

ADVANCES IN OPERATING SYSTEM DESIGN

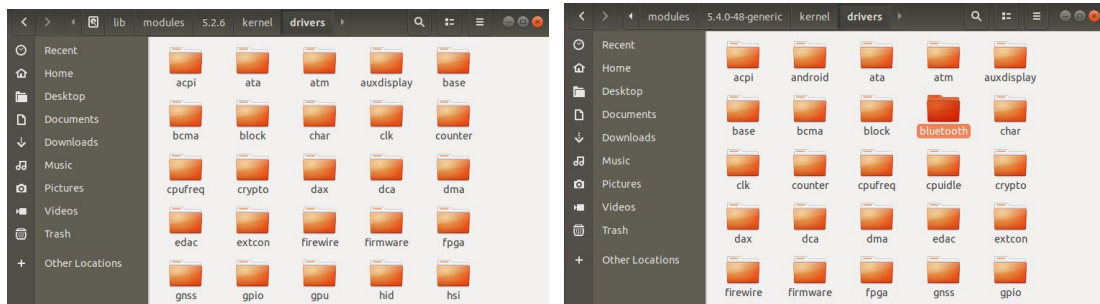
ASSIGNMENT 1: Installing Linux Kernel

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1. EXCLUDING BLUETOOTH SUBSYSTEM CONTROL

Bluetooth Subsystem Control was excluded from the `menuconfig` file of kernel version 5.2.6 by navigating to `Networking Support -> Bluetooth Subsystem Support`.

After installing the linux kernel, we found out that there was no `bluetooth` named directory in the path `/lib/modules/5.2.6/kernel/drivers/`. However, the same directory was present in `/lib/modules/5.4.0-48-generic/kernel/drivers/`, where the default kernel version is 5.4.0-48-generic. Here is a screenshot of the same observation.



(a) 5.2.6

(b) 5.4.0-48-generic

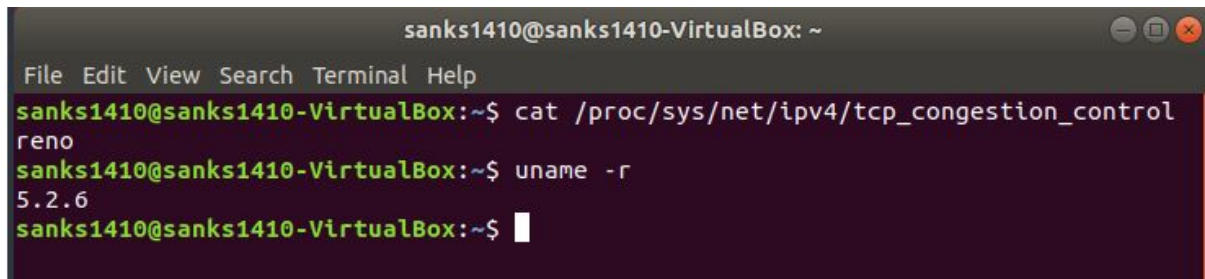
Also, on issuing the command `lsmod | grep bluetooth`, no output was observed.

In the config file for the kernel version 5.2.6, we will notice `# CONFIG_BT is not set`, however, for the config file of version 5.4.0-48-generic, `CONFIG_BT=y` is set.

2. RENO AS TCP CONGESTION CONTROL ALGORITHM

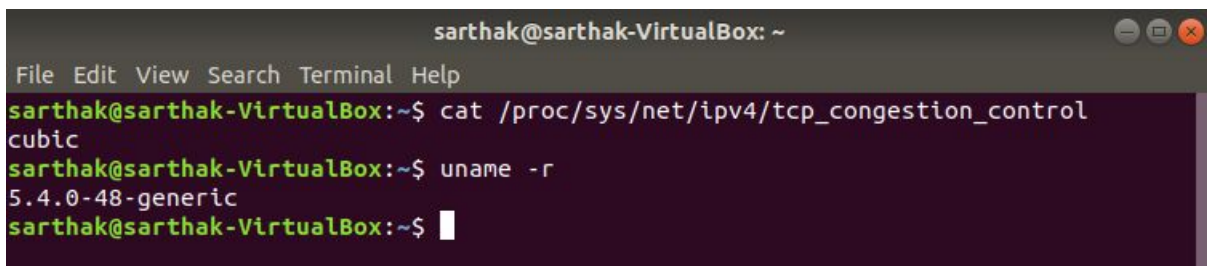
TCP Congestion Control Algorithm was changed to **Reno** from the `menuconfig` file of kernel version 5.2.6 by navigating to `Networking Support -> Networking Options -> TCP: advanced congestion control -> Default TCP congestion control -> Reno`.

After installing the linux kernel, we found out that on issuing the command `$ cat /proc/sys/net/ipv4/tcp_congestion_control`, kernel 5.2.6 showed **Reno** while kernel 5.4.0-48-generic showed **Cubic**. Here is a screenshot of the same observation.

A terminal window titled 'sanks1410@sanks1410-VirtualBox: ~' showing the output of two commands. The first command, 'cat /proc/sys/net/ipv4/tcp_congestion_control', returns 'reno'. The second command, 'uname -r', returns '5.2.6'.

```
sanks1410@sanks1410-VirtualBox: ~  
File Edit View Search Terminal Help  
sanks1410@sanks1410-VirtualBox:~$ cat /proc/sys/net/ipv4/tcp_congestion_control  
reno  
sanks1410@sanks1410-VirtualBox:~$ uname -r  
5.2.6  
sanks1410@sanks1410-VirtualBox:~$
```

(a) Kernel Version 5.2.6

A terminal window titled 'sarthak@sarthak-VirtualBox: ~' showing the output of two commands. The first command, 'cat /proc/sys/net/ipv4/tcp_congestion_control', returns 'cubic'. The second command, 'uname -r', returns '5.4.0-48-generic'.

```
sarthak@sarthak-VirtualBox: ~  
File Edit View Search Terminal Help  
sarthak@sarthak-VirtualBox:~$ cat /proc/sys/net/ipv4/tcp_congestion_control  
cubic  
sarthak@sarthak-VirtualBox:~$ uname -r  
5.4.0-48-generic  
sarthak@sarthak-VirtualBox:~$
```

(b) Kernel Version 5.4.0-48-generic

In the config file of 5.2.6, we will notice that the default TCP congestion control algorithm is **Reno**: `CONFIG_DEFAULT_RENO=y` and `CONFIG_DEFAULT_TCP_CONG="reno"`. However, for the config of version 5.4.0-48-generic, we will notice it is **Cubic**: `CONFIG_DEFAULT_CUBIC=y` and `CONFIG_DEFAULT_TCP_CONG="cubic"`.
