

→ Reduce side join

- a. Joining 2 or more big data sets
- b. 100TB with 100TB
- c. It is always FULL OUTER JOIN result
- d. 2 or more multiple mappers needed for reduce side join, but key should be same in all the mappers

Purchase Table

pur_id, dt, vendor_id, prod, qty_pur, ...

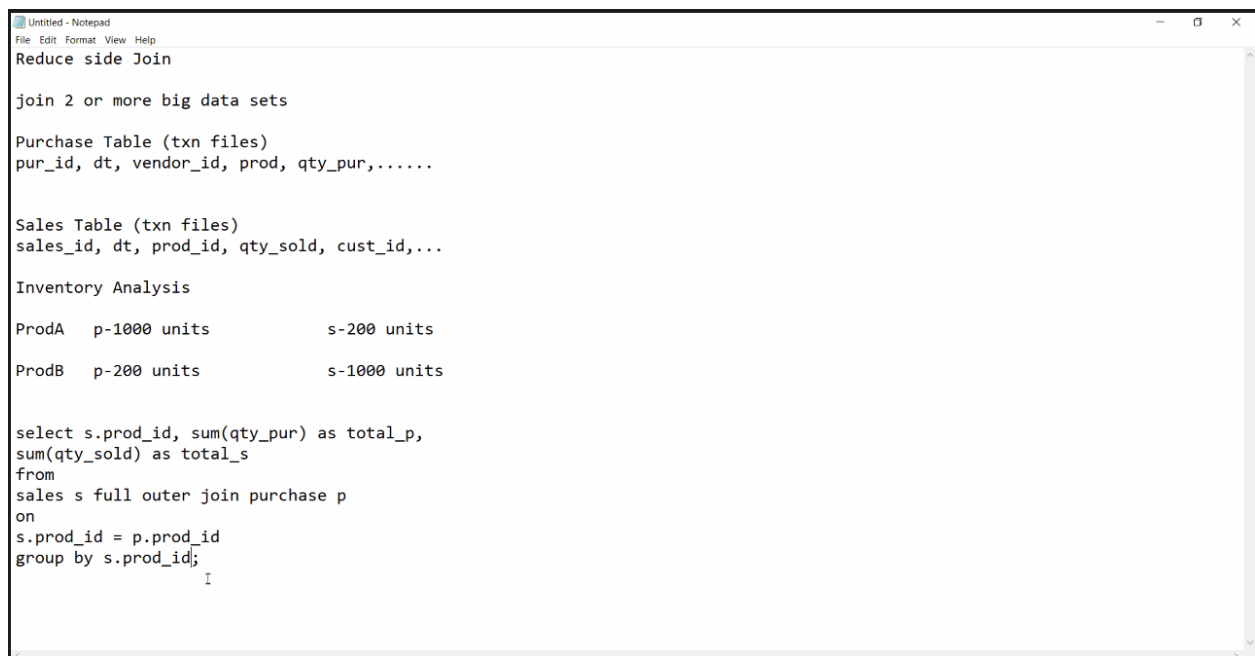
Sales Table

sales_id, dt, prod_id, qty_sold, cust_id, ...

Inventory analysis

ProdA p-1000 units s-200 units

```
SELECT s.prod_id, sum(qty_pur) , sum(qty_sold) FROM sales s
FULL OUTER JOIN purchase p ON s.prod_id= p.prod_id
GROUP BY s.prod_id;
```



```
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Reduce side Join

join 2 or more big data sets

Purchase Table (txn files)
pur_id, dt, vendor_id, prod, qty_pur,.....

Sales Table (txn files)
sales_id, dt, prod_id, qty_sold, cust_id,...

Inventory Analysis

ProdA  p-1000 units          s-200 units
ProdB  p-200 units           s-1000 units

select s.prod_id, sum(qty_pur) as total_p,
sum(qty_sold) as total_s
from
sales s full outer join purchase p
on
s.prod_id = p.prod_id
group by s.prod_id;
```

- e. 2 or more multiple mappers needed for reduce side join, but key should be same in all the mappers

Mapping stage:

sales_mapper
prod_id, qty_sold
A, s.150
B, s.600
A, s.50
B, s.400

purchase_mapper
prod_id, qty_pur
A, p.300
B, p.75
A, p.700
B, p.125

Shuffle Stage:

A, [s.150, s.50, p.300, p.700]
B, [s.600, s.400, p.75, p.125]

- An identifier is needed to identify which value is from which mapper, so we should make it like key, <mapper_identifier, some delimiter, value> instead of just key, value

Reducer stage:

A, Total_sale = 150+50
A, Total_pur = 300+700

B, Total_sale = 600+400
B, Total_pur = 75+125

A, (p-1000, s-200)
B, (p-200, s-1000)

- Identifier & delimiter is very much needed to identify which data is from which mapper, otherwise it is stuck in shuffle stage

→ Map-Side Join is faster than Reduce-Side Join

- Only mapper is needed in map-side join
- One lookup-file data is in memory in map-side join

(lookup) cust
id, name
1, John

(BigData) orders
order_id, id, amt
101, 1, 2000
102, 1, 3000

SELECT c.id, c.name, sum(o.amt) FROM customers c
JOIN orders o ON c.id=o.id GROUP BY o.id;

→ Tasks in Reduce-Side Join

- Join
- Group By
- Sum
- Display - Select

```

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B,(p-200,s-1000)

customer
4000001,Kristina,Chung,55,Pilot
4000002,Paige,Chen,74,Teacher
4000003,Sherri,Melton,34,Firefighter
4000004,Gretchen,Hill,66,Computer hardware engineer
4000005,Karen,Puckett,74,Lawyer

output
-----
id,name,total_sales
1,John,5000

select o.id, name, sum(amount)
from
orders o join cust c
on
o.id = c.id
group by o.id

tasks
1) Join
2) group by
3) sum
4) display - select

```

Handwritten notes:

- (lookup) cust* → *id, name* → *1, John*
- map-side output* → *id, name, amt* → *1, John, 2000* → *M-R* → *1, John, 3000*
- key - (1, John)* → *(1, John), [2000, 3000]*
- orders amt* → *101, 1, 2000* → *102, 1, 3000* → *(sig)*
- sum → entire table w/o group by*
- sum → on each id* → *= 1, John, 5000 ✓*

```

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customer
4000001,Kristina,Chung,55,Pilot
4000002,Paige,Chen,74,Teacher
4000003,Sherri,Melton,34,Firefighter
4000004,Gretchen,Hill,66,Computer hardware engineer
4000005,Karen,Puckett,74,Lawyer

sales
00000000,06-26-2011,4000001,040.33,Exercise & Fitness,Cardio Machine Accessories,Clarksville,Tennessee,credit
00000001,05-26-2011,4000001,198.44,Exercise & Fitness,Weightlifting Gloves,Long Beach,California,credit
00000002,06-01-2011,4009775,005.58,Exercise & Fitness,Weightlifting Machine Accessories,Anaheim,California,credit
00000003,06-05-2011,4002199,198.19,Gymnastics,Gymnastics Rings,Milwaukee,Wisconsin,credit

prob statement : find total amount sold, total count of txns for each cust firstname

Kristina      238.77      2

```

Customer

```

4000001,Kristina,Chung,55,Pilot
4000002,Paige,Chen,74,Teacher
4000003,Sherri,Melton,34,Firefighter
4000004,Gretchen,Hill,66,Computer hardware engineer
4000005,Karen,Puckett,74,Lawyer

```

Txns

```
00000000,06-26-2011,4007024,040.33,Exercise & Fitness,Cardio Machine Accessories,Clarksville,Tennessee,credit
00000001,05-26-2011,4006742,198.44,Exercise & Fitness,Weightlifting Gloves,Long Beach,California,credit
00000002,06-01-2011,4009775,005.58,Exercise & Fitness,Weightlifting Machine Accessories,Anaheim,California,credit
00000003,06-05-2011,4002199,198.19,Gymnastics,Gymnastics Rings,Milwaukee,Wisconsin,credit
```

→ Problem statement: find total amount sold, total count of txns for each cust firstname

Kristina 238.77 2

Customer Mapper

4000001, (cust Kristina)

Sales Mapper

4000001, (txn, 040.33)

4000001, (txn, 198.44)

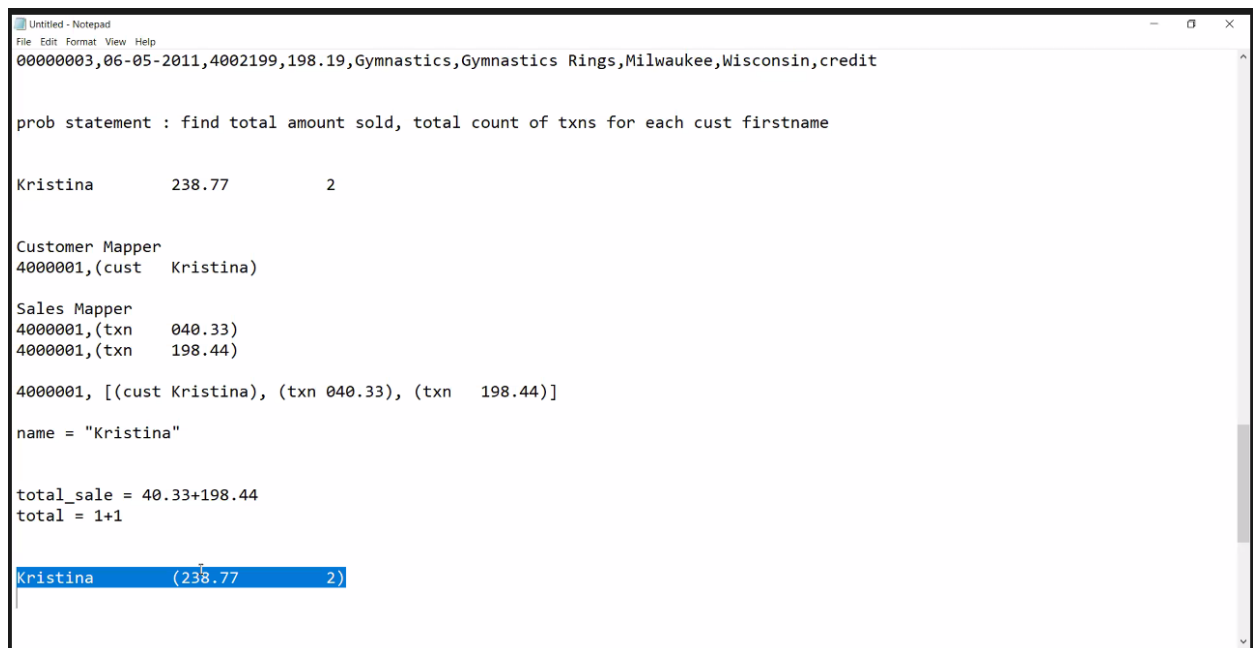
4000001, [(cust Kristina), (txn, 040.33), (txn, 198.44)]

name = "Kristina"

Total_sale = 40.33 + 198.44

Total = 1 + 1

Kristina (237.77 2)



```
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00000003,06-05-2011,4002199,198.19,Gymnastics,Gymnastics Rings,Milwaukee,Wisconsin,credit

prob statement : find total amount sold, total count of txns for each cust firstname

Kristina            238.77            2

Customer Mapper
4000001,(cust    Kristina)

Sales Mapper
4000001,(txn    040.33)
4000001,(txn    198.44)

4000001, [(cust Kristina), (txn 040.33), (txn    198.44)]

name = "Kristina"

total_sale = 40.33+198.44
total = 1+1

Kristina            (237.77            2)
```

→

Book1 - Excel

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customer		sales	
ID	name	sale_id	dt
1	John	1	01.01.23
2	Alan	2	05.02.23
		3	06.03.23
		4	04.04.23
		5	05.05.23

join output

sale_id	dt	cust	amt	id	name
1	01.01.23	1	5000	1	John
2	05.02.23	1	4000	1	John
3	06.03.23	2	3500	2	Alan
4	04.04.23	1	2000	1	John
5	05.05.23	2	1000	2	Alan

After group by

id	name	list
1	John	[5000,4000,2000]
2	Alan	[3500,1000]

join output	
sale_id	dt
1	01.01.23
2	05.02.23
3	06.03.23
4	04.04.23
5	05.05.23

After group by

id	name	list
1	John	[5000,4000,2000]
2	Alan	[3500,1000]

sum

id	name	total	count
1	John	11000	3
2	Alan	4500	2

Sheet1

```
SELECT name, sum(amount), count(s.id) FROM
customers c FULL OUTER JOIN sales s ON c.id = s.id
GROUP BY s.id, name;
```

#

```
[bigdatalab456422@ip-10-1-1-204 ~]$ hadoop jar myjar.jar ReduceJoin
training/custs.txt training/txns1.txt training/out12
WARNING: Use "yarn jar" to launch YARN applications.
23/05/23 06:53:44 INFO client.RMPProxy: Connecting to ResourceManager
at ip-10-1-1-204.ap-south-1.compute.internal/10.1.1.204:8032
23/05/23 06:53:44 WARN mapreduce.JobResourceUploader: Hadoop
command-line option parsing not performed. Implement the Tool
interface and execute your application with T
oolRunner to remedy this.
```

```
23/05/23 06:53:44 INFO mapreduce.JobResourceUploader: Disabling
Erasure Coding for path:
/user/bigdatalab456422/.staging/job_1684298513961_1195
23/05/23 06:53:45 INFO input.FileInputFormat: Total input files to
process : 1
23/05/23 06:53:45 INFO input.FileInputFormat: Total input files to
process : 1
23/05/23 06:53:45 INFO mapreduce.JobSubmitter: number of splits:2
23/05/23 06:53:45 INFO Configuration.deprecation:
yarn.resourcemanager.system-metrics-publisher.enabled is deprecated.
Instead, use yarn.system-metrics-publisher.enable
d
23/05/23 06:53:45 INFO mapreduce.JobSubmitter: Submitting tokens for
job: job_1684298513961_1195
23/05/23 06:53:45 INFO mapreduce.JobSubmitter: Executing with tokens:
[]
23/05/23 06:53:45 INFO conf.Configuration: resource-types.xml not
found
23/05/23 06:53:45 INFO resource.ResourceUtils: Unable to find
'resource-types.xml'.
23/05/23 06:53:45 INFO impl.YarnClientImpl: Submitted application
application_1684298513961_1195
23/05/23 06:53:45 INFO mapreduce.Job: The url to track the job:
http://ip-10-1-1-204.ap-south-1.compute.internal:6066/proxy/applicati
on\_1684298513961\_1195/
23/05/23 06:53:45 INFO mapreduce.Job: Running job:
job_1684298513961_1195
23/05/23 06:54:14 INFO mapreduce.Job: Job job_1684298513961_1195
running in uber mode : false
23/05/23 06:54:14 INFO mapreduce.Job:  map 0% reduce 0%
23/05/23 06:55:20 INFO mapreduce.Job:  map 50% reduce 0%
23/05/23 06:55:25 INFO mapreduce.Job:  map 100% reduce 0%
23/05/23 06:55:50 INFO mapreduce.Job:  map 100% reduce 100%
23/05/23 06:55:52 INFO mapreduce.Job: Job job_1684298513961_1195
completed successfully
23/05/23 06:55:53 INFO mapreduce.Job: Counters: 54
    File System Counters
        FILE: Number of bytes read=509016
        FILE: Number of bytes written=1648298
        FILE: Number of read operations=0
        FILE: Number of large read operations=0
        FILE: Number of write operations=0
        HDFS: Number of bytes read=4810551
        HDFS: Number of bytes written=196981
        HDFS: Number of read operations=11
```

HDFS: Number of large read operations=0
HDFS: Number of write operations=2
HDFS: Number of bytes read erasure-coded=0
Job Counters
Launched map tasks=2
Launched reduce tasks=1
Data-local map tasks=2
Total time spent by all maps in occupied slots
(ms)=129660
Total time spent by all reduces in occupied slots
(ms)=22300
Total time spent by all map tasks (ms)=129660
Total time spent by all reduce tasks (ms)=22300
Total vcore-milliseconds taken by all map tasks=129660
Total vcore-milliseconds taken by all reduce
tasks=22300
Total megabyte-milliseconds taken by all map
tasks=132771840
Total megabyte-milliseconds taken by all reduce
tasks=22835200

Map-Reduce Framework

Map input records=59999
Map output records=59999
Map output bytes=1206622
Map output materialized bytes=470223
Input split bytes=513
Combine input records=0
Combine output records=0
Reduce input groups=10000
Reduce shuffle bytes=470223
Reduce input records=59999
Reduce output records=10000
Spilled Records=119998
Shuffled Maps =2
Failed Shuffles=0
Merged Map outputs=2
GC time elapsed (ms)=2426
CPU time spent (ms)=7290
Physical memory (bytes) snapshot=1229955072
Virtual memory (bytes) snapshot=7771475968
Total committed heap usage (bytes)=1314390016
Peak Map Physical memory (bytes)=499953664
Peak Map Virtual memory (bytes)=2591252480
Peak Reduce Physical memory (bytes)=270733312
Peak Reduce Virtual memory (bytes)=2599899136

```
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
```

File Input Format Counters

Bytes Read=0

File Output Format Counters

Bytes Written=196981

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User

bigdatalab45644

Group

bigdatalab45644

Size

192.36 KB

user

bigdatalab45644

training

out12

part-r-00000

	5	637.220001
Kristina	9	988.510002
Paige	2	112.329998
Sherri	3	371.010002
Gretchen	4	672.539993
Karen	8	1080.420012
Patrick	3	184.009995
Elsie	7	719.660007
Hazel	0	0.000000
Malcolm	4	364.689995
Dolores	1	53.599998
Francis	4	488.240002
Sandy	5	281.070002
Marion	3	307.629997
Beth	6	596.170004
Julia	6	598.660011

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full outer join

→ data is always sorted on key, but we're not printing key (key is cust_id), thus data is not sorted

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Edit file

user / bigdatalab45644 / training / out12 / part-r-00000

Refresh

View as binary

Download

Last modified

05/23/2023 12:24 PM

+05:30

User

bigoatalab45644

Group

bigoatalab45644

Size

192.36 KB

Mode

100644

5

637.220001

Kristina

9

980.510002

Paige

2

112.329998

Sherri

3

371.010002

Gretchen

4

672.539993

Karen

8

1080.420012

Patrick

3

184.009995

Elsie

7

719.660007

Hazel

0

0.000000

Malcolm

4

364.689995

Dolores

1

53.599998

Francis

4

488.240002

Sandy

5

281.070002

Marion

3

307.629997

Beth

6

596.170004

Julia

6

598.660011

Jerome

8

719.550002

Neal

8

985.759998

→ Note:

- a. HIVE tool takes SQL query, converts SQL query into JAR file internally, and launches jar file on ResourceManager