_sold_date_sk#82]
               :     :     :  +- *BroadcastHashJoin [sr_returned_date_sk#48], [d_date_sk#111], Inner, BuildRight
               :     :     :     :- *Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, sr_net_loss#47, sr_returned_date_sk#48, cs_net_profit#81,
cs_sold_date_sk#82]
               :     :     :     :  +- *BroadcastHashJoin [ss_sold_date_sk#28], [d_date_sk#83], Inner, BuildRight
               :     :     :     :     :- *Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, ss_sold_date_sk#28, sr_net_loss#47,
sr_returned_date_sk#48, cs_net_profit#81, cs_sold_date_sk#82]
               :     :     :     :     :  +- *SortMergeJoin [sr_customer_sk#31, sr_item_sk#30], [cs_bill_customer_sk#51, cs_item_sk#63], Inner
               :     :     :     :     :     :- *Sort [sr_customer_sk#31 ASC NULLS FIRST, sr_item_sk#30 ASC NULLS FIRST], false, 0
               :     :     :     :     :     :  +- Exchange hashpartitioning(sr_customer_sk#31, sr_item_sk#30, 200)
               :     :     :     :     :     :     +- *Project [ss_item_sk#7, ss_store_sk#12, ss_net_profit#27, ss_sold_date_sk#28, sr_item_sk#30,
sr_customer_sk#31, sr_net_loss#47, sr_returned_date_sk#48]
               :     :     :     :     :     :        +- *SortMergeJoin [ss_customer_sk#8, ss_item_sk#7, ss_ticket_number#14L], [sr_customer_sk#31,
sr_item_sk#30, sr_ticket_number#37L], Inner
               :     :     :     :     :     :           :- *Sort [ss_customer_sk#8 ASC NULLS FIRST, ss_item_sk#7 ASC NULLS FIRST, ss_ticket_number#14L
ASC NULLS FIRST], false, 0
               :     :     :     :     :     :           :  +- Exchange hashpartitioning(ss_customer_sk#8, ss_item_sk#7, ss_ticket_number#14L, 200)
               :     :     :     :     :     :           :     +- *Filter (((isnotnull(ss_item_sk#7) && isnotnull(ss_ticket_number#14L)) &&
isnotnull(ss_customer_sk#8)) && isnotnull(ss_store_sk#12))
               :     :     :     :     :     :           :        +- HiveTableScan [ss_item_sk#7, ss_customer_sk#8, ss_store_sk#12,
ss_ticket_number#14L, ss_net_profit#27, ss_sold_date_sk#28], CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_sales`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [ss_sold_time_sk#6, ss_item_sk#7, ss_customer_sk#8, ss_cdemo_sk#9, ss_hdemo_sk#10, ss_addr_sk#11,
ss_store_sk#12, ss_promo_sk#13, ss_ticket_number#14L, ss_quantity#15, ss_wholesale_cost#16, ss_list_price#17, ss_sales_price#18, ss_ext_discount_amt#19,
ss_ext_sales_price#20, ss_ext_wholesale_cost#21, ss_ext_list_price#22, ss_ext_tax#23, ss_coupon_amt#24, ss_net_paid#25, ss_net_paid_inc_tax#26,
ss_net_profit#27], [ss_sold_date_sk#28], [isnotnull(ss_sold_date_sk#28)]
               :     :     :     :     :     :           +- *Sort [sr_customer_sk#31 ASC NULLS FIRST, sr_item_sk#30 ASC NULLS FIRST,
sr_ticket_number#37L ASC NULLS FIRST], false, 0
               :     :     :     :     :     :              +- Exchange hashpartitioning(sr_customer_sk#31, sr_item_sk#30, sr_ticket_number#37L, 200)
               :     :     :     :     :     :                 +- *Filter ((isnotnull(sr_customer_sk#31) && isnotnull(sr_item_sk#30)) &&
isnotnull(sr_ticket_number#37L))
               :     :     :     :     :                        +- HiveTableScan [sr_item_sk#30, sr_customer_sk#31, sr_ticket_number#37L,
sr_net_loss#47, sr_returned_date_sk#48], CatalogRelation `tpcds_bin_partitioned_orc_2`.`store_returns`, org.apache.hadoop.hive.ql.io.orc.OrcSerde,
[sr_return_time_sk#29, sr_item_sk#30, sr_customer_sk#31, sr_cdemo_sk#32, sr_hdemo_sk#33, sr_addr_sk#34, sr_store_sk#35, sr_reason_sk#36,
sr_ticket_number#37L, sr_return_quantity#38, sr_return_amt#39, sr_return_tax#40, sr_return_amt_inc_tax#41, sr_fee#42, sr_return_ship_cost#43,
sr_refunded_cash#44, sr_reversed_charge#45, sr_store_credit#46, sr_net_loss#47], [sr_returned_date_sk#48], [isnotnull(sr_returned_date_sk#48)]
               :     :     :     :     :     +- *Sort [cs_bill_customer_sk#51 ASC NULLS FIRST, cs_item_sk#63 ASC NULLS FIRST], false, 0
               :     :     :     :     :        +- Exchange hashpartitioning(cs_bill_customer_sk#51, cs_item_sk#63, 200)
               :     :     :     :     :           +- *Filter (isnotnull(cs_item_sk#63) && isnotnull(cs_bill_customer_sk#51))
               :     :     :     :     :              +- HiveTableScan [cs_bill_customer_sk#51, cs_item_sk#63, cs_net_profit#81, cs_sold_date_sk#82],
CatalogRelation `tpcds_bin_partitioned_orc_2`.`catalog_sales`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [cs_sold_time_sk#49, cs_ship_date_sk#50,
cs_bill_customer_sk#51, cs_bill_cdemo_sk#52, cs_bill_hdemo_sk#53, cs_bill_addr_sk#54, cs_ship_customer_sk#55, cs_ship_cdemo_sk#56, cs_ship_hdemo_sk#57,
cs_ship_addr_sk#58, cs_call_center_sk#59, cs_catalog_page_sk#60, cs_ship_mode_sk#61, cs_warehouse_sk#62, cs_item_sk#63, cs_promo_sk#64,
cs_order_number#65L, cs_quantity#66, cs_wholesale_cost#67, cs_list_price#68, cs_sales_price#69, cs_ext_discount_amt#70, cs_ext_sales_price#71,
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cs_ext_wholesale_cost#72, ... 9 more fields], [cs_sold_date_sk#82], [isnotnull(cs_sold_date_sk#82)]
   :     :     :     :        +- BroadcastExchange HashedRelationBroadcastMode(List(cast(input[0, int, true] as bigint)))
   :     :     :     :           +- *Project [d_date_sk#83]
   :     :     :     :              +- *Filter ((((isnotnull(d_moy#91) && isnotnull(d_year#89)) && (d_moy#91 = 4)) && (d_year#89 = 1998)) &&
isnotnull(d_date_sk#83))
   :     :     :     :                 +- HiveTableScan [d_date_sk#83, d_moy#91, d_year#89], CatalogRelation
`tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [d_date_sk#83, d_date_id#84, d_date#85, d_month_seq#86,
d_week_seq#87, d_quarter_seq#88, d_year#89, d_dow#90, d_moy#91, d_dom#92, d_qoy#93, d_fy_year#94, d_fy_quarter_seq#95, d_fy_week_seq#96, d_day_name#97,
d_quarter_name#98, d_holiday#99, d_weekend#100, d_following_holiday#101, d_first_dom#102, d_last_dom#103, d_same_day_ly#104, d_same_day_lq#105,
d_current_day#106, ... 4 more fields]
   :     :     :        +- BroadcastExchange HashedRelationBroadcastMode(List(cast(input[0, int, true] as bigint)))
   :     :     :           +- *Project [d_date_sk#111]
   :     :     :              +- *Filter (((((isnotnull(d_moy#119) && isnotnull(d_year#117)) && (d_moy#119 >= 4)) && (d_moy#119 <= 10)) &&
(d_year#117 = 1998)) && isnotnull(d_date_sk#111))
   :     :     :                 +- HiveTableScan [d_date_sk#111, d_moy#119, d_year#117], CatalogRelation
`tpcds_bin_partitioned_orc_2`.`date_dim`, org.apache.hadoop.hive.ql.io.orc.OrcSerde, [d_date_sk#111, d_date_id#112, d_date#113, d_month_seq#114,
d_week_seq#115, d_quarter_seq#116, d_year#117, d_dow#118, d_moy#119, d_dom#120, d_qoy#121, d_fy_year#122, d_fy_quarter_seq#123, d_fy_week_seq#124,
d_day_name#125, d_quarter_name#126, d_holiday#127, d_weekend#128, d_following_holiday#129, d_first_dom#130, d_last_dom#131, d_same_day_ly#132,
d_same_day_lq#133, d_current_day#134, ... 4 more fields]
   :     :        +- ReusedExchange [d_date_sk#139], BroadcastExchange HashedRelationBroadcastMode(List(cast(input[0, int, true] as bigint)))
   :     +- BroadcastExchange HashedRelationBroadcastMode(List(cast(input[0, int, false] as bigint)))
   :        +- *Filter isnotnull(s_store_sk#167)
   :           +- HiveTableScan [s_store_sk#167, s_store_id#168, s_store_name#172], CatalogRelation `tpcds_bin_partitioned_orc_2`.`store`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [s_store_sk#167, s_store_id#168, s_rec_start_date#169, s_rec_end_date#170, s_closed_date_sk#171,
s_store_name#172, s_number_employees#173, s_floor_space#174, s_hours#175, s_manager#176, s_market_id#177, s_geography_class#178, s_market_desc#179,
s_market_manager#180, s_division_id#181, s_division_name#182, s_company_id#183, s_company_name#184, s_street_number#185, s_street_name#186,
s_street_type#187, s_suite_number#188, s_city#189, s_county#190, ... 5 more fields]
   +- BroadcastExchange HashedRelationBroadcastMode(List(cast(input[0, int, false] as bigint)))
      +- *Filter isnotnull(i_item_sk#196)
         +- HiveTableScan [i_item_sk#196, i_item_id#197, i_item_desc#200], CatalogRelation `tpcds_bin_partitioned_orc_2`.`item`,
org.apache.hadoop.hive.ql.io.orc.OrcSerde, [i_item_sk#196, i_item_id#197, i_rec_start_date#198, i_rec_end_date#199, i_item_desc#200,
i_current_price#201, i_wholesale_cost#202, i_brand_id#203, i_brand#204, i_class_id#205, i_class#206, i_category_id#207, i_category#208,
i_manufact_id#209, i_manufact#210, i_size#211, i_formulation#212, i_color#213, i_units#214, i_container#215, i_manager_id#216, i_product_name#217]
```