Eddie Christopher Fox III 1
Student ID: 1155160788

Practical Lab 1

Lesson Outcome:

- Know basic Linux commands

- Know Jetpack programs

A. Mandatory [7%]

Tasks: Understand the purpose for each command. Capture screenshots that include

- Your student's name for the prompt
- Output

Example:

```
s007@user-desktop:~$ ls /
bin   lost+found  root  tegra194-mb1-bct-ratchet-p3668.cfg
boot  media       run   tmp
dev   mnt         sbin  usr
etc   opt         snap  var
home  proc        srv
lib   README.txt  sys
```

1. Basic

• Command autocompletion • Press <TAB> after the command to auto fill, as long as there is no ambiguity of the files in the current directory.

Check current working directory

Pwd

```
s1155160788@user-desktop:~$ pwd
/home/s1155160788
s1155160788@user-desktop:~$
```

List files in a directory ~

• ~ is the user home folder.

ls <DIR_NAME>

```
s1155160788@user-desktop:~$ ls
Desktop  examples.desktop  NoContent  testfile
s1155160788@user-desktop:~$
```

```
s1155160788@user-desktop:~$ ls ~
Desktop  examples.desktop  NoContent  testfile
s1155160788@user-desktop:~$
```

Read file content `examples.desktop`

`cat <FILE_NAME>`

Screenshot on next page for sizing reasons. Full output screenshot.

```
s1155160788@user-desktop:~$ cat examples.desktop
[Desktop Entry]
Version=1.0
Type=Link
Name=Examples
Name[aa]=Ceelallo
Name[ace]=Contoh
Name[af]=Voorbeelde
Name[am]=ምሳሌዎች
Name[an]=Exemplos
Name[ar]=أمثلة
Name[ast]=Exemplos
Name[az]=Nümunələr
Name[be]=Прыклады
Name[bg]=Примери
Name[bn]=উদাহরণ
Name[br]=Skouerioù
Name[bs]=Primjeri
Name[ca]=Exemples
Name[ca@valencia]=Exemples
Name[ckb]=نموونەکان
Name[cs]=Ukázky
Name[csb]=Przëmiôrë
Name[cy]=Enghreifftiau
Name[da]=Eksempler
Name[de]=Beispiele
Name[dv]=ދަތުރުތަކެއް
Name[el]=Παραδείγματα
Name[en_AU]=Examples
Name[en_CA]=Examples
Name[en_GB]=Examples
Name[eo]=Ekzemploj
Name[es]=Ejemplos
Name[et]=Näidised
Name[eu]=Adibideak
Name[fa]=نمونه‌ها
Name[fi]=Esimerkkejä
Name[fil]=Mga halimbawa
Name[fo]=Dømir
Name[fr]=Exemples
Name[fur]=Esemplis
Name[fy]=Foarbylden
Name[ga]=Samplaí
Name[gd]=Buill-eisimpleir
Name[gl]=Exemplos
Name[gu]=ઉદાહરણો
Name[gv]=Sampleyryn
Name[he]=דוגמאות
Name[hi]=उदाहरण
```

```
Name[he]=דוגמאות
Name[hi]=उदाहरण
Name[hr]=Primjeri
Name[ht]=Egzanp
Name[hu]=Minták
Name[hy]=Օրինակներ
Name[id]=Contoh
Name[is]=Sýnishorn
Name[it]=Esempi
Name[ja]=サンプル
Name[ka]=ნიმუშები
Name[kk]=Мысалдар
Name[kl]=Assersuutit
Name[km]=ឧទាហរណ៍
Name[kn]=ಉದಾಹರಣೆಗಳು
Name[ko]=예 시
Name[ku]=Mînak
Name[kw]=Ensamplow
Name[ky]=Мисалдар
Name[lb]=Beispiller
Name[lt]=Pavyzdžių failai
Name[lv]=Paraugi
Name[mg]=Ohatra
Name[mhr]=Пример-влак
Name[mi]=Tauira
Name[mk]=Примери
Name[ml]=ഉദാഹരണങ്ങള്
Name[mr]=उदाहर ण
Name[ms]=Contoh-contoh
Name[my]=ဥပမာများ
Name[nb]=Eksempler
Name[nds]=Bispelen
Name[ne]=उदाहरणह ू
Name[nl]=Voorbeeld-bestanden
Name[nn]=Døme
Name[nso]=Mehlala
Name[oc]=Exemples
Name[pa]=ਉਦਾਹਰਨ ਾਂ
Name[pl]=Przykłady
Name[pt]=Exemplos
Name[pt_BR]=Exemplos
Name[ro]=Exemple
Name[ru]=Примеры
Name[sc]=Esempiusu
Name[sco]=Examples
Name[sd]=مثالون
Name[se]=Ovdamearkkat
Name[shn]=ထူဝ်ယၢင်,
Name[si]=නිදසුන්
Name[sk]=Príklady
```

```
Name[si]=නිදසුන්
Name[sk]=Príklady
Name[sl]=Zgledi
Name[sml]=Saga Saupama
Name[sn]=Miyenzaniso
Name[sq]=Shembujt
Name[sr]=Примери
Name[sv]=Exempel
Name[sw]=Mifano
Name[szl]=Bajszpile
Name[ta]=உதாரணங்கள்
Name[ta_LK]=உதாரணங்கள்
Name[te]=ఉదాహరణలు
Name[tg]=Намунаҳо
Name[th]=ตัวอย่าง
Name[tr]=Örnekler
Name[tt]=Мисаллар
Name[ug]=مىساللار
Name[uk]=Приклади
Name[ur]=مثالیں
Name[uz]=Намуналар
Name[vec]=Esempi
Name[vi]=Mẫu ví dụ
Name[wae]=Bischbil
Name[zh_CN]=示例
Name[zh_HK]=範例
Name[zh_TW]=範例
Comment=Example content for Ubuntu
Comment[aa]=Ubuntuh addattinoh ceelallo
Comment[ace]=Contoh aso ke Ubuntu
Comment[af]=Voorbeeld inhoud vir Ubuntu
Comment[am]=ዝርዝር ምሳሌዎች ለ ኡቡንቱ
Comment[an]=Conteniu d'exemplo ta Ubuntu
Comment[ar]=أمثلة محتوى لأ وبونتو
Comment[ast]=Conteníu del exemplu pa Ubuntu
Comment[az]=Ubuntu üçün nümunə material
Comment[be]=Узоры дакументаў для Ubuntu
Comment[bg]=Примерно съдържание за Ubuntu
Comment[bn]=উবুন্টু সংক্রান্ত নমুনা তথ্য
Comment[br]=Skouerenn endalc'had evit Ubuntu
Comment[bs]=Primjer sadrzaja za Ubuntu
Comment[ca]=Continguts d'exemple per a l'Ubuntu
Comment[ca@valencia]=Continguts d'exemple per a l'Ubuntu
Comment[ckb]=نموونەی ناوەڕۆکێک بۆ ئوبوونتو
Comment[cs]=Ukázkový obsah pro Ubuntu
Comment[csb]=Przëmiôrowô zamkłosc dlô Ubuntu
Comment[cy]=Cynnwys enghraifft ar gyfer  Ubuntu
Comment[da]=Eksempel indhold til Ubuntu
Comment[de]=Beispielinhalt für Ubuntu
Comment[dv]=[illegible]
```

```
Comment[dv]=[illegible]
Comment[el]=Παραδείγματα περιεχομένου για το Ubuntu
Comment[en_AU]=Example content for Ubuntu
Comment[en_CA]=Example content for Ubuntu
Comment[en_GB]=Example content for Ubuntu
Comment[eo]=Ekzempla enhavo por Ubuntu
Comment[es]=Contenido de ejemplo para Ubuntu
Comment[et]=Ubuntu näidisfailid
Comment[eu]=Adibidezko edukia Ubunturako
Comment[fa]=محتویات نمونه برای اوبونتو
Comment[fi]=Esimerkkisisältöjä Ubuntulle
Comment[fil]=Halimbawang laman para sa Ubuntu
Comment[fo]=Dømis innihald fyri Ubuntu
Comment[fr]=Contenu d'exemple pour Ubuntu
Comment[fur]=Contignûts di esempli par Ubuntu
Comment[fy]=Foarbyld fan ynhâld foar Ubuntu
Comment[ga]=Inneachar samplach do Ubuntu
Comment[gd]=Eisimpleir de shusbaint airson Ubuntu
Comment[gl]=Contido do exemplo para Ubuntu
Comment[gu]=Ubuntu મા ટે ઉદાહરણ   સૂચી
Comment[gv]=Stoo Sanpleyr son Ubuntu
Comment[he]=תוכן לדוגמה עבור אובונטו
Comment[hi]=उबुन्टू हेतु उदाहरण   सार ांश
Comment[hr]=Primjeri sadržaja za Ubuntu
Comment[ht]=Kontni egzanplè pou Ubuntu
Comment[hu]=Mintatartalom Ubuntuhoz
Comment[hy]=Բովանդակության օրինակները Ubuntu-ի համար
Comment[id]=Contoh isi bagi Ubuntu
Comment[is]=Sýnishorn fyrir Ubuntu
Comment[it]=Contenuti di esempio per Ubuntu
Comment[ja]=Ubuntuのサンプルコンテンツ
Comment[ka]=უბუნტუს სანიმუშო შიგთავსი
Comment[kk]=Ubuntu құжаттар мысалдары
Comment[kl]=Ubuntu-mut imarisaanut assersuut
Comment[km]=ឧទាហរណ៍ សម្ភារ សម្រាប់ អ៊ូប៊ុនទូ
Comment[kn]=ಉಬುಂಟುನ ಉದಾಹರಣೆಗಳು
Comment[ko]=우 분 투  컨 텐 츠  예 시
Comment[ku]=Ji bo Ubuntu mînaka naverokê
Comment[ky]=Ubuntu-нун мисал документтери
Comment[lb]=Beispillinhalt fir Ubuntu
Comment[lt]=Įvairių dokumentų, paveikslėlių, garsų bei vaizdų pavyzdžiai
Comment[lv]=Parauga saturs Ubuntu videi
Comment[mg]=Ohatra ho an'i Ubuntu
Comment[mhr]=Ubuntu-лан документ-влакын пример-влак
Comment[mi]=Mata tauira o Ubuntu
Comment[mk]=Пример содржина за Убунту
Comment[ml]=ഉബുണ്ടുവിനു വേണ്ടി ഉള്ള ഉദാഹരണങ്ങള്
Comment[mr]=उबंटूसाठी   घटकांची   उदाहरणे
Comment[ms]=Kandungan contoh untuk Ubuntu
Comment[my]=Ubuntu အတွက်   နမူနာ   မာတိကာ
```

```
Comment[ms]=Kandungan contoh untuk Ubuntu
Comment[my]=Ubuntu အတွက် နမူနာ မာတိကာ
Comment[nb]=Eksempelinnhold for Ubuntu
Comment[ne]=उबन्टुका लागि उदाहरण सामग्री
Comment[nl]=Voorbeeldinhoud voor Ubuntu
Comment[nn]=Eksempelinnhald for Ubuntu
Comment[nso]=Mohlala wa dikagare tša Ubuntu
Comment[oc]=Exemples de contengut per Ubuntu
Comment[pa]=ਉਬਟੂ ਲਈ ਨਮੂਨਾ ਸਮੱਗਰੀ
Comment[pl]=Przykładowa zawartość dla Ubuntu
Comment[pt]=Conteúdo de exemplo para o Ubuntu
Comment[pt_BR]=Exemplo de conteúdo para Ubuntu
Comment[ro]=Conţinut exemplu pentru Ubuntu
Comment[ru]=Примеры документов для Ubuntu
Comment[sc]=Esempiu de cabidu pro Ubuntu
Comment[sco]=Example content fur Ubuntu
Comment[sd]=اوبنٽو لا ۾ مثال طور ڏنل مواد
Comment[shn]=ၵၢမ်,ယၢင်,လမ်းၼိုး တၢ, Ubuntu
Comment[si]=උබුන්ටු සඳහා උදාහරණ අන්තර්ගතයක්
Comment[sk]=Ukážkový obsah pre Ubuntu
Comment[sl]=Ponazoritvena vsebina za Ubuntu
Comment[sml]=Saupama Isina Ubuntu
Comment[sn]=Muyenzaniso wehuiswa kuitira Ubuntu
Comment[sq]=Shembull i përmbajtjes për Ubuntu
Comment[sr]=Садржај примера за Убунту
Comment[sv]=Exempelinnehåll för Ubuntu
Comment[sw]=Bidhaa mfano ya Ubuntu
Comment[szl]=Bajszpilnŏ treść dlŏ Ubuntu
Comment[ta]=உபுண்டுவி ற்காக எடு த்துகா ட்டு உள்ளடக்கங்கள்
Comment[ta_LK]=உபுண்டுவி ற்காக எடு த்துகா ட்டு உள்ளடக்கங்கள்
Comment[te]=Ubuntu కడుక మీఁద నముఁలు
Comment[tg]=Мӯҳтавои намунавӣ барои Ubuntu
Comment[th]=ต้วอย่างข้อมูลสำหรับ Ubuntu
Comment[tr]=Ubuntu için örnek içerik
Comment[tt]=Ubuntu өчен документ мисаллары
Comment[ug]=ئۇبۇنتۇنىڭ مىسالىرى
Comment[uk]=Приклади контенту для Ubuntu
Comment[ur]=یوبنٹو کیلئے مثالی مواد
Comment[uz]=Ubuntu учун намуна таркиби
Comment[vec]=Contenuti de esempio de Ubuntu
Comment[vi]=Mẫu ví dụ cho Ubuntu
Comment[wae]=D'Ubuntu bischbildatijä
Comment[zh_CN]=Ubuntu 示例内容
Comment[zh_HK]=Ubuntu 的範例內容
Comment[zh_TW]=Ubuntu 的範例內容
URL=file:///usr/share/example-content/
Icon=folder
X-Ubuntu-Gettext-Domain=example-content

s1155160788@user-desktop:~$
```

Get shell profile

```
cat ~/.bashrc
```

Screenshot of output starts on next page.

```
s1155160788@user-desktop:~$ cat ~/.bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples

# If not running interactively, don't do anything
case $- in
    *i*) ;;
      *) return;;
esac

# don't put duplicate lines or lines starting with space in the history.
# See bash(1) for more options
HISTCONTROL=ignoreboth

# append to the history file, don't overwrite it
shopt -s histappend

# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000

# check the window size after each command and, if necessary,
# update the values of LINES and COLUMNS.
shopt -s checkwinsize

# If set, the pattern "**" used in a pathname expansion context will
# match all files and zero or more directories and subdirectories.
#shopt -s globstar

# make less more friendly for non-text input files, see lesspipe(1)
[ -x /usr/bin/lesspipe ] && eval "$(SHELL=/bin/sh lesspipe)"

# set variable identifying the chroot you work in (used in the prompt below)
if [ -z "${debian_chroot:-}" ] && [ -r /etc/debian_chroot ]; then
    debian_chroot=$(cat /etc/debian_chroot)
fi

# set a fancy prompt (non-color, unless we know we "want" color)
case "$TERM" in
    xterm-color|*-256color) color_prompt=yes;;
esac

# uncomment for a colored prompt, if the terminal has the capability; turned
# off by default to not distract the user: the focus in a terminal window
# should be on the output of commands, not on the prompt
#force_color_prompt=yes

if [ -n "$force_color_prompt" ]; then
    if [ -x /usr/bin/tput ] && tput setaf 1 >&/dev/null; then
```

```
if [ -n "$force_color_prompt" ]; then
    if [ -x /usr/bin/tput ] && tput setaf 1 >&/dev/null; then
        # We have color support; assume it's compliant with Ecma-48
        # (ISO/IEC-6429). (Lack of such support is extremely rare, and such
        # a case would tend to support setf rather than setaf.)
        color_prompt=yes
    else
        color_prompt=
    fi
fi

if [ "$color_prompt" = yes ]; then
    PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w
\[\033[00m\]\$ '
else
    PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
fi
unset color_prompt force_color_prompt

# If this is an xterm set the title to user@host:dir
case "$TERM" in
xterm*|rxvt*)
    PS1="\[\e]0;${debian_chroot:+($debian_chroot)}\u@\h: \w\a\]$PS1"
    ;;
*)
    ;;
esac

# enable color support of ls and also add handy aliases
if [ -x /usr/bin/dircolors ]; then
    test -r ~/.dircolors && eval "$(dircolors -b ~/.dircolors)" || eval "$(dircolors -b)"
    alias ls='ls --color=auto'
    #alias dir='dir --color=auto'
    #alias vdir='vdir --color=auto'

    alias grep='grep --color=auto'
    alias fgrep='fgrep --color=auto'
    alias egrep='egrep --color=auto'
fi

# colored GCC warnings and errors
#export GCC_COLORS='error=01;31:warning=01;35:note=01;36:caret=01;32:locus=01:quote=01'

# some more ls aliases
alias ll='ls -alF'
alias la='ls -A'
alias l='ls -CF'

# Add an "alert" alias for long running commands.  Use like so:
#   sleep 10; alert
```

```
# Add an "alert" alias for long running commands.  Use like so:
#   sleep 10; alert
alias alert='notify-send --urgency=low -i "$([ $? = 0 ] && echo terminal || echo error)" "$(h
istory|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[;&|]\s*alert$//'\'')"'

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi
MANPATH=/usr/share/man
s1155160788@user-desktop:~$
```

Check history of commands

`history`

Screenshot of output starts on next page.

```
s1155160788@user-desktop:~$ history
    1  exit
    2  echo "Test"
    3  group
    4  gp
    5  groups
    6  sudo ls
    7  ls
    8  cd ~
    9  ls
   10  cd ~
   11  ls -alh
   12  cd ~
   13  cat ~bash.rc
   14  ls
   15  cd ..
   16  cat bash.rc
   17  cd ~
   18  cat .bashrc
   19  history
   20  man cat
   21  man ls
   22  man head
   23  head -n 5 .bashrc
   24  tail -n 5 .bashrc
   25  tail -5 .bashrc
   26  man sort
   27  tree
   28  touch NoContent
   29  ls
   30  man ftp
   31  man topic
   32  ls
   33  echo $SHELL
   34  man alias
   35  man bash
   36  sudo mandb
   37  man man
   38  manpath
   39  man
   40  man ls
   41  ll
   42  man history
   43  man ssh
   44  help
   45  help ls
   46  man -k ls
   47  info ls
   48  man mkdir
   49  nvpmodel
```

```
50  sudo nvpmodel -q
51  tegrastats
52  sudo apt install htop
53  htop
54  sudo apt update
55  sudo apt install man-db manpages-posix
56  man ls
57  man ssh
58  man dir
59  man passwd
60  man man
61  echo $MANPATH
62  pwd
63  echo "MANPATH=/usr/share/man" >> ~/.bashrc
64  exit
65  ls
66  groups
67  ls
68  sudo ls
69  sudo ls /
70  ls
71  curl
72  pwd
73  ls -al
74  cat .bashrc
75  ls
76  cat examples.desktop
77  ls
78  vim testfile
79  ls
80  cat testfile
81  ls
82  ls -a
83  cat .profile
84  pwd
85  ls
86  ls -a
87  ls -l
88  ls -al
89  cd .
90  cd ..
91  ls
92  cd s1155160788
93  pwd
94  cd .
95  cd ..
96  pwd
97  ls
98  cd s1155160788
99  cat examples.desktop
```

```
100  sh
101  sh
102  man man
103  find --help
104  help
105  help ls
106  echo $MANPATH
107  lsblk
108  fdisk -l
109  fdisk -1
110  sudo fdisk -l
111  ls
112  file examples.desktop
113  printenv
114  printenv home
115  man -a printf
116  sudo apt-get install --reinstall man-db
117  man ls
118  man ssh
119  man printf
120  echo $manpath
121  htop
122  lsblk
123  sudo apt install nano
124  which nano
125  nano
126  ls
127  nano testfile
128  cat testfile
129  nano testfile
130  man ls
131  sudo apt install man-pages
132  sudo apt update
133  sudo apt install man-pages
134  sudo apt install man
135  sudo apt install man-pages
136  sudo apt-get update
137  sudo apt install curl
138  which curl
139  which wget
140  man useradd
141  curl http://google.com
142  la
143  apt search manpages
144  sudo apt install man-db manpages-posix
145  sudo apt install manpages-dev manpages-posix-dev
146  man ls
147  man passwd
148  $ MANPATH=/usr/share/man man ls
149  alias man='MANPATH=/usr/share/man man'
```

```
  148  $ MANPATH=/usr/share/man man ls
  149  alias man='MANPATH=/usr/share/man man'
  150  man ls
  151  cd /
  152  cd /etc/dpkg/dpkg.cfg.d/excludes
  153  ls
  154  cd /etc
  155  ls
  156  cd dpkg
  157  ls
  158  cd dpkg.cfg.d/
  159  ls
  160  nano excludes
  161  cat excludes
  162  nano excludes
  163  cat excludes
  164  vim excludes
  165  cd /etc
  166  ls
  167  cd /dpkg
  168  cd dpkg
  169  ls
  170  cd dpkg.cfg.d/
  171  ls
  172  sudo vim excludes
  173  apt --reinstall install man-db coreutils
  174  sudo apt --reinstall install man-db coreutils
  175  man ls
  176  man passwd
  177  man pwd
  178  sudo apt install man
  179  man ssh
  180  man printf
  181  man man
  182  exit
  183  pwd
  184  ls
  185  cat examples.desktop
  186  ls ~
  187  ls
  188  ls ~
  189  cat ~/.bashrc
  190  history
s1155160788@user-desktop:~$
```

Read top 5 lines in a file

`head -n <LINE_NUM>`

Using the examples.desktop file:

```
s1155160788@user-desktop:~$ head -5 examples.desktop
[Desktop Entry]
Version=1.0
Type=Link
Name=Examples
Name[aa]=Ceelallo
s1155160788@user-desktop:~$
```

Read last 5 lines in a file

`less -n <LINE_NUM>`

Using the examples.desktop file.

Note: Output for the screenshot starts on the next page. I am omitting the full output of less to save space, for reasons explained in Note 2 below.

Note 2: I believe the command we should be using is the tail command instead of less (which will show everything). I will show the output of less first, and then the output of tail second, which will properly show the last 5 lines of examples.desktop.

```
s1155160788@user-desktop:~$ less -5 examples.desktop
[Desktop Entry]
Version=1.0
Type=Link
Name=Examples
Name[aa]=Ceelallo
Name[ace]=Contoh
Name[af]=Voorbeelde
Name[am]=ምሳሌዎች
Name[an]=Exemplos
Name[ar]=أمثلة
Name[ast]=Exemplos
Name[az]=Nümunələr
Name[be]=Прыклады
Name[bg]=Примери
Name[bn]=উদাহরণ
Name[br]=Skouerioù
Name[bs]=Primjeri
Name[ca]=Exemples
Name[ca@valencia]=Exemples
Name[ckb]=نموونە<U+200C>کان
Name[cs]=Ukázky
Name[csb]=Przëmiôrë
Name[cy]=Enghreifftiau
Name[da]=Eksempler
Name[de]=Beispiele
Name[dv]=ތަކެތި
Name[el]=Παραδείγματα
Name[en_AU]=Examples
Name[en_CA]=Examples
Name[en_GB]=Examples
Name[eo]=Ekzemploj
Name[es]=Ejemplos
Name[et]=Näidised
Name[eu]=Adibideak
Name[fa]=نمونه<U+200C>ها
Name[fi]=Esimerkkejä
Name[fil]=Mga halimbawa
Name[fo]=Dømir
Name[fr]=Exemples
Name[fur]=Esemplis
Name[fy]=Foarbylden
Name[ga]=Samplaí
Name[gd]=Buill-eisimpleir
Name[gl]=Exemplos
Name[gu]=ઉદાહરણો
Name[gv]=Sampleyryn
Name[he]=דוגמאות
Name[hi]=उदाहरण
Name[hr]=Primjeri
```

```
s1155160788@user-desktop:~$ tail -5 examples.desktop
Comment[zh_TW]=Ubuntu 的範例內容
URL=file:///usr/share/example-content/
Icon=folder
X-Ubuntu-Gettext-Domain=example-content

s1155160788@user-desktop:~$
```

Continuously follow text changes in `/var/log/syslog`

`tail -f <FILE_PATH>`

```
s1155160788@user-desktop:~$ sudo tail -f /var/log/syslog
[sudo] password for s1155160788:
Feb 20 11:11:32 user-desktop systemd[2538]: Reached target Paths.
Feb 20 11:11:32 user-desktop systemd[2538]: Listening on D-Bus User Message Bus Socket.
Feb 20 11:11:32 user-desktop systemd[2538]: Reached target Sockets.
Feb 20 11:11:32 user-desktop systemd[2538]: Reached target Basic System.
Feb 20 11:11:32 user-desktop systemd[2538]: Reached target Default.
Feb 20 11:11:32 user-desktop systemd[2538]: Startup finished in 83ms.
Feb 20 11:11:32 user-desktop systemd[1]: Started User Manager for UID 1002.
Feb 20 11:17:01 user-desktop CRON[2633]: (root) CMD (   cd / && run-parts --report /etc/cron.hourly)
Feb 20 11:19:37 user-desktop kernel: [11917924.462485] FAN rising trip_level:1 cur_temp:46100 trip_temps[2]:60000
Feb 20 11:21:02 user-desktop kernel: [11918009.581262] FAN cooling trip_level:0 cur_temp:37950 trip_temps[1]:46000
```

Find files matching pattern `*tensor*`

`find / -name <PATTERN>`

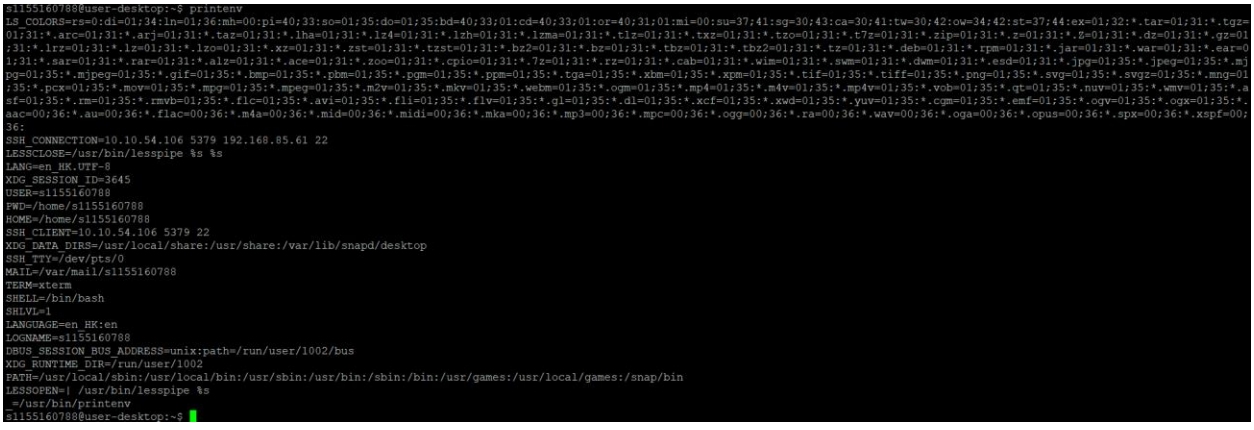
Screenshot on next page.

```
s1155160788@user-desktop:~$ sudo find / -name *tensor*
/usr/lib/python3.6/dist-packages/uff/converters/tensorflow
/usr/lib/python3.6/dist-packages/tensorrt
/usr/lib/python3.6/dist-packages/tensorrt/tensorrt.so
/usr/lib/python3.6/dist-packages/tensorrt-8.0.1.6.dist-info
/usr/share/doc/tensorrt-8.0.1.6
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvcaffeparser1_1_1_i_blob_name_to_tensor-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1impl_1_1_enum_max_impl_3_01_tensor_location_01_4-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1apiv_1_1_v_tensor.js
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1apiv_1_1_v_tensor.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_plugin_tensor_desc.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_plugin_tensor_desc.js
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_plugin_tensor_desc-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_dynamic_plugin_tensor_desc.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1_i_tensor.png
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1impl_1_1_enum_max_impl_3_01_tensor_format_01_4.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1impl_1_1_enum_max_impl_3_01_tensor_location_01_4.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1_i_tensor.js
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1_i_tensor.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_dynamic_plugin_tensor_desc.js
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1_dynamic_plugin_tensor_desc-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1apiv_1_1_v_tensor.png
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvcaffeparser1_1_1_i_blob_name_to_tensor.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1apiv_1_1_v_tensor-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/structnvinfer1_1_1impl_1_1_enum_max_impl_3_01_tensor_format_01_4-members.html
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvcaffeparser1_1_1_i_blob_name_to_tensor.js
/usr/share/doc/tensorrt-8.0.1.6/cpp/classnvinfer1_1_1_i_tensor-members.html
/usr/share/doc/tensorrt
/usr/share/doc/nvidia-container-csv-tensorrt
/usr/src/tensorrt
/usr/src/tensorrt/data/faster-rcnn/tensor_range.txt
/usr/src/tensorrt/data/int8_api/resnet50_per_tensor_dynamic_range.txt
/usr/src/tensorrt/samples/python/end_to_end_tensorflow_mnist
/usr/src/tensorrt/samples/python/yolov3_onnx/onnx_to_tensorrt.py
find: ‘/run/user/120/gvfs’: Permission denied
/etc/nvidia-container-runtime/host-files-for-container.d/tensorrt.csv
/var/lib/dpkg/info/nvidia-container-csv-tensorrt.md5sums
/var/lib/dpkg/info/tensorrt.list
/var/lib/dpkg/info/nvidia-container-csv-tensorrt.postinst
/var/lib/dpkg/info/nvidia-container-csv-tensorrt.list
/var/lib/dpkg/info/nvidia-container-csv-tensorrt.conffiles
/var/lib/dpkg/info/tensorrt.md5sums
s1155160788@user-desktop:~$
```

Check system environment

`printenv`

(Sorry, you may need to zoom in to see this screenshot well)



Find out the path for the program `wget`

`which <PROGRAM_NAME>`

```
s1155160788@user-desktop:~$ which wget
/usr/bin/wget
s1155160788@user-desktop:~$
```

Print a Global variable `JETSON_BOARD`

`echo $<VARIABLE_NAME>`

Note: It seems that almost everyone in the class I talked to gets an empty line when echoing $JETSON_BOARD. The variable may not be configured yet.

One person in the class was able to get a value but they were on the .51 node that was originally intended for TA's.

```
s1155160788@user-desktop:~$ echo $JETSON_BOARD

s1155160788@user-desktop:~$ sudo echo $JETSON_BOARD

s1155160788@user-desktop:~$
```

Print the global $PATH variable where the OS will search for the program

`echo $PATH`

```
s1155160788@user-desktop:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
s1155160788@user-desktop:~$
```

Create a file `foo.txt` but not writing any content

`touch <FILE_NAME>`

```
s1155160788@user-desktop:~$ touch foo.txt
s1155160788@user-desktop:~$ ls
Desktop  examples.desktop  foo.txt  NoContent  testfile
s1155160788@user-desktop:~$ cat foo.txt
s1155160788@user-desktop:~$
```

- Useful if you just want to create a lock file.

Print directory tree from `/bin`

`tree <DIR_NAME>`

Screenshot on next page.

```
s1155160788@user-desktop:~$ tree ~
/home/s1155160788
├── Desktop
│   ├── gnome-terminal.desktop
│   ├── lxterminal.desktop
│   ├── nv_devzone.desktop
│   ├── nv_forums.desktop
│   ├── nvidia-vpi_demos-1.1.desktop
│   ├── nv_jetson_projects.desktop
│   ├── nv_jetson_zoo.desktop
│   └── nv_l4t_readme.desktop
├── examples.desktop
├── foo.txt
├── NoContent
└── testfile

1 directory, 12 files
s1155160788@user-desktop:~$
```

- Type `apt install tree` in case command is not found

Get system services status of `sshd`

`systemctl status <SERVICE_NAME>`

```
s1155160788@user-desktop:~$ systemctl status sshd
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2021-08-11 14:32:42 HKT; 6 months 10 days ago
  Process: 7480 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)
  Process: 7475 ExecReload=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
  Process: 5514 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 5658 (sshd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/ssh.service
           └─5658 /usr/sbin/sshd -D
s1155160788@user-desktop:~$
```

Follow and read log files from a system unit `sshd`

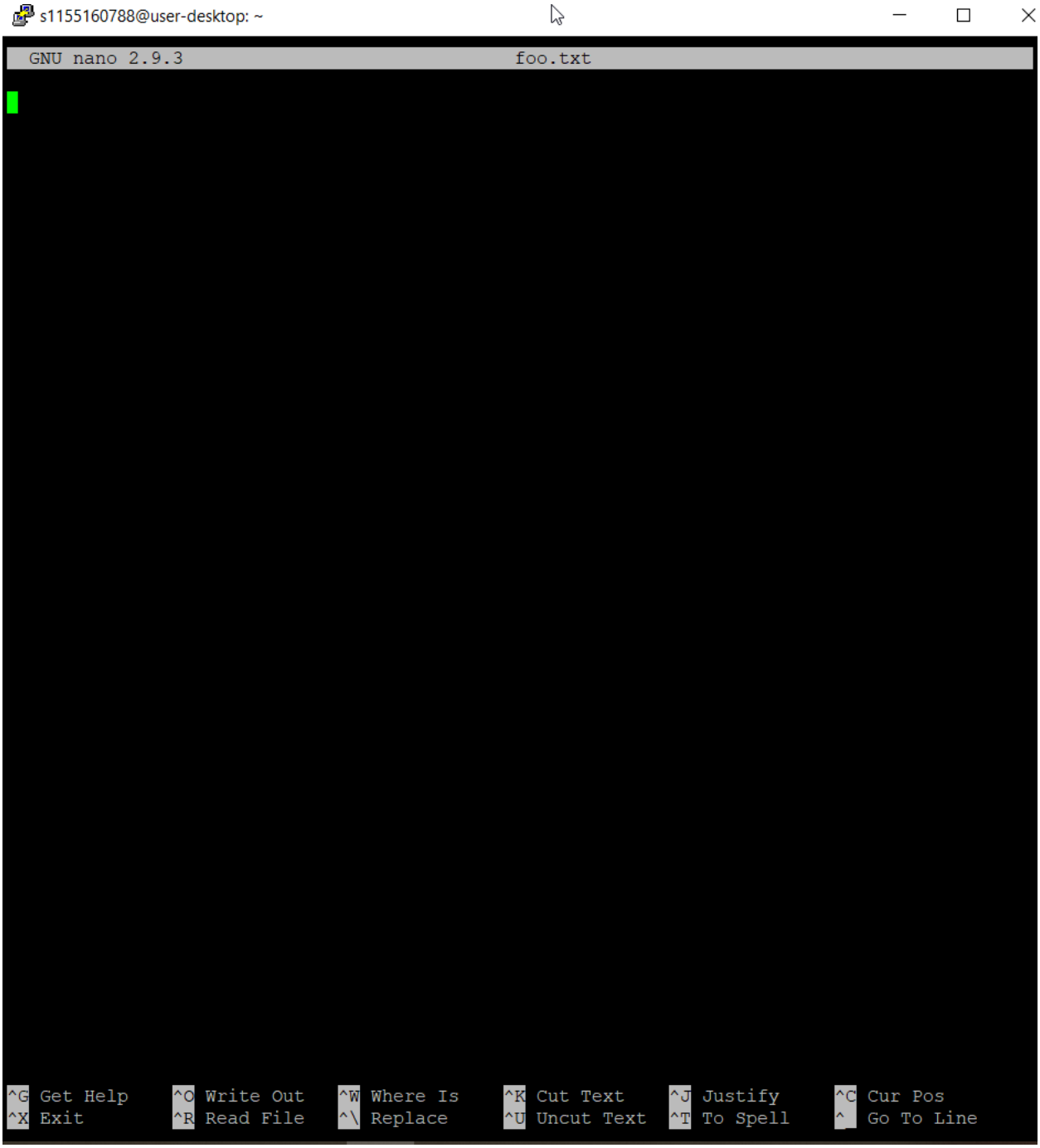
`journalctl -f -u <SERVICE_NAME>`

```
s1155160788@user-desktop:~$ sudo journalctl -f -u sshd
-- Logs begin at Thu 2021-07-22 02:51:38 HKT. --
```

2. Commonly Used Programs [For reference only]

Edit file (text editor)

```
nano foo.txt
```




```
s1155160788@user-desktop:~$ nano foo.txt
s1155160788@user-desktop:~$
```

File Downloader

Download files

`wget` https://raw.githubusercontent.com/mantisbt-plugins/source-integration/master/LICENSE

```
s1155160788@user-desktop:~$ wget https://raw.githubusercontent.com/mantisbt-plugins/source-integration/master/LICENSE
--2022-02-20 17:55:54--  https://raw.githubusercontent.com/mantisbt-plugins/source-integration/master/LICENSE
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.108.133, 185.199.109.133, 185.199.110.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.108.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1055 (1.0K) [text/plain]
Saving to: 'LICENSE'

LICENSE                 100%[=========================>]   1.03K  --.-KB/s    in 0s

2022-02-20 17:55:55 (2.87 MB/s) - 'LICENSE' saved [1055/1055]

s1155160788@user-desktop:~$
```

HTTP Client

Send HTTP GET Request

`curl` https://www.google.com

Terminal multiplexer

Create new session name `lab1`

`tmux new -s <SESSION_NAME>`

List all sessions

`tmux ls`

```
s1155160788@user-desktop:~$ tmux ls
lab1: 1 windows (created Sun Feb 20 18:02:25 2022) [189x49] (attached)
s1155160788@user-desktop:~$
```

Go to a session lab1

`tmux a -t <SESSION_NAME>`

Note: For this one, I cannot execute the command unless I first close my ssh session, so I close it, reconnect, and then type the command to enter the lab1 tmux session again. Afterwards I output being in lab1 session, and the commands I typed after exiting the lab1 session via ctrl + d.


```
s1155160788@user-desktop:~$ tmux ls
lab1: 1 windows (created Sun Feb 20 18:04:42 2022) [93x48]
s1155160788@user-desktop:~$ tmux a -t lab1
[exited]
s1155160788@user-desktop:~$
```

Get specific column

`ls / -alh | awk '{print $1}'`

```
s1155160788@user-desktop:~$ ls / -alh | awk '{print $1}'
total
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwx------
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
dr-xr-xr-x
-rw-rw-rw-
drwx------
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
drwxr-xr-x
dr-xr-xr-x
-rw-r--r--
drwxrwxrwt
drwxr-xr-x
drwxr-xr-x
s1155160788@user-desktop:~$
```

3. System Stats

Show CPU info

`cat /proc/cpuinfo`

```
s1155160788@user-desktop:~$ cat /proc/cpuinfo
processor       : 0
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

processor       : 1
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

processor       : 2
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

processor       : 3
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

processor       : 4
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
```

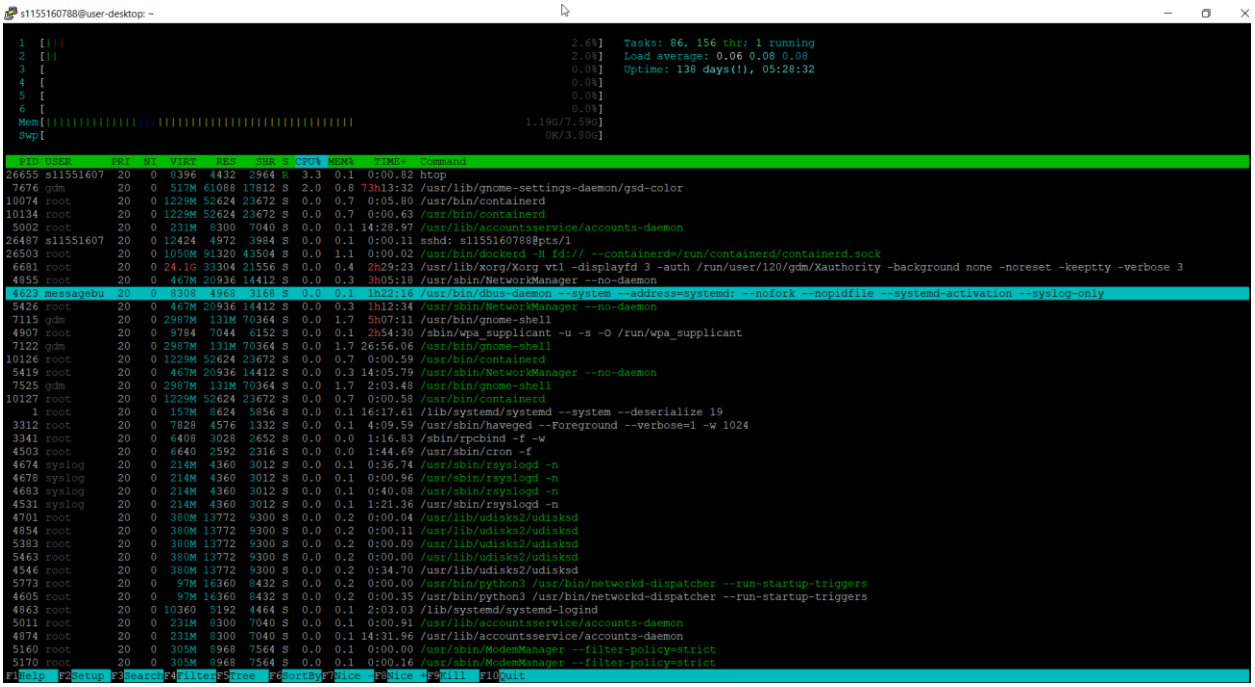
```
processor       : 4
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

processor       : 5
model name      : ARMv8 Processor rev 0 (v8l)
BogoMIPS        : 62.50
Features        : fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
CPU implementer : 0x4e
CPU architecture: 8
CPU variant     : 0x0
CPU part        : 0x004
CPU revision    : 0
MTS version     : 53250041

s1155160788@user-desktop:~$
```

4. Monitoring

Show workload

`htop`

- Type `apt install htop` in case command is not found



```
s1155160788@user-desktop:~$ htop
s1155160788@user-desktop:~$
```

Note: The screenshot above was taken after quitting htop

5. File System

List block devices

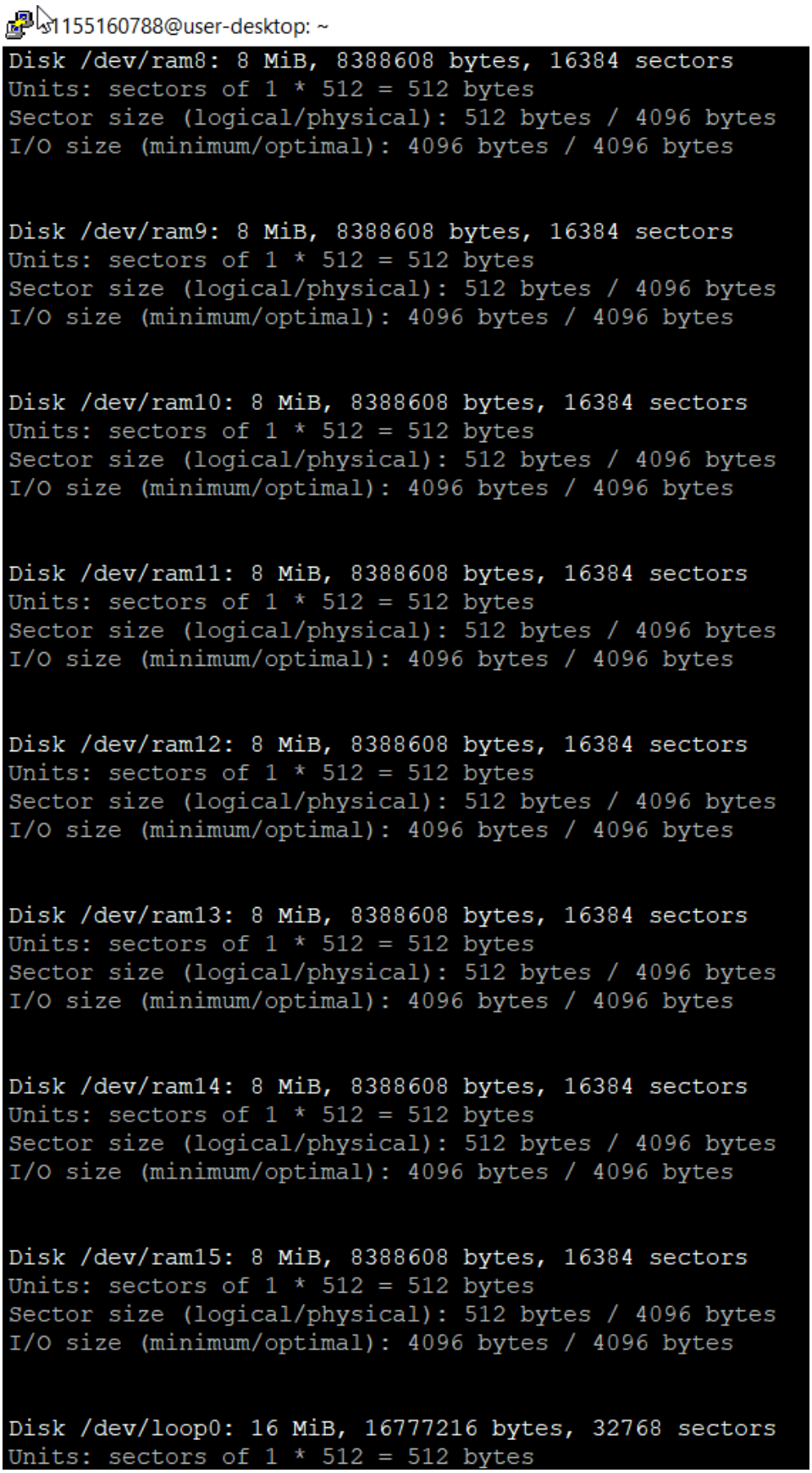
`Lsblk`

```
s1155160788@user-desktop:~$ lsblk
NAME         MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
loop0          7:0    0    16M  1 loop
mtdblock0     31:0    0    32M  0 disk
mmcblk0      179:0    0 119.4G  0 disk
├─mmcblk0p1  179:1    0   119G  0 part /
├─mmcblk0p2  179:2    0    64M  0 part
├─mmcblk0p3  179:3    0    64M  0 part
├─mmcblk0p4  179:4    0   448K  0 part
├─mmcblk0p5  179:5    0   448K  0 part
├─mmcblk0p6  179:6    0    63M  0 part
├─mmcblk0p7  179:7    0   512K  0 part
├─mmcblk0p8  179:8    0   256K  0 part
├─mmcblk0p9  179:9    0   256K  0 part
├─mmcblk0p10 179:10   0   100M  0 part
└─mmcblk0p11 179:11   0   128M  0 part
zram0        252:0    0 971.7M  0 disk [SWAP]
zram1        252:1    0 971.7M  0 disk [SWAP]
zram2        252:2    0 971.7M  0 disk [SWAP]
zram3        252:3    0 971.7M  0 disk [SWAP]
s1155160788@user-desktop:~$
```

List partitions

`fdisk -l`

```
s1155160788@user-desktop:~$ sudo fdisk -l
Disk /dev/ram0: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram1: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram2: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram3: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram4: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram5: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram6: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram7: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/ram8: 8 MiB, 8388608 bytes, 16384 sectors
```


1155160788@user-desktop: ~
Disk /dev/ram8: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram9: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram10: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram11: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram12: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram13: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram14: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/ram15: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disk /dev/loop0: 16 MiB, 16777216 bytes, 32768 sectors
Units: sectors of 1 * 512 = 512 bytes

```
Disk /dev/loop0: 16 MiB, 16777216 bytes, 32768 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x00000000


Disk /dev/mtdblock0: 32 MiB, 33554432 bytes, 65536 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes


Disk /dev/mmcblk0: 119.4 GiB, 128177930240 bytes, 250347520 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: AD764E59-201C-4E6B-B6AB-72892A29DF5B

Device           Start       End   Sectors  Size Type
/dev/mmcblk0p1  870400 250345471 249475072  119G Linux filesystem
/dev/mmcblk0p2    2048    133119    131072   64M Linux filesystem
/dev/mmcblk0p3  133120    264191    131072   64M Linux filesystem
/dev/mmcblk0p4  264192    265087       896  448K Linux filesystem
/dev/mmcblk0p5  266240    267135       896  448K Linux filesystem
/dev/mmcblk0p6  268288    397311    129024   63M Linux filesystem
/dev/mmcblk0p7  397312    398335      1024  512K Linux filesystem
/dev/mmcblk0p8  399360    399871       512  256K Linux filesystem
/dev/mmcblk0p9  401408    401919       512  256K Linux filesystem
/dev/mmcblk0p10 403456    608255    204800  100M Linux filesystem
/dev/mmcblk0p11 608256    870399    262144  128M Linux filesystem

Partition table entries are not in disk order.


Disk /dev/zram0: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/zram1: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/zram2: 971.7 MiB, 1018880000 bytes, 248750 sectors
```

```
Partition table entries are not in disk order.


Disk /dev/zram0: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/zram1: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/zram2: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/zram3: 971.7 MiB, 1018880000 bytes, 248750 sectors
Units: sectors of 1 * 4096 = 4096 bytes
Sector size (logical/physical): 4096 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
s1155160788@user-desktop:~$
```

Check file info for `~/examples.desktop`

`file <FILE_NAME>`

```
s1155160788@user-desktop:~$ file ~/examples.desktop
/home/s1155160788/examples.desktop: UTF-8 Unicode text
s1155160788@user-desktop:~$
```

6.Networking

Show all interfaces

`ip address`

`Screenshot on next page.`

```
s1155160788@user-desktop:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: dummy0: <BROADCAST,NOARP> mtu 1500 qdisc noop state DOWN group default qlen 1000
    link/ether 9e:97:f7:87:f5:cd brd ff:ff:ff:ff:ff:ff
3: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 48:b0:2d:2f:70:f4 brd ff:ff:ff:ff:ff:ff
    inet 192.168.85.61/23 brd 192.168.85.255 scope global dynamic noprefixroute eth0
       valid_lft 64370sec preferred_lft 64370sec
    inet6 fdb3:188b:ecd8:0:e510:48ca:230d:783a/64 scope global temporary dynamic
       valid_lft 600679sec preferred_lft 82263sec
    inet6 fdb3:188b:ecd8:0:a412:3ac:56c3:cb10/64 scope global temporary deprecated dynamic
       valid_lft 514297sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:985c:e7bf:e37f:8ad0/64 scope global temporary deprecated dynamic
       valid_lft 427916sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:5d1b:c9f7:d7b:8a7c/64 scope global temporary deprecated dynamic
       valid_lft 341534sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:d525:8185:bc1e:195f/64 scope global temporary deprecated dynamic
       valid_lft 255153sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:2573:f03b:6ee0:6b6e/64 scope global temporary deprecated dynamic
       valid_lft 168771sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:8ca4:a6f:5ad2:2e67/64 scope global temporary deprecated dynamic
       valid_lft 82388sec preferred_lft 0sec
    inet6 fdb3:188b:ecd8:0:bf7d:61e3:2c12:ce8c/64 scope global mngtmpaddr noprefixroute
       valid_lft forever preferred_lft forever
    inet6 fe80::20fb:38d:b40e:cbac/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
4: wlan0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc mq state DOWN group default qlen 1000
    link/ether 20:4e:f6:0a:0b:23 brd ff:ff:ff:ff:ff:ff
5: l4tbr0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 1000
    link/ether 8e:58:ec:f9:bb:71 brd ff:ff:ff:ff:ff:ff
6: rndis0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast master l4tbr0 state DOWN group default qlen 1000
    link/ether 8e:58:ec:f9:bb:71 brd ff:ff:ff:ff:ff:ff
7: usb0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast master l4tbr0 state DOWN group default qlen 1000
    link/ether 8e:58:ec:f9:bb:73 brd ff:ff:ff:ff:ff:ff
8: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:2e:0d:db:05 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0
       valid_lft forever preferred_lft forever
s1155160788@user-desktop:~$
```

Show all listening interface on port 22

`netstat -nap | grep 22`

```
s1155160788@user-desktop:~$ sudo netstat -nap | grep 22
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      17538/sshd
tcp        0      0 192.168.85.61:22        10.10.54.106:6906       ESTABLISHED 26450/sshd: s115516
tcp6       0      0 :::22                   :::*                    LISTEN      17538/sshd
unix  2      [ ACC ]     STREAM     LISTENING     6024223  15753/dockerd       /var/run/docker/libnetwork/d528ce3c5889.sock
unix  2      [ ]         DGRAM                    6049362  26229/systemd       /run/user/1002/systemd/notify
unix  2      [ ACC ]     STREAM     LISTENING     6049366  26229/systemd       /run/user/1002/systemd/private
unix  2      [ ACC ]     STREAM     LISTENING     6049371  26229/systemd       /run/user/1002/bus
unix  2      [ ACC ]     STREAM     LISTENING     6049373  26229/systemd       /run/user/1002/gnupg/S.gpg-agent.ssh
unix  2      [ ACC ]     STREAM     LISTENING     6049375  26229/systemd       /run/user/1002/gnupg/S.gpg-agent.extra
unix  2      [ ACC ]     STREAM     LISTENING     6049377  26229/systemd       /run/user/1002/gnupg/S.dirmngr
unix  2      [ ACC ]     STREAM     LISTENING     6049379  26229/systemd       /run/user/1002/gnupg/S.gpg-agent.browser
unix  2      [ ACC ]     STREAM     LISTENING     6049381  26229/systemd       /run/user/1002/gnupg/S.gpg-agent
unix  2      [ ACC ]     STREAM     LISTENING     6049383  26229/systemd       /run/user/1002/snapd-session-agent.socket
unix  2      [ ACC ]     STREAM     LISTENING     11922    1/systemd           /run/rpcbind.sock
unix  2      [ ACC ]     STREAM     LISTENING     6022290  15753/dockerd       /var/run/docker/metrics.sock
unix  3      [ ]         STREAM     CONNECTED     6022052  15753/dockerd
unix  3      [ ]         DGRAM                    6001922  7201/systemd-timesy
unix  3      [ ]         STREAM     CONNECTED     32264    4623/dbus-daemon    /var/run/dbus/system_bus_socket
unix  2      [ ]         DGRAM                    6052266  26680/sudo
unix  2      [ ]         DGRAM                    13222    4531/rsyslogd
unix  3      [ ]         STREAM     CONNECTED     41622    7115/gnome-shell
unix  3      [ ]         STREAM     CONNECTED     32262    4623/dbus-daemon    /var/run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     28222    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     44522    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     6022295  15753/dockerd
unix  3      [ ]         STREAM     CONNECTED     28226    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     6022298  10074/containerd    /run/containerd/containerd.sock
unix  3      [ ]         STREAM     CONNECTED     42228    6681/Xorg           @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     6022297  15753/dockerd
unix  3      [ ]         STREAM     CONNECTED     32245    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     42216    7051/gnome-session-
unix  2      [ ]         DGRAM                    6051022  26450/sshd: s115516
unix  3      [ ]         STREAM     CONNECTED     44220    7568/ibus-portal
unix  2      [ ]         DGRAM                    6049335  26229/systemd
unix  3      [ ]         DGRAM                    6049365  26229/systemd
unix  3      [ ]         STREAM     CONNECTED     44223    7568/ibus-portal
unix  3      [ ]         STREAM     CONNECTED     44221    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         DGRAM                    6049364  26229/systemd
unix  3      [ ]         STREAM     CONNECTED     28224    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     6049325  26229/systemd
unix  3      [ ]         STREAM     CONNECTED     44224    1/systemd           /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     46322    7682/gsd-datetime
unix  3      [ ]         STREAM     CONNECTED     32276    4623/dbus-daemon    /var/run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     32275    5450/whoopsie
s1155160788@user-desktop:~$
```

7. Package Management

Update package repository list

`apt-get update`

```
s1155160788@user-desktop:~$ sudo apt-get update
Get:1 file:/var/cuda-repo-l4t-10-2-local  InRelease
Ign:1 file:/var/cuda-repo-l4t-10-2-local  InRelease
Get:2 file:/var/visionworks-repo  InRelease
Ign:2 file:/var/visionworks-repo  InRelease
Get:3 file:/var/visionworks-sfm-repo  InRelease
Ign:3 file:/var/visionworks-sfm-repo  InRelease
Get:4 file:/var/visionworks-tracking-repo  InRelease
Ign:4 file:/var/visionworks-tracking-repo  InRelease
Get:5 file:/var/cuda-repo-l4t-10-2-local  Release [564 B]
Get:6 file:/var/visionworks-repo  Release [2,001 B]
Get:7 file:/var/visionworks-sfm-repo  Release [2,005 B]
Get:5 file:/var/cuda-repo-l4t-10-2-local  Release [564 B]
Get:8 file:/var/visionworks-tracking-repo  Release [2,010 B]
Get:6 file:/var/visionworks-repo  Release [2,001 B]
Get:7 file:/var/visionworks-sfm-repo  Release [2,005 B]
Get:8 file:/var/visionworks-tracking-repo  Release [2,010 B]
Get:9 https://repo.download.nvidia.com/jetson/common r32.6 InRelease [2,555 B]
Get:10 https://repo.download.nvidia.com/jetson/t194 r32.6 InRelease [2,547 B]
Hit:13 http://ports.ubuntu.com/ubuntu-ports bionic InRelease
Get:14 http://ports.ubuntu.com/ubuntu-ports bionic-updates InRelease [88.7 kB]
Get:17 http://ports.ubuntu.com/ubuntu-ports bionic-backports InRelease [74.6 kB]
Get:18 http://ports.ubuntu.com/ubuntu-ports bionic-security InRelease [88.7 kB]
Get:19 http://ports.ubuntu.com/ubuntu-ports bionic-updates/main arm64 DEP-11 Metadata [291 kB]
Get:20 http://ports.ubuntu.com/ubuntu-ports bionic-updates/universe arm64 DEP-11 Metadata [295 kB]
Get:21 http://ports.ubuntu.com/ubuntu-ports bionic-backports/universe arm64 DEP-11 Metadata [9,260 B]
Get:22 http://ports.ubuntu.com/ubuntu-ports bionic-security/main arm64 DEP-11 Metadata [49.1 kB]
Get:23 http://ports.ubuntu.com/ubuntu-ports bionic-security/universe arm64 DEP-11 Metadata [54.3 kB]
Fetched 956 kB in 4s (225 kB/s)
Reading package lists... Done
s1155160788@user-desktop:~$
```

Install package `build-essential`

`apt install <PACKAGE_NAME>`

```
s1155160788@user-desktop:~$ sudo apt install build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
build-essential is already the newest version (12.4ubuntu1).
The following packages were automatically installed and are no longer required:
  apt-clone archdetect-deb bogl-bterm busybox-static cryptsetup-bin cuda-cuobjdump-10-2 cuda-gdb-10-2 cuda-libraries-10-2 cuda-libraries-dev-10-2 cuda-memcheck-10-2 cuda-nvdisasm-10-2
  cuda-nvgraph-10-2 cuda-nvgraph-dev-10-2 cuda-nvml-dev-10-2 cuda-nvprof-10-2 cuda-nvprune-10-2 cuda-nvtx-10-2 cuda-visual-tools-10-2 dpkg-repack gir1.2-timezonemap-1.0 gir1.2-xkl-1.0
  grub-common kde-window-manager kinit kio kpackagetool5 kwayland-data kwin-common kwin-data kwin-x11 libcufft-dev-10-2 libcurand-10-2 libcurand-dev-10-2 libcusolver-10-2
  libcusolver-dev-10-2 libcusparse-10-2 libcusparse-dev-10-2 libdebian-installer4 libkdecorations2-5v5 libkdecorations2private5v5 libkf5activities5 libkf5attica5 libkf5completion-data
  libkf5completion5 libkf5declarative-data libkf5declarative5 libkf5doctools5 libkf5globalaccel-data libkf5globalaccel5 libkf5globalaccelprivate5 libkf5idletime5 libkf5jobwidgets-data
  libkf5jobwidgets5 libkf5kcmutils-data libkf5kcmutils5 libkf5kiocore5 libkf5kiontlm5 libkf5kiowidgets5 libkf5newstuff-data libkf5newstuff5 libkf5newstuffcore5 libkf5package-data
  libkf5package5 libkf5plasma5 libkf5quickaddons5 libkf5solid5 libkf5solid5-data libkf5sonnet5-data libkf5sonnetcore5 libkf5sonnetui5 libkf5textwidgets-data libkf5textwidgets5
  libkf5waylandclient5 libkf5waylandserver5 libkf5xmlgui-bin libkf5xmlgui-data libkf5xmlgui5 libkscreenlocker5 libkwin4-effect-builtins1 libkwineffects11 libkwinglutils11
  libkwinxrenderutils11 libqgsttools-p1 libqt5designer5 libqt5help5 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediaquick-p5 libqt5multimediawidgets5 libqt5opengl5
  libqt5quickwidgets5 libqt5sql5 libqt5test5 libxcb-composite0 libxcb-cursor0 libxcb-damage0 libxmu-dev libxmu-headers os-prober python3-dbus.mainloop.pyqt5 python3-icu python3-pam
  python3-pyqt5 python3-pyqt5.qtsvg python3-pyqt5.qtwebkit qml-module-org-kde-kquickcontrolsaddons qml-module-qtmultimedia qml-module-qtquick2 rdate tasksel tasksel-data
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
s1155160788@user-desktop:~$
```

Remove package `build-essential` without removing all dependencies from that package)

`apt purge <PACKAGE_NAME>`

```
s1155160788@user-desktop:~$ sudo apt purge build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  apt-clone archdetect-deb bogl-bterm busybox-static cryptsetup-bin cuda-cuobjdump-10-2 cuda-gdb-10-2 cuda-libraries-10-2 cuda-libraries-dev-10-2 cuda-memcheck-10-2 cuda-nvdisasm-10-2
  cuda-nvgraph-10-2 cuda-nvgraph-dev-10-2 cuda-nvml-dev-10-2 cuda-nvprof-10-2 cuda-nvprune-10-2 cuda-nvtx-10-2 cuda-visual-tools-10-2 dpkg-repack gir1.2-timezonemap-1.0 gir1.2-xkl-1.0
  grub-common kde-window-manager kinit kio kpackagetool5 kwayland-data kwin-common kwin-data kwin-x11 libcufft-dev-10-2 libcurand-10-2 libcurand-dev-10-2 libcusolver-10-2
  libcusolver-dev-10-2 libcusparse-10-2 libcusparse-dev-10-2 libdebian-installer4 libkdecorations2-5v5 libkdecorations2private5v5 libkf5activities5 libkf5attica5 libkf5completion-data
  libkf5completion5 libkf5declarative-data libkf5declarative5 libkf5doctools5 libkf5globalaccel-data libkf5globalaccel5 libkf5globalaccelprivate5 libkf5idletime5 libkf5jobwidgets-data
  libkf5jobwidgets5 libkf5kcmutils-data libkf5kcmutils5 libkf5kiocore5 libkf5kiontlm5 libkf5kiowidgets5 libkf5newstuff-data libkf5newstuff5 libkf5newstuffcore5 libkf5package-data
  libkf5package5 libkf5plasma5 libkf5quickaddons5 libkf5solid5 libkf5solid5-data libkf5sonnet5-data libkf5sonnetcore5 libkf5sonnetui5 libkf5textwidgets-data libkf5textwidgets5
  libkf5waylandclient5 libkf5waylandserver5 libkf5xmlgui-bin libkf5xmlgui-data libkf5xmlgui5 libkscreenlocker5 libkwin4-effect-builtins1 libkwineffects11 libkwinglutils11
  libkwinxrenderutils11 libqgsttools-p1 libqt5designer5 libqt5help5 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediaquick-p5 libqt5multimediawidgets5 libqt5opengl5
  libqt5quickwidgets5 libqt5sql5 libqt5test5 libxcb-composite0 libxcb-cursor0 libxcb-damage0 libxmu-dev libxmu-headers os-prober python3-dbus.mainloop.pyqt5 python3-icu python3-pam
  python3-pyqt5 python3-pyqt5.qtsvg python3-pyqt5.qtwebkit qml-module-org-kde-kquickcontrolsaddons qml-module-qtmultimedia qml-module-qtquick2 rdate tasksel tasksel-data
Use 'sudo apt autoremove' to remove them.
The following packages will be REMOVED:
  build-essential*
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 20.5 kB disk space will be freed.
Do you want to continue? [Y/n] y
(Reading database ... 173201 files and directories currently installed.)
Removing build-essential (12.4ubuntu1) ...
s1155160788@user-desktop:~$
```

Upgrade package `build-essential`

`apt upgrade <PACKAGE_NAME>`

```
s1155160788@user-desktop:~$ sudo apt upgrade build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  apt-clone archdetect-deb bogl-bterm busybox-static cryptsetup-bin cuda-cuobjdump-10-2 cuda-gdb-10-2 cuda-libraries-10-2 cuda-libraries-dev-10-2 cuda-memcheck-10-2 cuda-nvdisasm-10-2
  cuda-nvgraph-10-2 cuda-nvgraph-dev-10-2 cuda-nvml-dev-10-2 cuda-nvprof-10-2 cuda-nvprune-10-2 cuda-nvtx-10-2 cuda-visual-tools-10-2 dpkg-repack gir1.2-timezonemap-1.0 gir1.2-xkl-1.0
  grub-common kde-window-manager kinit kio kpackagetool5 kwayland-data kwin-common kwin-data kwin-x11 libcufft-dev-10-2 libcurand-10-2 libcurand-dev-10-2 libcusolver-10-2
  libcusolver-dev-10-2 libcusparse-10-2 libcusparse-dev-10-2 libdebian-installer4 libkdecorations2-5v5 libkdecorations2private5v5 libkf5activities5 libkf5attica5 libkf5completion-data
  libkf5completion5 libkf5declarative-data libkf5declarative5 libkf5doctools5 libkf5globalaccel-data libkf5globalaccel5 libkf5globalaccelprivate5 libkf5idletime5 libkf5jobwidgets-data
  libkf5jobwidgets5 libkf5kcmutils-data libkf5kcmutils5 libkf5kiocore5 libkf5kiontlm5 libkf5kiowidgets5 libkf5newstuff-data libkf5newstuff5 libkf5newstuffcore5 libkf5package-data
  libkf5package5 libkf5plasma5 libkf5quickaddons5 libkf5solid5 libkf5solid5-data libkf5sonnet5-data libkf5sonnetcore5 libkf5sonnetui5 libkf5textwidgets-data libkf5textwidgets5
  libkf5waylandclient5 libkf5waylandserver5 libkf5xmlgui-bin libkf5xmlgui-data libkf5xmlgui5 libkscreenlocker5 libkwin4-effect-builtins1 libkwineffects11 libkwinglutils11
  libkwinxrenderutils11 libqgsttools-p1 libqt5designer5 libqt5help5 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediaquick-p5 libqt5multimediawidgets5 libqt5opengl5
  libqt5quickwidgets5 libqt5sql5 libqt5test5 libxcb-composite0 libxcb-cursor0 libxcb-damage0 libxmu-dev libxmu-headers os-prober python3-dbus.mainloop.pyqt5 python3-icu python3-pam
  python3-pyqt5 python3-pyqt5.qtsvg python3-pyqt5.qtwebkit qml-module-org-kde-kquickcontrolsaddons qml-module-qtmultimedia qml-module-qtquick2 rdate tasksel tasksel-data
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  build-essential
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 4,754 B of archives.
After this operation, 20.5 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ports.ubuntu.com/ubuntu-ports bionic/main arm64 build-essential arm64 12.4ubuntu1 [4,754 B]
Fetched 4,754 B in 0s (12.0 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package build-essential.
(Reading database ... 173192 files and directories currently installed.)
Preparing to unpack .../build-essential_12.4ubuntu1_arm64.deb ...
Unpacking build-essential (12.4ubuntu1) ...
Setting up build-essential (12.4ubuntu1) ...
s1155160788@user-desktop:~$
```

Search for package name `nvidia` in repo

`apt-cache search <PACKAGE_NAME>`

Screenshot on next page.

```
s1155160788@user-desktop:~$ sudo apt-cache search nvidia
dmraid - Device-Mapper Software RAID support tool
libvdpau-dev - Video Decode and Presentation API for Unix (development files)
libvdpau-doc - Video Decode and Presentation API for Unix (documentation)
libvdpau1 - Video Decode and Presentation API for Unix (libraries)
libvdpau1-dbg - Video Decode and Presentation API for Unix (debug symbols)
libxnvctrl-dev - NV-CONTROL X extension (development files)
libxnvctrl0 - NV-CONTROL X extension (runtime library)
nvidia-prime - Tools to enable NVIDIA's Prime
nvidia-settings - Tool for configuring the NVIDIA graphics driver
ubuntu-drivers-common - Detect and install additional Ubuntu driver packages
vdpau-driver-all - Video Decode and Presentation API for Unix (driver metapackage)
xserver-xorg-video-nouveau - X.Org X server -- Nouveau display driver
libnvidia-common-390 - Shared files used by the NVIDIA libraries
bbswitch-dkms - Interface for toggling the power on NVIDIA Optimus video cards
bumblebee - NVIDIA Optimus support for Linux
conky-all - highly configurable system monitor (all features enabled)
conky-all-dbg - highly configurable system monitor (all features enabled - debug)
cpufreqd - fully configurable daemon for dynamic frequency and voltage scaling
flashrom - Identify, read, write, erase, and verify BIOS/ROM/flash chips
gimp-normalmap - Normal map plugin for GIMP
hobbit-plugins - plugins for the Xymon network monitor
kubuntu-driver-manager - Driver Manager for Kubuntu
kubuntu-driver-manager-dbg - Driver Manager for Kubuntu -- debug symbols
libnvtt-bin - NVIDIA Texture Tools (Binaries)
libnvtt-dev - NVIDIA Texture Tools (Header)
libnvtt2 - NVIDIA Texture Tools
mate-optimus - MATE Desktop applet for controlling NVIDIA Optimus graphics cards
mate-sensors-applet - Display readings from hardware sensors in your MATE panel
numba-doc - native machine code compiler for Python (docs)
psensor - display graphs for monitoring hardware temperature
psensor-server - Psensor server for monitoring hardware sensors remotely
pyrit - GPGPU-driven WPA/WPA2-PSK key cracker
pyrit-opencl - OpenCL extension module for Pyrit
python-numba - native machine code compiler for Python 2
python3-numba - native machine code compiler for Python 3
sensors-applet - Display readings from hardware sensors in your Gnome panel
sysinfo - display computer and system information
vc-dev - Library to ease explicit vectorization of C++ code
vdpauinfo - Video Decode and Presentation API for Unix (vdpauinfo utility)
u-boot-tegra - A boot loader for NVIDIA Tegra systems
hashcat-nvidia - Installs hashcat and its dependencies for users with NVIDIA GPU
libcupti-doc - NVIDIA CUDA Profiler Tools Interface documentation
nouveau-firmware - Firmware for nVidia graphics cards
nvidia-cg-doc - Cg Toolkit - GPU Shader Authoring Language (documentation)
nvidia-cuda-doc - NVIDIA CUDA and OpenCL documentation
python-pycuda-doc - module to access Nvidia's CUDA computation API (documentation)
tegrarcm - Tool to upload payloads in Tegra SoC recovery mode
xserver-xorg-video-nouveau-hwe-18.04 - X.Org X server -- Nouveau display driver
libnvidia-common-418 - Transitional package for libnvidia-common-430
```

```
libnvidia-common-418 - Transitional package for libnvidia-common-430
libnvidia-common-418-server - Shared files used by the NVIDIA libraries
libnvidia-common-430 - Transitional package for libnvidia-common-440
libnvidia-common-435 - Transitional package for libnvidia-common-455
libnvidia-common-440 - Transitional package for libnvidia-common-450
libnvidia-common-440-server - Transitional package for libnvidia-common-450-server
libnvidia-common-450 - Transitional package for libnvidia-common-460
libnvidia-common-450-server - Shared files used by the NVIDIA libraries
libnvidia-common-455 - Transitional package for libnvidia-common-460
libnvidia-common-460 - Transitional package for libnvidia-common-470
libnvidia-common-465 - Transitional package for libnvidia-common-470
libnvidia-common-470 - Shared files used by the NVIDIA libraries
libnvidia-common-470-server - Shared files used by the NVIDIA libraries
libnvidia-common-495 - Transitional package for libnvidia-common-510
libnvidia-common-510 - Shared files used by the NVIDIA libraries
libnvidia-common-460-server - Transitional package for libnvidia-common-470-server
cuda-nvtx-10-2 - NVIDIA Tools Extension
cuda-gdb-10-2 - CUDA-GDB
cuda-libraries-dev-10-2 - CUDA Libraries 10.2 development meta-package
cuda-libraries-10-2 - CUDA Libraries 10.2 meta-package
cuda-visual-tools-10-2 - CUDA visual tools
deepstream-6.0 - Nvidia DeepStreamSDK runtime libraries, development files and samples
libnvidia-container-tools - NVIDIA container runtime library (command-line tools)
libnvidia-container0 - NVIDIA container runtime library
libnvvpi1 - NVIDIA Vision Programming Interface library
libvisionworks - NVIDIA's VisionWorks Library and supplemental data
libvisionworks-dev - Development files for NVIDIA's VisionWorks Library
libvisionworks-samples - Samples for NVIDIA's VisionWorks Library
libvisionworks-sfm - SFM module for NVIDIA's VisionWorks Library
libvisionworks-sfm-dev - Development files for SFM module for NVIDIA's VisionWorks Library
libvisionworks-tracking - Tracking module for NVIDIA's VisionWorks Library
libvisionworks-tracking-dev - Development files for Tracking module for NVIDIA's VisionWorks Library
nsight-systems-cli-2021.2.3 - Nsight Systems is a statistical sampling profiler with tracing features.
nvidia-container-csv-cuda - Jetpack CUDA CSV file
nvidia-container-csv-cudnn - Jetpack CUDNN CSV file
nvidia-container-csv-tensorrt - Jetpack TensorRT CSV file
nvidia-container-csv-visionworks - Jetpack VisionWorks CSV file
nvidia-container-runtime - NVIDIA container runtime
nvidia-container-toolkit - NVIDIA container runtime hook
nvidia-docker2 - nvidia-docker CLI wrapper
python-vpi1 - NVIDIA VPI python 2.7 bindings
python3-vpi1 - NVIDIA VPI python 3.6 bindings
vpi1-demos - NVIDIA VPI GUI demo applications
vpi1-dev - NVIDIA VPI C/C++ development library and headers
vpi1-samples - NVIDIA VPI command-line sample applications
nvidia-container - NVIDIA Container Meta Package
nvidia-cuda - NVIDIA CUDA Meta Package
nvidia-cudnn8 - NVIDIA CUDNN8 Meta Package
nvidia-jetpack - NVIDIA Jetpack Meta Package
nvidia-l4t-3d-core - NVIDIA GL EGL Package
```

Screenshot on next page.

```
nvidia-jetpack - NVIDIA Jetpack Meta Package
nvidia-l4t-3d-core - NVIDIA GL EGL Package
nvidia-l4t-apt-source - NVIDIA L4T apt source list debian package
nvidia-l4t-bootloader - NVIDIA Bootloader Package
nvidia-l4t-camera - NVIDIA Camera Package
nvidia-l4t-configs - NVIDIA configs debian package
nvidia-l4t-core - NVIDIA Core Package
nvidia-l4t-cuda - NVIDIA CUDA Package
nvidia-l4t-firmware - NVIDIA Firmware Package
nvidia-l4t-gputools - NVIDIA dgpu helper Package
nvidia-l4t-graphics-demos - NVIDIA graphics demo applications
nvidia-l4t-gstreamer - NVIDIA GST Application files
nvidia-l4t-init - NVIDIA Init debian package
nvidia-l4t-initrd - NVIDIA initrd debian package
nvidia-l4t-jetson-io - NVIDIA Jetson.IO debian package
nvidia-l4t-jetson-multimedia-api - NVIDIA Jetson Multimedia API is a collection of lower-level APIs that support flexible application development.
nvidia-l4t-kernel - NVIDIA Kernel Package
nvidia-l4t-kernel-dtbs - NVIDIA Kernel DTB Package
nvidia-l4t-kernel-headers - NVIDIA Linux Tegra Kernel Headers Package
nvidia-l4t-libvulkan - NVIDIA Vulkan Loader Package
nvidia-l4t-multimedia - NVIDIA Multimedia Package
nvidia-l4t-multimedia-utils - NVIDIA Multimedia Package
nvidia-l4t-oem-config - NVIDIA OEM-Config Package
nvidia-l4t-tools - NVIDIA Public Test Tools Package
nvidia-l4t-wayland - NVIDIA Wayland Package
nvidia-l4t-weston - NVIDIA Weston Package
nvidia-l4t-x11 - NVIDIA X11 Package
nvidia-l4t-xusb-firmware - NVIDIA USB Firmware Package
nvidia-opencv - NVIDIA OpenCV Meta Package
nvidia-tensorrt - NVIDIA TensorRT Meta Package
nvidia-visionworks - NVIDIA VisionWorks Meta Package
nvidia-vpi - NVIDIA Vpi Meta Package
libvisionworks-tracking-repo - Package repository for NVIDIA's VisionWorks Tracking module.
libvisionworks-sfm-repo - Package repository for NVIDIA's VisionWorks SFM module.
libvisionworks-repo - NVIDIA VisionWorks computer vision library.
s1155160788@user-desktop:~$
```

8. Jetpack related

Check current active power mode

`nvpmodel -q`

```
s1155160788@user-desktop:~$ sudo nvpmodel -q
[sudo] password for s1155160788:
NV Fan Mode:quiet
NV Power Mode: MODE_15W_6CORE
2
s1155160788@user-desktop:~$
```

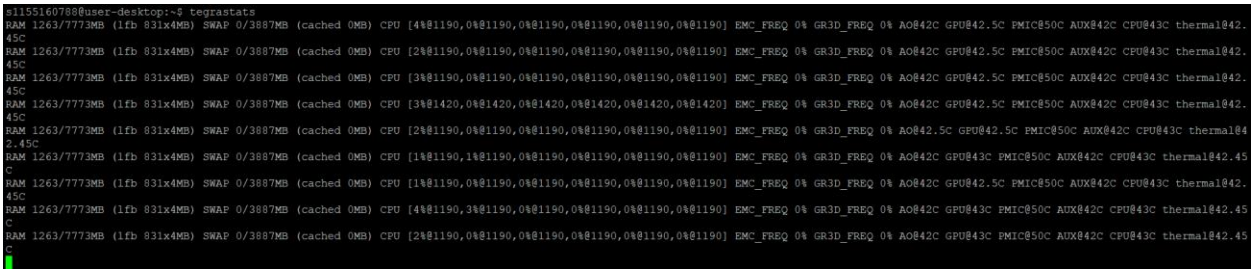
Change power mode to 2 (persist after reboot)

`nvpmodel -m 2`

```
s1155160788@user-desktop:~$ sudo nvpmodel -m 2
NVPM WARN: patching tpc_pg_mask: (0x1:0x4)
NVPM WARN: patched tpc_pg_mask: 0x4
s1155160788@user-desktop:~$
```

Check CPU/GPU memory utilizations

`Tegrastats`



B. Comprehensive [3%]

Q1) What is a shell? What is its purpose?

A shell is the program that allows humans / other programs to interface with the operating system. There are Command Line Interfaces (CLI) that take text from keyboard input and provide the commands to the operating system to execute, as well as Graphical User Interfaces (GUI), which are more graphical / visual and involve a combination of keyboard and mouse input, such as the Windows shell used by Microsoft Windows operating systems.

The Nvidia Jetson Xavier NX edge nodes we are using, like many linux systems, come with the bash shell (short for Bourne Again Shell) by default, a command line shell.

Q2) What are the three standard streams in Linux?

The standard streams are used for input and output communication between programs and between a computer program and the environment it operates in. The three standard streams are standard input (stdin), standard output (stdout), and standard error (stderr).

Programs often / usually read their input from the standard input (stdin) stream.

Programs often / usually write their output data to the standard output (stdout) stream.

Programs often / usually output their error / debugging messages to the standard error (stderr) stream. It generally will not be seen in the console unless it is redirected to the standard output stream by using the 2> &1 command.

Q3) What is the difference between redirection and pipe? Show an example.

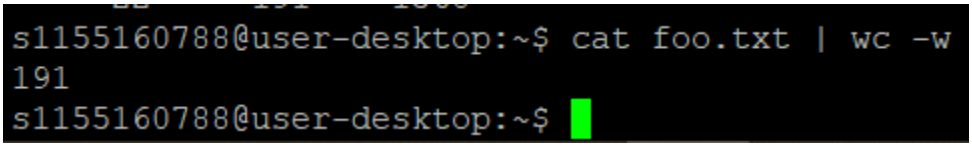
Redirection is generally used to pass / reroute / redirect the input or output of a command to or from a file. This is accomplished through > and < where the direction it is pointing indicates the target of the passing operation. In class, we also learned about >>, which is a form of redirection which appends an output to the contents of a file.

Piping will specifically take the output of one command / program, and use it as the input for the next command / program on the other side of the pipe (indicated by |).

Below is an example of using redirection to take the output of the “ls -alh” command and pass it to the foo.txt file, appending this to the contents of the foo.txt file, which we call through “cat foo.txt” afterwards.

```
s1155160788@user-desktop:~$ ls -alh
total 80K
drwxr-xr-x 8 s1155160788 s1155160788 4.0K Feb 20 17:55 .
drwxr-xr-x 7 root        root        4.0K Feb 19 15:32 ..
-rw------- 1 s1155160788 s1155160788 3.0K Feb 20 18:04 .bash_history
-rw-r--r-- 1 s1155160788 s1155160788  220 Feb 19 14:40 .bash_logout
-rw-r--r-- 1 s1155160788 s1155160788 3.8K Feb 19 15:49 .bashrc
drwx------ 2 s1155160788 s1155160788 4.0K Feb 19 14:43 .cache
drwx------ 3 s1155160788 s1155160788 4.0K Feb 19 15:32 .config
drwxr-xr-x 2 s1155160788 s1155160788 4.0K Feb 19 14:40 Desktop
-rw-r--r-- 1 s1155160788 s1155160788 8.8K Feb 19 14:40 examples.desktop
-rw-rw-r-- 1 s1155160788 s1155160788    0 Feb 20 11:55 foo.txt
drwx------ 2 s1155160788 s1155160788 4.0K Feb 20 17:10 .gconf
drwx------ 3 s1155160788 s1155160788 4.0K Feb 19 14:43 .gnupg
-rw-rw-r-- 1 s1155160788 s1155160788 1.1K Feb 20 17:55 LICENSE
drwxrwxr-x 3 s1155160788 s1155160788 4.0K Feb 19 16:20 .local
-rw-rw-r-- 1 s1155160788 s1155160788    0 Feb 19 15:15 NoContent
-rw-r--r-- 1 s1155160788 s1155160788  807 Feb 19 14:40 .profile
-rw-r--r-- 1 s1155160788 s1155160788    0 Feb 19 14:52 .sudo_as_admin_successful
-rw-rw-r-- 1 s1155160788 s1155160788   52 Feb 19 16:22 testfile
-rw------- 1 s1155160788 s1155160788 2.0K Feb 19 16:41 .viminfo
-rw-rw-r-- 1 s1155160788 s1155160788  180 Feb 20 17:55 .wget-hsts
-rw-r--r-- 1 s1155160788 s1155160788 2.1K Feb 19 14:40 .xsessionrc
s1155160788@user-desktop:~$ ls -alh > foo.txt
s1155160788@user-desktop:~$ cat foo.txt
total 80K
drwxr-xr-x 8 s1155160788 s1155160788 4.0K Feb 20 17:55 .
drwxr-xr-x 7 root        root        4.0K Feb 19 15:32 ..
-rw------- 1 s1155160788 s1155160788 3.0K Feb 20 18:04 .bash_history
-rw-r--r-- 1 s1155160788 s1155160788  220 Feb 19 14:40 .bash_logout
-rw-r--r-- 1 s1155160788 s1155160788 3.8K Feb 19 15:49 .bashrc
drwx------ 2 s1155160788 s1155160788 4.0K Feb 19 14:43 .cache
drwx------ 3 s1155160788 s1155160788 4.0K Feb 19 15:32 .config
drwxr-xr-x 2 s1155160788 s1155160788 4.0K Feb 19 14:40 Desktop
-rw-r--r-- 1 s1155160788 s1155160788 8.8K Feb 19 14:40 examples.desktop
-rw-rw-r-- 1 s1155160788 s1155160788    0 Feb 20 19:45 foo.txt
drwx------ 2 s1155160788 s1155160788 4.0K Feb 20 17:10 .gconf
drwx------ 3 s1155160788 s1155160788 4.0K Feb 19 14:43 .gnupg
-rw-rw-r-- 1 s1155160788 s1155160788 1.1K Feb 20 17:55 LICENSE
drwxrwxr-x 3 s1155160788 s1155160788 4.0K Feb 19 16:20 .local
-rw-rw-r-- 1 s1155160788 s1155160788    0 Feb 19 15:15 NoContent
-rw-r--r-- 1 s1155160788 s1155160788  807 Feb 19 14:40 .profile
-rw-r--r-- 1 s1155160788 s1155160788    0 Feb 19 14:52 .sudo_as_admin_successful
-rw-rw-r-- 1 s1155160788 s1155160788   52 Feb 19 16:22 testfile
-rw------- 1 s1155160788 s1155160788 2.0K Feb 19 16:41 .viminfo
-rw-rw-r-- 1 s1155160788 s1155160788  180 Feb 20 17:55 .wget-hsts
-rw-r--r-- 1 s1155160788 s1155160788 2.1K Feb 19 14:40 .xsessionrc
s1155160788@user-desktop:~$
```

Next is an example of piping where I pipe the output of the command “cat foo.txt” and use it as the input for the wc -w command. This second command counts the number of words from the cat foo.txt command, which is the same as the file contents of foo.txt.



Q4) What is the tool used to resume a shell session when the network is interrupted?

Tmux, which is short for terminal multiplexer, can be used for this purpose. It creates an emulated shell called a session that can be generated through “tmux new -s (session name)”. If the connection is interrupted, you can relog into the server and use tmux a -t (session name) to resume the emulated session, with all the output and consequences of commands preserved, such as a copying and file transfer operations that were ongoing. Even if you lost internet connection, as long as the server / unix / linux workstation maintained the command, it would keep running.

Tmux can also be used for many other things such as switching between programs, attaching them to different terminals, etc.