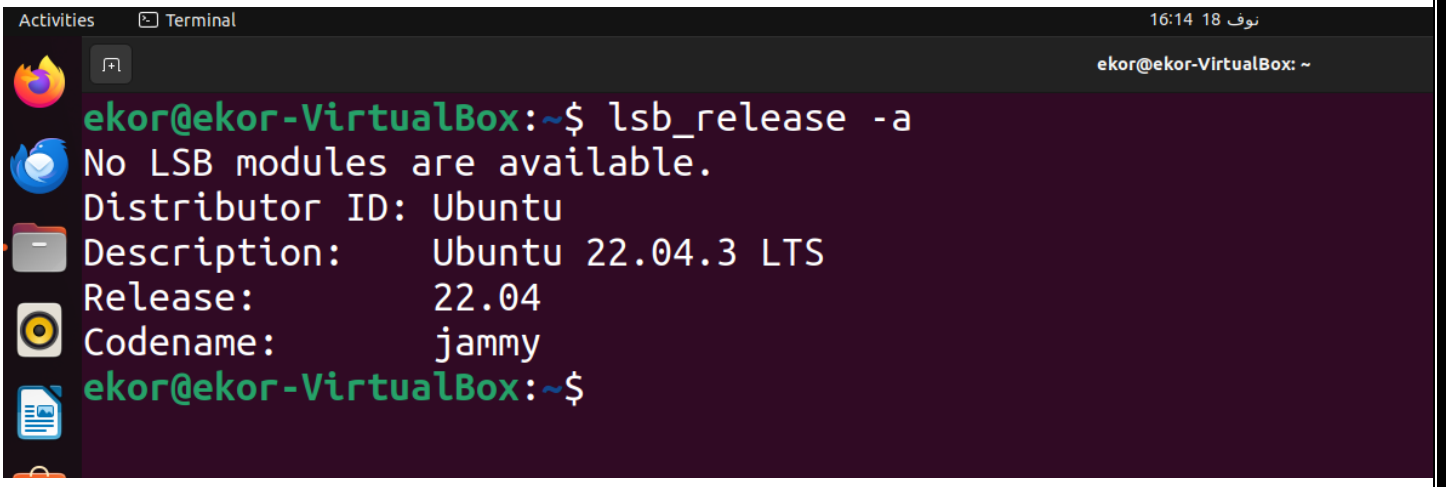
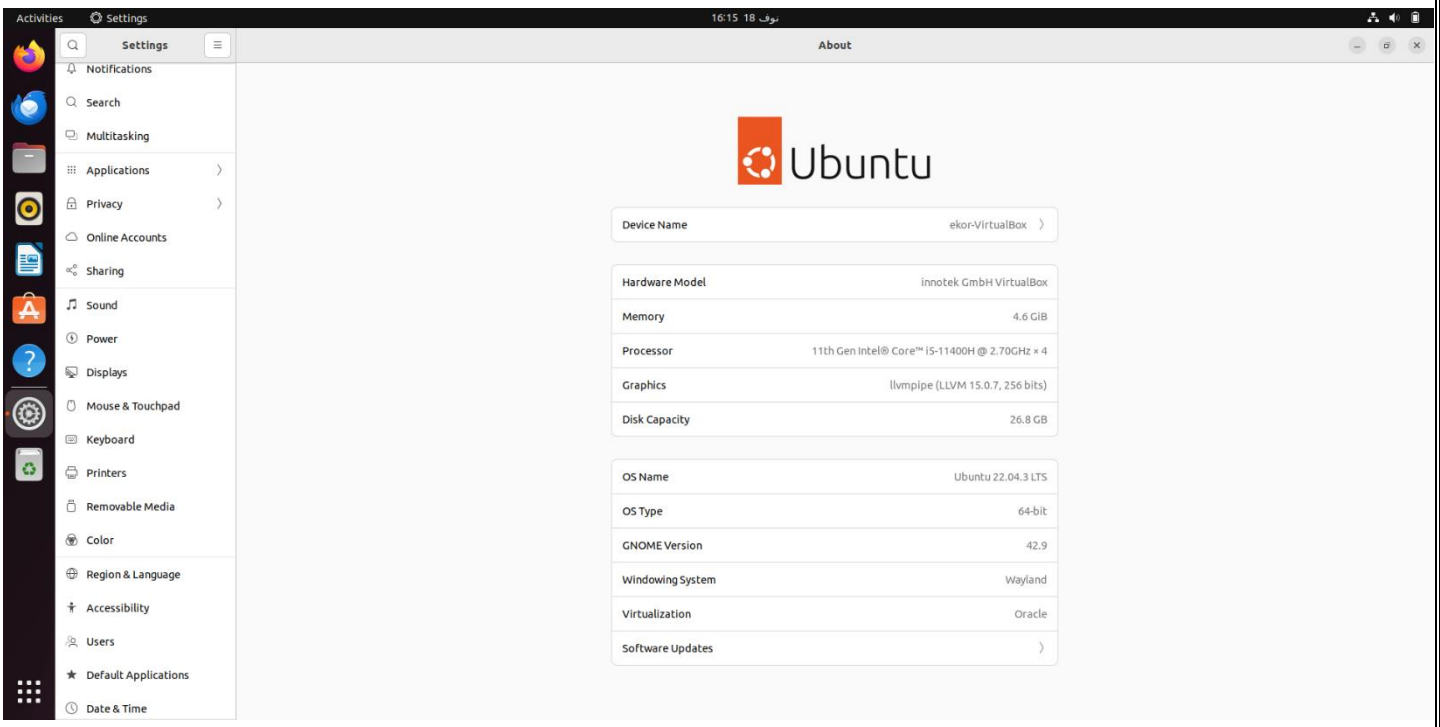
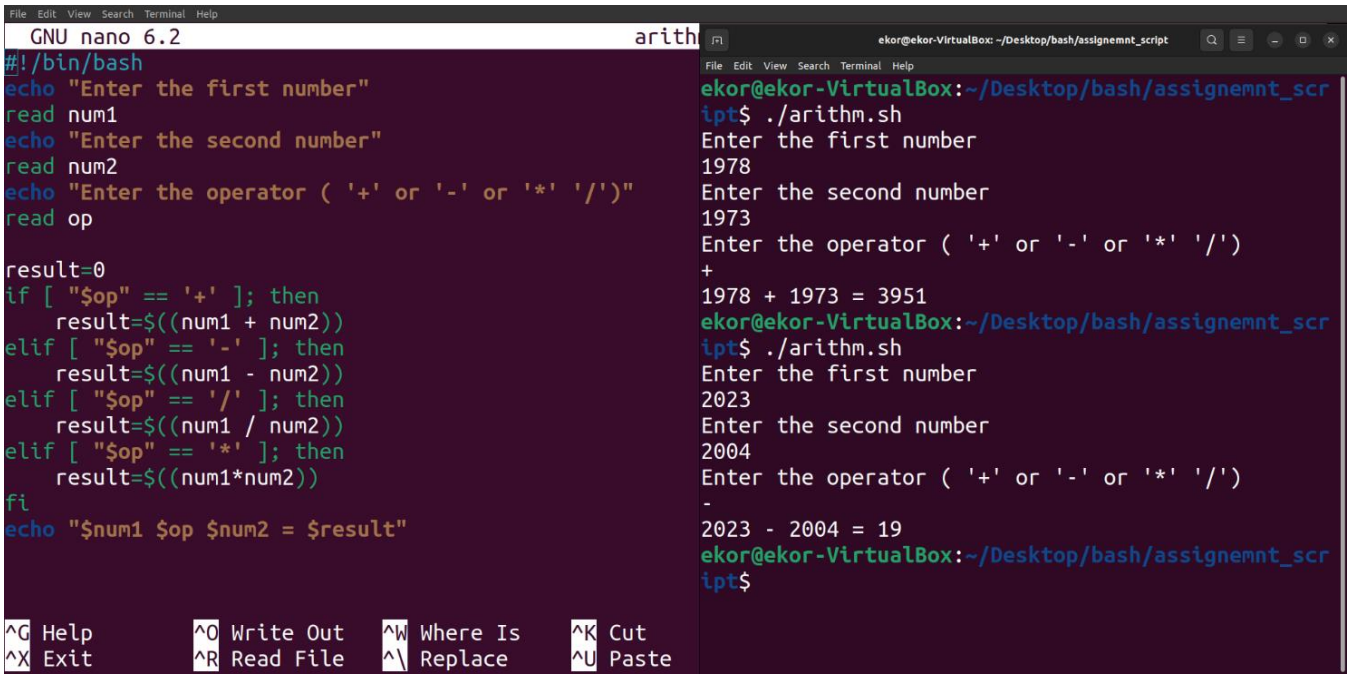
- **Task1: (In Lab Task)**

1. **Install Ubuntu OS, then identify its version.**





2. Carry out the following:
   a. Use “Echo” Command with different options and arguments to examine some Arithmetic, Logic and Quotes operations form user's input variables in three different examples.

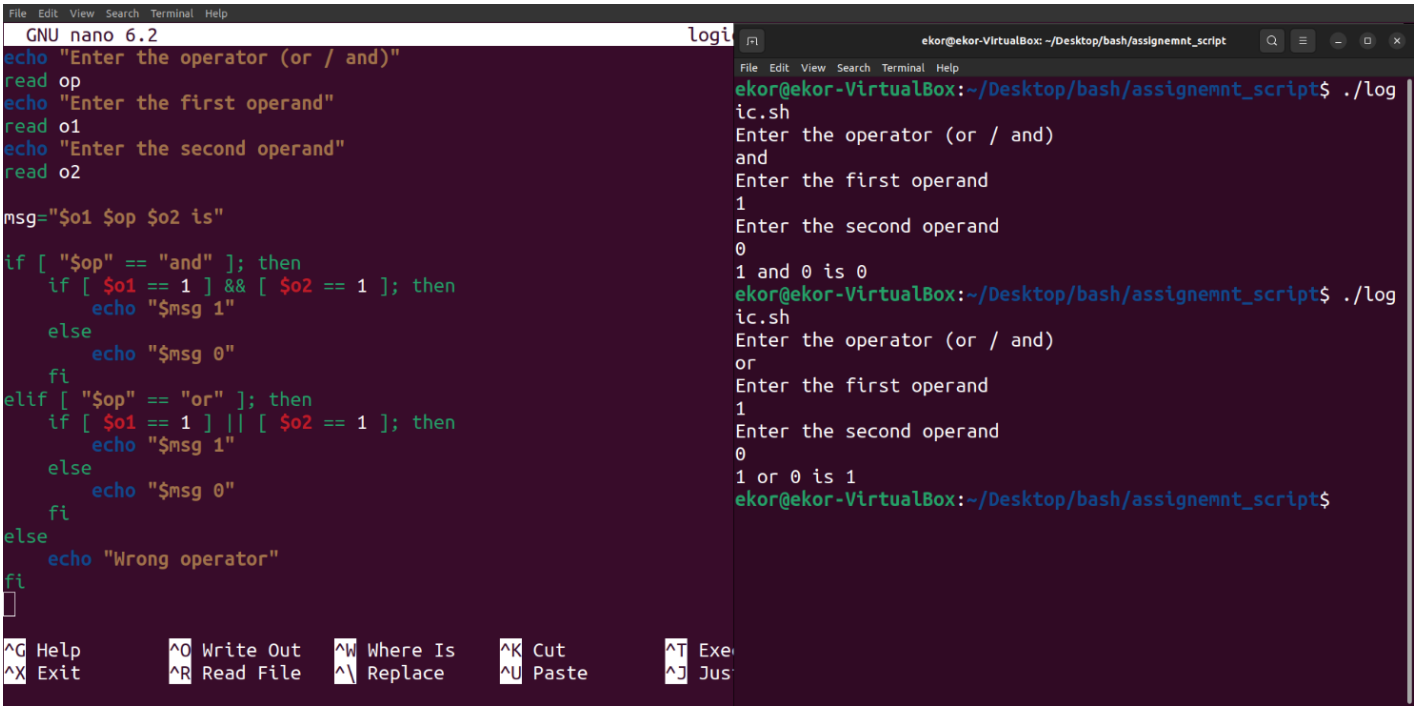


```
GNU nano 6.2                                  arith
#!/bin/bash
echo "Enter the first number"
read num1
echo "Enter the second number"
read num2
echo "Enter the operator ( '+' or '-' or '*' '/')"
read op

result=0
if [ "$op" == '+' ]; then
    result=$((num1 + num2))
elif [ "$op" == '-' ]; then
    result=$((num1 - num2))
elif [ "$op" == '/' ]; then
    result=$((num1 / num2))
elif [ "$op" == '*' ]; then
    result=$((num1*num2))
fi
echo "$num1 $op $num2 = $result"


^G Help      ^O Write Out   ^W Where Is   ^K Cut
^X Exit      ^R Read File   ^\ Replace    ^U Paste
```

```
ekor@ekor-VirtualBox: ~/Desktop/bash/assignemnt_script
File  Edit  View  Search  Terminal  Help
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_scr
ipt$ ./arithm.sh
Enter the first number
1978
Enter the second number
1973
Enter the operator ( '+' or '-' or '*' '/')
+
1978 + 1973 = 3951
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_scr
ipt$ ./arithm.sh
Enter the first number
2023
Enter the second number
2004
Enter the operator ( '+' or '-' or '*' '/')
-
2023 - 2004 = 19
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_scr
ipt$
```



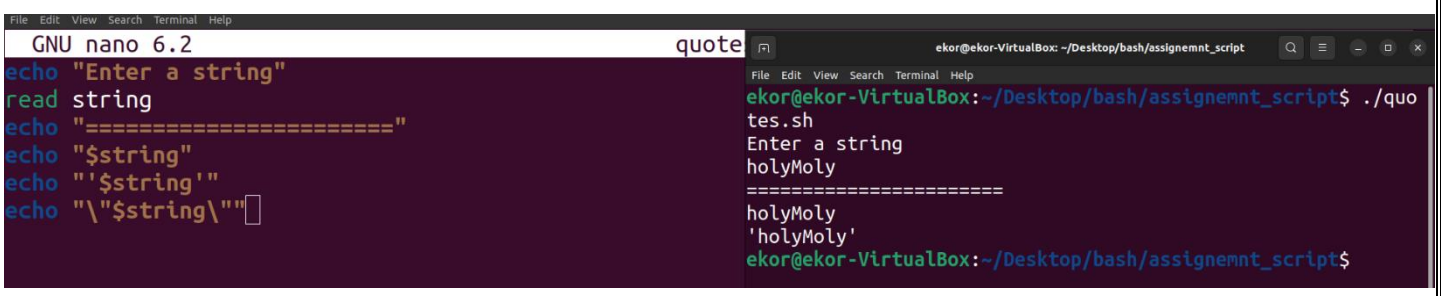
```
GNU nano 6.2                                  logi
echo "Enter the operator (or / and)"
read op
echo "Enter the first operand"
read o1
echo "Enter the second operand"
read o2

msg="$o1 $op $o2 is"

if [ "$op" == "and" ]; then
    if [ $o1 == 1 ] && [ $o2 == 1 ]; then
        echo "$msg 1"
    else
        echo "$msg 0"
    fi
elif [ "$op" == "or" ]; then
    if [ $o1 == 1 ] || [ $o2 == 1 ]; then
        echo "$msg 1"
    else
        echo "$msg 0"
    fi
else
    echo "Wrong operator"
fi

^G Help      ^O Write Out   ^W Where Is   ^K Cut      ^T Exe
^X Exit      ^R Read File   ^\ Replace    ^U Paste    ^J Jus
```

```
ekor@ekor-VirtualBox: ~/Desktop/bash/assignemnt_script
File  Edit  View  Search  Terminal  Help
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$ ./log
ic.sh
Enter the operator (or / and)
and
Enter the first operand
1
Enter the second operand
0
1 and 0 is 0
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$ ./log
ic.sh
Enter the operator (or / and)
or
Enter the first operand
1
Enter the second operand
0
1 or 0 is 1
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$
```



```
GNU nano 6.2                                  quote
echo "Enter a string"
read string
echo "======================="
echo "$string"
echo "'$string'"
echo "\"$string\""
```

```
ekor@ekor-VirtualBox: ~/Desktop/bash/assignemnt_script
File  Edit  View  Search  Terminal  Help
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$ ./quo
tes.sh
Enter a string
holyMoly
=======================
holyMoly
'holyMoly'
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$
```

b. Use “Cat” command with different options and arguments in three different examples to create single or multiple files, view content of a file, and redirect output in terminal or files.

```
File  Edit  View  Search  Terminal  Help
ekor@ekor-VirtualBox:~/Desktop/bash$ cat > file1.txt
this is file 1 ..... blablablabla
ekor@ekor-VirtualBox:~/Desktop/bash$ cat > file2.txt > file3.txt
this is file 3 ..... writing some irrelevant words
ekor@ekor-VirtualBox:~/Desktop/bash$ cat file3.txt > file2.txt
ekor@ekor-VirtualBox:~/Desktop/bash$ cat file1.txt
this is file 1 ..... blablablabla
ekor@ekor-VirtualBox:~/Desktop/bash$ cat file2.txt
this is file 3 ..... writing some irrelevant words
ekor@ekor-VirtualBox:~/Desktop/bash$ cat file3.txt
this is file 3 ..... writing some irrelevant words
ekor@ekor-VirtualBox:~/Desktop/bash$
```

c. In light of that scenario, create a simple Shell script for user’s login process as described in the given scenario and as shown in figure (1). **Use your Name as a user login name and assume your password.**

```
  GNU nano 6.2                                  llogin.sh *
username="ekor" password="ekor" attempts=3
while [ $attempts -ne 0 ]
do
    echo "Enter your username"
    read user
    echo "Enter you password"
    read pass

    if [ "$user" == "$username" ] && [ "$pass" == "$password" ]
    then
        echo "You are in!"
        exit 0
    else
        ((attempts--))
        if [ $attempts == 0 ]
        then
            echo "==================================="
            echo "You account is locked!"
            echo "==================================="
            exit 0
        fi
        echo "=====Wrong username or password====="
        echo "=====You havs $attempts tries====="
    fi
done

^G Help      ^O Write Out  ^W Where Is  ^K Cut       ^T E
^X Exit      ^R Read File  ^\ Replace   ^U Paste     ^J J
```

```
ekor@ekor-VirtualBox: ~/Desktop/bash/assignemnt_script
File  Edit  View  Search  Terminal  Help
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$ ./llogin
.sh
Enter your username
ekor
Enter you password
ekor
You are in!
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_script$ ./llogin
.sh
Enter your username
test
Enter you password
test
=====Wrong username or password=====
=====You havs 2 tries====
Enter your username
rrr
Enter you password
rrr
=====Wrong username or password=====
=====You havs 1 tries====
Enter your username
adsf
Enter you password
afds
===================================
You account is locked!
===================================
ekor@ekor-VirtualBox:~/Desktop/bash/assignemnt_sekor@ekor-Virtu
alBox:~/Desktop/bash/assignemnt_sekor@ekor-VirtualBox:~/Desktop
ekor@ekor-VirtualBox:~/Desktopekor@ekor-VirtualBox:~/Desktop/ba
```

d. Form the given scenario, Analyze the usage of different types of loops and decision making conditions in Shell script for the given user's login process.

First line I used while loop, the condition will keep asking the user for username and password till the attempts be zero.

The **if** condition here is checking if the user entered true username and password or not. If the input is true the loop will terminate.

- **Task 2:**

a. Describe kernel types and link each type with one of Linux operating systems.

- **Monolithic Kernel:** A monolithic kernel is an operating system architecture where **the entire system runs in kernel mode**. In this design, the kernel consists of a single, large executable that includes various services such as memory management, device drivers, file system management, and process management, among others. Consequently, all these services can directly interact with each other, bypassing the need for IPC (Inter-Process Communication) mechanisms, which simplifies communication and reduces overhead.
  Used by Ubuntu.

- **Microkernels:** A microkernel architecture has only core functionality like process and memory management in kernel mode, while other services like device drivers, file systems, and networking are separate user-mode processes. This design leads to a more modular, fault-tolerant, and secure system, as individual components can be updated or replaced without affecting the entire system.
  Used by MINIX and Arch

- **Hybrid Kernels:** Hybrid kernels combine aspects of both monolithic and microkernel architectures. They run some core services in kernel mode and others in user mode, offering a balance between performance and modularity. Hybrid kernels can adapt their design according to specific requirements, incorporating the best aspects of both architectures.
  Used by Fedora

b. Based on your exploration of Linux operating system, critically explain the advantages and disadvantages of kali Linux as one of the most popular Linux based distribution. Then from your point of view, present briefly some of its features such as desktop environment and kernel type and applications such as network analysis or system monitoring applications.

Kali Linux is a Debian-based Linux distribution designed for digital forensics, penetration testing, and security auditing.

Advantages:

- **Security Tools:** Kali Linux comes pre-installed with a wide range of security tools and applications used for penetration testing, network analysis, vulnerability assessment, and forensics. This saves time for security professionals as they don't need to manually install these tools.
- **Community Support:** Kali Linux has a large and active community of users and developers. This means that there is a wealth of online resources, forums, and tutorials available for users seeking help or looking to expand their knowledge of security and penetration testing.
- **Regular Updates:** Kali Linux is actively maintained and updated by Offensive Security, the company behind its development. This ensures that the distribution stays current with the latest security tools and features, providing users with the best tools for their security tasks.
- **Customization:** Kali Linux is highly customizable, allowing users to tailor the system to their specific needs. This flexibility is crucial for security professionals who may have specific requirements for their testing environments.
- **Live Boot Capability:** Kali Linux can be run as a live system directly from a USB drive or DVD without the need for installation. This feature is useful for security professionals who want to use a clean and isolated environment for testing without affecting their primary operating system.

Disadvantages:

- **Learning Curve:** Kali Linux is not recommended for beginners or users who are new to Linux. The extensive range of security tools and the nature of their use require a good understanding of cybersecurity concepts. Beginners might find it overwhelming and challenging to navigate.
- **Overkill for General Use:** Kali Linux is specifically designed for security professionals and ethical hackers. For everyday use, it may include tools and features that are unnecessary and could potentially pose security risks if not used responsibly.
- **Resource Intensive:** Some of the security tools bundled with Kali Linux can be resource-intensive. Running multiple tools simultaneously may require a powerful computer system with sufficient RAM and processing power.
- **Ethical Considerations:** While Kali Linux is designed for ethical hacking and security testing, some users may misuse it for malicious activities. This misuse can harm the reputation of the distribution and the broader ethical hacking community.
- **Limited User Support:** While there is an active community around Kali Linux, the distribution is primarily aimed at experienced security professionals. Users looking for general-purpose support or assistance with non-security-related issues may find the community support less extensive compared to more mainstream distributions.

c. Compare and contrast the required system specifications for one play Gamming applications if it has been used in basic operating system platform such as Microsoft Windows, Android OS, and Linux distribution: Red Hat or Debian. Then, discuss how it could be matched with each operating systems, and suggest any programs needed to make it works with that application, if found.

1. Microsoft Windows:
    - Hardware Requirements:
        - CPU: Typically, Windows supports a wide range of CPUs, but the specific requirements may vary based on the game.
        - RAM: Usually, a minimum of 8 GB RAM is recommended for modern gaming.
        - GPU: The game might have specific graphics card requirements, such as DirectX version compatibility.
        - Storage: Sufficient free space on the hard drive is needed.
    - Compatibility:
        - Most mainstream gaming applications are developed for Windows, making it a primary gaming platform.
        - DirectX is commonly used for graphics rendering, so the game might require a specific DirectX version.
    - Suggested Programs:
        - Graphics drivers: Ensure that the latest GPU drivers are installed.
        - DirectX: Make sure the system has the required DirectX version.
2. Android OS:
    - Hardware Requirements:
        - CPU: Android games are designed to run on a variety of processors found in smartphones and tablets.
        - RAM: Android devices typically have varying amounts of RAM; the game should specify the minimum requirement.
        - GPU: Graphics requirements will depend on the complexity of the game.
        - Storage: Games need sufficient storage space on the device.
    - Compatibility:
        - Android games are primarily distributed through the Google Play Store, ensuring compatibility with a wide range of devices.
    - Suggested Programs:
        - No additional programs are typically needed; games are installed directly from the Google Play Store.
3. Linux (Red Hat or Debian):
    - Hardware Requirements:
        - CPU: Linux supports a variety of processors, but the game might have specific requirements.
        - RAM: Similar to Windows, a minimum of 8 GB RAM is often recommended.
        - GPU: Compatibility with OpenGL or Vulkan for graphics rendering.
        - Storage: Games need sufficient space on the disk.
    - Compatibility:
        - Gaming on Linux has improved, but not all games are available natively.
        - Compatibility layers like Proton (for Steam) can enhance game support.
    - Suggested Programs:
        - Graphics drivers: Ensure that the latest open-source or proprietary drivers are installed.
        - Compatibility layers: Proton for Steam games, Wine for non-Steam games.

D. Critically evaluate the benefits and drawbacks of using Ubuntu Linux rather than kali Linux. For example: The desktop environment, application programs, and Web browsers.

Ubuntu Linux:
Benefits:

1. User-Friendly Desktop Environment:
    - Pros: Ubuntu uses a user-friendly desktop environment, such as GNOME or Unity, making it accessible for users familiar with other operating systems like Windows or macOS.
2. Wide Range of Application Programs:
    - Pros: Ubuntu has a vast repository of software available through its package manager, making it easy to install and update various applications. It is a general-purpose Linux distribution suitable for a variety of tasks.
3. Web Browsers:
    - Pros: Ubuntu supports a wide range of web browsers, including popular ones like Firefox, Chrome, and others. Users have the flexibility to choose their preferred browser.
4. Community Support:
    - Pros: Ubuntu has a large and active community, providing extensive support through forums, documentation, and online resources. This makes problem-solving and learning easier for users.

Drawbacks:

1. Security Emphasis:
    - Cons: Ubuntu is not designed with a primary focus on security and penetration testing, making it less suitable for ethical hacking or cybersecurity tasks compared to specialized distributions like Kali Linux.

Kali Linux:

Benefits:

1. Specialized for Penetration Testing:
    - Pros: Kali Linux is specifically designed for penetration testing, ethical hacking, and security-related tasks. It comes pre-installed with a variety of security tools, making it a go-to choice for cybersecurity professionals.
2. Security-Focused Desktop Environment:
    - Pros: Kali Linux uses a customized desktop environment optimized for security tasks. It provides a focused and efficient environment for penetration testers.
3. Pre-Installed Security Tools:
    - Pros: Kali Linux includes a vast array of pre-installed security tools for network analysis, vulnerability assessment, and penetration testing. This eliminates the need for users to manually install these tools.

Drawbacks:

1. Less User-Friendly for General Use:
    - Cons: Kali Linux may not be as user-friendly for general tasks as Ubuntu. Its primary purpose is security testing, and it might lack the convenience features found in more general-purpose distributions.
2. Limited Application Variety

- **Task 3:**

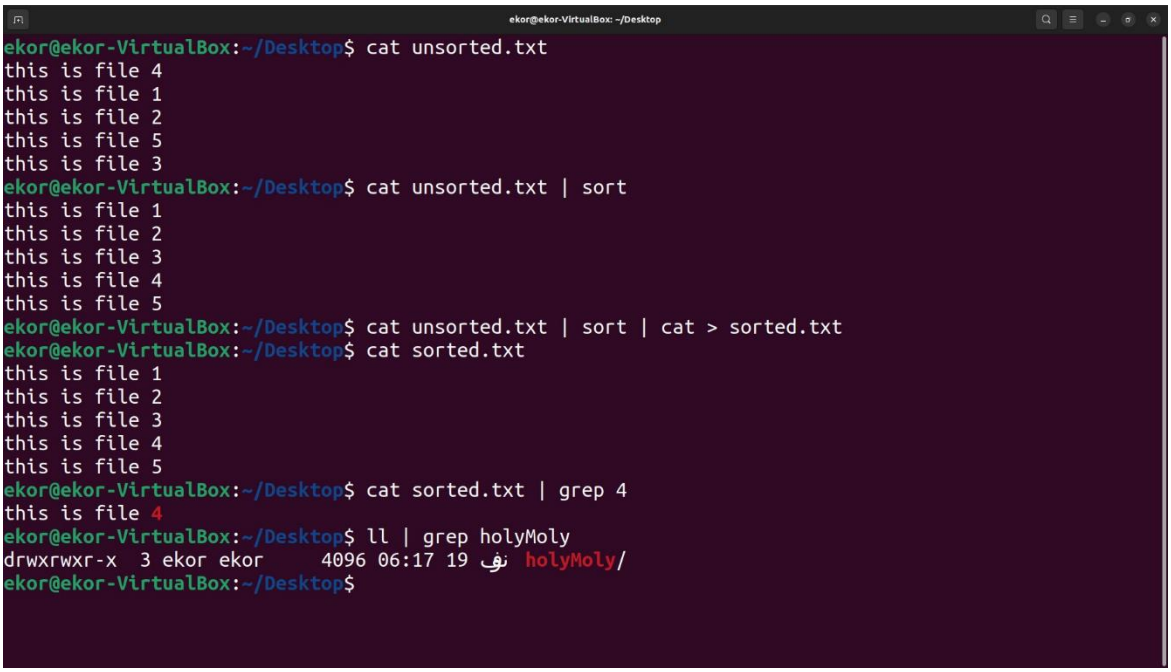
A. From your exploration, contrast shell types and extract the relations for Linux Debian distributions

- **Debian Linux Default Shell:** Debian Linux uses Bash (Bourne Again Shell) as its default shell for both interactive sessions and scripting.
- **The GNU Bourne-Again Shell:** Bash, the default shell, is an extended version of the Bourne Shell (`sh`). Debian scripts and utilities are often written with Bash compatibility in mind.
- **C Shell Family:** Debian supports shells like Tcsh and C Shell (`csh`). While less common for scripting, they offer different interactive features and syntax.

B. List some of Ubuntu text editors and create text file using one of them.

- VIM
- GNU Nano
- Gedit
- Kate

C. Evaluate the Pipe method for two commands, such that output of one command serves as input to the next, with many options and arguments, and examine that with at least three different examples.



D. Critically evaluate the usage of Redirected method using "tail" and “head” commands for text files with example

Tail Command

Advantages:

- Real-time monitoring
- Customizable output
- Combining with other commands

Disadvantages:

- Limited to end of file
- Random access not efficient

Head Command

Advantages:

- Quick Preview
- Efficient Output
- Readability

Disadvantages:

- Limited to the beginning
- Not real time