Phase 4
(2 Phase Commit Protocol)

This phase implements the 2 Phase Commit Protocol for horizontally fragmented tables.

Algorithm:

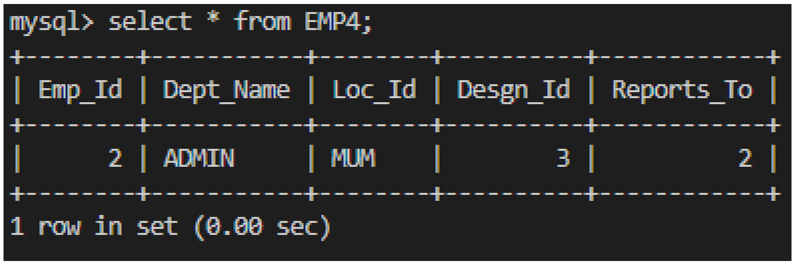
- Start Flask server on all sites
- The coordinator will first make sure if the protocol needs to be executed i.e if changes are happening at the same site, then no need to execute the protocol.
- The update query is broken into insert and delete queries into respective sites
- Now they act as participants.
- From here on the 2PC protocol is followed.

Example:

Query: `UPDATE EMPLOYEE SET EMPLOYEE.Dept_Name=\'ADMIN\' WHERE Emp_Id=4`

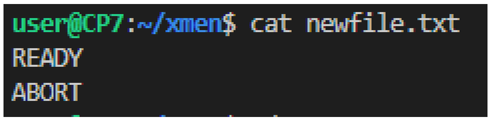
Earlier: DB states

At CP8

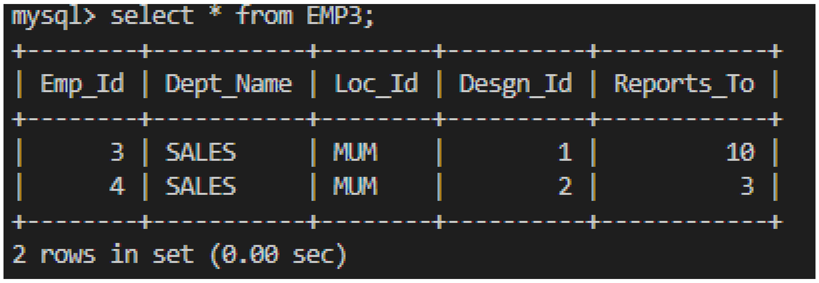


```
mysql> select * from EMP4;
+--------+-----------+--------+----------+------------+
| Emp_Id | Dept_Name | Loc_Id | Desgn_Id | Reports_To |
+--------+-----------+--------+----------+------------+
|      2 | ADMIN     | MUM    |        3 |          2 |
+--------+-----------+--------+----------+------------+
1 row in set (0.00 sec)
```

At CP7:

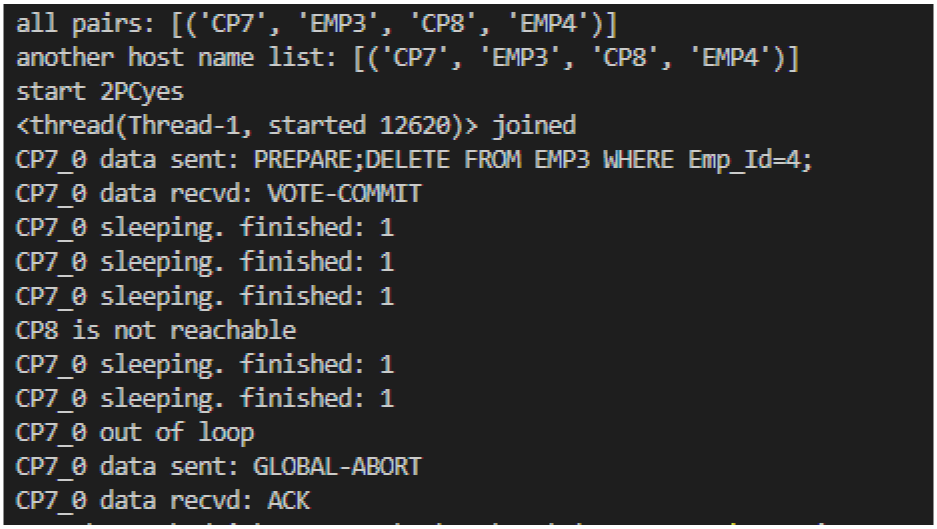


```
user@CP7:~/xmen$ cat newfile.txt
READY
ABORT
```



```
mysql> select * from EMP3;
+--------+-----------+--------+----------+------------+
| Emp_Id | Dept_Name | Loc_Id | Desgn_Id | Reports_To |
+--------+-----------+--------+----------+------------+
|      3 | SALES     | MUM    |        1 |         10 |
|      4 | SALES     | MUM    |        2 |          3 |
+--------+-----------+--------+----------+------------+
2 rows in set (0.00 sec)
```

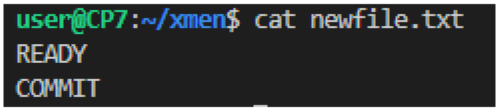
When CP8 was aborted, the snapshots remained the same.



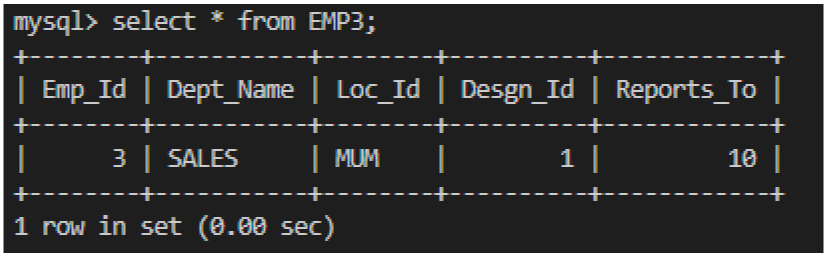
```
all pairs: [('CP7', 'EMP3', 'CP8', 'EMP4')]
another host name list: [('CP7', 'EMP3', 'CP8', 'EMP4')]
start 2PCyes
<thread(Thread-1, started 12620)> joined
CP7_0 data sent: PREPARE;DELETE FROM EMP3 WHERE Emp_Id=4;
CP7_0 data recvd: VOTE-COMMIT
CP7_0 sleeping. finished: 1
CP7_0 sleeping. finished: 1
CP7_0 sleeping. finished: 1
CP8 is not reachable
CP7_0 sleeping. finished: 1
CP7_0 sleeping. finished: 1
CP7_0 out of loop
CP7_0 data sent: GLOBAL-ABORT
CP7_0 data recvd: ACK
```

However, if the transaction went well, the updated snapshots are as follows:

At CP7:

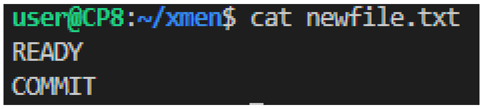


```
user@CP7:~/xmen$ cat newfile.txt
READY
COMMIT
```

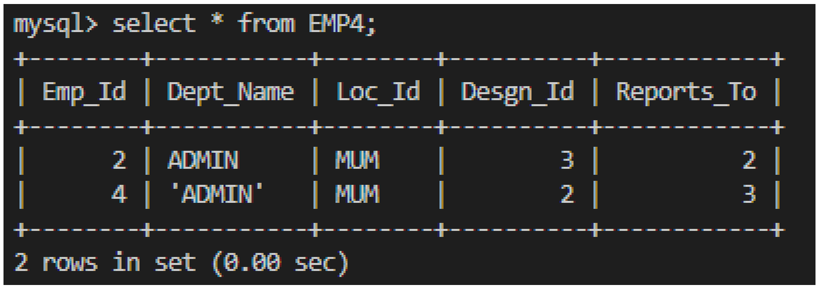


```
mysql> select * from EMP3;
+--------+-----------+--------+----------+------------+
| Emp_Id | Dept_Name | Loc_Id | Desgn_Id | Reports_To |
+--------+-----------+--------+----------+------------+
|      3 | SALES     | MUM    |        1 |         10 |
+--------+-----------+--------+----------+------------+
1 row in set (0.00 sec)
```

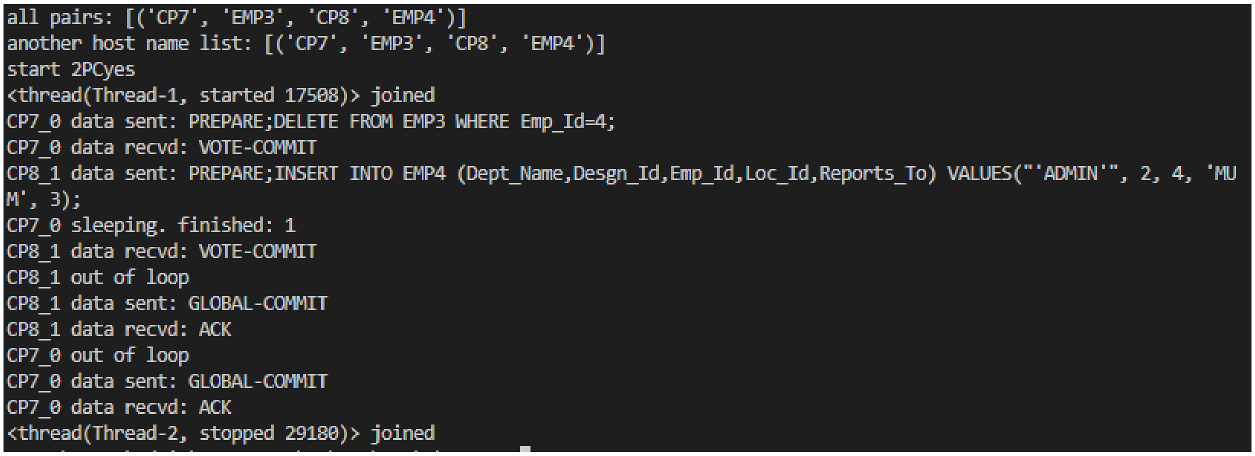
At CP8:



```
user@CP8:~/xmen$ cat newfile.txt
READY
COMMIT
```



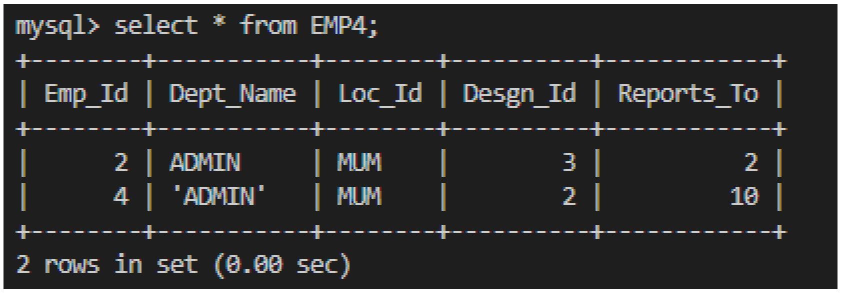
```
mysql> select * from EMP4;
+--------+-----------+--------+----------+------------+
| Emp_Id | Dept_Name | Loc_Id | Desgn_Id | Reports_To |
+--------+-----------+--------+----------+------------+
|      2 | ADMIN     | MUM    |        3 |          2 |
|      4 | 'ADMIN'   | MUM    |        2 |          3 |
+--------+-----------+--------+----------+------------+
2 rows in set (0.00 sec)
```



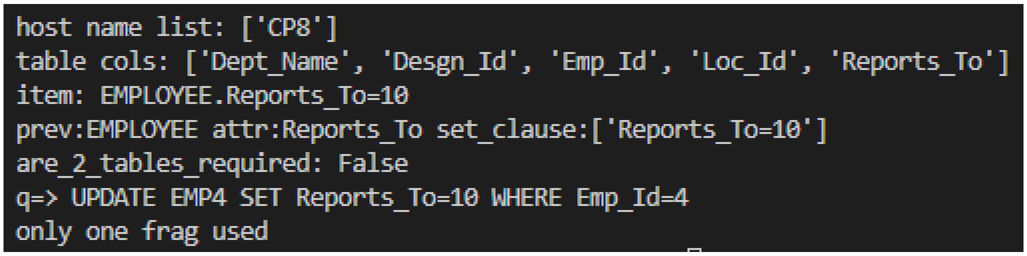
```
all pairs: [('CP7', 'EMP3', 'CP8', 'EMP4')]
another host name list: [('CP7', 'EMP3', 'CP8', 'EMP4')]
start 2PCyes
<thread(Thread-1, started 17508)> joined
CP7_0 data sent: PREPARE;DELETE FROM EMP3 WHERE Emp_Id=4;
CP7_0 data recvd: VOTE-COMMIT
CP8_1 data sent: PREPARE;INSERT INTO EMP4 (Dept_Name,Desgn_Id,Emp_Id,Loc_Id,Reports_To) VALUES("'ADMIN'", 2, 4, 'MU
M', 3);
CP7_0 sleeping. finished: 1
CP8_1 data recvd: VOTE-COMMIT
CP8_1 out of loop
CP8_1 data sent: GLOBAL-COMMIT
CP8_1 data recvd: ACK
CP7_0 out of loop
CP7_0 data sent: GLOBAL-COMMIT
CP7_0 data recvd: ACK
<thread(Thread-2, stopped 29180)> joined
```

When updation is happening at the same site:

Query; UPDATE EMPLOYEE SET EMPLOYEE.Reports_To=10 WHERE Emp_Id=4



```
mysql> select * from EMP4;
+--------+-----------+--------+----------+------------+
| Emp_Id | Dept_Name | Loc_Id | Desgn_Id | Reports_To |
+--------+-----------+--------+----------+------------+
|      2 | ADMIN     | MUM    |        3 |          2 |
|      4 | 'ADMIN'   | MUM    |        2 |         10 |
+--------+-----------+--------+----------+------------+
2 rows in set (0.00 sec)
```



```
host name list: ['CP8']
table cols: ['Dept_Name', 'Desgn_Id', 'Emp_Id', 'Loc_Id', 'Reports_To']
item: EMPLOYEE.Reports_To=10
prev:EMPLOYEE attr:Reports_To set_clause:['Reports_To=10']
are_2_tables_required: False
q=> UPDATE EMP4 SET Reports_To=10 WHERE Emp_Id=4
only one frag used
```