

Advanced Practical Embedded Software

Homework 1 (Revision 2017.9.1)

Github Repo Link: <https://github.com/Arundhathi/Advanced-Practical-Embedded-Systems.git>

Repo Name: Advanced Practical Embedded Systems

Branch: Master

Problem 1: All surveys completed

Problem 2: Done

Problem 3: Slack set up.

Problem 4: Project Partner: Vignesh Jayaram

Problem 5: VM Virtual Box

Problem 6:

Kernel Building

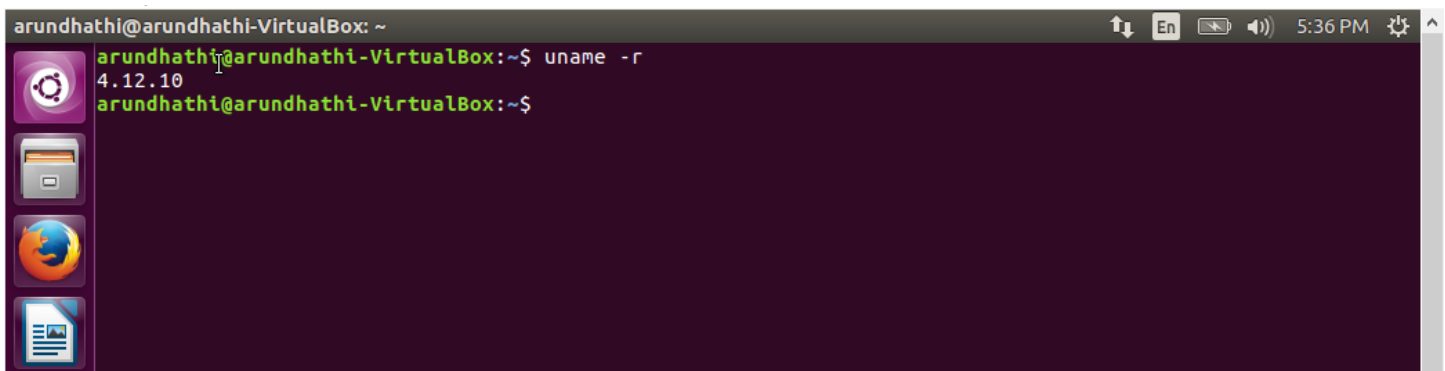
6.1 – Commands used to build kernel:

(Download tarred file of a stable kernel version 4.12.10 from www.kernel.org)

(change directory to downloads. Optionally move the tarred file to folder of one's preference)

1. `tar -xvf (nameofstablekernelversion).tar`
2. change directory to untarred kernel folder
3. `sudo apt-get install git`
4. `sudo apt-get install libssl-dev`
5. `make oldconfig`
6. `sudo make -j4`
7. `sudo make modules_install -j4`
8. `sudo make install -j4`
9. `sudo update-grub`
10. `vim /etc/default/grub`
11. comment out `"#GRUB_HIDDEN_TIMEOUT=0"`
12. change `"GRUB_TIMEOUT"` to 10

6.2 – Screenshots depicting newly installed kernels:



The screenshot shows a terminal window titled 'arundhathi@arundhathi-VirtualBox: ~'. The prompt is 'arundhathi@arundhathi-VirtualBox:~\$'. The user has entered the command 'uname -r', and the output is '4.12.10'. The prompt is now 'arundhathi@arundhathi-VirtualBox:~\$'. The terminal window has a dark purple background and a light blue border. On the left side, there is a vertical toolbar with icons for a gear, a folder, a globe, and a document. The top right corner of the window shows system icons for network, volume, and power, along with the time '5:36 PM'.

```
arundhathi@arundhathi-VirtualBox: ~  
arundhathi@arundhathi-VirtualBox:~$ uname -r  
4.12.10  
arundhathi@arundhathi-VirtualBox:~$
```

GNU GRUB version 2.02~beta2-36ubuntu3.12

```
*Ubuntu, with Linux 4.12.10
Ubuntu, with Linux 4.12.10 (upstart)
Ubuntu, with Linux 4.12.10 (recovery mode)
Ubuntu, with Linux 4.12.10.old
Ubuntu, with Linux 4.12.10.old (upstart)
Ubuntu, with Linux 4.12.10.old (recovery mode)
Ubuntu, with Linux 4.10.0-33-generic
Ubuntu, with Linux 4.10.0-33-generic (upstart)
Ubuntu, with Linux 4.10.0-33-generic (recovery mode)
Ubuntu, with Linux 4.10.0-28-generic
Ubuntu, with Linux 4.10.0-28-generic (upstart)
Ubuntu, with Linux 4.10.0-28-generic (recovery mode)
```

Use the ↑ and ↓ keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line. ESC to return previous
menu.

```
arundhathi@arundhathi-VirtualBox:~$ ls /boot
abi-4.10.0-28-generic      initrd.img-4.10.0-28-generic  System.map-4.10.0-33-generic
abi-4.10.0-33-generic     initrd.img-4.10.0-33-generic  System.map-4.12.10
config-4.10.0-28-generic  initrd.img-4.12.10           System.map-4.12.10.old
config-4.10.0-33-generic  memtest86+.bin               vmlinuz-4.10.0-28-generic
config-4.12.10            memtest86+.elf               vmlinuz-4.10.0-33-generic
config-4.12.10.old        memtest86+_multiboot.bin     vmlinuz-4.12.10
grub                      System.map-4.10.0-28-generic  vmlinuz-4.12.10.old
arundhathi@arundhathi-VirtualBox:~$
```

6.3 – set of commands to uninstall old and unused kernels:

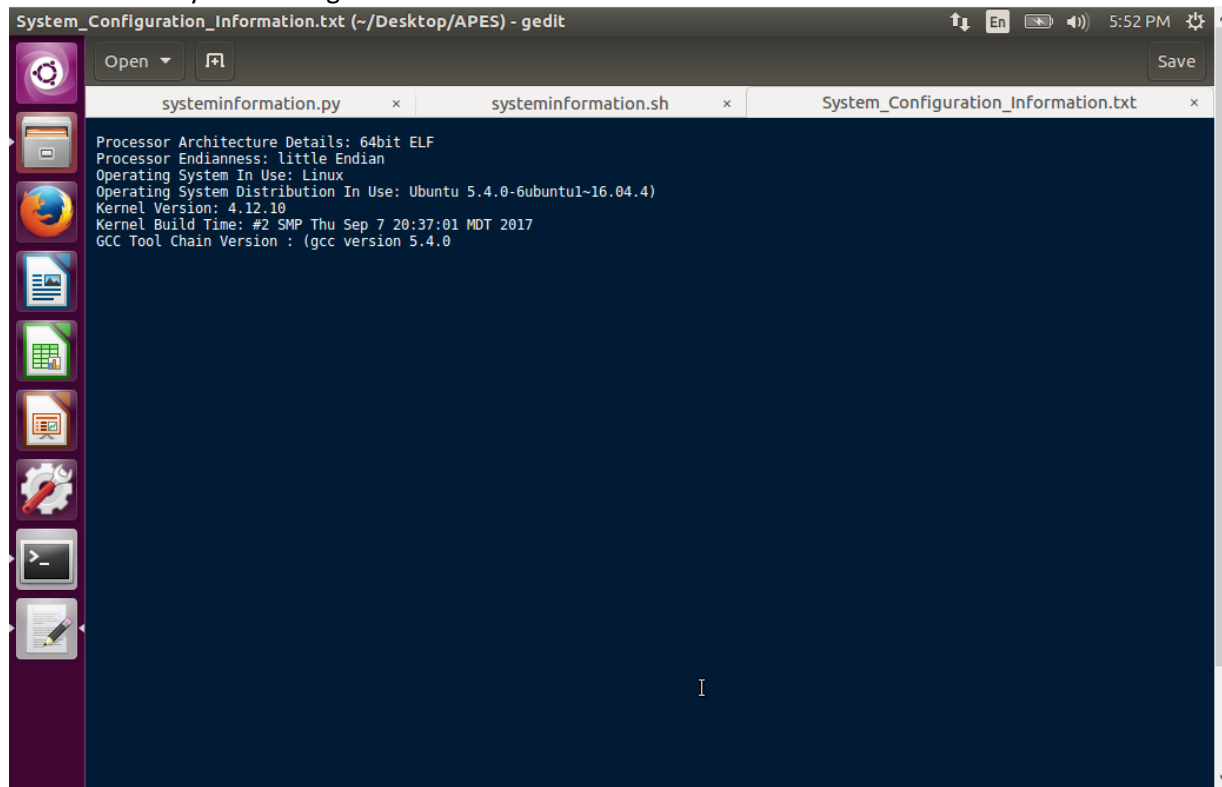
1. `uname -r`
2. `dpkg --get-selections | grep linux-image`
3. `sudo apt-get purge linux-image-x.x.x-generic` //replace 'x' with values of kernel version that needs to be uninstalled
4. `sudo update-grub`

Problem 7:

System Information Script

Command to run script: `source systeminformation.sh`

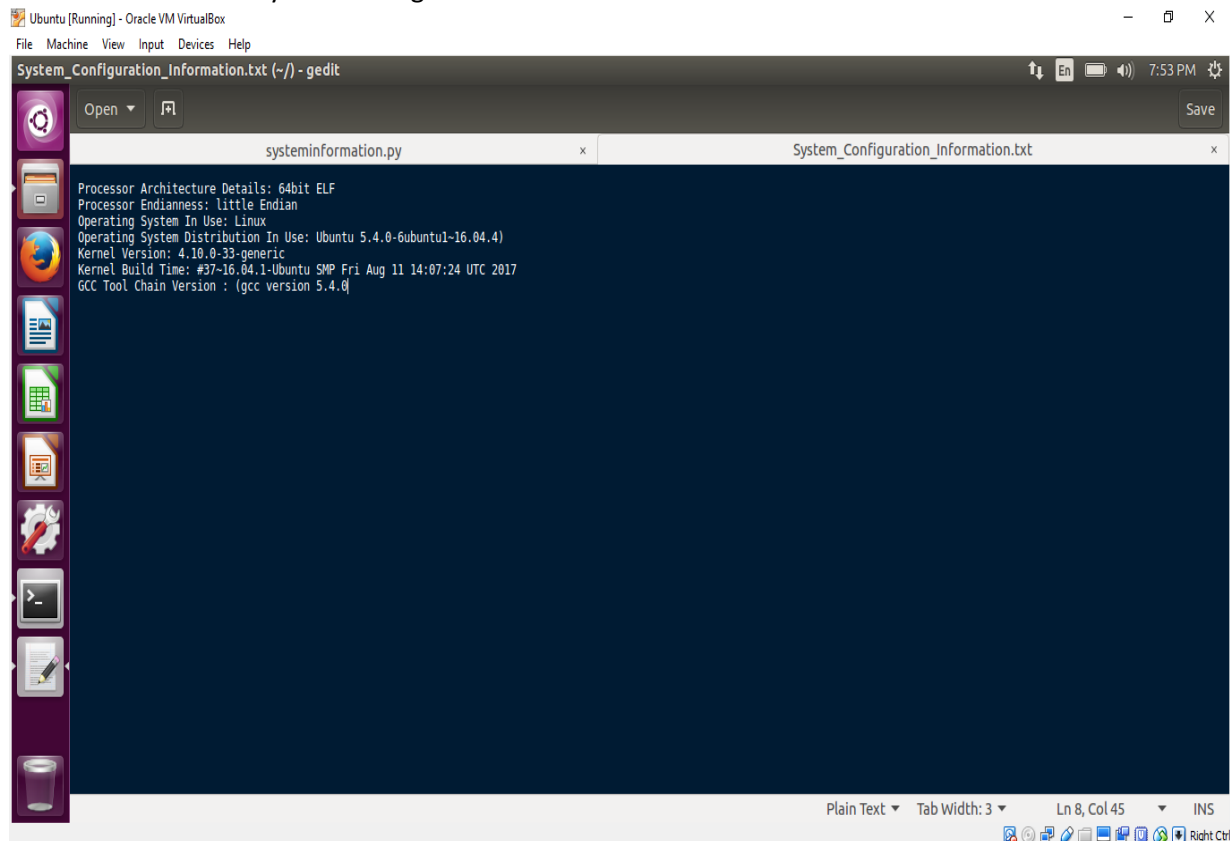
New Kernel – System configuration Information Text File



The screenshot shows a terminal window titled "System_Configuration_Information.txt (-/Desktop/APES) - gedit". The window has three tabs: "systeminformation.py", "systeminformation.sh", and "System_Configuration_Information.txt". The active tab is "System_Configuration_Information.txt", which contains the following text:

```
Processor Architecture Details: 64bit ELF
Processor Endianness: little Endian
Operating System In Use: Linux
Operating System Distribution In Use: Ubuntu 5.4.0-6ubuntu1~16.04.4
Kernel Version: 4.12.10
Kernel Build Time: #2 SMP Thu Sep 7 20:37:01 MDT 2017
GCC Tool Chain Version : (gcc version 5.4.0)
```

Old Generic Kernel - System Configuration Information File



The screenshot shows a terminal window titled "System_Configuration_Information.txt (-/) - gedit". The window has two tabs: "systeminformation.py" and "System_Configuration_Information.txt". The active tab is "System_Configuration_Information.txt", which contains the following text:

```
Processor Architecture Details: 64bit ELF
Processor Endianness: little Endian
Operating System In Use: Linux
Operating System Distribution In Use: Ubuntu 5.4.0-6ubuntu1~16.04.4
Kernel Version: 4.10.0-33-generic
Kernel Build Time: #37~16.04.1-Ubuntu SMP Fri Aug 11 14:07:24 UTC 2017
GCC Tool Chain Version : (gcc version 5.4.0)
```

Problem 8:

Kernel Build Script

Command to run script: `source buildkernel.sh`

List of commands to modify path:

1. `vim .bashrc`
2. append path as below

Modification paths:

```
export PATH="$PATH:/home/arundhathi/Advanced-Practical-Embedded-Systems/Utils"  
export PATH="$PATH:/home/arundhathi/Desktop/APES"
```

3. save file and run scripts from anywhere

Problem 9:

Data Structures: Github – Master branch → Folder Homeworks --> Homework 1