Security Engineering
Lab 1 (Report)

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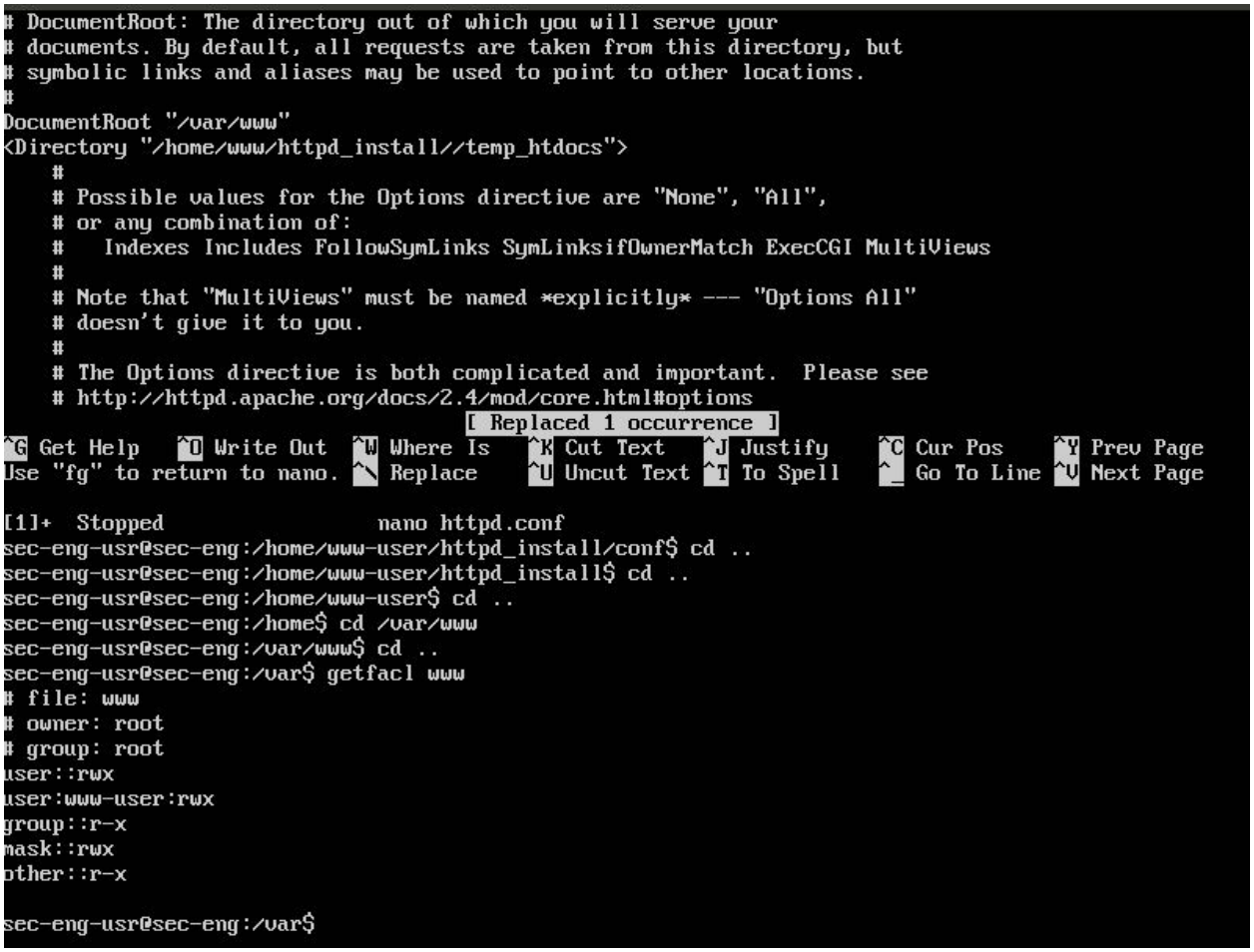
1. Basic ACLs

Steps followed during the lab assignment :

1)Copy the files to the user directory.
Command : sudo cp -r /root/httpd_install/* /home/www-user

2) Move to httpd_install directory.
Command : cd /home/www-user/httpd_install

3)Change DocumentRoot in the httpd.conf
sudo nano httpd.conf



4)Change the directory to /var/www

cd /var/www

5) Add user-www permissions in the ACL and remove all others

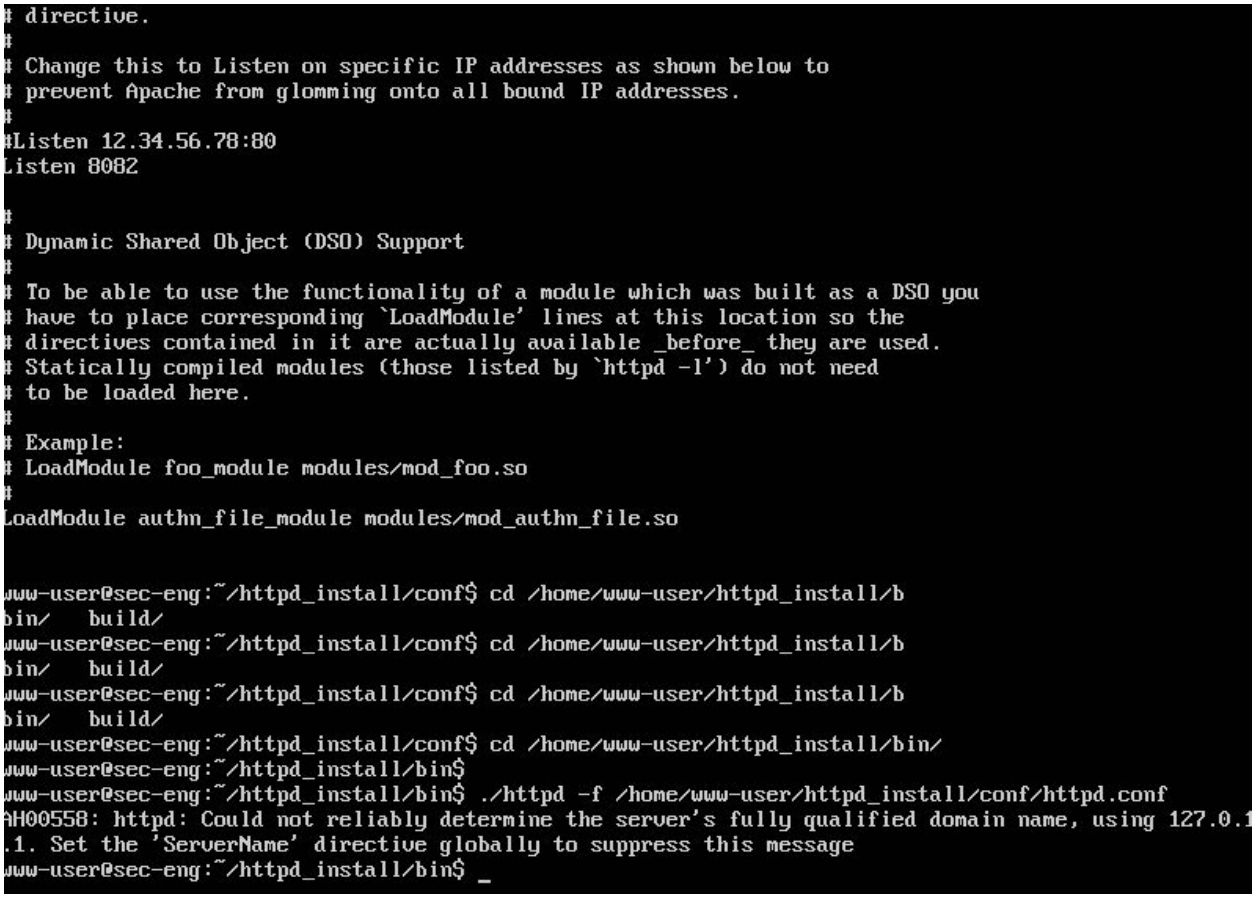
Getfacl www

Sudo setfacl -m u:www-user:rwx www	(add user permission)
Sudo setfacl -m u::--- ./www	(delete permission)
Sudo setfacl -m g::--- ./www	(delete permission)
Sudo setfacl -m o::--- ./www	(delete permission)

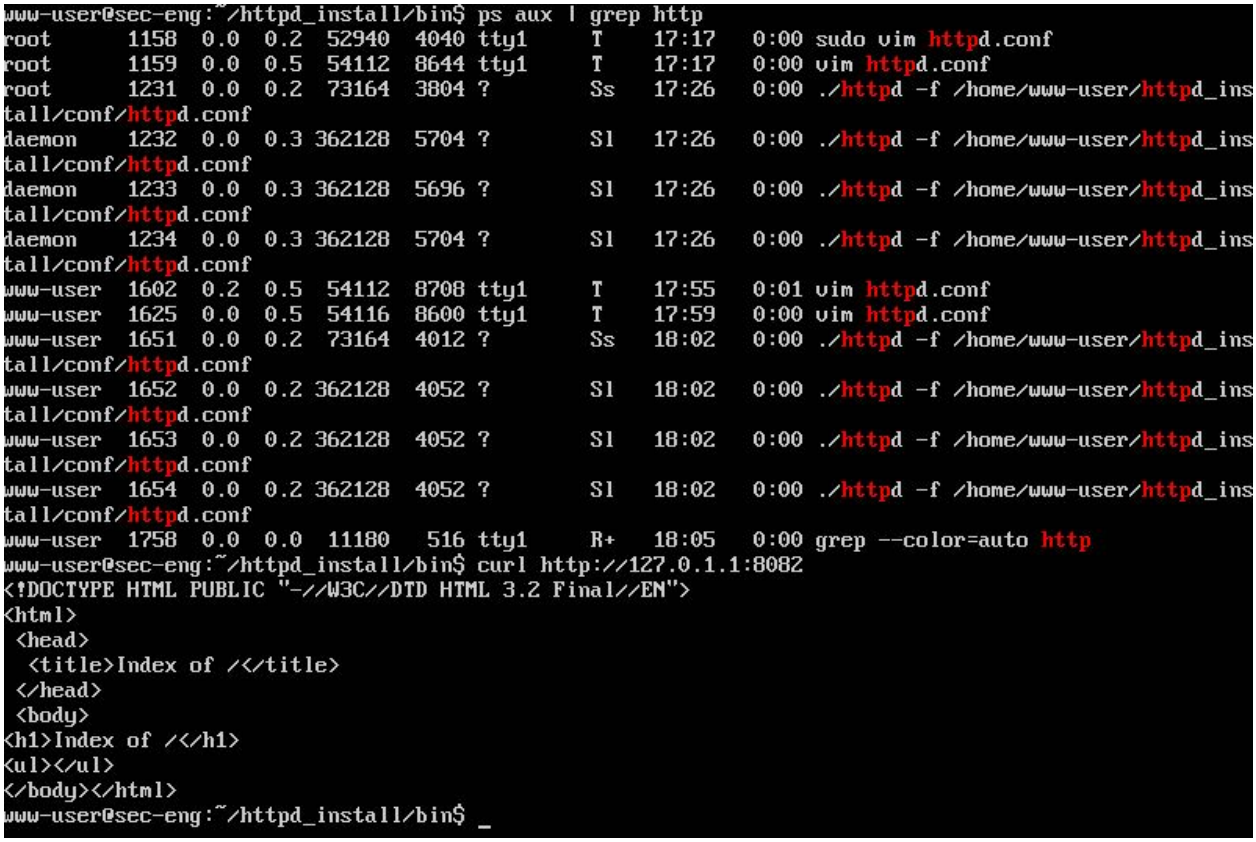
```
sec-eng-usr@sec-eng:/var$ setfacl -x other www
setfacl: www: Malformed access ACL `user::rwx,user:www-user:rwx,group::r-x,mask::rwx': Missing or wr
ong entry at entry 5
sec-eng-usr@sec-eng:/var$ sudo setfacl -m u::--- ./www
[sudo] password for sec-eng-usr:
sec-eng-usr@sec-eng:/var$ getfacl www
# file: www
# owner: root
# group: root
user::---
user:www-user:rwx
group::r-x
mask::rwx
other::r-x

sec-eng-usr@sec-eng:/var$ sudo setfacl -m u:*:--- ./www
setfacl: Option -m: Invalid argument near character 3
sec-eng-usr@sec-eng:/var$ setfacl -s u:www-user:rwx www
Usage: setfacl [-bkndRLP] { -m|-M|-x|-X ... } file ...
Try `setfacl --help' for more information.
sec-eng-usr@sec-eng:/var$ sudo setfacl -s u:www-user:rwx www
Usage: setfacl [-bkndRLP] { -m|-M|-x|-X ... } file ...
Try `setfacl --help' for more information.
sec-eng-usr@sec-eng:/var$ sudo setfacl -m o::--- ./www
sec-eng-usr@sec-eng:/var$ getfacl www
# file: www
# owner: root
# group: root
user::---
user:www-user:rwx
group::r-x
mask::rwx
other::---

sec-eng-usr@sec-eng:/var$ sudo setfacl -m g::--- ./www
sec-eng-usr@sec-eng:/var$
```

```
user::---
user:www-user:rwx
group::r-x
mask::rwx
other::r-x

sec-eng-usr@sec-eng:/var$ sudo setfacl -m u:*:--- ./www
setfacl: Option -m: Invalid argument near character 3
sec-eng-usr@sec-eng:/var$ setfacl -s u:www-user:rwx www
Usage: setfacl [-bkndRLP] { -m|-M|-x|-X ... } file ...
Try `setfacl --help' for more information.
sec-eng-usr@sec-eng:/var$ sudo setfacl -s u:www-user:rwx www
Usage: setfacl [-bkndRLP] { -m|-M|-x|-X ... } file ...
Try `setfacl --help' for more information.
sec-eng-usr@sec-eng:/var$ sudo setfacl -m o::--- ./www
sec-eng-usr@sec-eng:/var$ getfacl www
# file: www
# owner: root
# group: root
user::---
user:www-user:rwx
group::r-x
mask::rwx
other::---

sec-eng-usr@sec-eng:/var$ sudo setfacl -m g::--- ./www
sec-eng-usr@sec-eng:/var$ getfacl www
# file: www
# owner: root
# group: root
user::---
user:www-user:rwx
group::---
mask::rwx
other::---

sec-eng-usr@sec-eng:/var$ _
```

6)Run the HTTP server from the bin directory
./httpd -f /home/www-user/httpd_install/conf/httpd_conf



7)Switch to the www-user and test if permission is obtained by sending a request to the server
curl 127.0.0.1:8082
Permission given



ps aux | grep http to verify server running

After that create a new dir name “new” where www-user has no permission to that file

Change documentroot location to var/new

Run http server by foing inside bin
./httpd -f /home/www-user/httpd_install/conf/httpd_conf

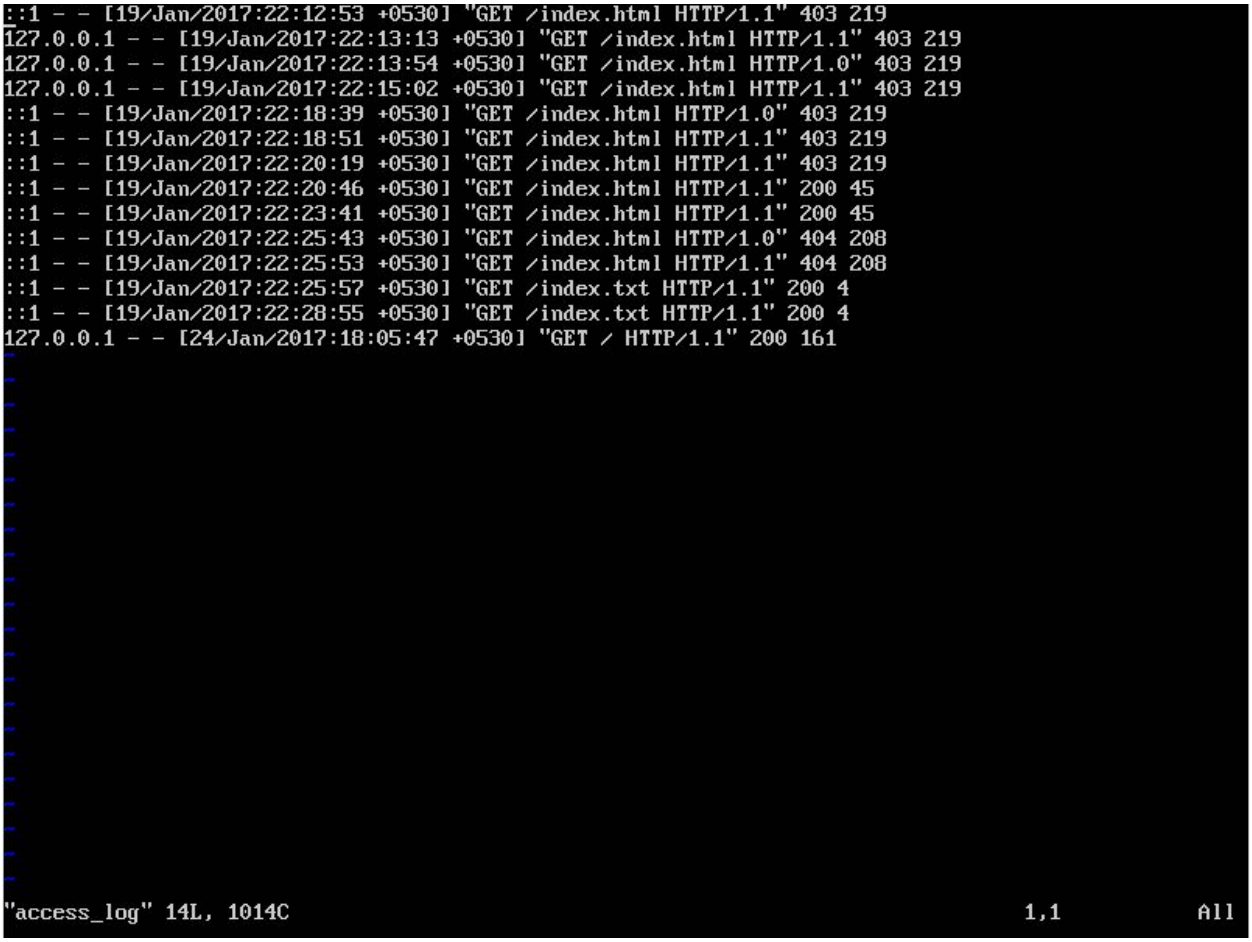
Curl 127.0.0.1:8082

```
Unable to get valid context for sec-eng-usr
sec-eng-usr@sec-eng:~$ cd /var
sec-eng-usr@sec-eng:/var$ ls
backups  cache  crash  lib  local  lock  log  mail  opt  run  spool  tmp  webapp  www
sec-eng-usr@sec-eng:/var$ mkdir new
mkdir: cannot create directory ‘new’: Permission denied
sec-eng-usr@sec-eng:/var$ sudo mkdir new
[sudo] password for sec-eng-usr:
sec-eng-usr@sec-eng:/var$ getfacl new
# file: new
# owner: root
# group: root
user::rwx
group::r-x
other::r-x

sec-eng-usr@sec-eng:/var$ sudo setfacl -m o::--- new
sec-eng-usr@sec-eng:/var$ getfacl new
# file: new
# owner: root
# group: root
user::rwx
group::r-x
other::---

sec-eng-usr@sec-eng:/var$ sudo setfacl -m g::--- new
sec-eng-usr@sec-eng:/var$ getfacl new
# file: new
# owner: root
# group: root
user::rwx
group::---
other::---

sec-eng-usr@sec-eng:/var$
```

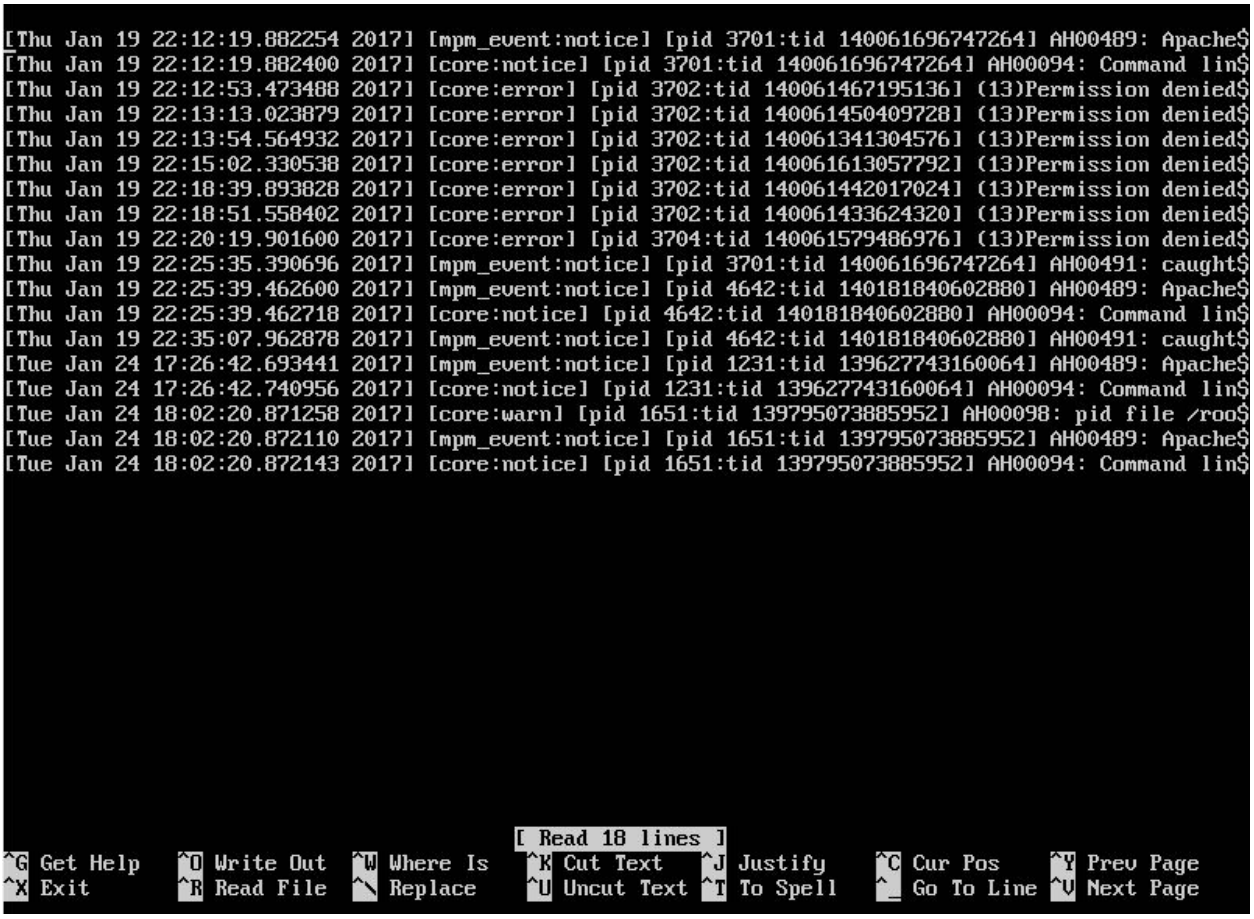
Create new dir in /root and remove other users and group permission.

```
# you might expect, make sure that you have specifically enabled it
# below.
#

#
# DocumentRoot: The directory out of which you will serve your
# documents. By default, all requests are taken from this directory, but
# symbolic links and aliases may be used to point to other locations.
#
DocumentRoot "/var/new"
<Directory "/var/new">
    #
    # Possible values for the Options directive are "None", "All",
    # or any combination of:


sec-eng-usr@sec-eng:/home/www-user/httpd_install/conf$ cd /home/www-user/httpd_install/
sec-eng-usr@sec-eng:/home/www-user/httpd_install$ cd bin
sec-eng-usr@sec-eng:/home/www-user/httpd_install/bin$ sudo ./httpd -f /home/www-user/httpd_install/c
onf/httpd.conf
AH00558: httpd: Could not reliably determine the server's fully qualified domain name, using 127.0.1
.1. Set the 'ServerName' directive globally to suppress this message
sec-eng-usr@sec-eng:/home/www-user/httpd_install/bin$ su www-user
Password:
www-user@sec-eng:~/httpd_install/bin$ curl 127.0.0.1.8082
curl: (6) Could not resolve host: 127.0.0.1.8082
www-user@sec-eng:~/httpd_install/bin$ curl 127.0.0.1:8082
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access /
on this server.<br />
</p>
</body></html>
www-user@sec-eng:~/httpd_install/bin$ _
```

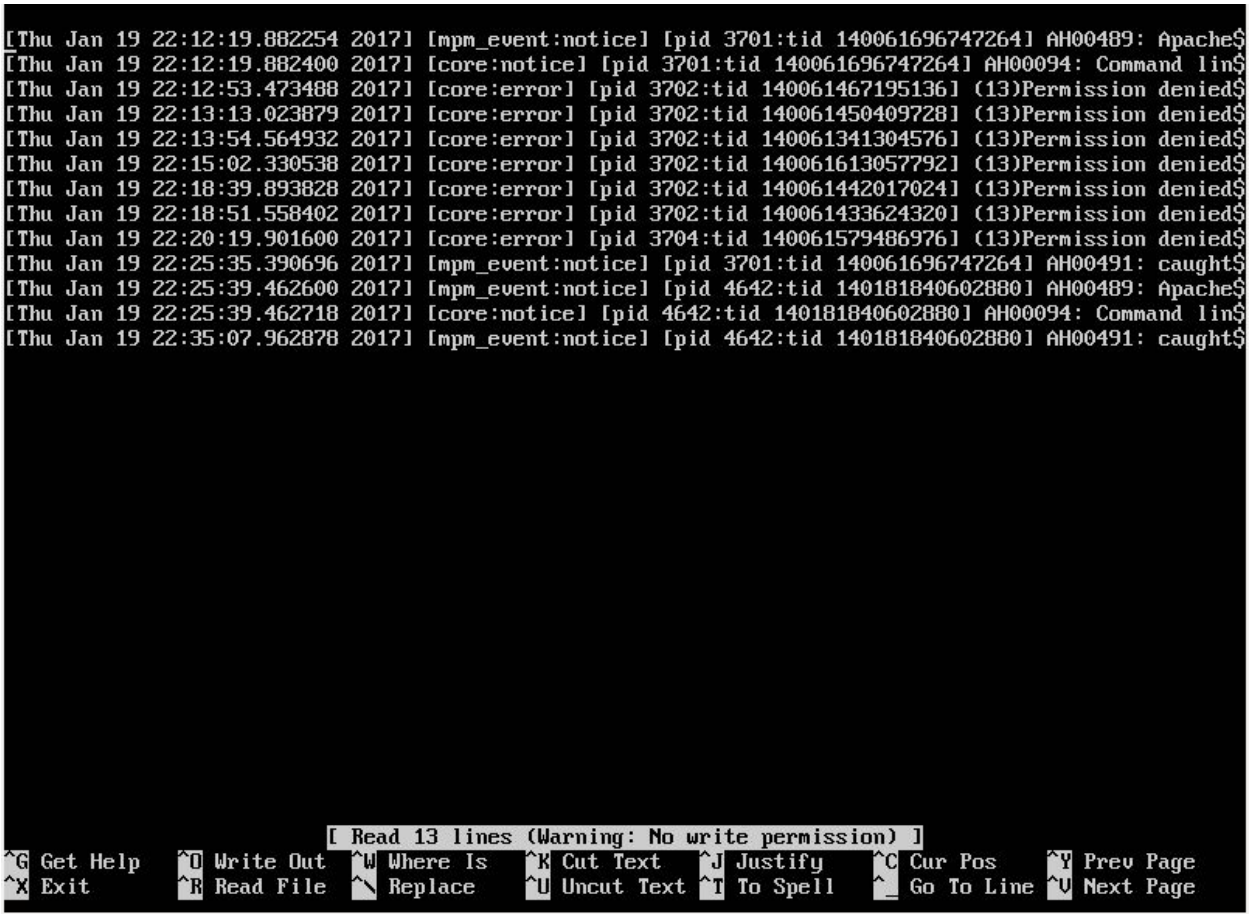
```
sec-eng-usr@sec-eng:/var/log/apache2$ sudo setfacl -s u:www-user:rwx ./access.log
Usage: setfacl [-bkndRLP] { -m|-M|-x|-X ... } file ...
Try `setfacl --help' for more information.
sec-eng-usr@sec-eng:/var/log/apache2$ ls
access.log  error.log  other_vhosts_access.log
sec-eng-usr@sec-eng:/var/log/apache2$ sudo setfacl -m u:www-user:rwx ./access.log
sec-eng-usr@sec-eng:/var/log/apache2$ getfacl access.log
# file: access.log
# owner: root
# group: adm
user::rw-
user:www-user:rwx
group::r--
mask::rwx
other::---

sec-eng-usr@sec-eng:/var/log/apache2$ _
```


::1 - - [19/Jan/2017:22:12:53 +0530] "GET /index.html HTTP/1.1" 403 219
127.0.0.1 - - [19/Jan/2017:22:13:13 +0530] "GET /index.html HTTP/1.1" 403 219
127.0.0.1 - - [19/Jan/2017:22:13:54 +0530] "GET /index.html HTTP/1.0" 403 219
127.0.0.1 - - [19/Jan/2017:22:15:02 +0530] "GET /index.html HTTP/1.1" 403 219
::1 - - [19/Jan/2017:22:18:39 +0530] "GET /index.html HTTP/1.0" 403 219
::1 - - [19/Jan/2017:22:18:51 +0530] "GET /index.html HTTP/1.1" 403 219
::1 - - [19/Jan/2017:22:20:19 +0530] "GET /index.html HTTP/1.1" 403 219
::1 - - [19/Jan/2017:22:20:46 +0530] "GET /index.html HTTP/1.1" 200 45
::1 - - [19/Jan/2017:22:23:41 +0530] "GET /index.html HTTP/1.1" 200 45
::1 - - [19/Jan/2017:22:25:43 +0530] "GET /index.html HTTP/1.0" 404 208
::1 - - [19/Jan/2017:22:25:53 +0530] "GET /index.html HTTP/1.1" 404 208
::1 - - [19/Jan/2017:22:25:57 +0530] "GET /index.txt HTTP/1.1" 200 4
::1 - - [19/Jan/2017:22:28:55 +0530] "GET /index.txt HTTP/1.1" 200 4
127.0.0.1 - - [24/Jan/2017:18:05:47 +0530] "GET / HTTP/1.1" 200 161
"access_log" 14L, 1014C
1,1
All

access.log


[Thu Jan 19 22:12:19.882254 2017] [mpm_event:notice] [pid 3701:tid 140061696747264] AH00489: Apache$
[Thu Jan 19 22:12:19.882400 2017] [core:notice] [pid 3701:tid 140061696747264] AH00094: Command lin$
[Thu Jan 19 22:12:53.473488 2017] [core:error] [pid 3702:tid 140061467195136] (13)Permission denied$
[Thu Jan 19 22:13:13.023879 2017] [core:error] [pid 3702:tid 140061450409728] (13)Permission denied$
[Thu Jan 19 22:13:54.564932 2017] [core:error] [pid 3702:tid 140061341304576] (13)Permission denied$
[Thu Jan 19 22:15:02.330538 2017] [core:error] [pid 3702:tid 140061613057792] (13)Permission denied$
[Thu Jan 19 22:18:39.893828 2017] [core:error] [pid 3702:tid 140061442017024] (13)Permission denied$
[Thu Jan 19 22:18:51.558402 2017] [core:error] [pid 3702:tid 140061433624320] (13)Permission denied$
[Thu Jan 19 22:20:19.901600 2017] [core:error] [pid 3704:tid 140061579486976] (13)Permission denied$
[Thu Jan 19 22:25:35.390696 2017] [mpm_event:notice] [pid 3701:tid 140061696747264] AH00491: caught$
[Thu Jan 19 22:25:39.462600 2017] [mpm_event:notice] [pid 4642:tid 140181840602880] AH00489: Apache$
[Thu Jan 19 22:25:39.462718 2017] [core:notice] [pid 4642:tid 140181840602880] AH00094: Command lin$
[Thu Jan 19 22:35:07.962878 2017] [mpm_event:notice] [pid 4642:tid 140181840602880] AH00491: caught$
[Tue Jan 24 17:26:42.693441 2017] [mpm_event:notice] [pid 1231:tid 139627743160064] AH00489: Apache$
[Tue Jan 24 17:26:42.740956 2017] [core:notice] [pid 1231:tid 139627743160064] AH00094: Command lin$
[Tue Jan 24 18:02:20.871258 2017] [core:warn] [pid 1651:tid 139795073885952] AH00098: pid file /roo$
[Tue Jan 24 18:02:20.872110 2017] [mpm_event:notice] [pid 1651:tid 139795073885952] AH00489: Apache$
[Tue Jan 24 18:02:20.872143 2017] [core:notice] [pid 1651:tid 139795073885952] AH00094: Command lin$
[Read 18 lines]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos ^Y Prev Page
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line ^V Next Page

error.log

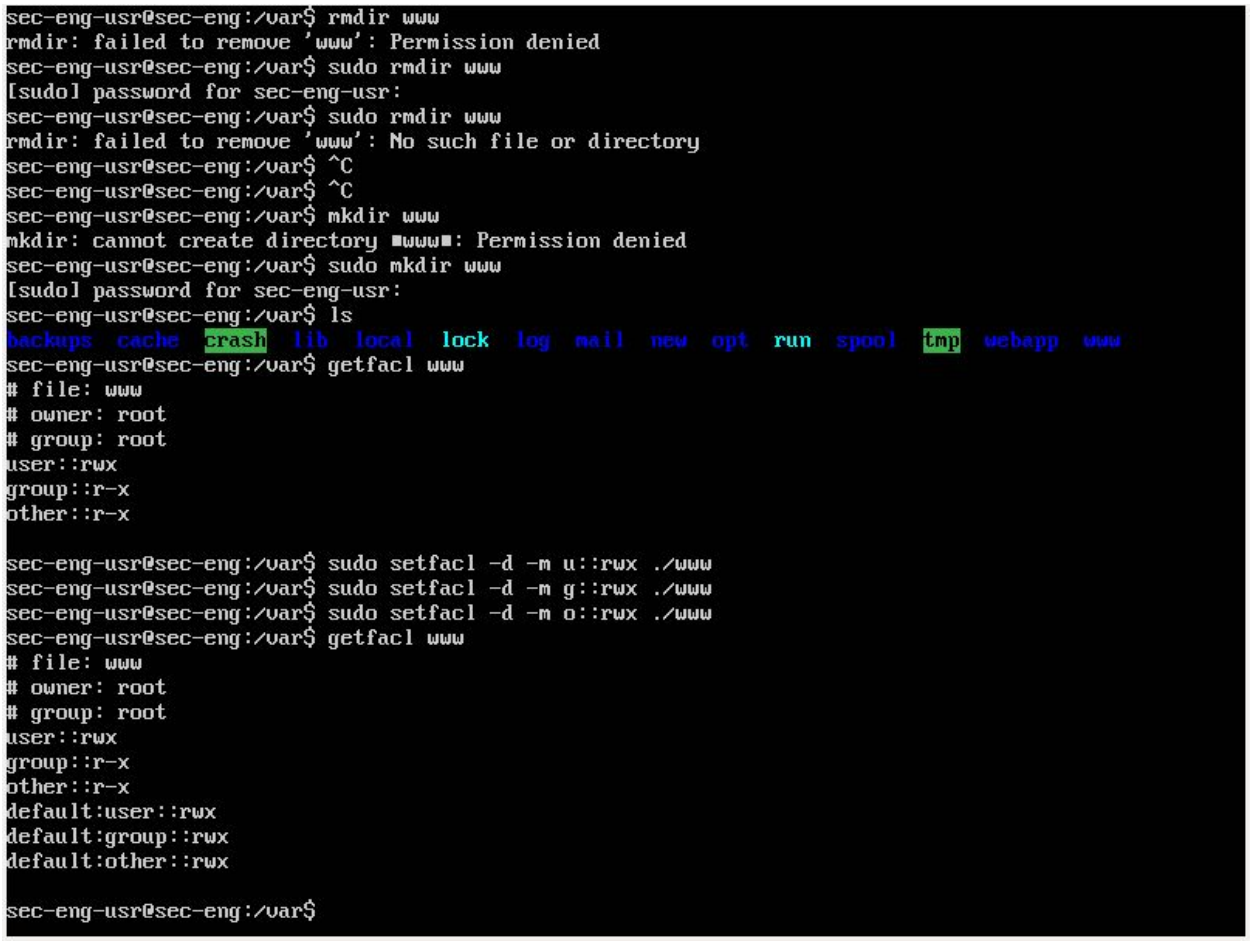


Error log for permission denied

2. Default ACLs

1)In this question we create two directories in /var/www,

Give default permissions **rwx** for users, groups and others to /var/www.



2)

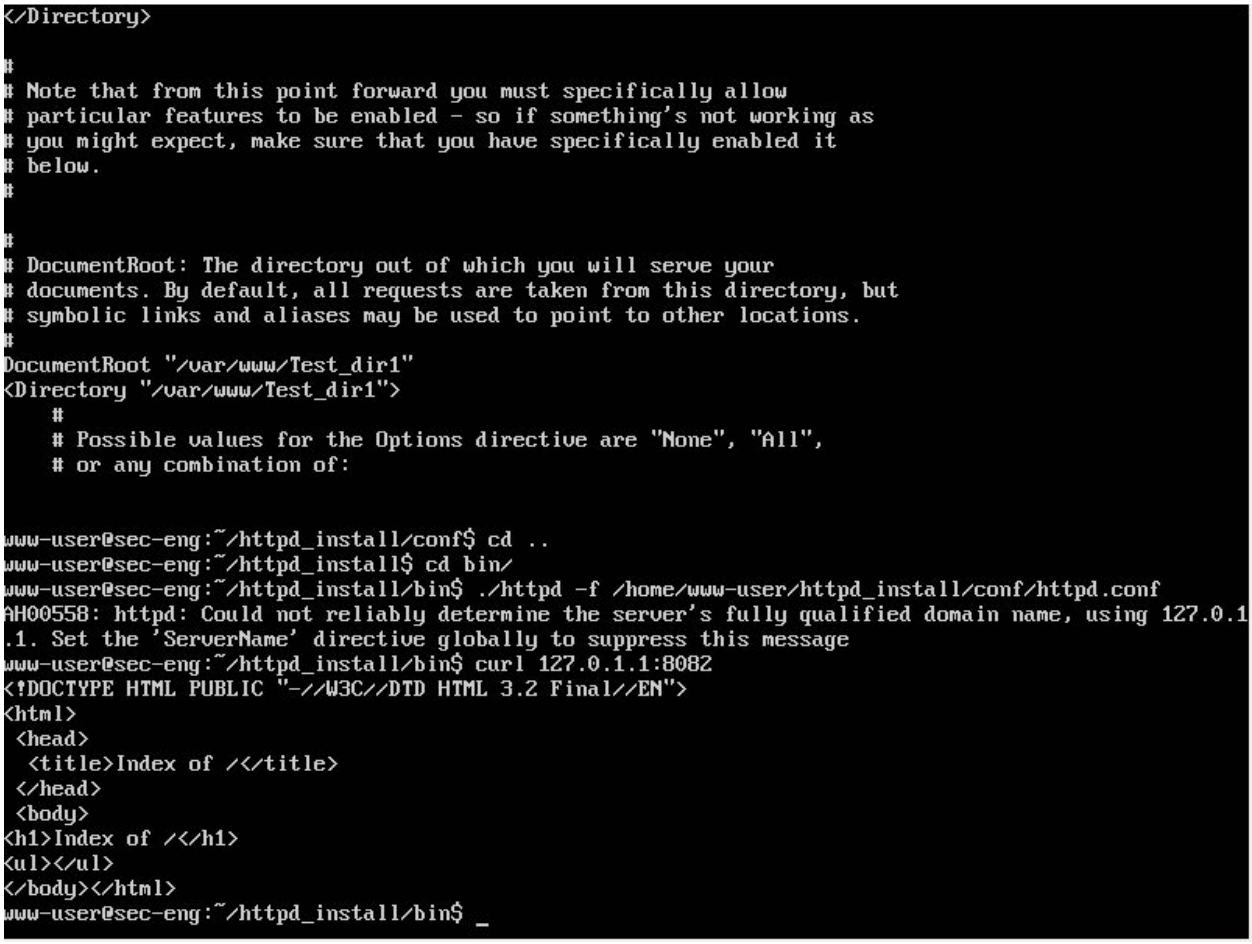
var/www/Test_dir1 : inherited default permissions as **rwx** from the parent directory (var/www/) .Give default permissions as **- - -** for users,groups and others.
var/www/Test_dir2: inherited default permissions as **rwx** from the parent directory (var/www/)

```
sec-eng-usr@sec-eng:/var$ sudo setfacl -d -m g::rwx ./www
sec-eng-usr@sec-eng:/var$ sudo setfacl -d -m o::rwx ./www
sec-eng-usr@sec-eng:/var$ getfacl www
# file: www
# owner: root
# group: root
user::rwx
group::r-x
other::r-x
default:user::rwx
default:group::rwx
default:other::rwx

sec-eng-usr@sec-eng:/var$ sudo mkdir Test_dir1
sec-eng-usr@sec-eng:/var$ sudo mkdir Test_dir2
sec-eng-usr@sec-eng:/var$ sudo rmdir Test_dir2
sec-eng-usr@sec-eng:/var$ sudo rmdir Test_dir1
sec-eng-usr@sec-eng:/var$ cd www
sec-eng-usr@sec-eng:/var/www$ sudo mkdir Test_dir1
sec-eng-usr@sec-eng:/var/www$ sudo mkdir Test_dir2
sec-eng-usr@sec-eng:/var/www$ ls
Test_dir1  Test_dir2
sec-eng-usr@sec-eng:/var/www$ sudo setfacl -d -m o::--- ./Test_dir1
sec-eng-usr@sec-eng:/var/www$ sudo setfacl -d -m u::--- ./Test_dir1
sec-eng-usr@sec-eng:/var/www$ sudo setfacl -d -m g::--- ./Test_dir1
sec-eng-usr@sec-eng:/var/www$ getfacl Test_dir1
# file: Test_dir1
# owner: root
# group: root
user::rwx
group::rwx
other::rwx
default:user::---
default:group::---
default:other::---

sec-eng-usr@sec-eng:/var/www$ _
```

3) Run getfacl Test_dir1 and getfacl Test_dir1 to check the assigned permissions

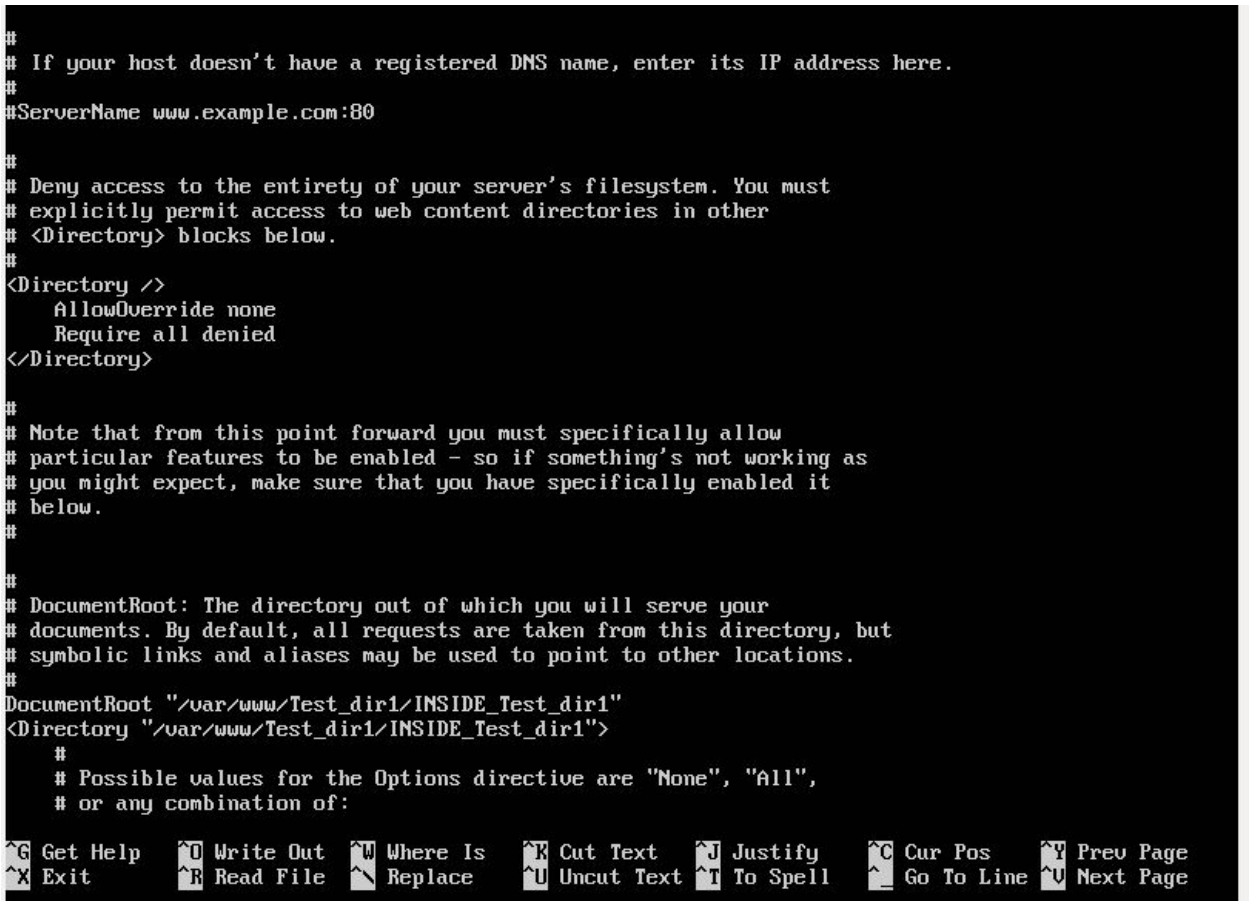
```
sec-eng-usr@sec-eng:/var/www$
sec-eng-usr@sec-eng:/var/www$
sec-eng-usr@sec-eng:/var/www$ getfacl Test_dir1
# file: Test_dir1
# owner: root
# group: root
user::rwx
group::rwx
other::rwx
default:user::---
default:group::---
default:other::---

sec-eng-usr@sec-eng:/var/www$ getfacl Test_dir2
# file: Test_dir2
# owner: root
# group: root
user::rwx
group::rwx
other::rwx
default:user::rwx
default:group::rwx
default:other::rwx

sec-eng-usr@sec-eng:/var/www$ cd Test_dir1
sec-eng-usr@sec-eng:/var/www/Test_dir1$ getfacl INSIDE_Test_dir1/
# file: INSIDE_Test_dir1/
# owner: sec-eng-usr
# group: sec-eng-usr
user::---
group::---
other::---
default:user::---
default:group::---
default:other::---

sec-eng-usr@sec-eng:/var/www/Test_dir1$ _
```

4) set DocumentRoot : directory /var/www/Test_dir1
Allowed access and given the following output.



(Error code 403 : Forbidden (as default access of www is overwritten by default access of Test_dir1))

Moving to Inside the directory(/var/www/Test_dir1/INSIDE_Test_dir1) where permission is not granted.(first setting DocumentRoot in the httpd.conf file)

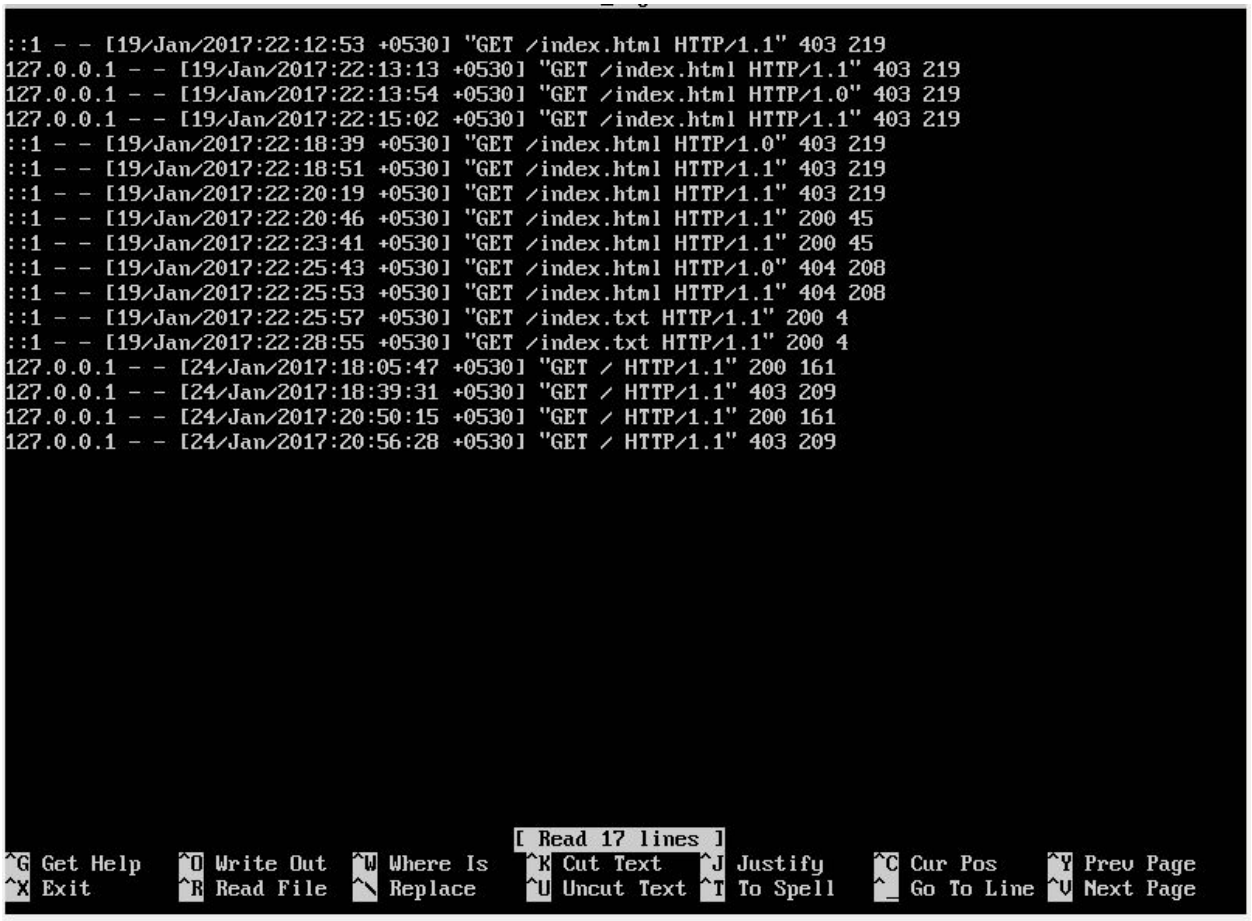


Run the server and check for response(Denied 403 Error.)

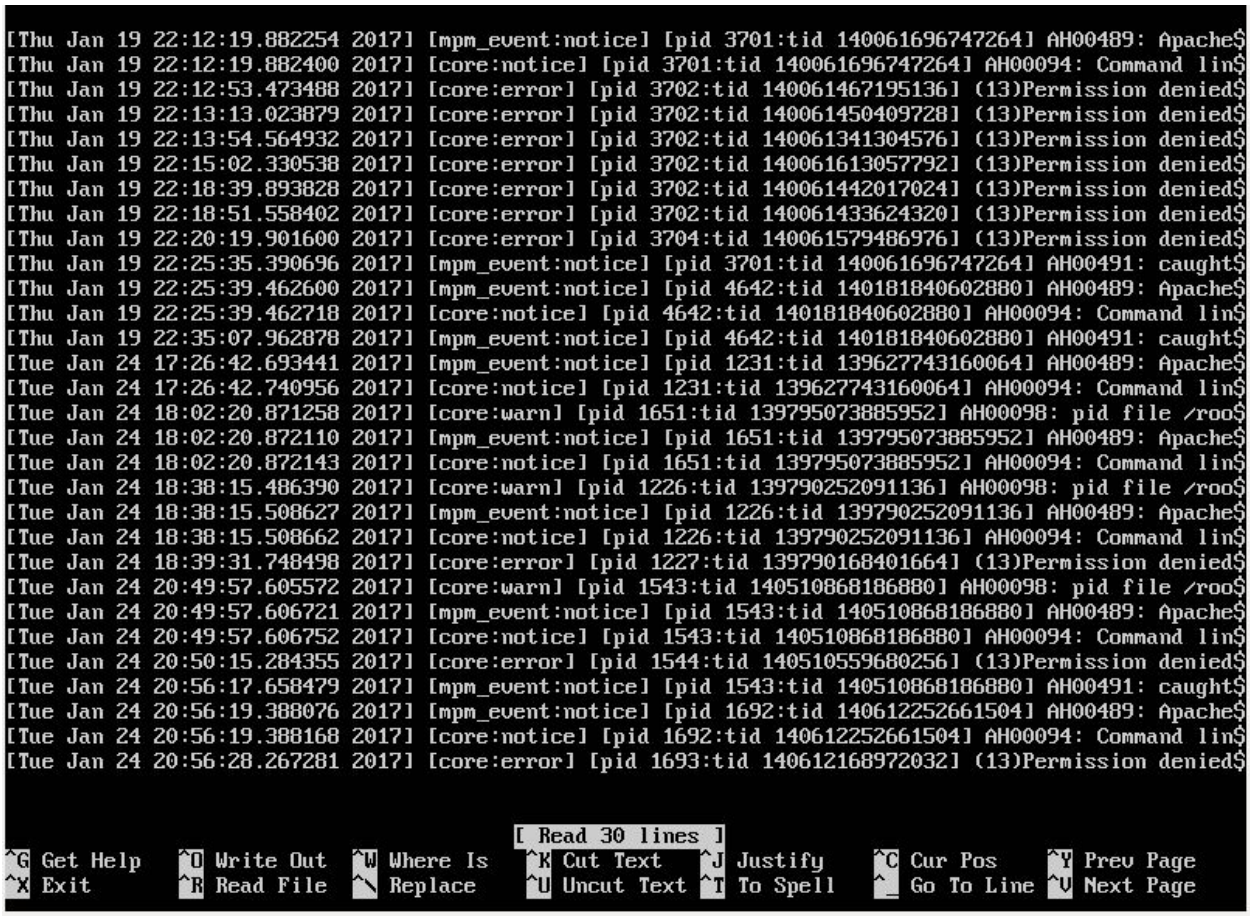
```
# you might expect, make sure that you have specifically enabled it
# below.
#


#
# DocumentRoot: The directory out of which you will serve your
# documents. By default, all requests are taken from this directory, but
# symbolic links and aliases may be used to point to other locations.
#
DocumentRoot "/var/www/Test_dir1/INSIDE_Test_dir1"
<Directory "/var/www/Test_dir1/INSIDE_Test_dir1">
    #
    # Possible values for the Options directive are "None", "All",
    # or any combination of:


www-user@sec-eng:~/httpd_install/conf$ cd ..
www-user@sec-eng:~/httpd_install$ cd bin
www-user@sec-eng:~/httpd_install/bin$ ./httpd -f /home/www-user/httpd_install/conf/httpd.conf
AH00558: httpd: Could not reliably determine the server's fully qualified domain name, using 127.0.1
.1. Set the 'ServerName' directive globally to suppress this message
httpd (pid 1543) already running
www-user@sec-eng:~/httpd_install/bin$ kill 1543
www-user@sec-eng:~/httpd_install/bin$ ./httpd -f /home/www-user/httpd_install/conf/httpd.conf
AH00558: httpd: Could not reliably determine the server's fully qualified domain name, using 127.0.1
.1. Set the 'ServerName' directive globally to suppress this message
www-user@sec-eng:~/httpd_install/bin$ curl 127.0.1.1:8082
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access /
on this server.<br />
</p>
</body></html>
www-user@sec-eng:~/httpd_install/bin$
```

Logs :

Access Logs (for successful request) :



Error Logs:


[Thu Jan 19 22:12:19.882254 2017] [mpm_event:notice] [pid 3701:tid 140061696747264] AH00489: Apache$
[Thu Jan 19 22:12:19.882400 2017] [core:notice] [pid 3701:tid 140061696747264] AH00094: Command lin$
[Thu Jan 19 22:12:53.473488 2017] [core:error] [pid 3702:tid 140061467195136] (13)Permission denied$
[Thu Jan 19 22:13:13.023879 2017] [core:error] [pid 3702:tid 140061450409728] (13)Permission denied$
[Thu Jan 19 22:13:54.564932 2017] [core:error] [pid 3702:tid 140061341304576] (13)Permission denied$
[Thu Jan 19 22:15:02.330538 2017] [core:error] [pid 3702:tid 140061613057792] (13)Permission denied$
[Thu Jan 19 22:18:39.893828 2017] [core:error] [pid 3702:tid 140061442017024] (13)Permission denied$
[Thu Jan 19 22:18:51.558402 2017] [core:error] [pid 3702:tid 140061433624320] (13)Permission denied$
[Thu Jan 19 22:20:19.901600 2017] [core:error] [pid 3704:tid 140061579486976] (13)Permission denied$
[Thu Jan 19 22:25:35.390696 2017] [mpm_event:notice] [pid 3701:tid 140061696747264] AH00491: caught$
[Thu Jan 19 22:25:39.462600 2017] [mpm_event:notice] [pid 4642:tid 140181840602880] AH00489: Apache$
[Thu Jan 19 22:25:39.462718 2017] [core:notice] [pid 4642:tid 140181840602880] AH00094: Command lin$
[Thu Jan 19 22:35:07.962878 2017] [mpm_event:notice] [pid 4642:tid 140181840602880] AH00491: caught$
[Tue Jan 24 17:26:42.693441 2017] [mpm_event:notice] [pid 1231:tid 139627743160064] AH00489: Apache$
[Tue Jan 24 17:26:42.740956 2017] [core:notice] [pid 1231:tid 139627743160064] AH00094: Command lin$
[Tue Jan 24 18:02:20.871258 2017] [core:warn] [pid 1651:tid 139795073885952] AH00098: pid file /roo$
[Tue Jan 24 18:02:20.872110 2017] [mpm_event:notice] [pid 1651:tid 139795073885952] AH00489: Apache$
[Tue Jan 24 18:02:20.872143 2017] [core:notice] [pid 1651:tid 139795073885952] AH00094: Command lin$
[Tue Jan 24 18:38:15.486390 2017] [core:warn] [pid 1226:tid 139790252091136] AH00098: pid file /roo$
[Tue Jan 24 18:38:15.508627 2017] [mpm_event:notice] [pid 1226:tid 139790252091136] AH00489: Apache$
[Tue Jan 24 18:38:15.508662 2017] [core:notice] [pid 1226:tid 139790252091136] AH00094: Command lin$
[Tue Jan 24 18:39:31.748498 2017] [core:error] [pid 1227:tid 139790168401664] (13)Permission denied$
[Tue Jan 24 20:49:57.605572 2017] [core:warn] [pid 1543:tid 140510868186880] AH00098: pid file /roo$
[Tue Jan 24 20:49:57.606721 2017] [mpm_event:notice] [pid 1543:tid 140510868186880] AH00489: Apache$
[Tue Jan 24 20:49:57.606752 2017] [core:notice] [pid 1543:tid 140510868186880] AH00094: Command lin$
[Tue Jan 24 20:50:15.284355 2017] [core:error] [pid 1544:tid 140510559680256] (13)Permission denied$
[Tue Jan 24 20:56:17.658479 2017] [mpm_event:notice] [pid 1543:tid 140510868186880] AH00491: caught$
[Tue Jan 24 20:56:19.388076 2017] [mpm_event:notice] [pid 1692:tid 140612252661504] AH00489: Apache$
[Tue Jan 24 20:56:19.388168 2017] [core:notice] [pid 1692:tid 140612252661504] AH00094: Command lin$
[Tue Jan 24 20:56:28.267281 2017] [core:error] [pid 1693:tid 140612168972032] (13)Permission denied$
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