

Test cases ran and outputs

Configuration : Star Topology

Mechanism : PUSH BASED

Central peer is running on port 4000 and all other 4 peers are running on ports 5000,6000, 7000 and 8000.

Initial status of the program when the peers start :

Peer running at localhost:4000 :

```
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Master1_N1804106865
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Cache1_N1804106865
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Peer address localhost:4000
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Peer Neighbours
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: localhost:5000
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: localhost:6000
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: localhost:7000
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: localhost:8000
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Watching this folder
PeerDownloads/Master1_N1804106865
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Peer Server running ...
Mon Mar 20 20:41:01 CDT 2017 >>>> PA3 - Debug Information :: Peer Client running ...
*****
Peer Display Menu *****
1 : Lookup a file
2 : Download file from a peer
3 : Display seen query messages
4 : Display seen queryhit messages
5 : Display Peer files info
6 : Refresh a stale file
7 : Modify one of the files held by me
8 : Exit
Enter your choice number
*****
```

Your Choice :

Peer running at localhost:5000 :

```
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Master1_N1804077074
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Cache1_N1804077074
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Peer address localhost:5000
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Peer Neighbours
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: localhost:4000
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Watching this folder
PeerDownloads/Master1_N1804077074
```

Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Peer Server running ...
Mon Mar 20 20:32:27 CDT 2017 >>>> PA3 - Debug Information :: Peer Client running ...

Peer running at localhost:6000 :

Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Master1_N1804047283
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Cache1_N1804047283
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Peer address localhost:6000
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Peer Neighbours
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: localhost:4000
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Watching this folder
PeerDownloads/Master1_N1804047283
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Peer Server running ...
Mon Mar 20 20:32:30 CDT 2017 >>>> PA3 - Debug Information :: Peer Client running ...

Peer running at localhost:7000 :

Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Master1_N1804017492
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Cache1_N1804017492
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Peer address localhost:7000
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Peer Neighbours
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: localhost:4000
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Watching this folder
PeerDownloads/Master1_N1804017492
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Peer Server running ...
Mon Mar 20 20:32:33 CDT 2017 >>>> PA3 - Debug Information :: Peer Client running ...

Peer running at localhost:8000 :

Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Master1_N1803987701
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Creating folder
PeerDownloads/Cache1_N1803987701
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Peer address localhost:8000
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Peer Neighbours
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: localhost:4000
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Watching this folder
PeerDownloads/Master1_N1803987701
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Peer Server running ...
Mon Mar 20 20:32:40 CDT 2017 >>>> PA3 - Debug Information :: Peer Client running ...

All the peers when started create two folder for themselves, namely :

1. Master folder (which store the files that this peer own)
2. Cache folder (which stores the files downloaded from other peers)

Once the peers are started and folders are created, place the files in the master folders of the respective peers :

for example if you want to below configuration :

peer1 owns 1.txt

peer2 owns 2.txt

peer3 owns 3.txt

Follow below steps :

1. Start three peers
2. Place the files in their respective folders(Note that peer has to be running when the files are placed)

Sample output when the a file is created :

File named 4.txt is created and contents are written on peer running at localhost:4000

(Note : In Linux when file is created and written, internally a file is created, contents are written into a temporary file, original file is deleted and temporary file is renamed. So when I am watching on the directory I get all 3 events)

Your Choice : Mon Mar 20 20:53:43 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event

Mon Mar 20 20:53:43 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_CREATE file = 4.txt

Mon Mar 20 20:53:44 CDT 2017 >>>> PA3 - Debug Information :: {"filesMetaData":{"4.txt":{"version":1,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":[2017,3,20,20,53,43,418000000],"stale":false,"ttr":90}}}

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_DELETE file = 4.txt

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_CREATE file = 4.txt

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: {"version":2,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":[2017,3,20,20,53,50,106000000],"stale":false,"ttr":90}

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: {"filesMetaData":{"4.txt":

{"version":2,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":[2017,3,20,20,53,50,106000000],"stale":false,"ttr":90}}}

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_MODIFY file = 4.txt

A invalidation message is sent out to all neighbors.

localhost:5000 console :

Mon Mar 20 20:53:50 CDT 2017 >>>> PA3 - Debug Information :: Received Message :
INVALIDATION localhost:4000_1 4.txt 2 7 localhost:4000

Not forwarding to server from whom I received this message

Below is the console output at localhost:4000 after file is created :

```
*****
Peer Display Menu *****
1 : Lookup a file
2 : Download file from a peer
3 : Display seen query messages
4 : Display seen queryhit messages
5 : Display Peer files info
6 : Refresh a stale file
7 : Modify one of the files held by me
8 : Exit
Enter your choice number
5
-----
/                               \
      Peer File Information
\                               /
-----
/                               \
{
  "version" : 2,
  "original" : true,
  "name" : "4.txt",
  "fromAddress" : {
    "url" : "localhost",
    "port" : 4000
  },
  "lastUpdated" : [ 2017, 3, 20, 20, 53, 50, 106000000 ],
  "stale" : false,
  "ttr" : 90
}
\                               /
-----
```

this gives the file information of the file that this peer is contains
(Note : this options lists both owned and downloaded files)

File lookup :

Below is the console output of localhost:5000 when lookup is done for 4.txt :
(a query message is sent out to all neighbors and received the queryhit message fromlocalhost:4000)

```
*****
```

Your Choice : 1

```
Mon Mar 20 21:16:40 CDT 2017 >>>> PA3 - Debug Information :: Received Message : queryhit localhost:5000_2 4.txt
localhost:4000 7 {"version":2,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":
[2017,3,20,20,53,50,106000000],"stale":false,"ttr":90} 2017-03-20T20:53:50.106 1
```

```
-----
File 4.txt found at peer with port localhost:4000
```

Console output of localhost:4000 where the file 4.txt resides :

(a query message is received from localhost:4000 and once file is found queryhit message is sent out to localhost:5000)

Mon Mar 20 21:16:40 CDT 2017 >>>> PA3 - Debug Information :: Received Message : query localhost:5000_2 4.txt
localhost:5000 7

File Download :

Below is the console output at localhost:5000 when file, 4.txt, is downloaded from localhost:4000

Your choice : 2

Enter filename : 4.txt

Enter Host name of the download server : localhost

Enter port number of of the download server : 4000

Message to User:

File is downloaded to PeerDownloads/Cache1_N1804077074 Folder

Peer Display Menu *****

1 : Lookup a file

2 : Download file from a peer

3 : Display seen query messages

4 : Display seen queryhit messages

5 : Display downloaded files info

6 : Refresh a stale file

7 : Modify one of the files held by me

8 : Exit

Enter your choice number

Your Choice : 5 //display file information

```
-----  
/                                     \  
      Peer File Information  
\  
-----  
-----  
/                                     \  
{  
  "version" : 2,  
  "original" : false,  
  "name" : "4.txt",  
  "fromAddress" : {  
    "url" : "localhost",  
    "port" : 4000  
  },  
  "lastUpdated" : [ 2017, 3, 20, 20, 53, 50, 106000000 ],  
  "stale" : false,  
  "ttl" : 90  
}  
\  
-----
```

Console output at localhost:4000 during download:

Mon Mar 20 21:16:41 CDT 2017 >>>> PA3 - Debug Information :: Removing localhost:5000_2

Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Received Message : download_metadata 4.txt

Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Serving request of the type = download_metadata

Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Sending Meta Data.

Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Received Message : download 4.txt
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Serving request of the type = download
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Sending File Data
Note : we had to intenally split download into two stages :
first stage : request is sent to download the file metadata (version, origin server, last update time etc)
second stage : request is sent to download the actual file (i.e the file contents)

File 4.txt is manually updated at localhost:4000

Console output :

```
Mon Mar 20 21:16:41 CDT 2017 >>>> PA3 - Debug Information :: Removing localhost:5000_2
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Received Message : download_metadata 4.txt
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Serving request of the type = download_metadata
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Sending Meta Data.
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Received Message : download 4.txt
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Serving request of the type = download
Mon Mar 20 21:28:03 CDT 2017 >>>> PA3 - Debug Information :: Sending File Data
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_DELETE file = 4.txt
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_CREATE file = 4.txt
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information ::
{"version":3,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":
[2017,3,20,21,38,8,112000000],"stale":false,"ttr":90}
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: {"filesMetaData":{"4.txt":
{"version":3,"original":true,"name":"4.txt","fromAddress":{"url":"localhost","port":4000},"lastUpdated":
[2017,3,20,21,38,8,112000000],"stale":false,"ttr":90}}}
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Forwarding create/modify/delete event
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Event = ENTRY_MODIFY file = 4.txt
```

An Invalidation message is sent out to all neighbors :

console output at localhost:5000

```
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Received Message : INVALIDATION
localhost:4000_2 4.txt 3 7 localhost:4000
```

console output at localhost:6000

```
Mon Mar 20 21:38:08 CDT 2017 >>>> PA3 - Debug Information :: Received Message : INVALIDATION
localhost:4000_2 4.txt 3 7 localhost:4000
```

File information after handling INVALIDATION message for 4.txt from localhost:4000 :
(Note that the file is marked as Stale)

5

```
-----
/                               \
      Peer File Information
\                               /
-----
/                               \
{
  "version" : 3,
  "original" : false,
  "name" : "4.txt",
  "fromAddress" : {
    "url" : "localhost",
    "port" : 4000
  },
  "lastUpdated" : [ 2017, 3, 20, 20, 53, 50, 106000000 ],
  "stale" : true,
  "ttr" : 90
}
```

```
}
\
-----
```

File is refreshed using option 6 and then file status is displayed using option 5 :
(Note that after refreshing, file is marked as not stale)

Your Choice : 6

Enter filename :

4.txt

Peer Display Menu *****

1 : Lookup a file

2 : Download file from a peer

3 : Display seen query messages

4 : Display seen queryhit messages

5 : Display downloaded files info

6 : Refresh a stale file

7 : Modify one of the files held by me

8 : Exit

Enter your choice number

Your Choice : 5

```
-----
/                               \
      Peer File Information
\                               /
-----
/                               \
{
  "version" : 3,
  "original" : false,
  "name" : "4.txt",
  "fromAddress" : {
    "url" : "localhost",
    "port" : 4000
  },
  "lastUpdated" : [ 2017, 3, 20, 21, 38, 8, 112000000 ],
  "stale" : false,
  "ttr" : 90
}
\                               /
-----
```

Lookup from another peer, i.e, localhost:6000

(Note that there are two results from localhost:4000 and localhost:5000)

Your Choice : 1

Enter filename : 4.txt

Peer Display Menu *****

1 : Lookup a file

2 : Download file from a peer

3 : Display seen query messages

4 : Display seen queryhit messages

5 : Display downloaded files info

6 : Refresh a stale file

7 : Modify one of the files held by me

8 : Exit

Enter your choice number

Your Choice : Mon Mar 20 21:48:10 CDT 2017 >>>> PA3 - Debug Information :: Received Message : query
localhost:6000_3 4.txt localhost:4000 6
Mon Mar 20 21:48:10 CDT 2017 >>>> PA3 - Debug Information :: Not forwarding query localhost:6000_3 4.txt
localhost:4000 6
Mon Mar 20 21:48:10 CDT 2017 >>>> PA3 - Debug Information :: Received Message : queryhit localhost:6000_3
4.txt localhost:4000 7 {"version":3,"original":true,"name":"4.txt","fromAddress":
{"url":"localhost","port":4000},"lastUpdated":[2017,3,20,21,38,8,112000000],"stale":false,"ttr":90} 2017-03-
20T21:38:08.112 1

File 4.txt found at peer with port localhost:4000

Mon Mar 20 21:48:10 CDT 2017 >>>> PA3 - Debug Information :: Received Message : queryhit localhost:6000_3
4.txt localhost:5000 6 {"version":3,"original":true,"name":"4.txt","fromAddress":
{"url":"localhost","port":4000},"lastUpdated":[2017,3,20,21,38,8,112000000],"stale":false,"ttr":90} 2017-03-
20T21:38:08.112 1

File 4.txt found at peer with port localhost:5000

Lookup from another peer, i.e, localhost:6000, when download file at localhost:5000 is stale
(Note that there is only one results from localhost:4000)

Console output when 4.txt was invalidated from localhost:4000
localhost:4000 has pushed INVALIDATION message to all the neighbors
Mon Mar 20 21:50:29 CDT 2017 >>>> PA3 - Debug Information :: Received Message :
INVALIDATION localhost:4000_3 4.txt 4 7 localhost:4000

Your Choice : 1

Enter filename : 4.txt

Mon Mar 20 21:51:23 CDT 2017 >>>> PA3 - Debug Information :: Received Message : query
localhost:6000_5 4.txt localhost:4000 6
Mon Mar 20 21:51:23 CDT 2017 >>>> PA3 - Debug Information :: Not forwarding query
localhost:6000_5 4.txt localhost:4000 6
Mon Mar 20 21:51:23 CDT 2017 >>>> PA3 - Debug Information :: Received Message : queryhit
localhost:6000_5 4.txt localhost:4000 7 {"version":4,"original":true,"name":"4.txt","fromAddress":
{"url":"localhost","port":4000},"lastUpdated":
[2017,3,20,21,50,29,367000000],"stale":false,"ttr":90} 2017-03-20T21:50:29.367 1

File 4.txt found at peer with port localhost:4000
