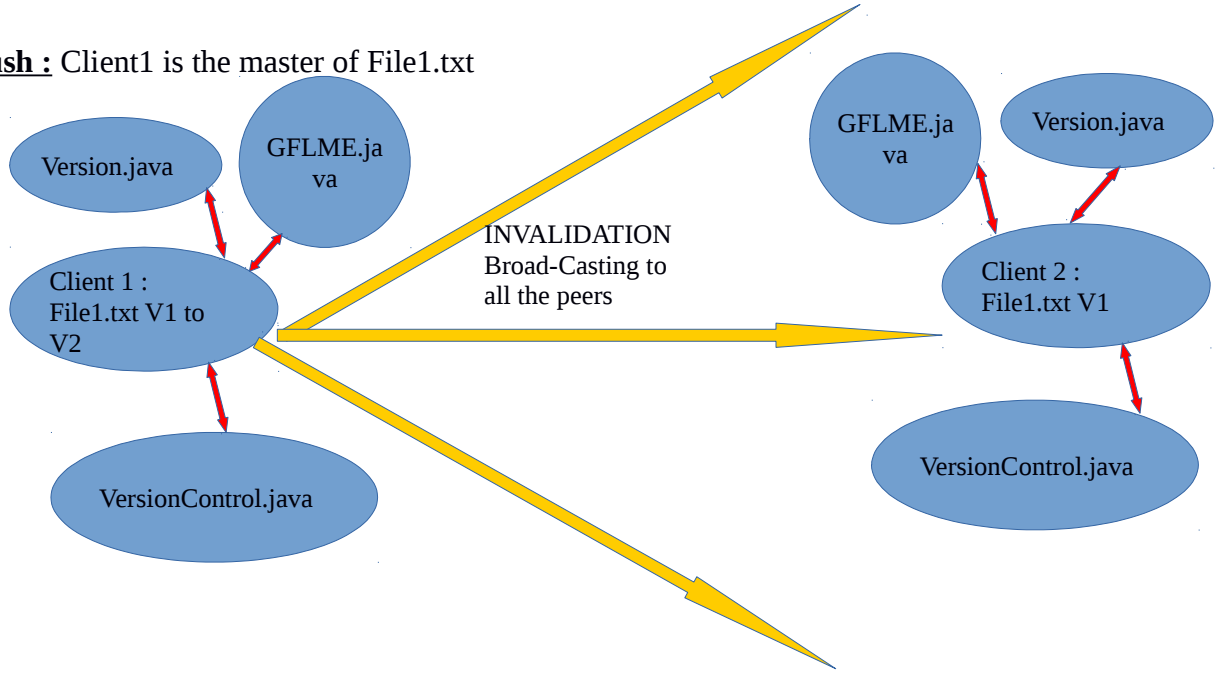
3. Compare the PULL and PUSH approach. List their advantages, disadvantages, and applicability respectively.

PUSH approach : When ever master copy of a particular file is modified by the master peer of that file then the master peer broad-cast INVALIDATE message to all the peers and if a peer has a copy of the file which the master changed then it mark the file invalid local to it. The master peer propagates the "Invalidate" message to all its neighboring peers. This technique is inefficient in terms of network bandwidth usage, but it's simple, stateless, the technique provides strong consistency guarantees in the absence of failures.

1)Push : Client1 is the master of File1.txt



When Client1 make any changes to the master copy of the File File1.txt then it broadcast INVALIDATION notification to all the peers which has a copy of the file. On receiving the INVALIDATION notification the peers make the copy of the file File1.txt to be invalid.

Advantages:

- The peers having a duplicate copy of the master file need not have to keep on checking the consistency of the file.
- Each peers own their own file and manages the version control by sending Invalidate messages to all the other peers, freeing other peers from this burden.

Disadvantages :

- Pushing the INVALIDATION message to all the peers including the ones which don't have a copy of the file owned by a particular peer is just a waste of bandwidth of the network.

PULL approach : Every TTR value a particular peer check with the master of the files it has whether it has the valid or invalid file. When it founds that the file in its local repository is invalid it display it to the user invalid file with the file name which is invalid and gives the option of update or refresh by re-

downloading the file again from the master of that particular file. If the peer has invalid file , usinf the version number send to the master peer of a particular file the master replies with “out-of-date” file i.e. invalid and inform the related peers .

Advantages:

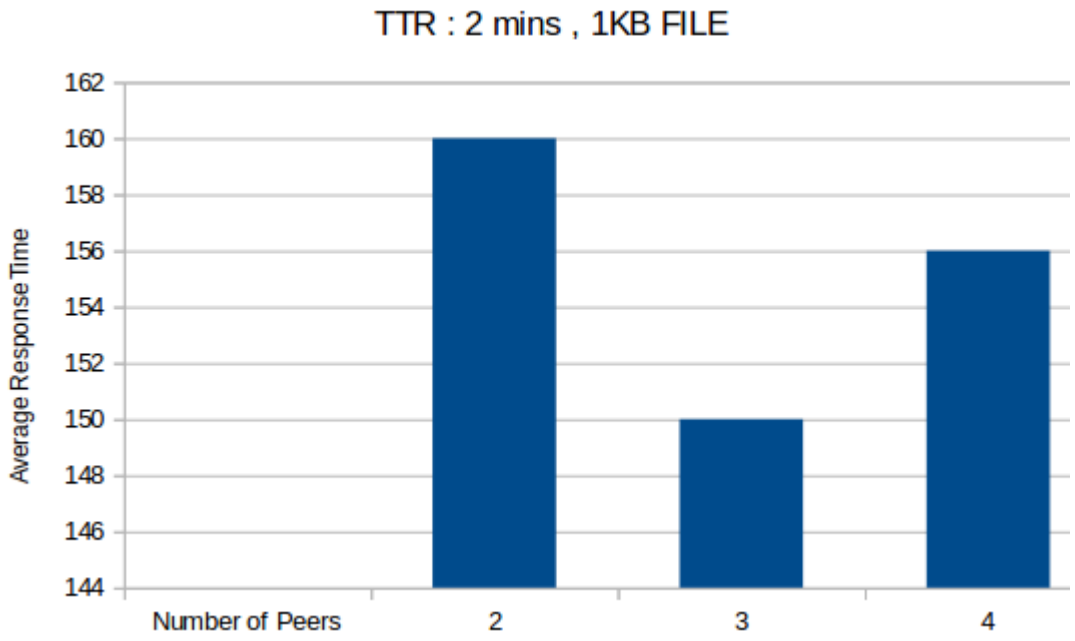
- The peers having a duplicate copy of files owned by master peers of those files keep on checking the consistency of those files with the master , freeing the master an over-head of updating all the peers if there is a modification to the files owned by a master.
- It provide an option to the user to change the TTR value according to the density and traffic of the network and and option of turning the refresh function on and off. A peer can choise to keep the old version marked as invalid or download a new version if the master make any changes to the related file.

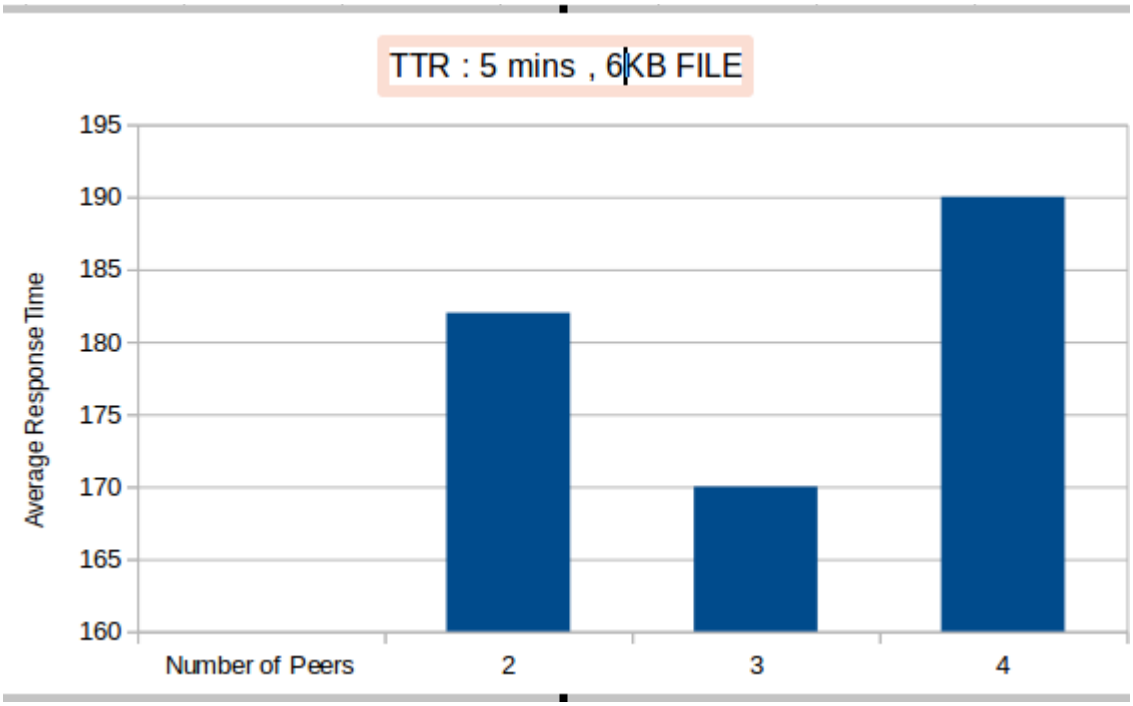
Disadvantages :

- Engaging the network every TTR value of time may be a burden on the network.
- If master peer of a particular file never change the file then still it consumes the network and keep on checking whether the master has changed the file or not. This is not feasible.

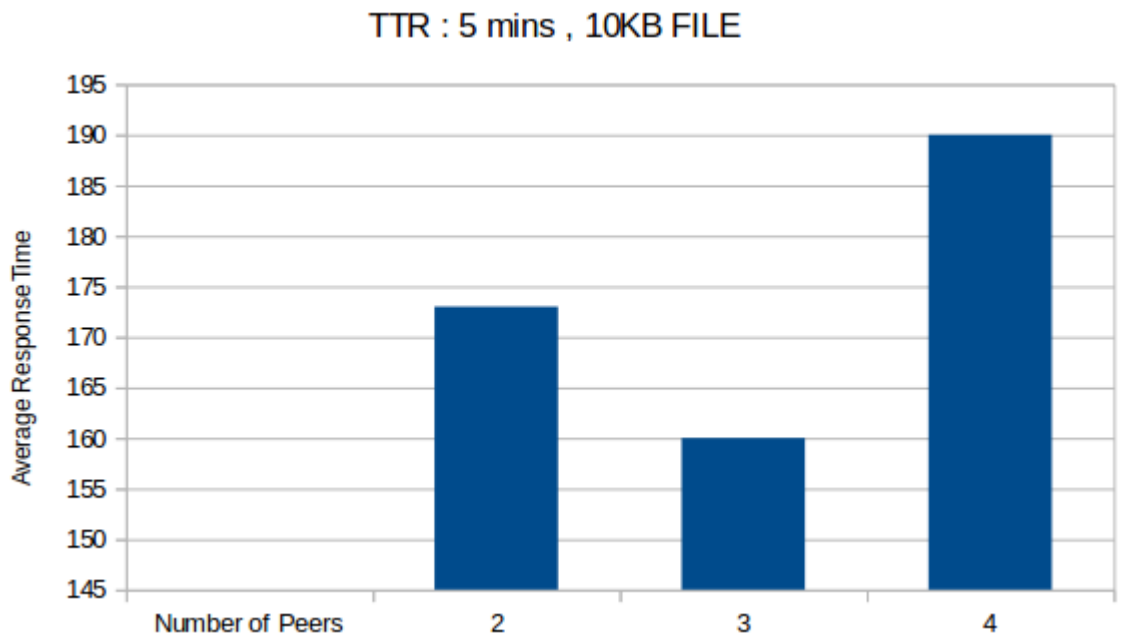
A peer gets a response for a query by the master peer of a particular file and any slave peer of that file having a duplicate file of the master copy.
Following is the response time observed from master peer and slave peer related to a file.

BUS TOPOLOGY



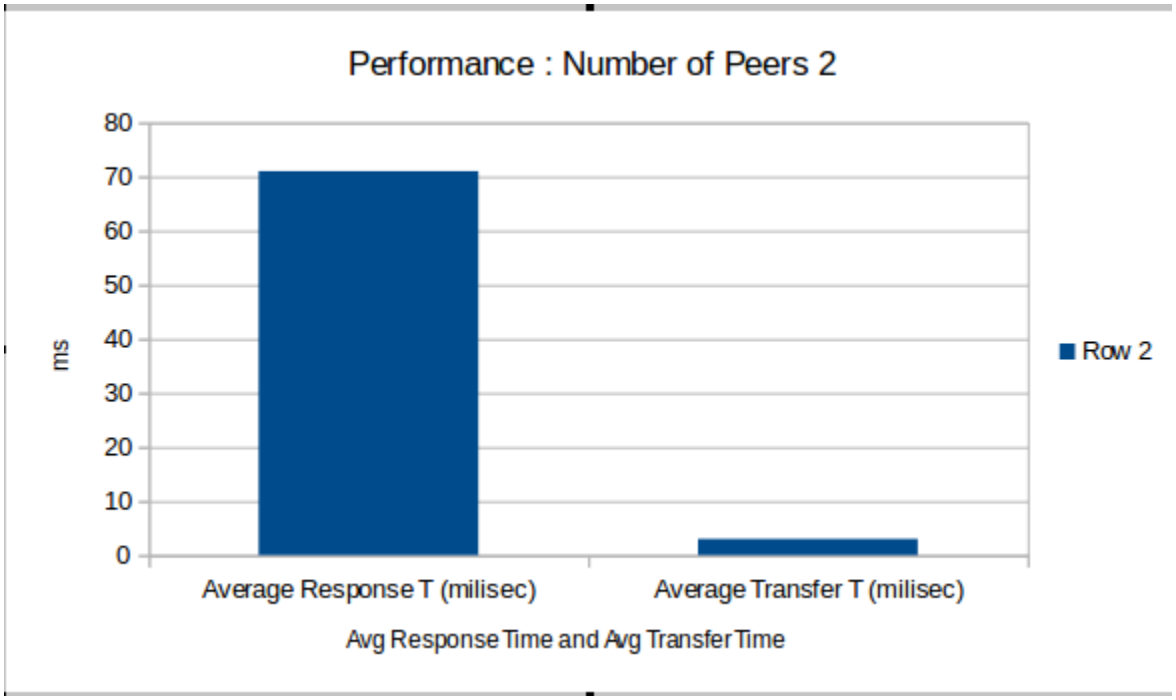


STAR TOPOLOGY:

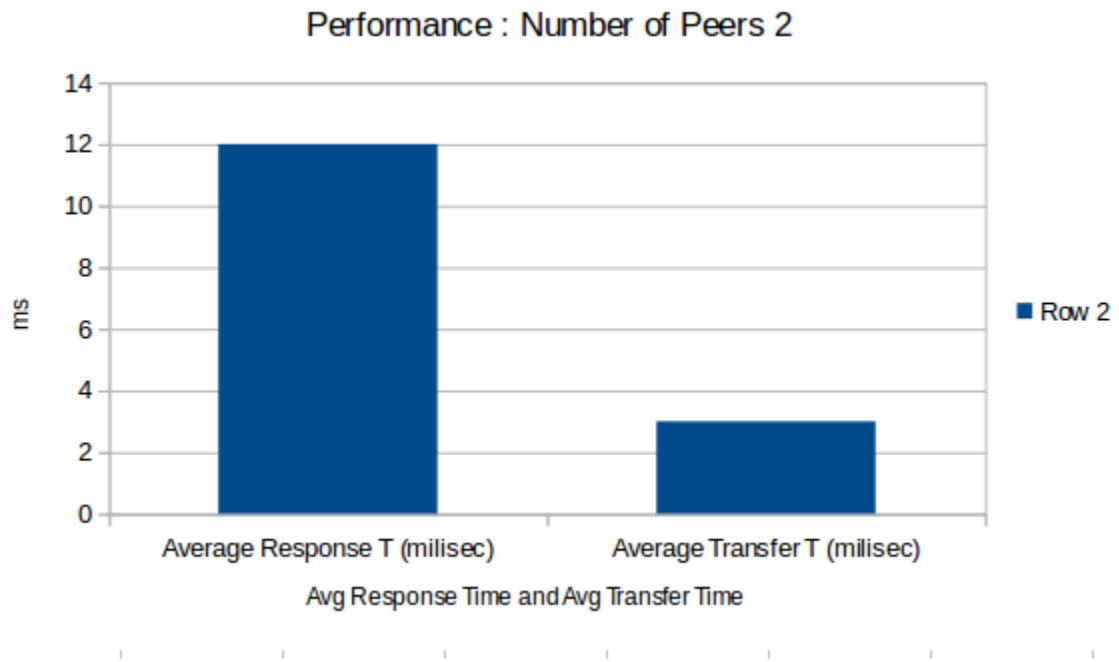


[NOTE: Since every file has its master peer who is authorized to modify that particular file and other peers can only update a file from its master peer and also have an option of downloading a file from a master copy at master peer or downloading a duplicate copy from a peer which earlier downloaded the file from master there can be only two peers communicating at a time for downloading when a refresh or an update for a file is selected so the below performace evalution is for the refresh function i.e. response time in communication between the master peer of a file and slave peer of the file.

➔ Compute the average response time per client query request by measuring the average response time seen by a client where there's only 1 client issuing queries, then 2 clients, 3 clients, and so on.(BUS TOPOLOGY).

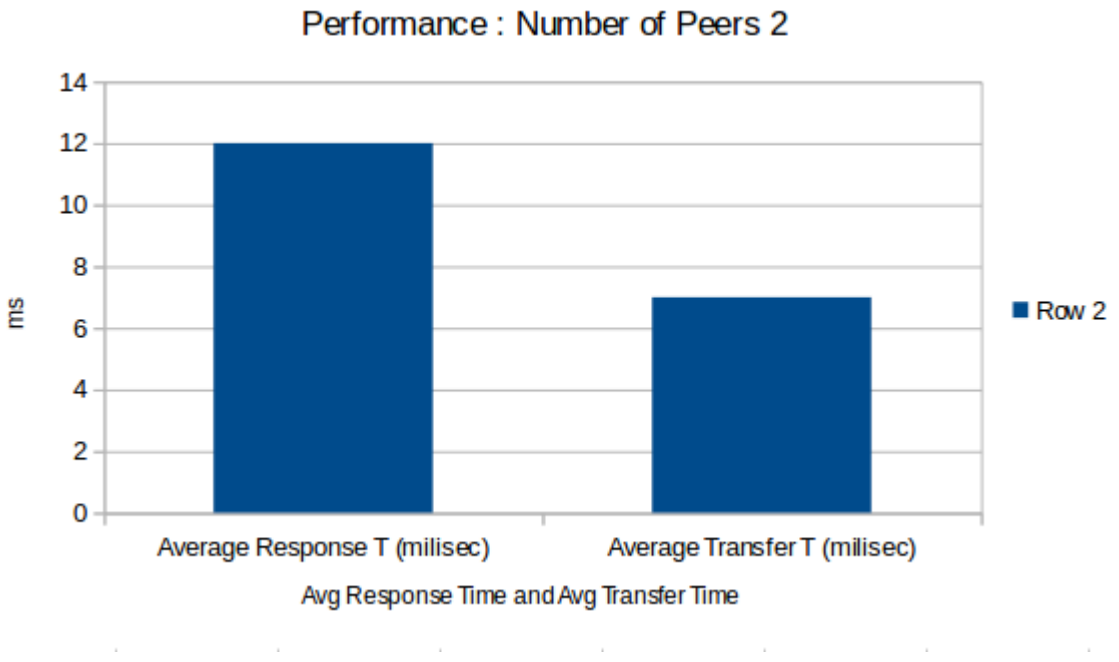


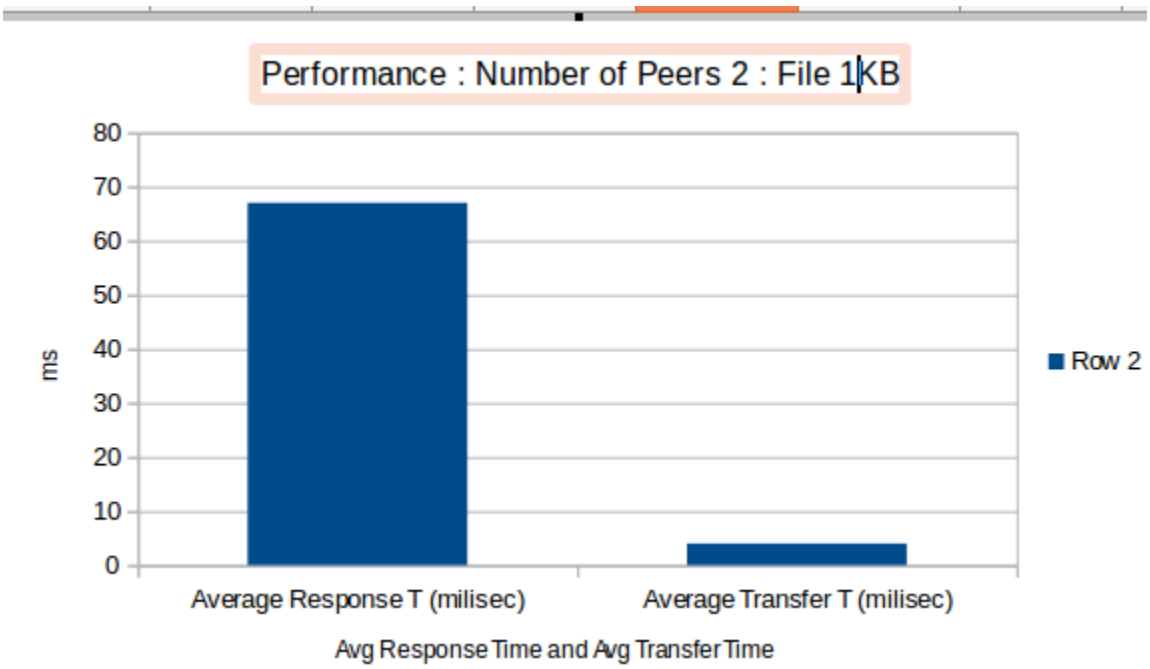
Number of peers :2 File:1KB

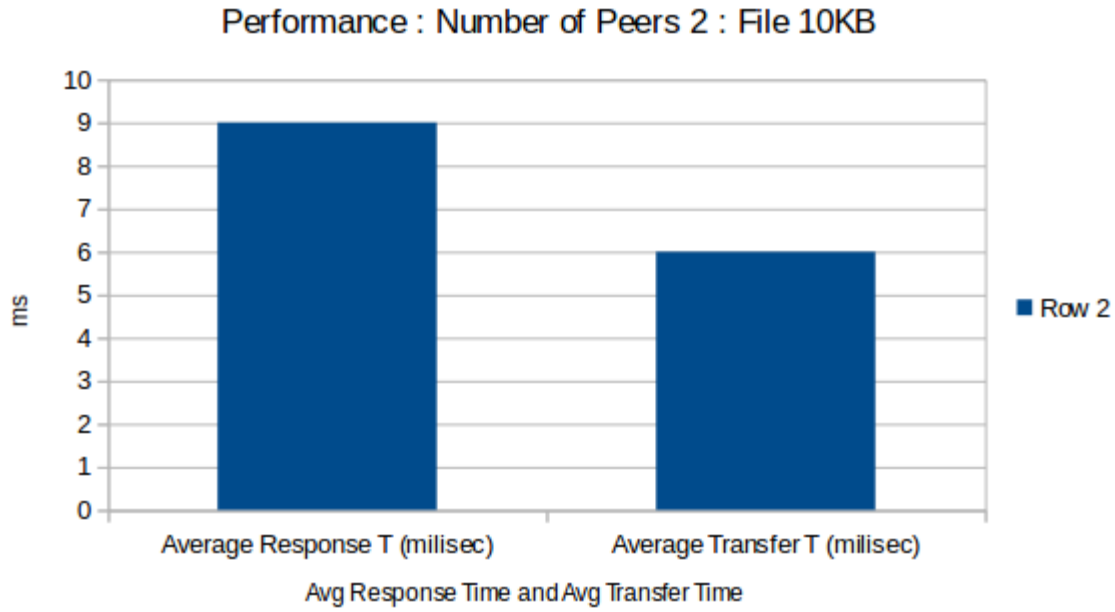


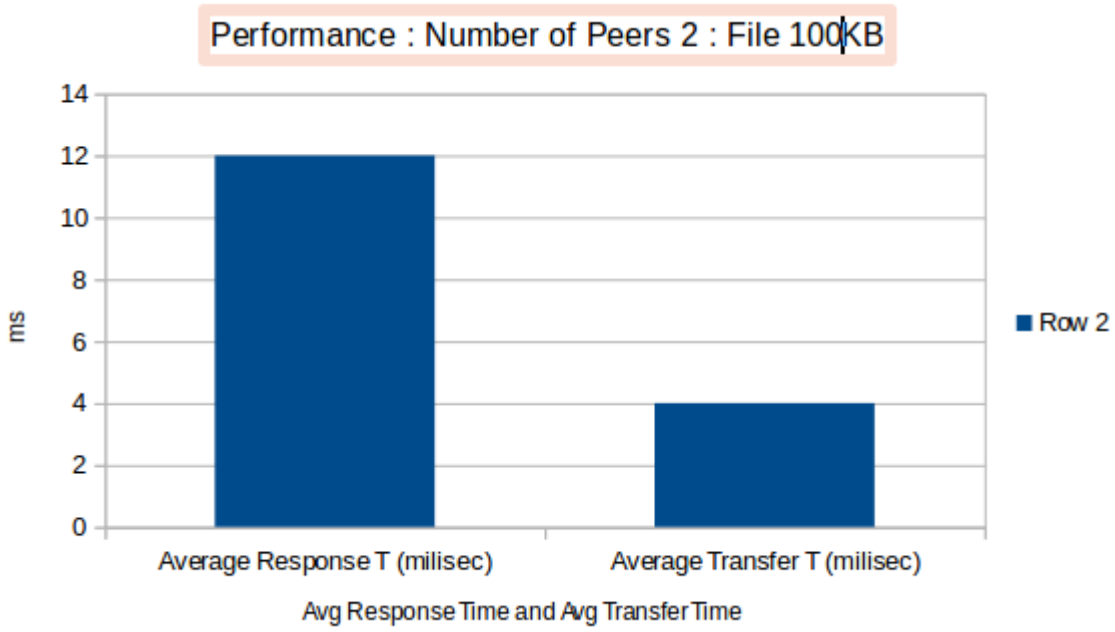
Number of peers : 2 File:10KB

STAR TOPOLOGY.




Performance : Number of Peers 2 : File 1KB
80
70
60
50
40
30
20
10
0
ms
Average Response T (milisec)
Average Transfer T (milisec)
Avg Response Time and Avg Transfer Time
Row 2


Performance : Number of Peers 2 : File 10KB
10
9
8
7
6
5
4
3
2
1
0
ms
Average Response T (milisec)
Average Transfer T (milisec)
Avg Response Time and Avg Transfer Time
Row 2


Performance : Number of Peers 2 : File 100KB
14
12
10
8
6
4
2
0
ms
Row 2
Average Response T (milisec)
Average Transfer T (milisec)
Avg Response Time and Avg Transfer Time