

Balanced
File Read

Data
Distribution

Local Join

Join Result
Distribution

Local
Aggregation

Path
(local)

Path
(distributed)



T_{Δ}
(initial CC)

T_{join}
(local)

T_{join}
(distributed)

New T
(updated CC)

T_{Δ}
($\text{New}_T - T_{\Delta}$)

MPI_Alltoallv

MPI_Alltoallv

Node 0 GPU 0

1	2
2	1
2	3
3	2
4	5
5	4

2	1
2	3
6	4
6	5
7	7

2	2
6	6
7	7

Node ID

Inner

Outer

1	2
3	2
4	6
5	6
7	7

2	1
2	3
6	4
6	5
7	7

2	1
6	4
7	7

ID 1 < 2
ID 4 < 6

2	1
6	4

Node 1 GPU 0

4	6
5	6
6	4
6	5
7	7

1	2
3	2
4	5
4	6
5	4
5	6

1	1
3	3
4	4
5	5

2	1
2	3
5	4
6	4
4	5
6	5

1	2
3	2
4	5
4	6
5	4
5	6

1	1
3	2
4	4
5	4

ID 2 < 3
ID 4 < 5

3	2
5	4