# Embedded Systems

# Week 2: Linux Fundamentals I

**Fenerbahçe University**

# Professor & TAs

Prof: Dr. Vecdi Emre Levent
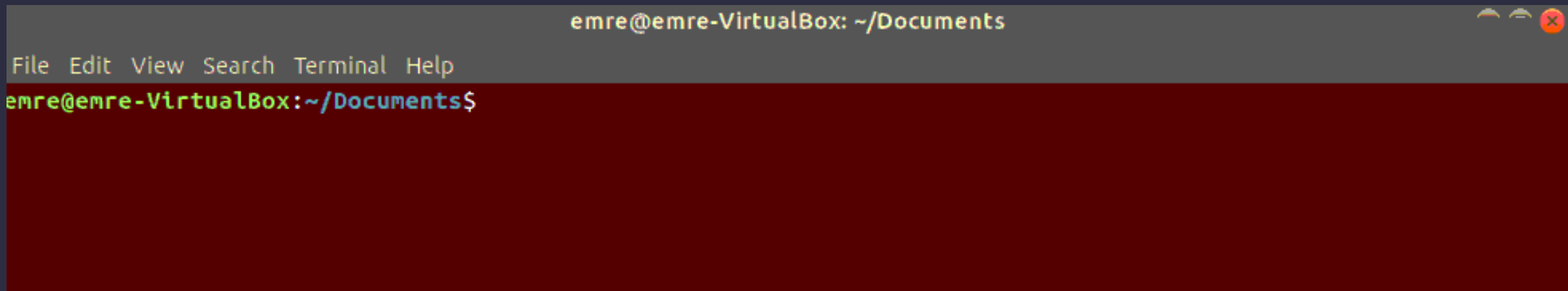
Office: 311

Email: emre.levent@fbu.edu.tr

TA: Arş. Gör. Uğur Özbalkan

Office: 311

Email: ugur.ozbalkan@fbu.edu.tr

# Fundamental Linux Commands

If you are using a GUI based OS, you may type CNTRL + ALT + t
for opening terminal

# Fundamental Linux Commands

pwd: Shows full path of working directory

```
emre@emre-VirtualBox:~/Downloads$ pwd
/home/emre/Downloads
```

# Fundamental Linux Commands

ls: List files and directories under current working directory

```
emre@emre-VirtualBox:~/Downloads$ ls
petalinux-v2021.2-final-installer.run
pynq-supported-board-file-master.zip
Xilinx_Unified_2021.2_1021_0703_Lin64.bin
```

ls –al: List detailed files and directories under current working directory

```
emre@emre-VirtualBox:~/Downloads$ ls -al
total 2483188
drwxr-xr-x  2 emre emre       4096 Oca 22 16:42 .
drwxr-xr-x 41 emre emre       4096 Oca 22 16:34 ..
-rwxrw-r--  1 emre emre 2255897193 Ara 16 15:13 petalinux-v2021.2-final-installer.run
-rw-rw-r--  1 emre emre     812456 Ara 16 20:59 pynq-supported-board-file-master.zip
-rwxrw-r--  1 emre emre  286051682 Ara 16 15:09 Xilinx_Unified_2021.2_1021_0703_Lin64.bin
```

# Fundamental Linux Commands

If you want more detail about command you can use

man "command"

```
emre@emre-VirtualBox:~/Downloads$ man ls
```

This will show detailed manual of command

```
LS(1)                          User Commands                          LS(1)

NAME
       ls - list directory contents

SYNOPSIS
       ls [OPTION]... [FILE]...

DESCRIPTION
       List  information about the FILEs (the current directory by default).  Sort entries alphabetically
       if none of -cftuvSUX nor --sort is specified.

       Mandatory arguments to long options are mandatory for short options too.

       -a, --all
              do not ignore entries starting with .

       -A, --almost-all
              do not list implied . and ..

       --author
              with -l, print the author of each file
```

# Fundamental Linux Commands

cd: Changes working folder

```
emre@emre-VirtualBox:~/Downloads$ cd /home/emre/Desktop
emre@emre-VirtualBox:~/Desktop$ pwd
/home/emre/Desktop
emre@emre-VirtualBox:~/Desktop$ 
```

For going upper folder

```
emre@emre-VirtualBox:~/Desktop$ cd ..
emre@emre-VirtualBox:~$ pwd
/home/emre
emre@emre-VirtualBox:~$
```

# Fundamental Linux Commands

mkdir: Creates folder

```
emre@emre-VirtualBox:~/Documents$ ls
emre@emre-VirtualBox:~/Documents$ mkdir test
emre@emre-VirtualBox:~/Documents$ ls
test
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:03 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
```

sudo: Super user command execution

sudo command …

# Fundamental Linux Commands

- chmod: Change a file or folder authorizations

```
emre@emre-VirtualBox:~/Documents$ ls
test   testfile
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:07 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
-rw-rw-r--  1 emre emre    0 Oca 22 17:07 testfile
emre@emre-VirtualBox:~/Documents$ sudo chmod 777 testfile
[sudo] password for emre:
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:07 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
-rwxrwxrwx  1 emre emre    0 Oca 22 17:07 testfile
```

# Fundamental Linux Commands

- chmod: Change a file or folder authorizations, authorize for execution

  chmod u+x petalinux-v202.X.X-final-installer.run

# Fundamental Linux Commands

- rm: Remove a file

```
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:07 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
-rwxrwxrwx  1 emre emre    0 Oca 22 17:07 testfile
emre@emre-VirtualBox:~/Documents$ rm testfile
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:09 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
```

# Fundamental Linux Commands

- rm -rf: Remove a folder

```
emre@emre-VirtualBox:~/Documents$ ls -al
total 12
drwxr-xr-x  3 emre emre 4096 Oca 22 17:09 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
drwxrwxr-x  2 emre emre 4096 Oca 22 17:03 test
emre@emre-VirtualBox:~/Documents$ rm -rf test
emre@emre-VirtualBox:~/Documents$ ls -al
total 8
drwxr-xr-x  2 emre emre 4096 Oca 22 17:09 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
```

# Fundamental Linux Commands

- history: Shows previously entered commands

```
404   ls -al
405   sudo chmod 777 testfile
406   ls -al
407   rm testfile
408   ls -al
409   rm -rf test
410   ls -al
411   history
```

# Fundamental Linux Commands

- touch: Creates empty file

```
emre@emre-VirtualBox:~/Documents$ ls -al
total 8
drwxr-xr-x  2 emre emre 4096 Oca 22 17:09 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
emre@emre-VirtualBox:~/Documents$ touch testX
emre@emre-VirtualBox:~/Documents$ ls -al
total 8
drwxr-xr-x  2 emre emre 4096 Oca 22 17:19 .
drwxr-xr-x 41 emre emre 4096 Oca 22 17:02 ..
-rw-rw-r--  1 emre emre    0 Oca 22 17:19 testX
```

# Fundamental Linux Commands

- exit: Closes current terminal

# Fundamental Linux Commands

- To execute a executable file

./executableFile

- If this file is a shell script then you may call

sh script.sh

- Also you may use source command for execute a shell script

source script.sh

Difference ise sh creates new session and losts if this script sets environment variables

- export: to set a environmet variable:

export: variableName="test"

```
emre@emre-VirtualBox:~/Documents$ export testVar="deneme"
```

# Fundamental Linux Commands

- echo: print variables:

echo $varName

```
emre@emre-VirtualBox:~/Documents$ echo $testVar
deneme
```

# Fundamental Linux Commands

- ip a: lists current ethernet settings

```
emre@emre-VirtualBox:~/Documents$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t qlen 1000
    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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP gr
oup default qlen 1000
    link/ether 08:00:27:e4:f8:c4 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 82776sec preferred_lft 82776sec
    inet6 fe80::62a0:5fee:8f60:af5/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

# Fundamental Linux Commands

- ping: Send a ethernet packet to remote host for checking alive test

```
emre@emre-VirtualBox:~/Documents$ ping 10.0.2.15
PING 10.0.2.15 (10.0.2.15) 56(84) bytes of data.
64 bytes from 10.0.2.15: icmp_seq=1 ttl=64 time=0.032 ms
64 bytes from 10.0.2.15: icmp_seq=2 ttl=64 time=0.024 ms
64 bytes from 10.0.2.15: icmp_seq=3 ttl=64 time=0.024 ms
```

# Fundamental Linux Commands

- ps aux: List all process currently working

```
root       17335   0.0  0.0        0        0 ?         I     16:48    0:00 [kworker/2:2]
emre       17356   0.0  0.0    29908     4328 pts/0     T     16:55    0:00 man ls
emre       17366   0.0  0.0    18376      952 pts/0     T     16:55    0:00 pager
emre       17376   0.0  0.0    29908     4252 pts/0     T     16:57    0:00 man ls
emre       17386   0.0  0.0    18376     1040 pts/0     T     16:57    0:00 pager
emre       17416   0.1  0.5   680460    47400 pts/0     Sl+   17:02    0:03 gedit x.txt
emre       17426   0.0  0.1    35420     9812 pts/1     Ss    17:03    0:00 bash
root       17446   0.0  0.0        0        0 ?         I     17:05    0:00 [kworker/0:0-cg
root       17474   0.0  0.0        0        0 ?         I     17:09    0:00 [kworker/1:1-cg
root       17486   0.0  0.0        0        0 ?         I     17:14    0:00 [kworker/3:1-cg
root       17487   0.0  0.0        0        0 ?         R     17:14    0:00 [kworker/u12:3-
root       17506   0.0  0.0        0        0 ?         I     17:24    0:00 [kworker/u12:1-
root       18366   0.0  0.0        0        0 ?         I     17:34    0:00 [kworker/5:0-cg
emre       18394   0.0  0.0    45896     3764 pts/1     R+    17:37    0:00 ps aux
```

# Fundamental Linux Commands

- top: List all process with their hardware (CPU, RAM) usage