



King Abdulaziz University
Electrical and Computer Engineering Department

EE 463

Operating Systems Lab

Lab 1

**Install Linux on a Virtual Machine and Learn Basic
Linux Commands.**

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❖ Introduction

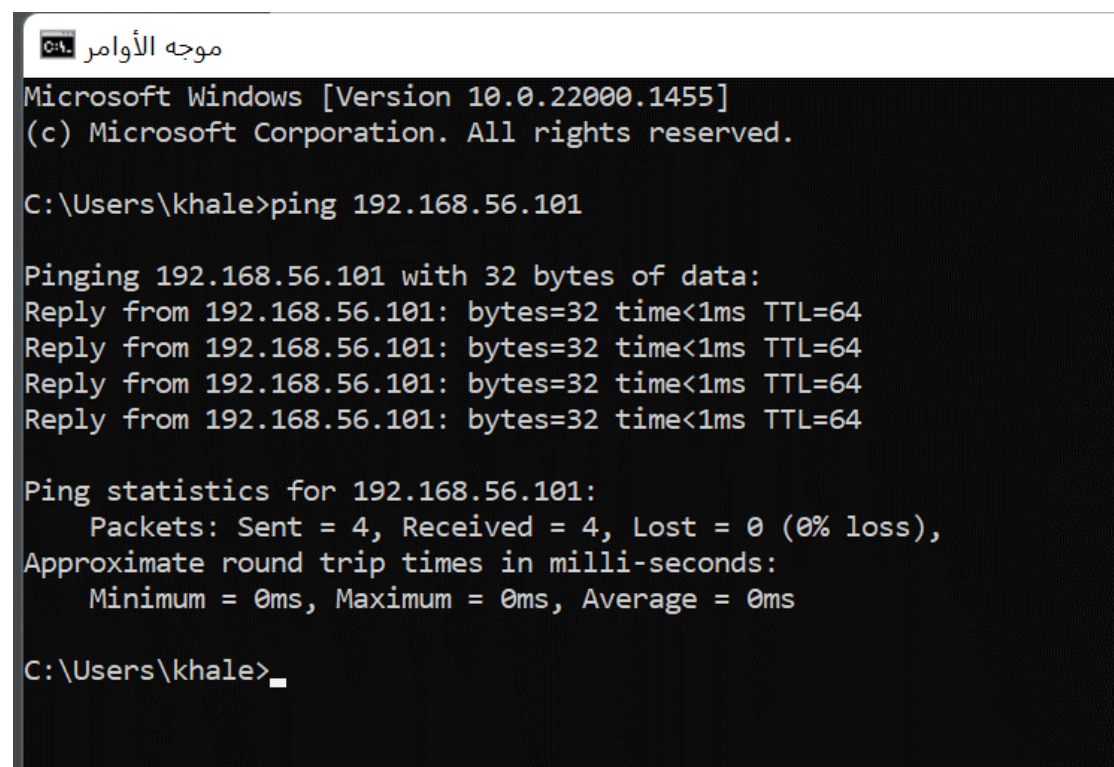
Nowadays, the industry of tech is more focused on hyper virtualization and the development of virtual environments. In hyper visualization there are two types:

- 1- BareMetal/native Hyper visors, they use the hardware to host the virtual environments.
- 2- Hosted hypervisors, in which the virtual environment is hosted on the operating system of the computer.

In this lab we will download a software that lets us host a virtual environment (Linux) on our windows operating system, thus it's a type 2 hypervisor demonstration. We will test the environment and use it to run code.

❖ Testing connection

Testing connection from host to guest system.



```
وجه الأوامر
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\khale>ping 192.168.56.101

Pinging 192.168.56.101 with 32 bytes of data:
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64
Reply from 192.168.56.101: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.56.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\khale>
```

Figure 1 using host cmd to test the environment connection.

Running c program add.c

Figure 2 Test run a C program on guest environment.

Vim used to edit errors:

Figure 3 Vim editor on add.c file.

❖ Linux Command tutorial:

```
root@lamp: /root
khaledahhasii@lamp /root$ exit
exit
root@lamp ~# adduser khaledahhasii
Adding user `khaledahhasii' ...
Adding new group `khaledahhasii' (1001) ...
Adding new user `khaledahhasii' (1001) with group `khaledahhasii' ...
Creating home directory `/home/khaledahhasii' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for khaledahhasii
Enter the new value, or press ENTER for the default
    Full Name []: khaled dahhas
    Room Number []: 1
    Work Phone []: 1
    Home Phone []: 1
    Other []: NA
Is the information correct? [Y/n] Y
root@lamp ~#
```

Figure 4 adding normal user (example).

❖ UNIX Tutorial one:

Following steps 1.1 to 1.4 and doing exercise 1a:

```
khaledahhasii@lamp: /home/khaledahhasii
For Advanced commandline config run:    confconsole
For more info see: https://www.turnkeylinux.org/docs/confconsole

Linux lamp 4.19.0-8-amd64 #1 SMP Debian 4.19.98-1+deb10u1 (2020-04-27) x86_64
Last login: Sat Mar 25 19:20:55 2023 from 192.168.56.1
khaledahhasii@lamp ~$ ls
khaledahhasii@lamp ~$ ls -a
.  .bash_history  .bashrc  .penv  .profile.d  .ssh
.. .bash_logout  .bashrc.d  .profile  .sdirs
khaledahhasii@lamp ~$ mkdir unixstuff
khaledahhasii@lamp ~$ ls
unixstuff
khaledahhasii@lamp ~$ cd unixstuff
khaledahhasii@lamp ~/unixstuff$ mkdir backups
khaledahhasii@lamp ~/unixstuff$ ls
backups
khaledahhasii@lamp ~/unixstuff$ ls -a
.  ..  backups
khaledahhasii@lamp ~/unixstuff$ cd .
khaledahhasii@lamp ~/unixstuff$ cd ..
khaledahhasii@lamp ~$
```

Figure 5 making directories.

Steps 1.5 to 1.6 and doing exercise 1b

```

khaledahhasii@lamp ~$ cd
khaledahhasii@lamp ~$ pwd
/home/khaledahhasii
khaledahhasii@lamp ~$ ls
unixstuff
khaledahhasii@lamp ~$ cd unixstuff
khaledahhasii@lamp ~/unixstuff$ pwd
/home/khaledahhasii/unixstuff
khaledahhasii@lamp ~/unixstuff$ cd
khaledahhasii@lamp ~$ ls unixstuff
backups
khaledahhasii@lamp ~$ ls backups
ls: cannot access 'backups': No such file or directory
khaledahhasii@lamp ~$ ls unixstuff/backups
khaledahhasii@lamp ~$ ls ~/unixstuff
backups
khaledahhasii@lamp ~$ ls ~
unixstuff
khaledahhasii@lamp ~$ ls ../../
khaledahhasii kaledahhasii
khaledahhasii@lamp ~$

```

Figure 6 using pwd and full paths.

❖ UNIX Tutorial two.

Following images are demonstration of steps 2.1 to 2.3 where file copying, moving, and removing is used.

```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
khaledahhasii@lamp ~$ cd ~/unixstuff
khaledahhasii@lamp ~/unixstuff$ ls
backups
khaledahhasii@lamp ~/unixstuff$ cp ~/vol/examples/tutorial/science.txt .
khaledahhasii@lamp ~/unixstuff$ ls
backups science.txt
khaledahhasii@lamp ~/unixstuff$ cp ~/vol/examples/tutorial/science.txt ./science.bak
khaledahhasii@lamp ~/unixstuff$ ls
backups science.bak science.txt

```

Figure 7 Step 2.1 and exercise 2a

```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.bak  science.txt
khaledahhasii@lamp ~/unixstuff$ mv science.bak backups
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.txt
khaledahhasii@lamp ~/unixstuff$ cd backups
khaledahhasii@lamp ~/unixstuff/backups$ ls
science.bak
khaledahhasii@lamp ~/unixstuff/backups$ cd ~/unixstuff
khaledahhasii@lamp ~/unixstuff$ cp science.txt tempfile.txt
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.txt  tempfile.txt
khaledahhasii@lamp ~/unixstuff$ rm tempfile.txt
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.txt
khaledahhasii@lamp ~/unixstuff$ mkdir tempstuff
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.txt  tempstuff
khaledahhasii@lamp ~/unixstuff$ rmdir tempstuff
khaledahhasii@lamp ~/unixstuff$ ls
backups  science.txt
khaledahhasii@lamp ~/unixstuff$ █

```

Figure 8 steps 2.2, 2.3 and exercise 2b

The following images are demonstration of steps 2.4 and 2.5 regarding displaying the text file and searching through it:

```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
with before, but we have so many skills and such experience in this area that
I'm sure it will succeed."

To fund the serious side of Herstmonceux, therefore, customers must be
attracted to the entertainments. It was this that made the Fabricators' Week
with its display of potential new attractions so significant. It was clear tha
t
the spinning top had potential if it could be made more surprising.

"What about this?" Prof Berry suggested. "I'll show you how to cut it down."

Drawing a Swiss army knife from his pocket, he sliced through the air beneath
the top, and with the magnetic force interrupted, the top dropped to the
ground.

That's the sort of cortickling thing you learn at science centres - a Swiss
Army knife not only has a tool for removing stones from horses' hooves but one
for destroying adiabatic traps.

* Herstmonceux Science Centre is open daily 10am-6pm (tel 01323-832731),
nearest stations Battle and Polgate. The International Study Centre offers
limited accommodation (01323-834444).
khaledahhasii@lamp ~/unixstuff$ █

```

Figure 9 using cat on science.txt

```
khaledahhasii@lamp: /home/khaledahhasii/unixstuff
The Electronic Telegraph Thursday 28 September 1995 Science

This summer the Royal Observatory at Herstmonceux
found new life as a science centre. Andro Linklater
celebrates a partial victory for the heritage

THE SIGHT of a child's top spinning unsupported in mid-air should have been
surprising. Rotating there in space, it not only defied the rules of gravity,
it defied common sense, and at least three Fellows of the Royal Society gazed
at it in something close to wonder.

But this was Fabricators' Week at the Herstmonceux Science Centre, with
exhibitors from science centres all over Europe arriving to demonstrate
prototypes of experiments they hoped to produce as hands-on displays - a tube
of rocket-propelled rubber balls, a solar-powered toy car, a model of planetar
y
movement. They had a much tougher audience in mind. Would it astonish a child?

"Well I certainly found it surprising," Prof Michael Berry FRS, an expert in
gravitational physics and the top's demonstrator, said a trifle indignantly.
"The physics of why the top doesn't topple over are extraordinarily complex,
and so far as I know, no one has ever demonstrated the experiment before."
science.txt
```

Figure 10 using `less` on `science.txt`. (more convenient for reading)

```
khaledahhasii@lamp ~/unixstuff$ head science.txt
The Electronic Telegraph Thursday 28 September 1995 Science

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at it in something close to wonder.
khaledahhasii@lamp ~/unixstuff$ head -5 science.txt
The Electronic Telegraph Thursday 28 September 1995 Science

This summer the Royal Observatory at Herstmonceux
found new life as a science centre. Andro Linklater
celebrates a partial victory for the heritage
```

Figure 11 using `head` on `science.txt`


```

khaledahhasii@lamp ~/unixstuff$ tail science.txt
the top, and with the magnetic force interrupted, the top dropped to the
ground.

That's the sort of cortickling thing you learn at science centres - a Swiss
Army knife not only has a tool for removing stones from horses' hooves but one
for destroying adiabatic traps.

* Herstmonceux Science Centre is open daily 10am-6pm (tel 01323-832731),
nearest stations Battle and Polgate. The International Study Centre offers
limited accommodation (01323-834444).
khaledahhasii@lamp ~/unixstuff$ tail -15 science.txt
the spinning top had potential if it could be made more surprising.

"What about this?" Prof Berry suggested. "I'll show you how to cut it down."

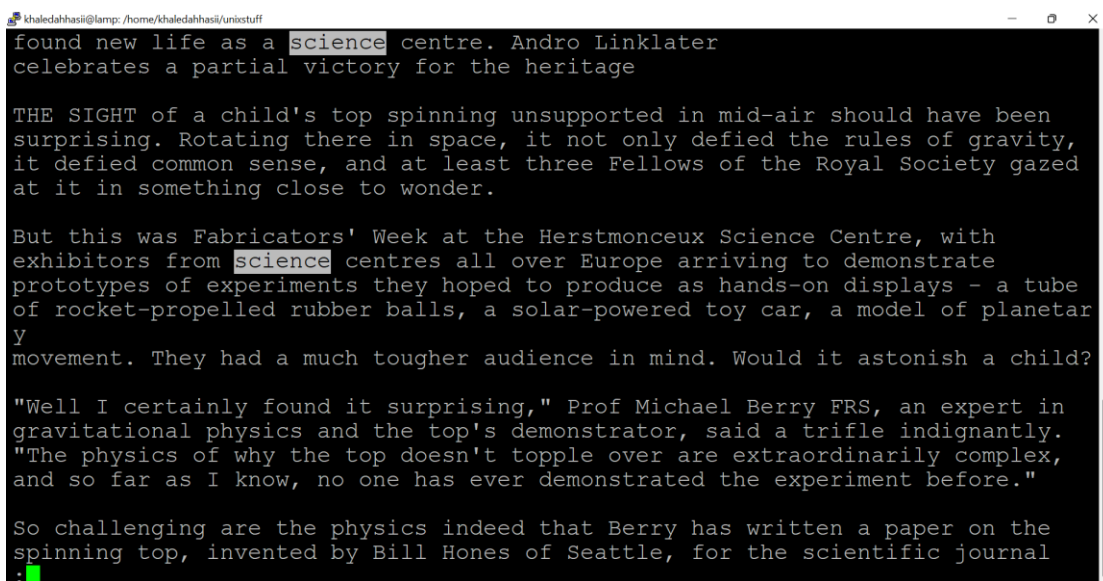
Drawing a Swiss army knife from his pocket, he sliced through the air beneath
the top, and with the magnetic force interrupted, the top dropped to the
ground.

That's the sort of cortickling thing you learn at science centres - a Swiss
Army knife not only has a tool for removing stones from horses' hooves but one
for destroying adiabatic traps.

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nearest stations Battle and Polgate. The International Study Centre offers
limited accommodation (01323-834444).

```

Figure 12 using tail on science.txt



```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
found new life as a science centre. Andro Linklater
celebrates a partial victory for the heritage

THE SIGHT of a child's top spinning unsupported in mid-air should have been
surprising. Rotating there in space, it not only defied the rules of gravity,
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movement. They had a much tougher audience in mind. Would it astonish a child?

"Well I certainly found it surprising," Prof Michael Berry FRS, an expert in
gravitational physics and the top's demonstrator, said a trifle indignantly.
"The physics of why the top doesn't topple over are extraordinarily complex,
and so far as I know, no one has ever demonstrated the experiment before."

So challenging are the physics indeed that Berry has written a paper on the
spinning top, invented by Bill Hones of Seattle, for the scientific journal
:

```

Figure 13 using less and /science to search for science word


```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
khaledahhasii@lamp ~/unixstuff$ grep science science.txt
found new life as a science centre. Andro Linklater
exhibitors from science centres all over Europe arriving to demonstrate
perception, the challenge presented by the encounter of science with a child's
the Exploratory, Britain's first hands-on science centre housed in Temple Mead
s
"The point about a science centre is that the exhibits should be fun," he said
.
making science enjoyable. Both the Exploratory, which attracts 150,000 visitor
s
attempt at cortex tickling. This time he aims not only to make science
light-sensitive acoustic chimes, its success as a science centre is not in
That's the sort of cortickling thing you learn at science centres - a Swiss
khaledahhasii@lamp ~/unixstuff$ grep Science science.txt
The Electronic Telegraph Thursday 28 September 1995 Science
But this was Fabricators' Week at the Herstmonceux Science Centre, with
on Science" exhibition, all betray the same puckish outlook.
director, Steve Pizzey, whose Science Projects company devised the exhibits,
* Herstmonceux Science Centre is open daily 10am-6pm (tel 01323-832731),

```

Figure 14 Searching for "science" using grep and demonstrating case sensitivity.

```

khaledahhasii@lamp ~/unixstuff$ grep -i science science.txt
The Electronic Telegraph Thursday 28 September 1995 Science
found new life as a science centre. Andro Linklater
But this was Fabricators' Week at the Herstmonceux Science Centre, with
exhibitors from science centres all over Europe arriving to demonstrate
perception, the challenge presented by the encounter of science with a child's
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light-sensitive acoustic chimes, its success as a science centre is not in
director, Steve Pizzey, whose Science Projects company devised the exhibits,
That's the sort of cortickling thing you learn at science centres - a Swiss
* Herstmonceux Science Centre is open daily 10am-6pm (tel 01323-832731),

```

Figure 15 grep -i to search without case sensitivity.

```

khaledahhasii@lamp: /home/khaledahhasii/unixstuff
khaledahhasii@lamp ~/unixstuff$ grep -i 'spinning top' science.txt
spinning top, invented by Bill Hones of Seattle, for the scientific journal
the spinning top had potential if it could be made more surprising.
khaledahhasii@lamp ~/unixstuff$ grep -ivc science science.txt
128
khaledahhasii@lamp ~/unixstuff$ wc -w science.txt
1251 science.txt
khaledahhasii@lamp ~/unixstuff$ wc -l science.txt
142 science.txt
khaledahhasii@lamp ~/unixstuff$

```

Figure 16 using grep to search for sentences and count lines with certain conditions. and using wc for counting lines and words.

❖ Discussion

In this lab we learned how to connect to a virtual Linux system and how to use it for creating files and running code and also how to move files from the host to the guest using WinSCP. We now are capable to create a development environment in a virtual system and we learned how to use Linux commands to traverse through files and display text and also using vim editor to edit program code.