

```

SELECT SUM(lo_revenue), lo_partykey
FROM ssb.lineorder
WHERE lo_shipmode='AIR'
GROUP BY lo_partkey;

```

Id	Operation	Name
0	SELECT STATEMENT	
1	PX COORDINATOR	
2	PX SEND QC (RANDOM)	:TQ10001
3	HASH GROUP BY	
4	PX RECEIVE	
5	PX SEND HASH	:TQ10000
6	HASH GROUP BY	
7	PX BLOCK ITERATOR	
8	TABLE ACCESS STORAGE FULL	LINEORDER

## SIX common types of Data Redistribution

	4	PX RECEIVE PX SEND HASH	:TQ10000
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### 1. HASH

A hash function is applied to the value of the column we are distributing on. In our example that would be the PARTKEY

Data is then distributed to the consumer working on the corresponding hash partition

hash partition of step,

at consumer process을

갖동한 레코드 수를 가지게 된다.

제1번 consumer는 hash 2로.  
'1'이 나온 레코드를 반환한다.

제2번 consumer는 hash 3로.  
'2'가 나온 레코드를 반환한다.

제3번 consumer는 hash 4로.  
'3'이 나온 레코드를 반환한다.

⋮

## SIX common types of Data Redistribution



4

PX RECEIVE



5

PX SEND ROUND ROBIN

:TQ10000



### 2. Round Robin

Randomly but evenly distributes the data (among the consumers)



## SIX common types of Data Redistribution



4

PX RECEIVE



5

PX SEND BROADCAST

:TQ10000



### 3. Broadcast

Send complete result set to all consumers

Typically used (when the result set is small)



## SIX common types of Data Redistribution



4

PX RECEIVE



5

PX SEND RANGE

:TQ10000



### 4. Range

Individual parallel servers work on different data ranges

Each row is sent to the consumer working on the range it belongs to

(When this method is used) the QC doesn't need to sort the results it receives from the parallel server processes

It just presents the results in the correct order

## Six common types of Data Redistribution



4

PX RECEIVE



5

PX SEND PART(KEY)

:TQ10000



### 5. Partitioning Key Distribution

Individual consumers work on different partitions of a table

Producers will map each scanned row to a consumer (based on the partitioning column)

This method is typically chosen (when doing parallel joins and the table on the right hand side of the join is partitioned )

## Six common types of Data Redistribution

4	PX RECEIVE	:TQ10000
5	PX SEND PART(KEY) LOCAL	



A LOCAL suffix on the redistribution methods in a RAC database indicates rows are distributed to only the consumers on same RAC node

## Six common types of Data Redistribution

NEW IN  
12.1

4	PX RECEIVE	:TQ10000
5	PX SEND HYBRID-HASH	



### 6. Hybrid-Hash

New adaptive distribution method to avoid data skews

Statistic collectors inserted in front of producers to see if the number of rows to be distributed matches the estimate

If the number of rows produced meets or exceeds the threshold, HASH distribution is used

But if the number of rows is less than the threshold BROADCAST distribution is used