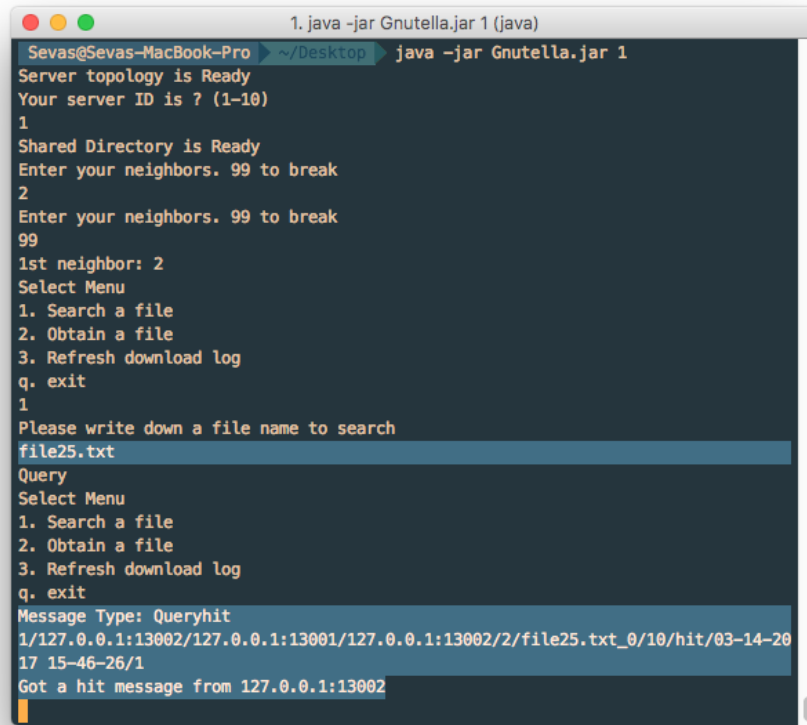


## Program testing (including program output)

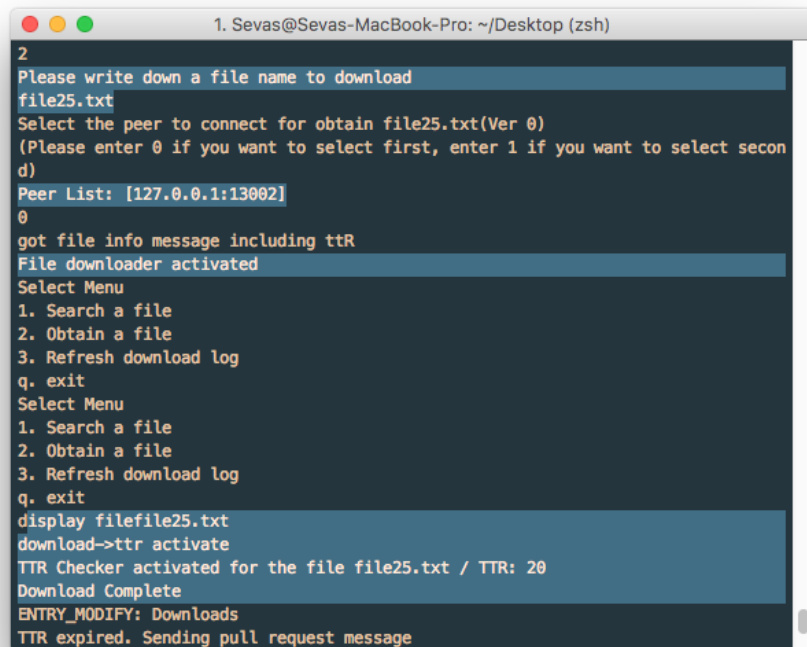
### 1. Pull-Based Consistency

#### a. File searching by issuing query and getting query hit message



```
1. java -jar Gnutella.jar 1 (java)
Sevas@Sevas-MacBook-Pro ~/Desktop java -jar Gnutella.jar 1
Server topology is Ready
Your server ID is ? (1-10)
1
Shared Directory is Ready
Enter your neighbors. 99 to break
2
Enter your neighbors. 99 to break
99
1st neighbor: 2
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
1
Please write down a file name to search
file25.txt
Query
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
Message Type: Queryhit
1/127.0.0.1:13002/127.0.0.1:13001/127.0.0.1:13002/2/file25.txt_0/10/hit/03-14-20
17 15-46-26/1
Got a hit message from 127.0.0.1:13002
```

#### b. File downloading and run TTR checker



```
1. Sevas@Sevas-MacBook-Pro: ~/Desktop (zsh)
2
Please write down a file name to download
file25.txt
Select the peer to connect for obtain file25.txt(Ver 0)
(Please enter 0 if you want to select first, enter 1 if you want to select second)
Peer List: [127.0.0.1:13002]
0
got file info message including ttr
File downloader activated
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
display filefile25.txt
download->ttr activate
TTR Checker activated for the file file25.txt / TTR: 20
Download Complete
ENTRY_MODIFY: Downloads
TTR expired. Sending pull request message
```

c. TTR Expires and send a pull request message to the origin server then get a response indicates that file has been modified

```
1. Sevas@Sevas-MacBook-Pro: ~/Desktop (zsh)
(Please enter 0 if you want to select first, enter 1 if you want to select second)
Peer List: [127.0.0.1:13002]
0
File downloader activated
got file info message including ttr
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
Select Menu
1. Search a file
2. Obtain a file
3. Refresh download log
q. exit
display filefile25.txt
download->ttr activate
TTR Checker activated for the file file25.txt / TTR: 20
Download Complete
ENTRY_MODIFY: Downloads
TTR expired. Sending pull request message
PullRequest
PullRequest: file found, fn: file25.txt_0
new version of the file file25.txt / version: 1
```

## 2. Push-Based Consistency

a. File searching by issuing query and getting query hit message

```
1. java -jar Gnutella.jar 0 (java)
Please write down a file name to search
file22.txt
Select Menu
1. Search a file
2. Obtain a file
q. exit
Message Type: Queryhit
1/127.0.0.1:13002/127.0.0.1:13001/127.0.0.1:13002/2/file22.txt_0/10/hit/03-14-20
17 16-27-00/1
Got a hit message from 127.0.0.1:13002
2
```

b. Downloading the file

```
1. java -jar Gnutella.jar 0 (java)
Please write down a file name you want to download
file22.txt
Select the peer to connect for obtain file22.txt(Ver 0)
(Please enter 0 if you want to select first, enter 1 if you want to select second)
Peer List: [127.0.0.1:13002]
0
File downloader activated
Select Menu
1. Search a file
2. Obtain a file
q. exit
```

c. Modifying the file at the original server and the original broadcasts invalidation message

```
1. java -jar Gnutella.jar 0 (java)
file22.txt
Select the peer to connect for obtain file22.txt(Ver 0)
(Please enter 0 if you want to select first, enter 1 if you want to select second)
Peer List: [127.0.0.1:13002]
0
File downloader activated
Select Menu
1. Search a file
2. Obtain a file
q. exit
Select Menu
1. Search a file
2. Obtain a file
q. exit
display filefile22.txt
Download Complete
ENTRY_MODIFY: Downloads
Message Type: Invalidation
file file22.txt has been invalidated
```

d. The other server got an invalidation message with new version number and invalidate the copy

```
2. java -jar Gnutella.jar 0 (java)
99
1st neighbor: 1
Select Menu
1. Search a file
2. Obtain a file
q. exit
1: 127.0.0.1:13001
File Obtain Requested from 127.0.0.1:13001
Upload Complete
ENTRY_MODIFY: file22.txt
Updated Version No. of file22.txt: 1
Invalidation: 1/2/neighbor/file22.txt_1/10
```