

SYSTEM ADMINISTRATION AND MAINTENANCE

Group Number: 5

Group Members: Trizia Mae Carpena
Sean Andrei Forlanda
Mark Ruiz

Signatures:

WINDOWS

User Management Tasks

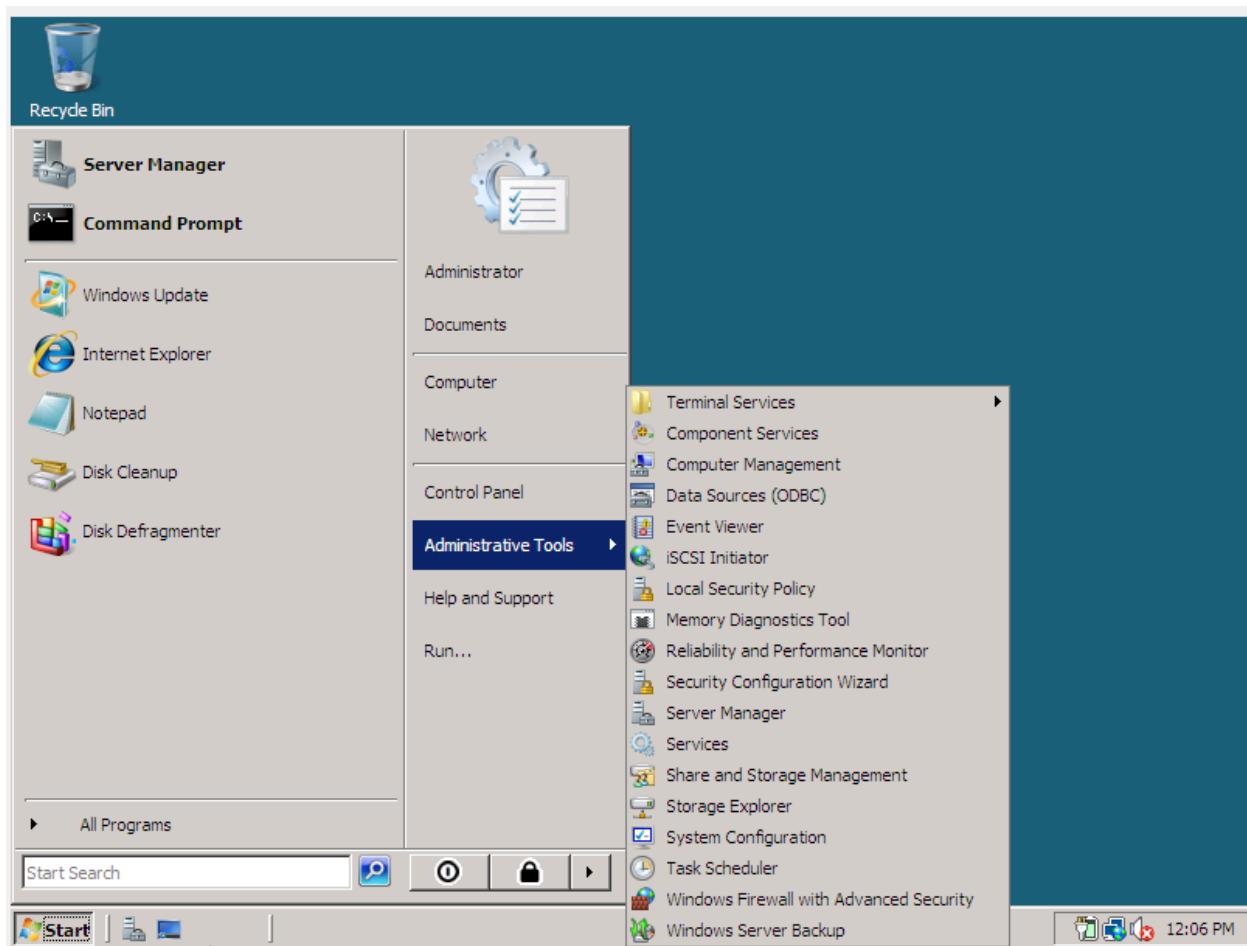
Create User Accounts

- Create at least three user accounts: an Administrator account, a Standard user account, and a Guest account.
- Assign different permissions to each account (e.g., allow the Administrator account full access, restrict the Guest account).

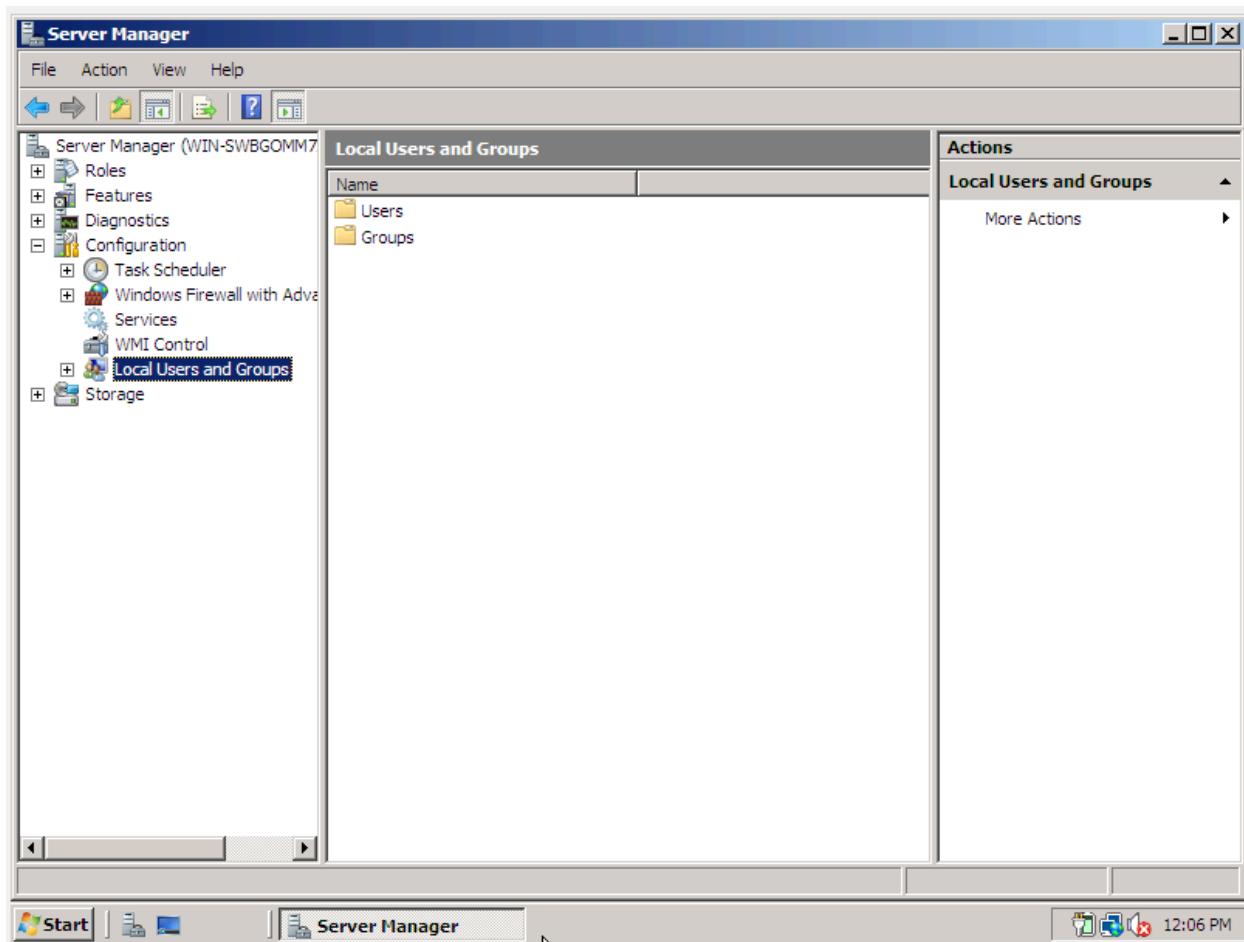
Modify User Permissions

- Change the permissions of one user account (for example, elevate a Standard user to Administrator temporarily).
- Document the steps taken to modify the permissions.

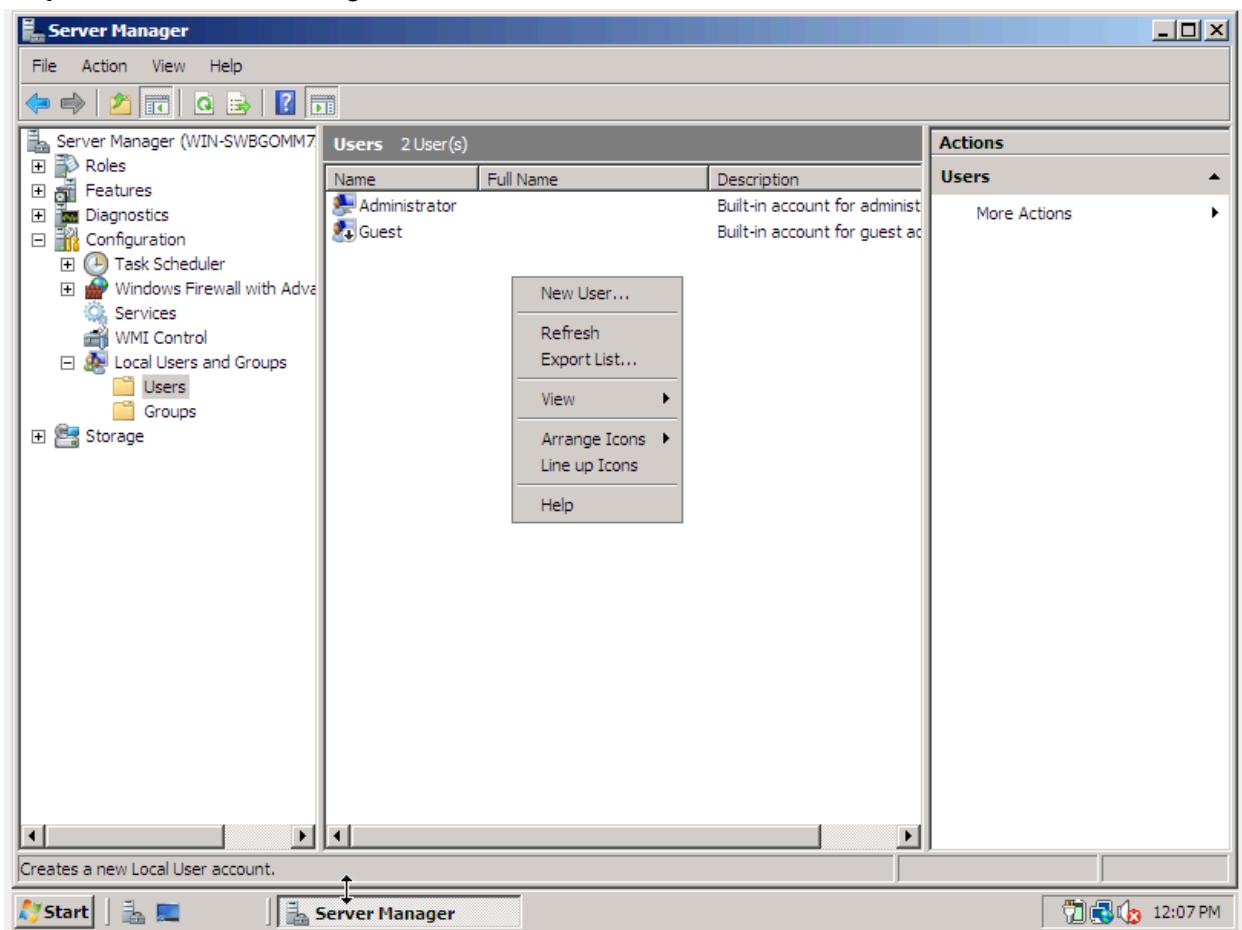
Step 1: Click “Administrative Tools” and then under that click “Server Manager”.



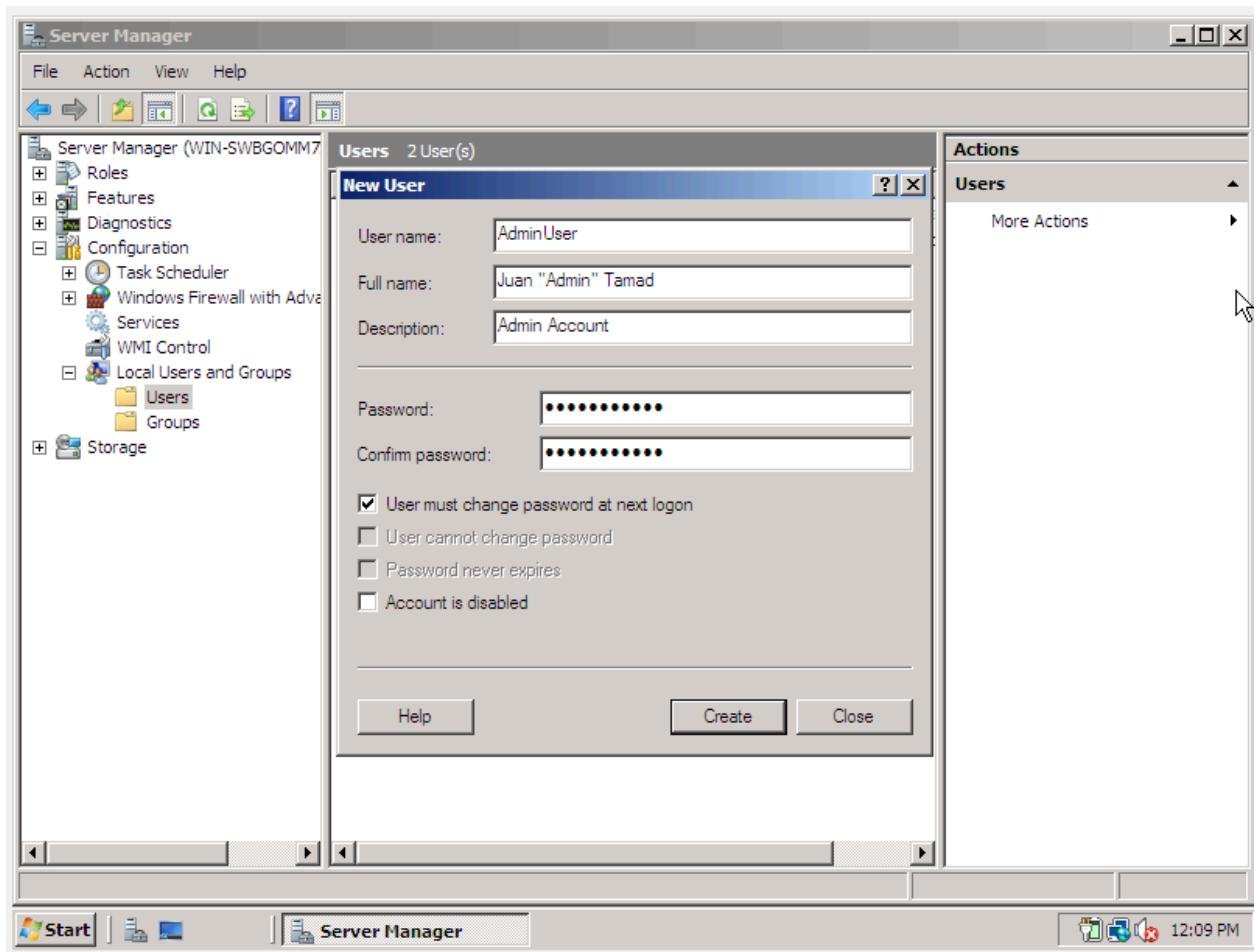
Step 2: Click "Local Users and Groups" then click "Users" folder.



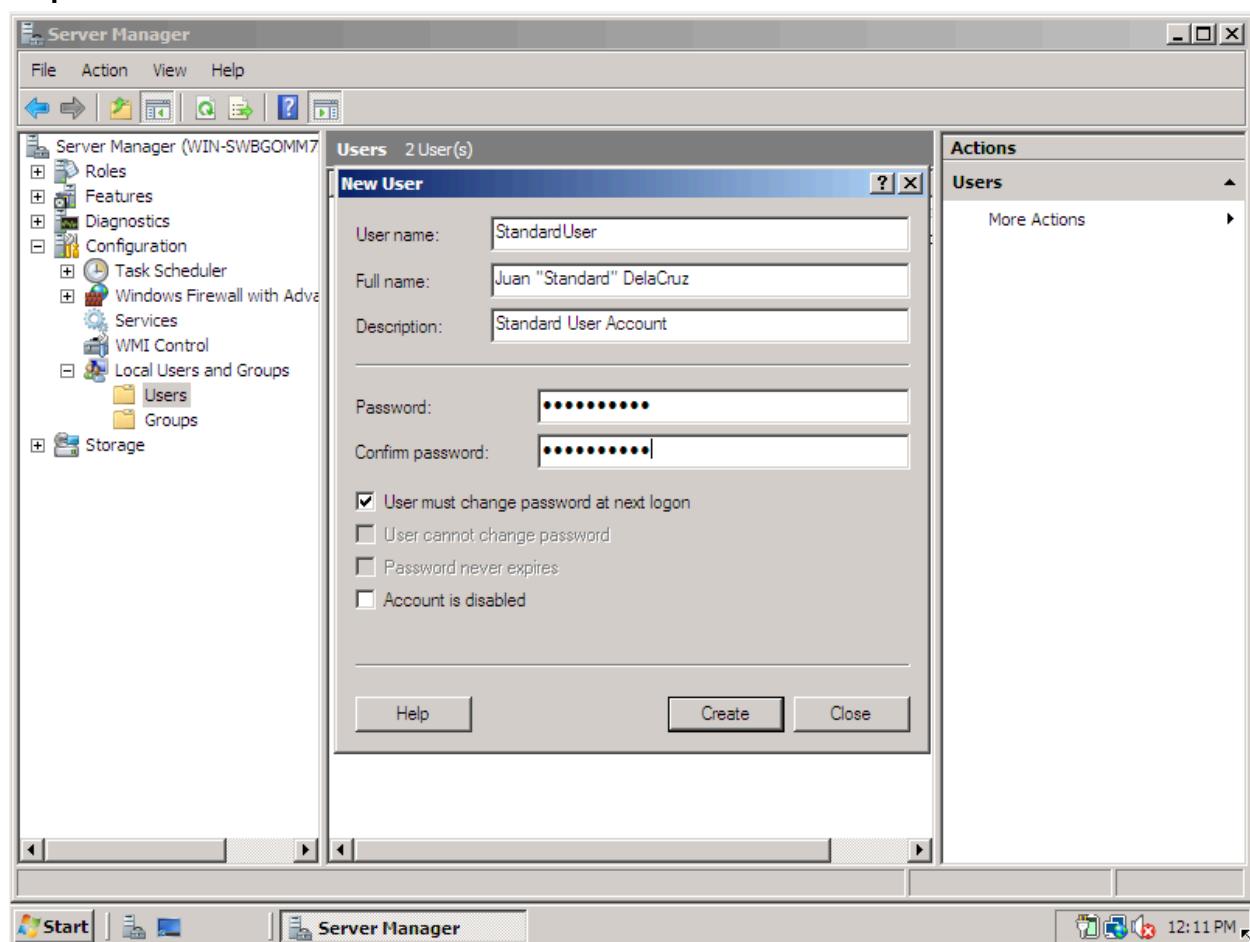
Step 3: Inside the folder, right-click then click “New User”



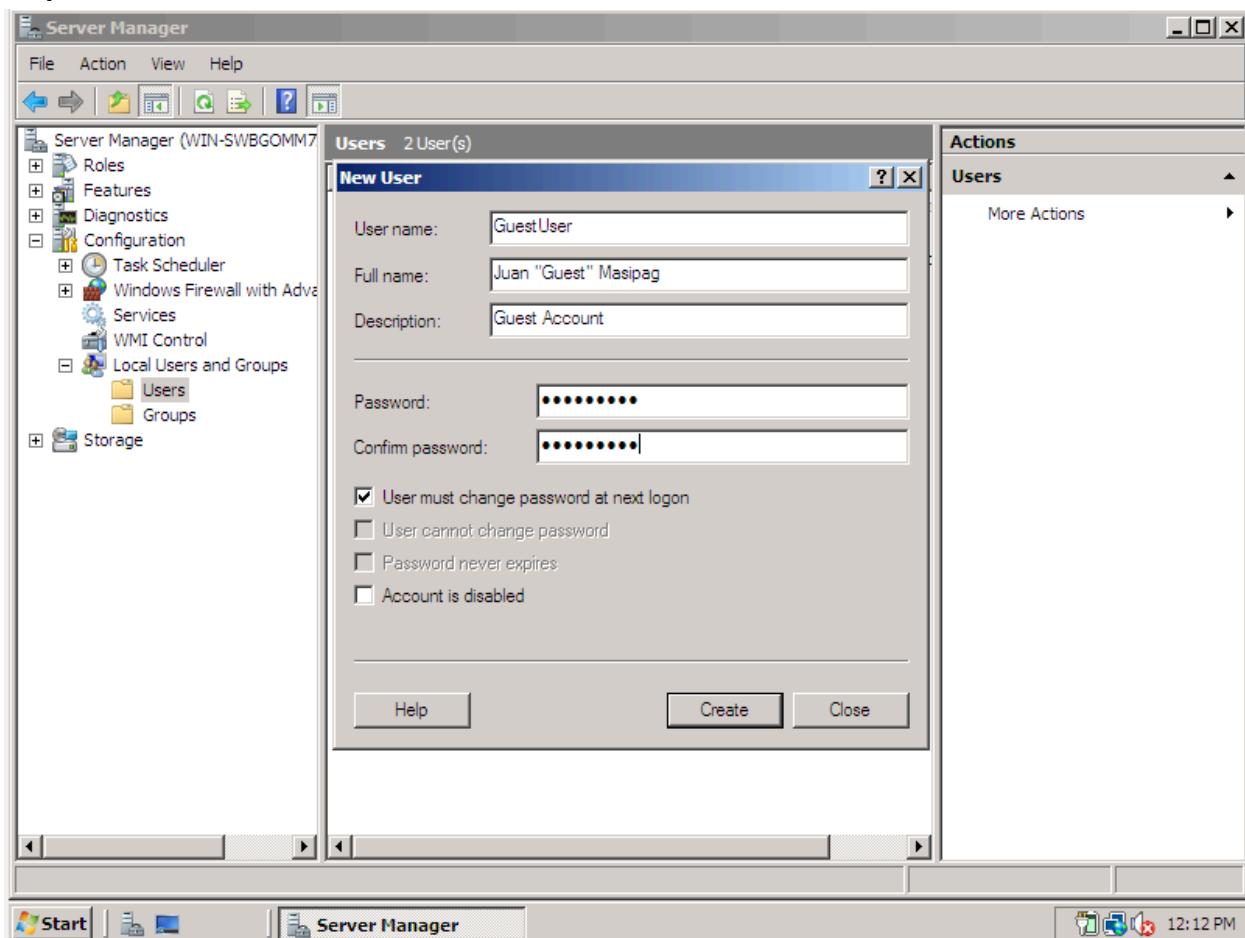
Step 4: Create an Admin Account



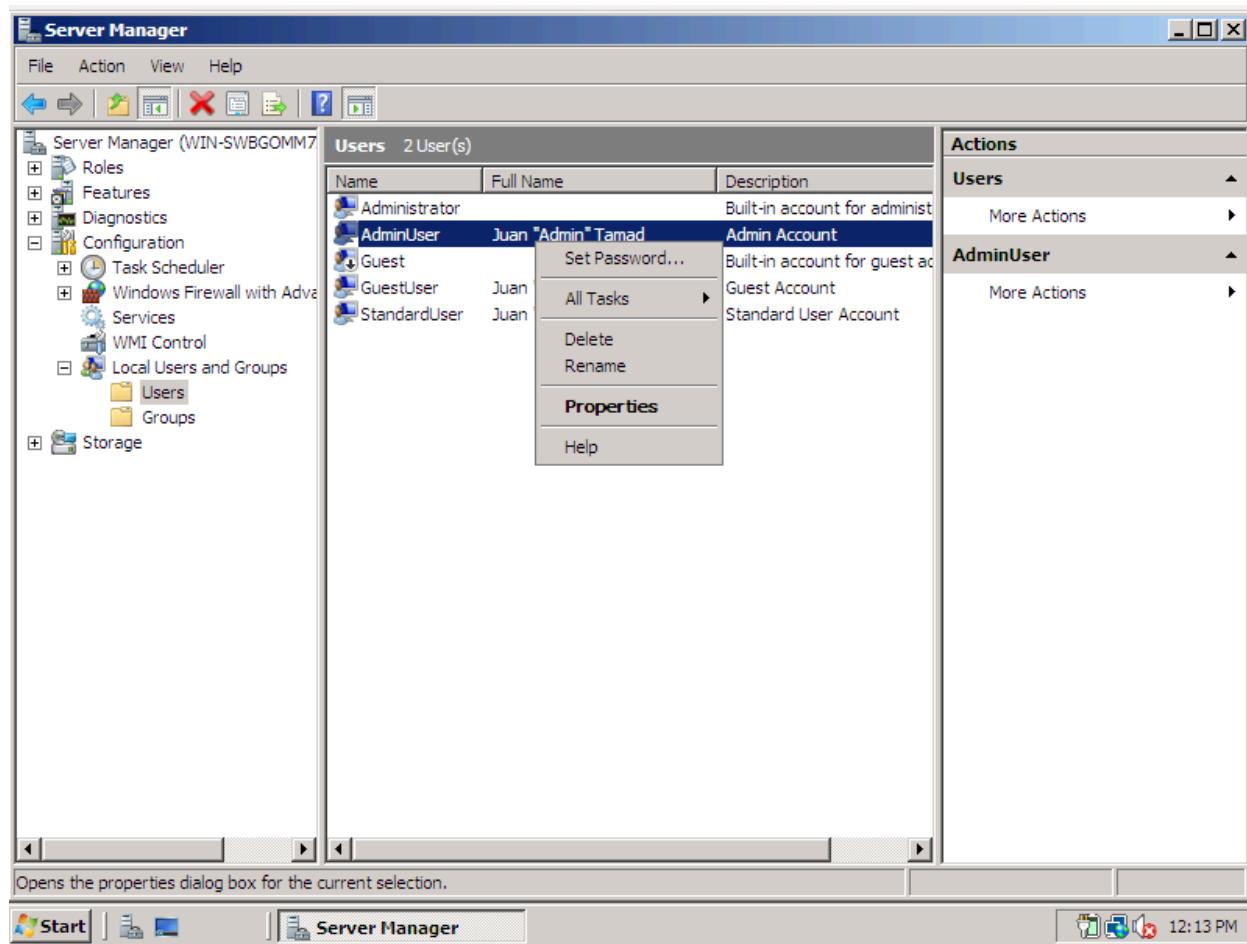
Step 5: Create a Standard User Account



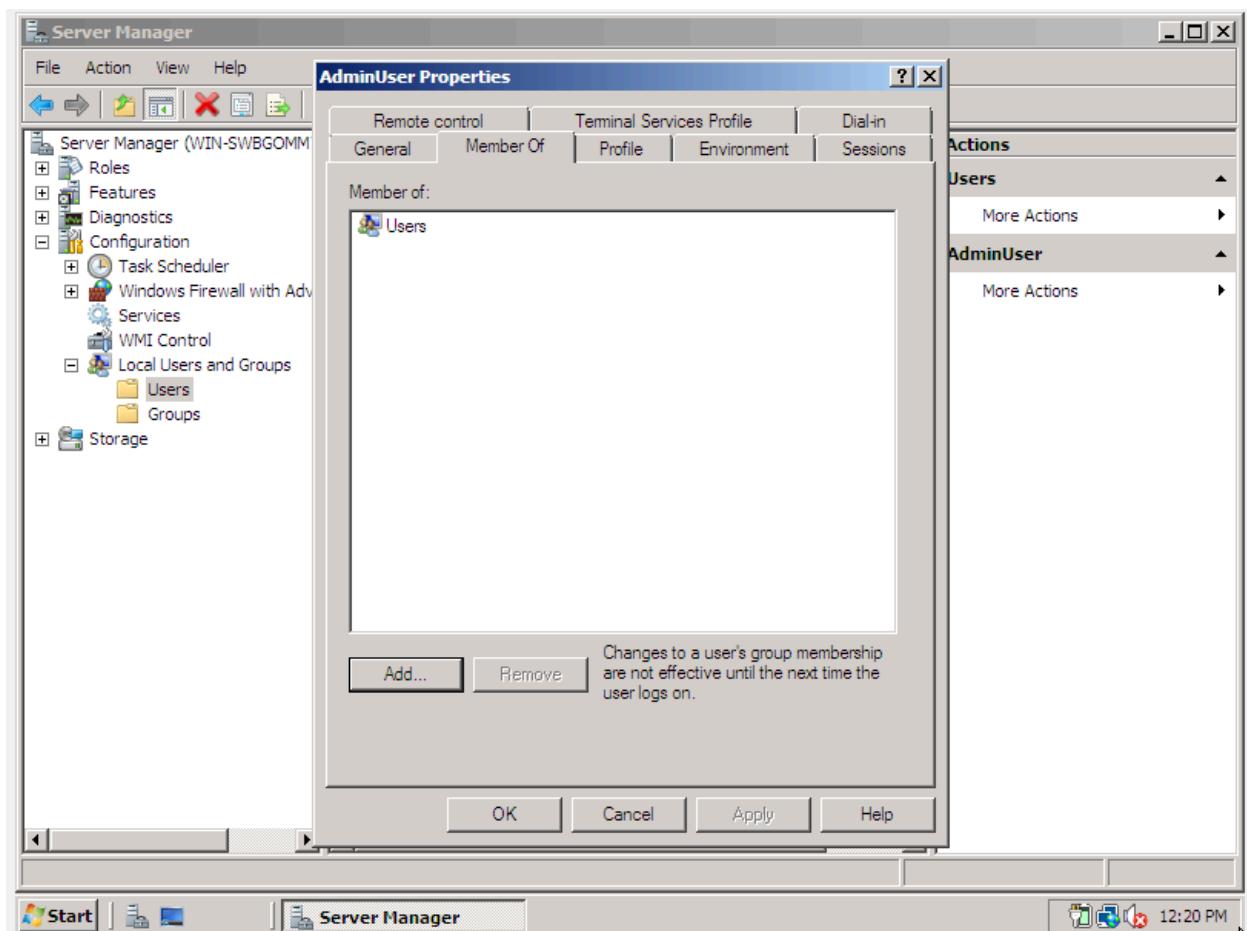
Step 6: Create a Guest Account



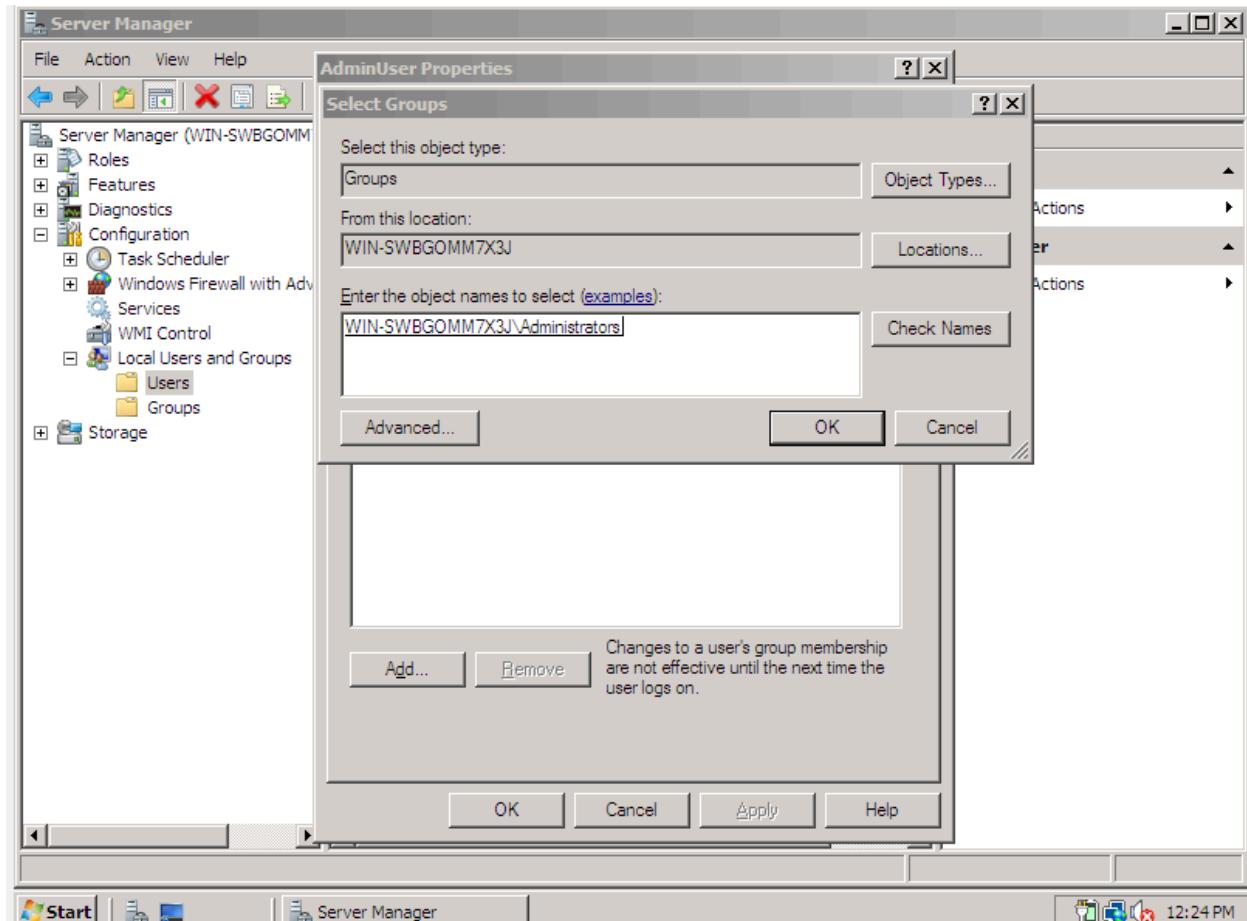
Step 7: To modify the account permissions, right-click the “AdminUser” and then click “Properties”



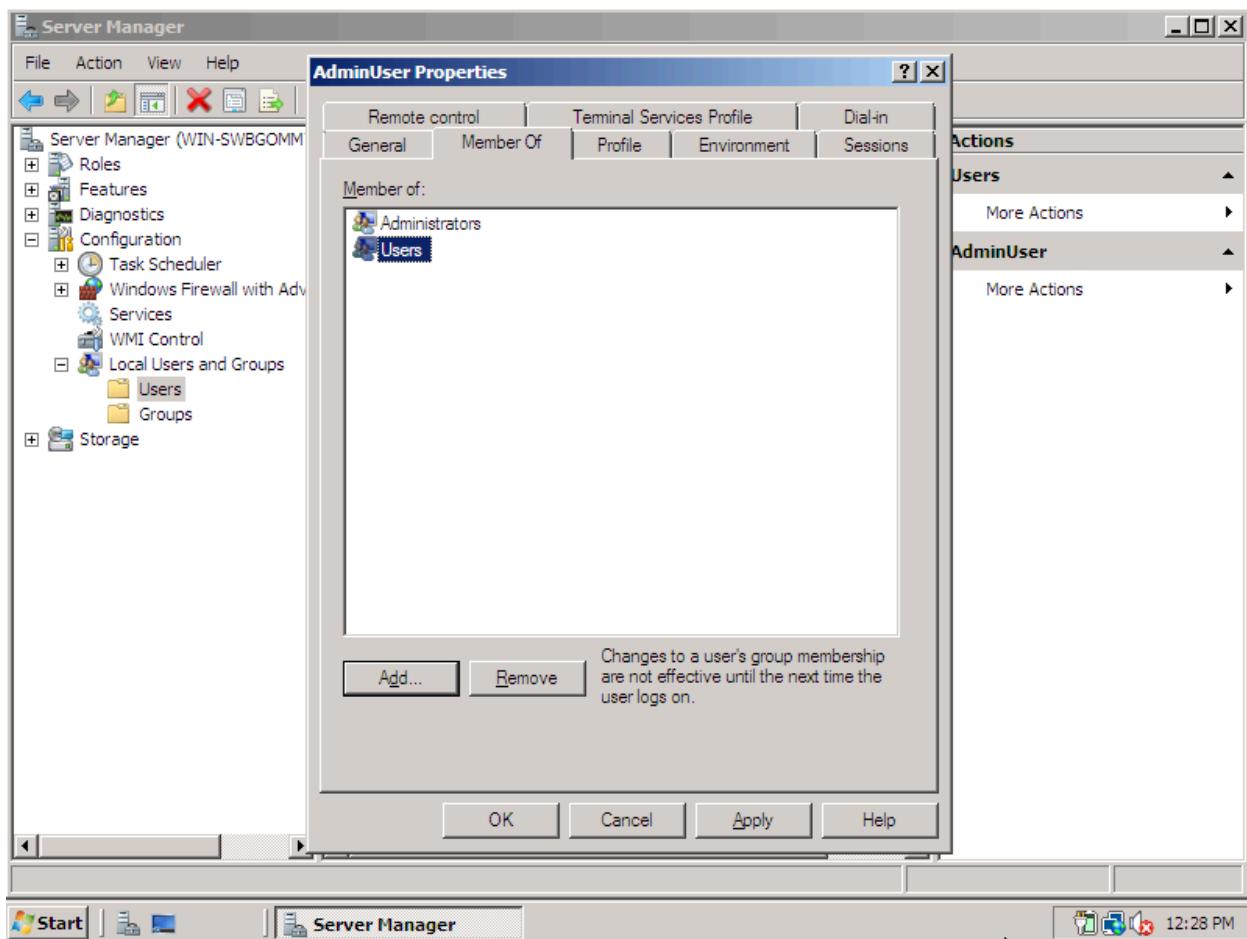
Step 8: Inside that, click the “Member of” tab, then click the “Add” button



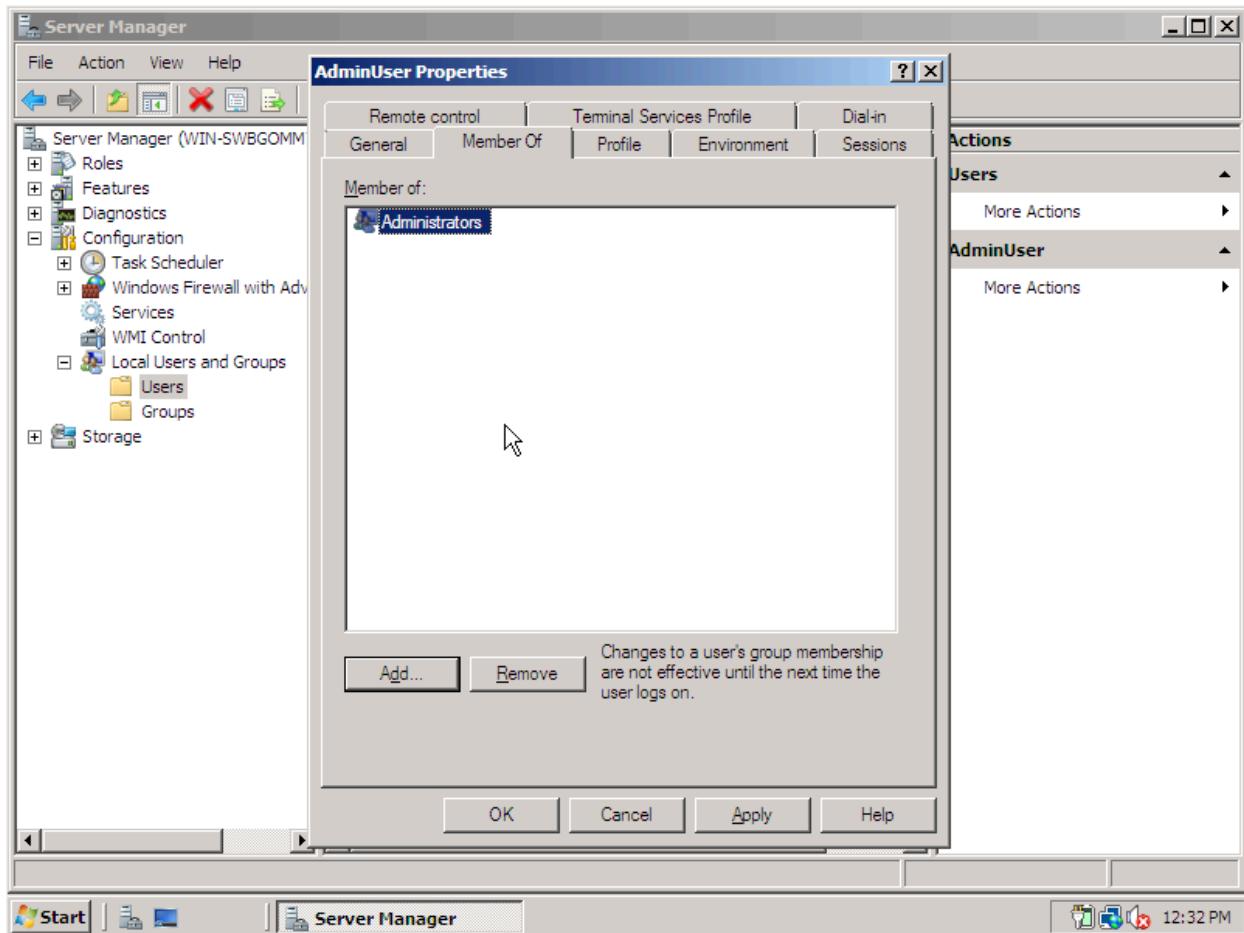
Step 9: After clicking the “Add” button, a modal will appear. Type “**Administrators**” under **enter the object names to select**, then click the “Check Names” button if administrators exist in the “Groups folder”. After that, click the “OK” button.



Step 10: Inside the AdminUser Properties under the Member Of tab, click Users then the “Remove” button.

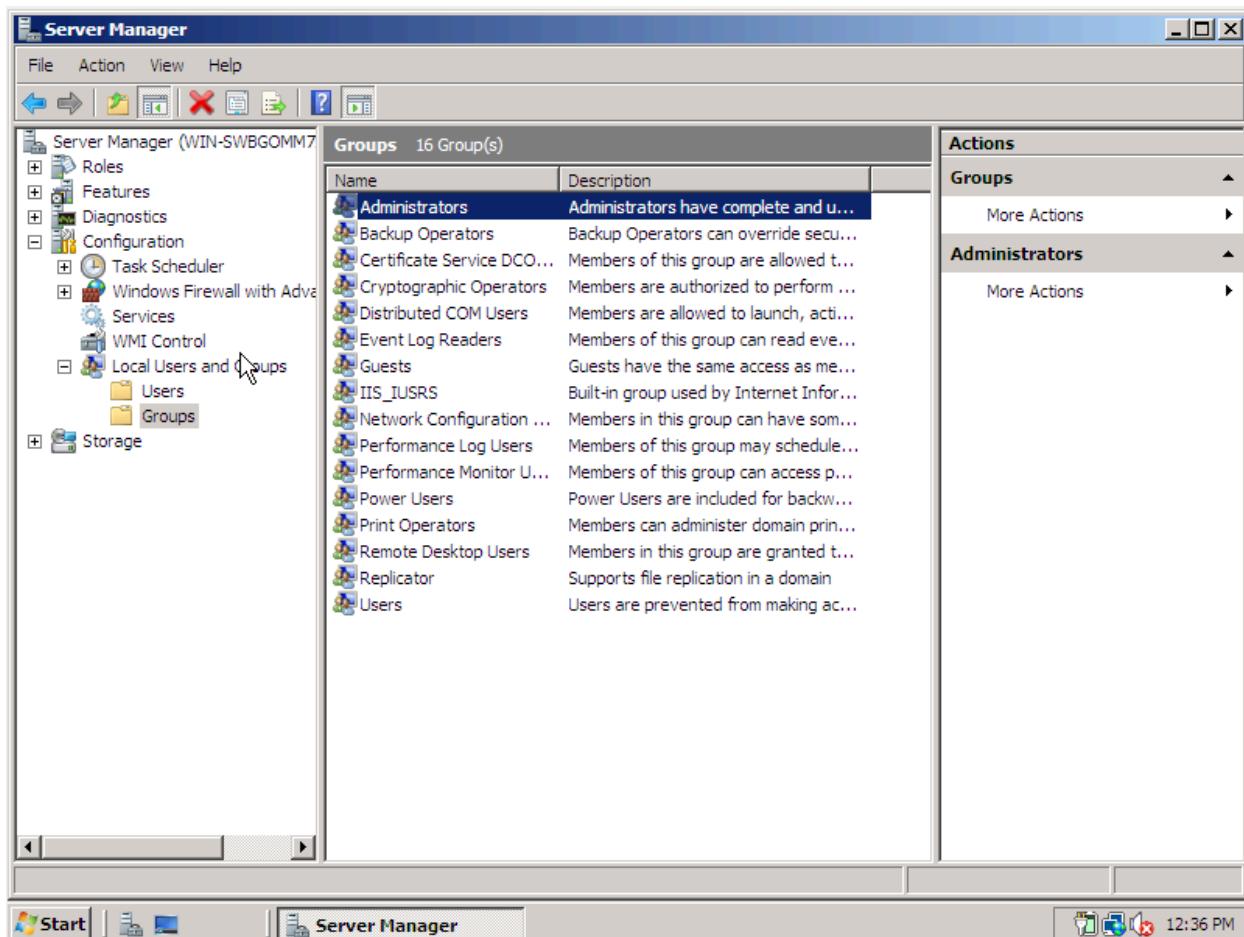


Step 11: After removing the Users, click the Administrators then click the “Apply” button then click the “OK” button.

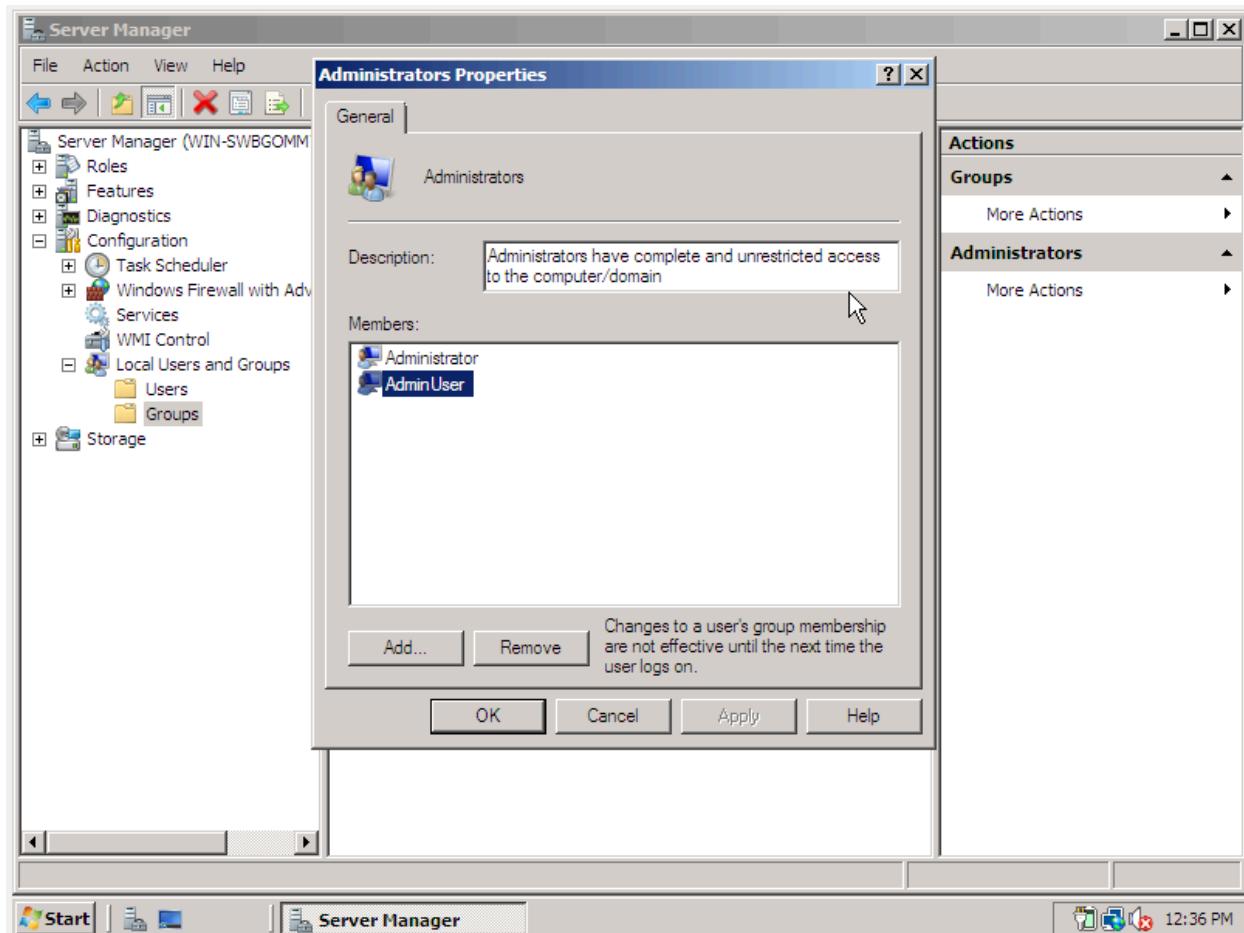


Step 12:

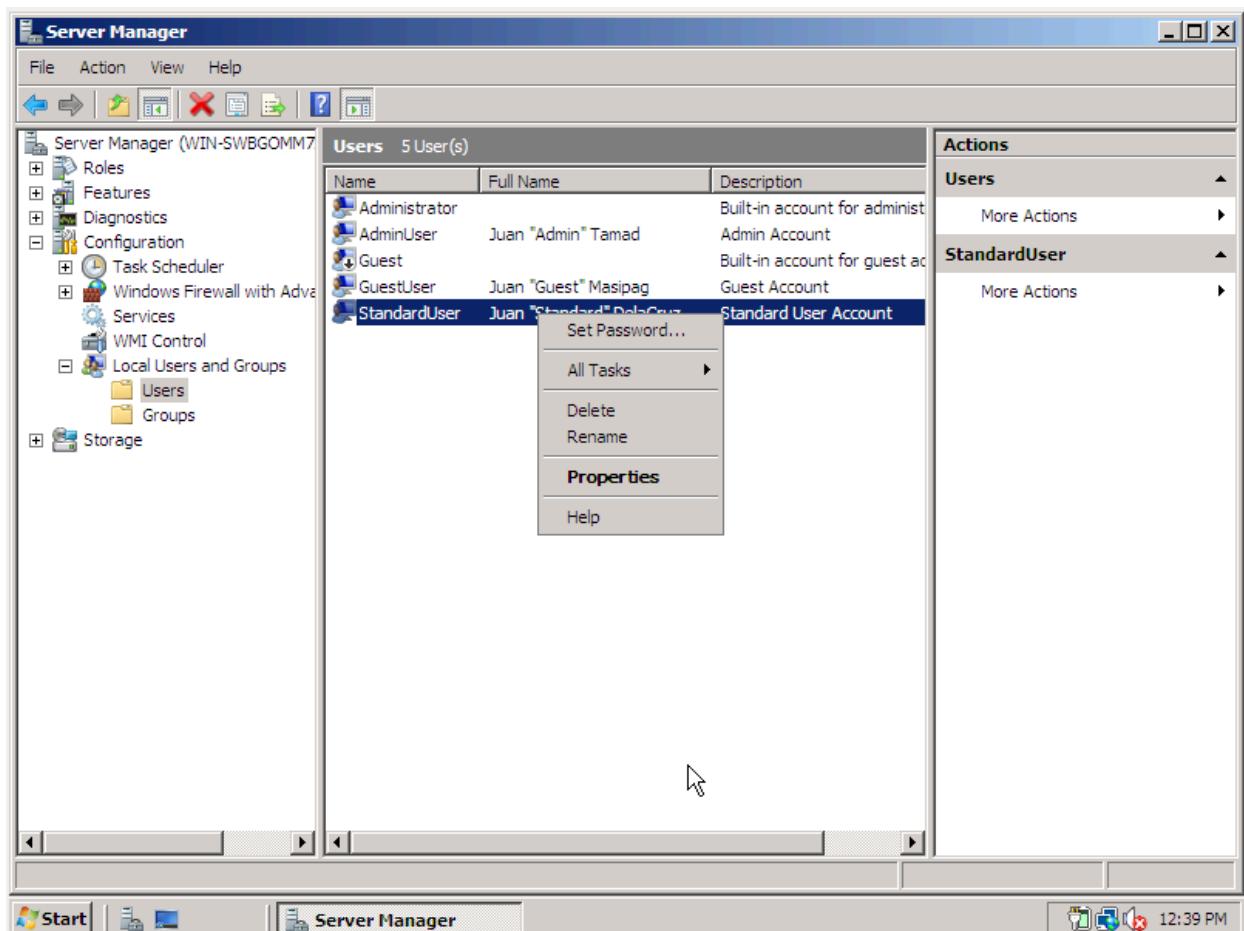
1. You can check if the created AdminUser account is in the Administrators by clicking the groups folder



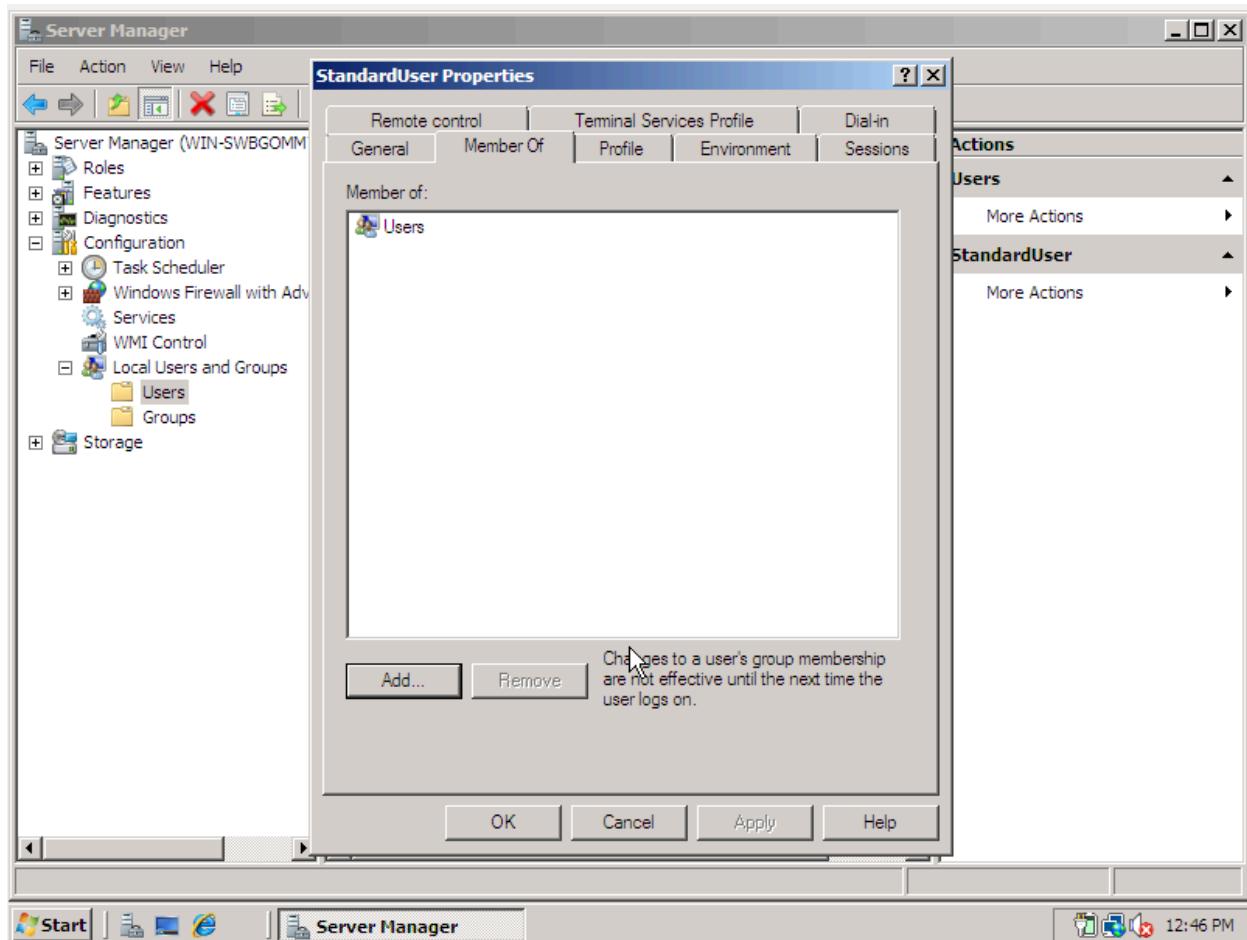
2. Then inside the Administrators Properties you can see that the AdminUser is in the Administrators



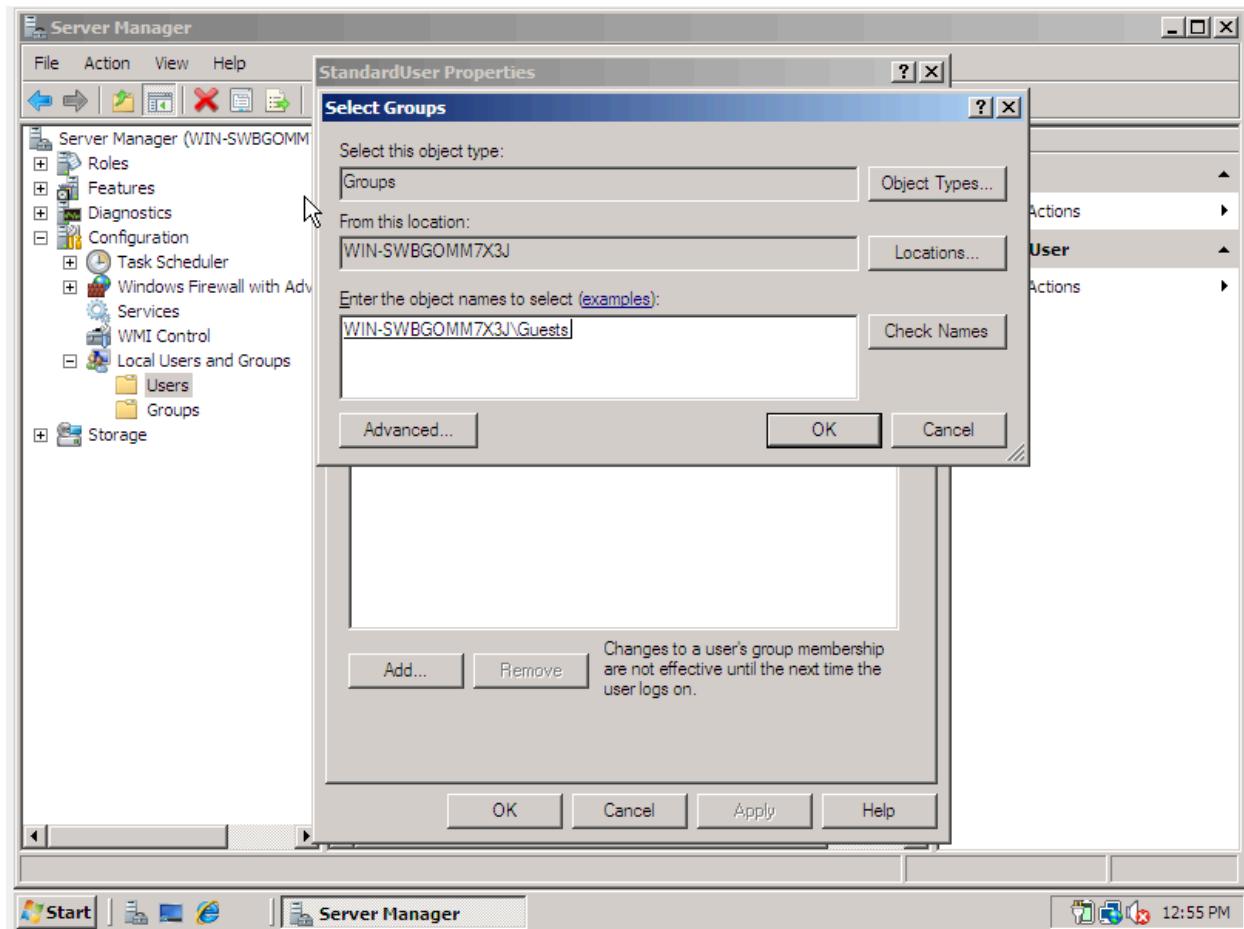
Step 13: To modify the account permissions, right-click the “StandardUser” and then click “Properties”.



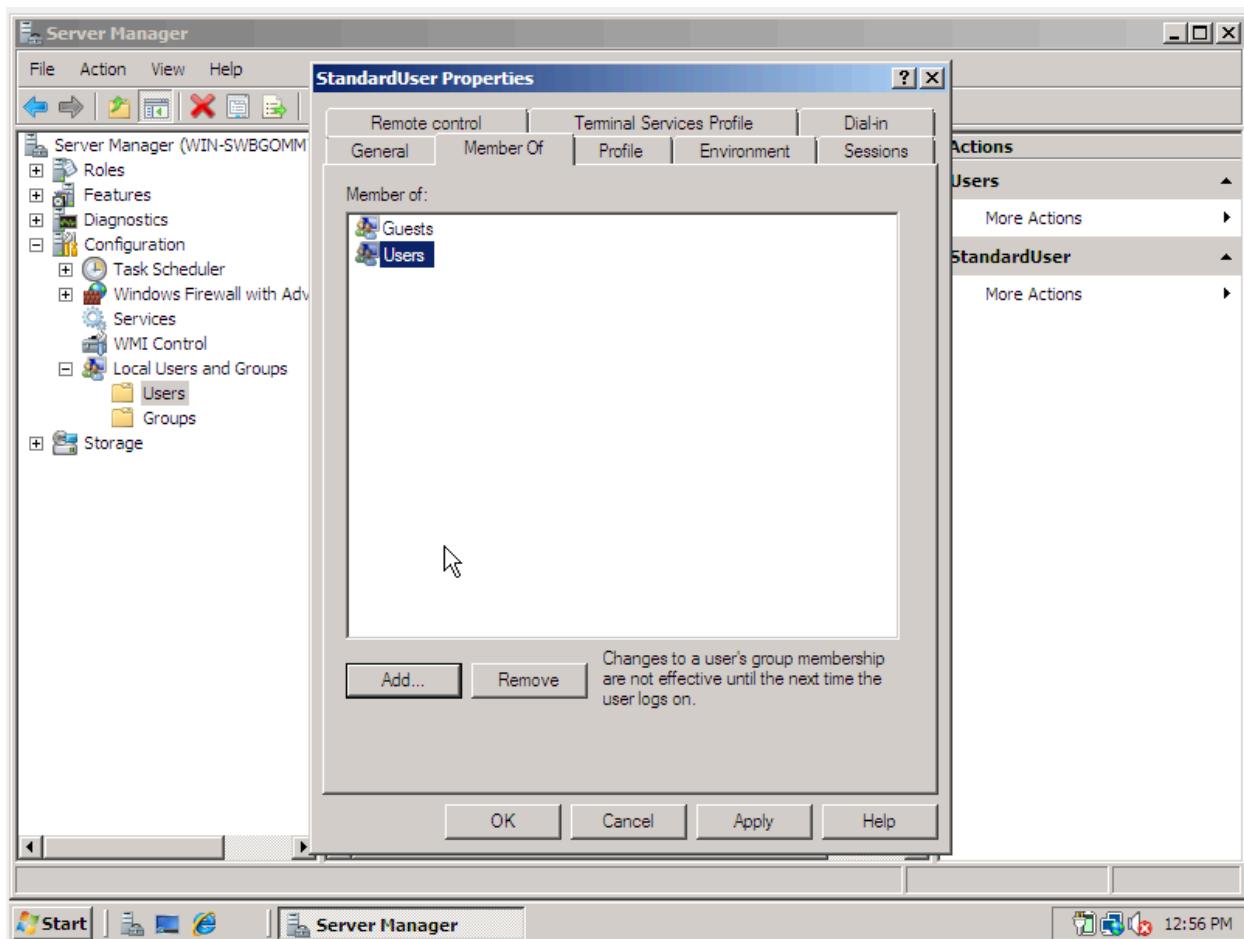
Step 14: Inside that, click the “Member of” tab, then click the “Add” button.



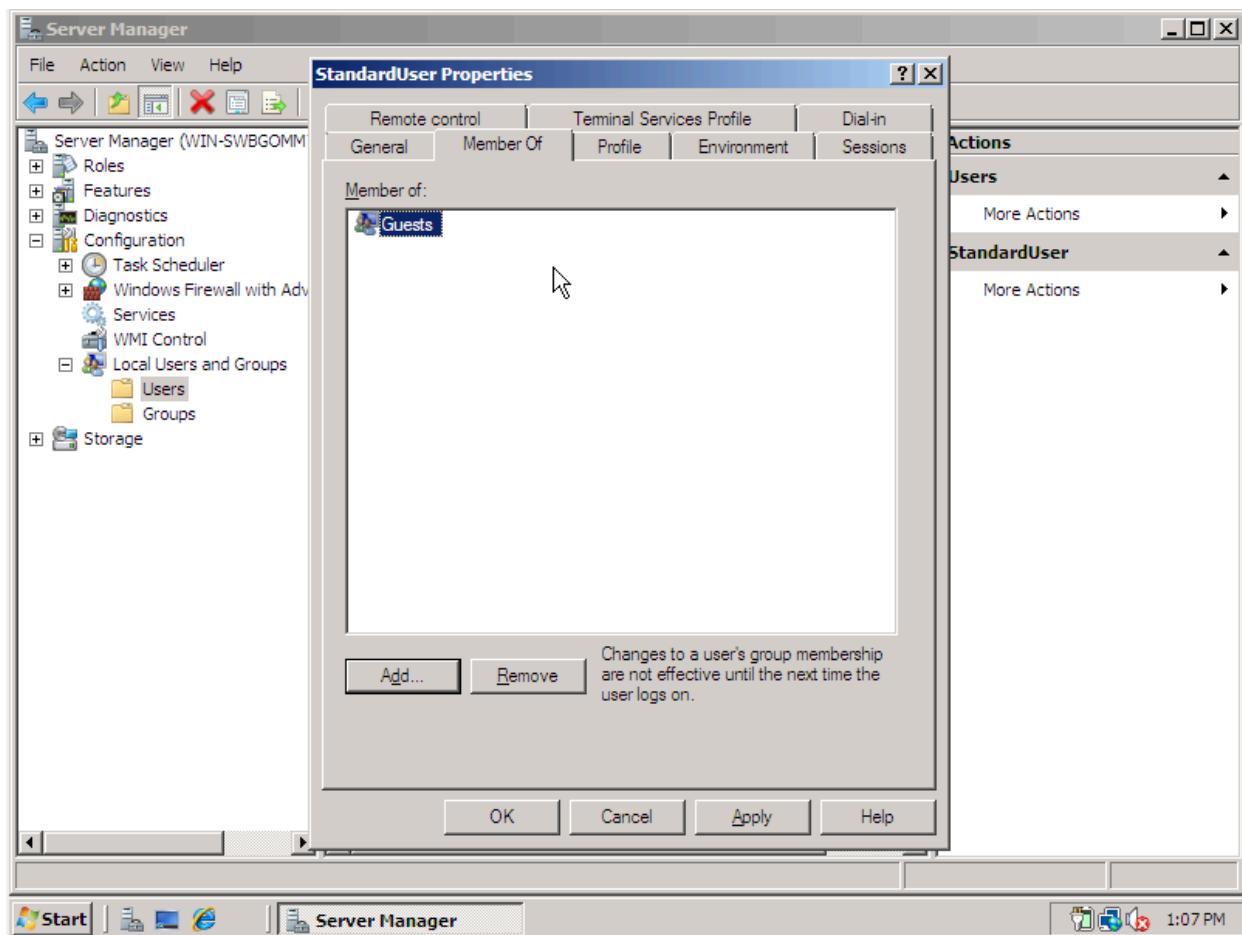
Step 15: After clicking the “Add” button, a modal will appear. Type “**Guests**” under **enter the object names to select**, then click the “Check Names” button if Guests exist in the “**Groups folder**”. After that, click the “OK” button.



Step 16: Inside the StandardUser Properties under the Member Of tab, click Users then the “Remove” button.

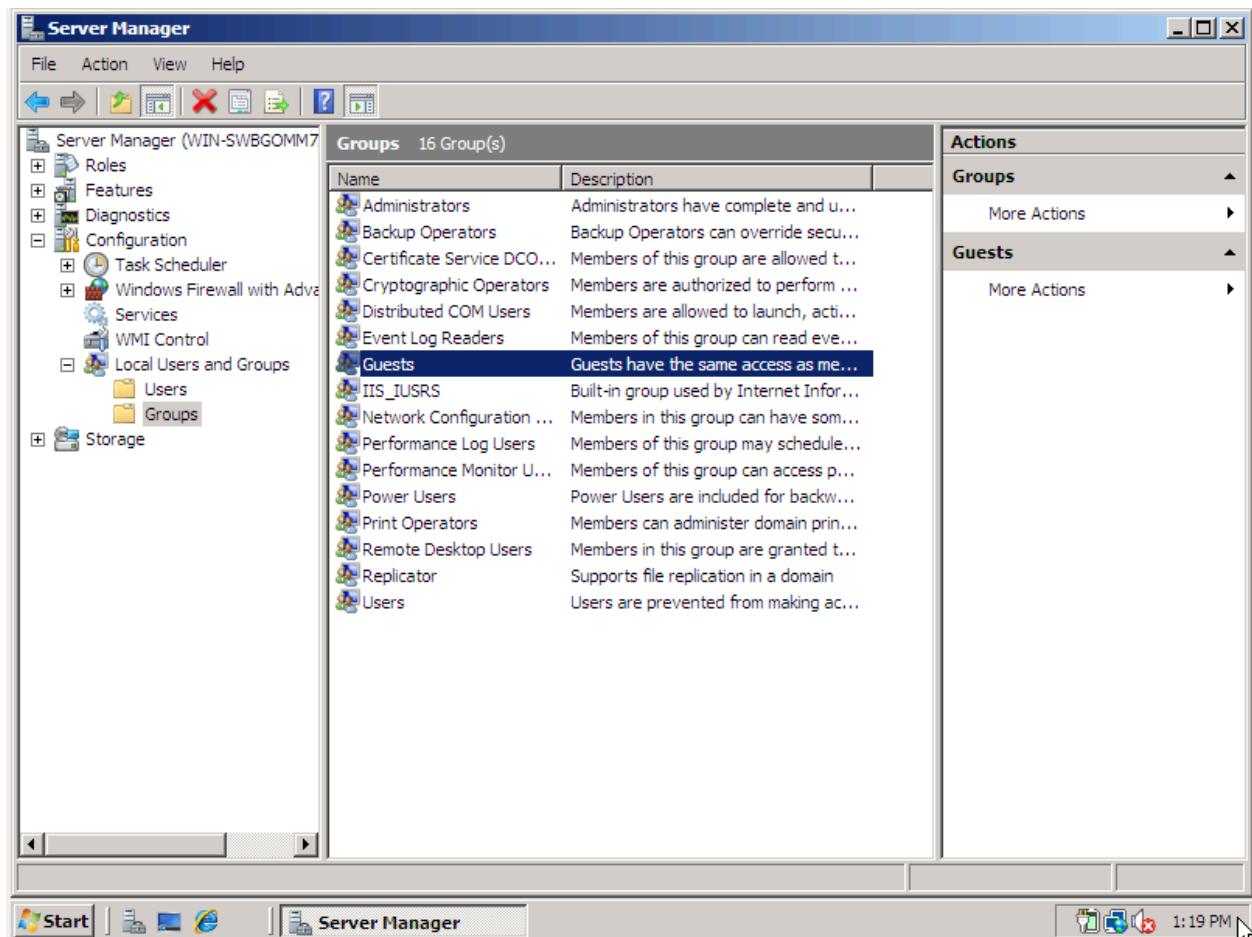


Step 17: After removing the Users, click the Guests then click the “Apply” button then click the “OK” button.

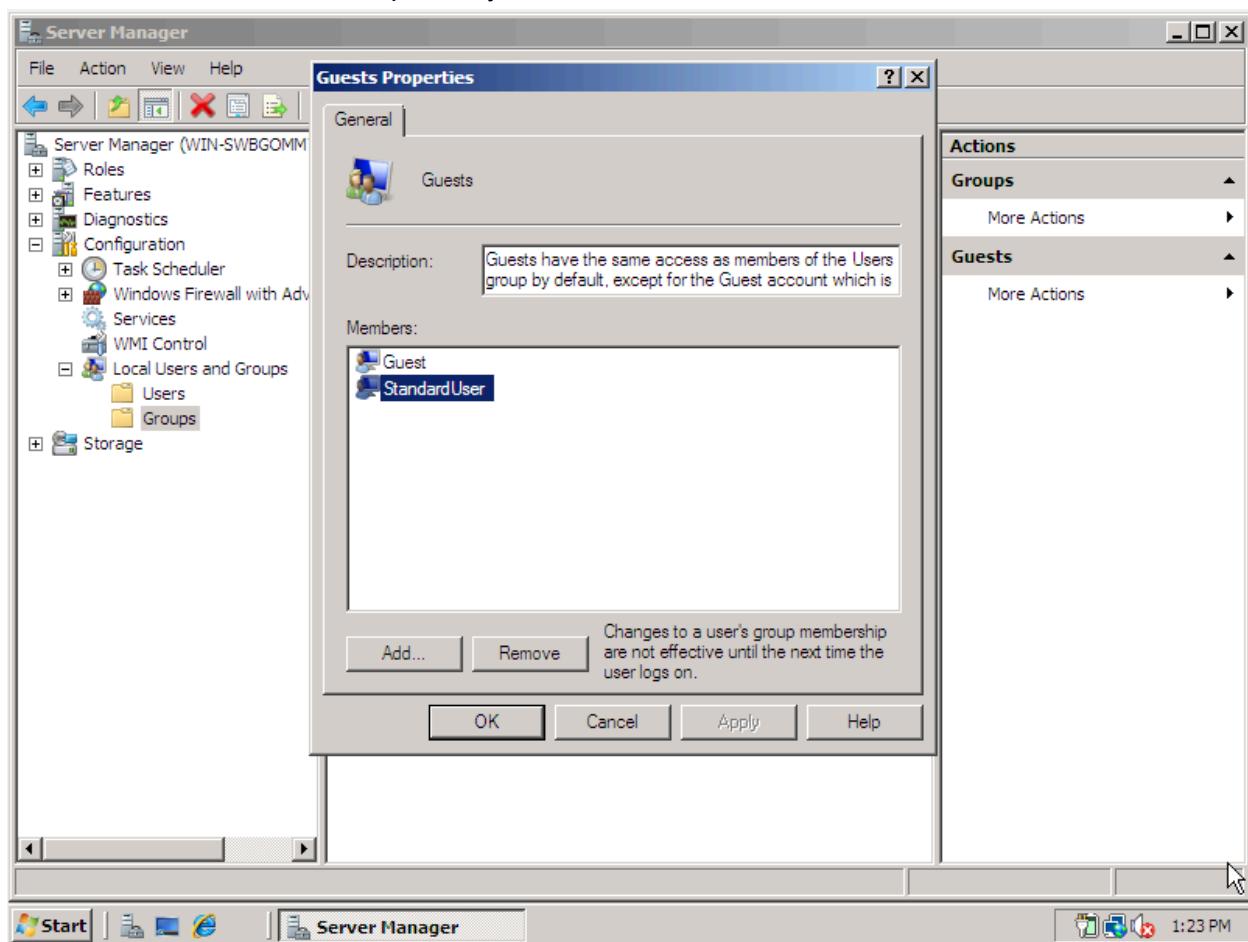


Step 18:

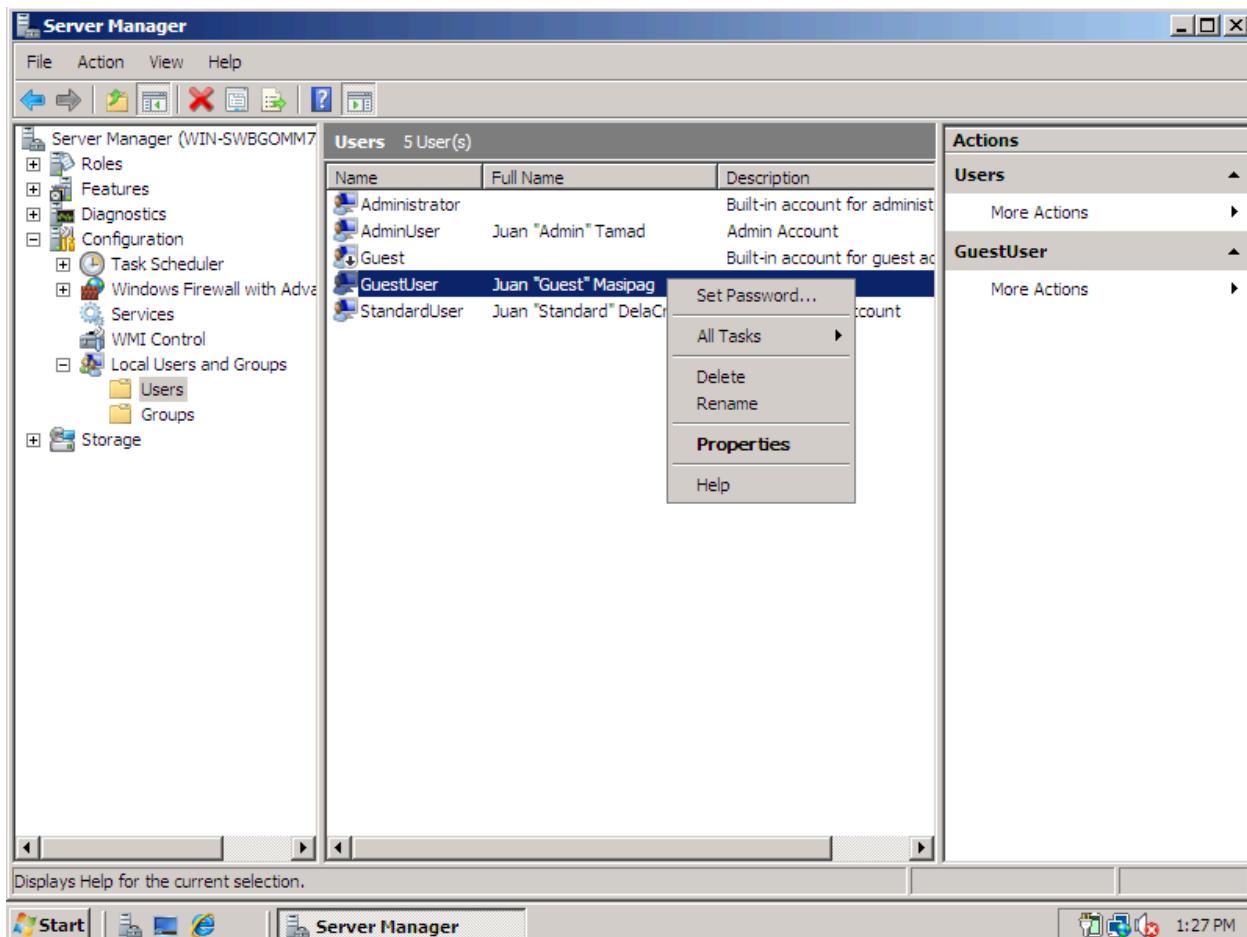
1. You can check if the created StandardUser account is in the Guests by clicking the groups folder.



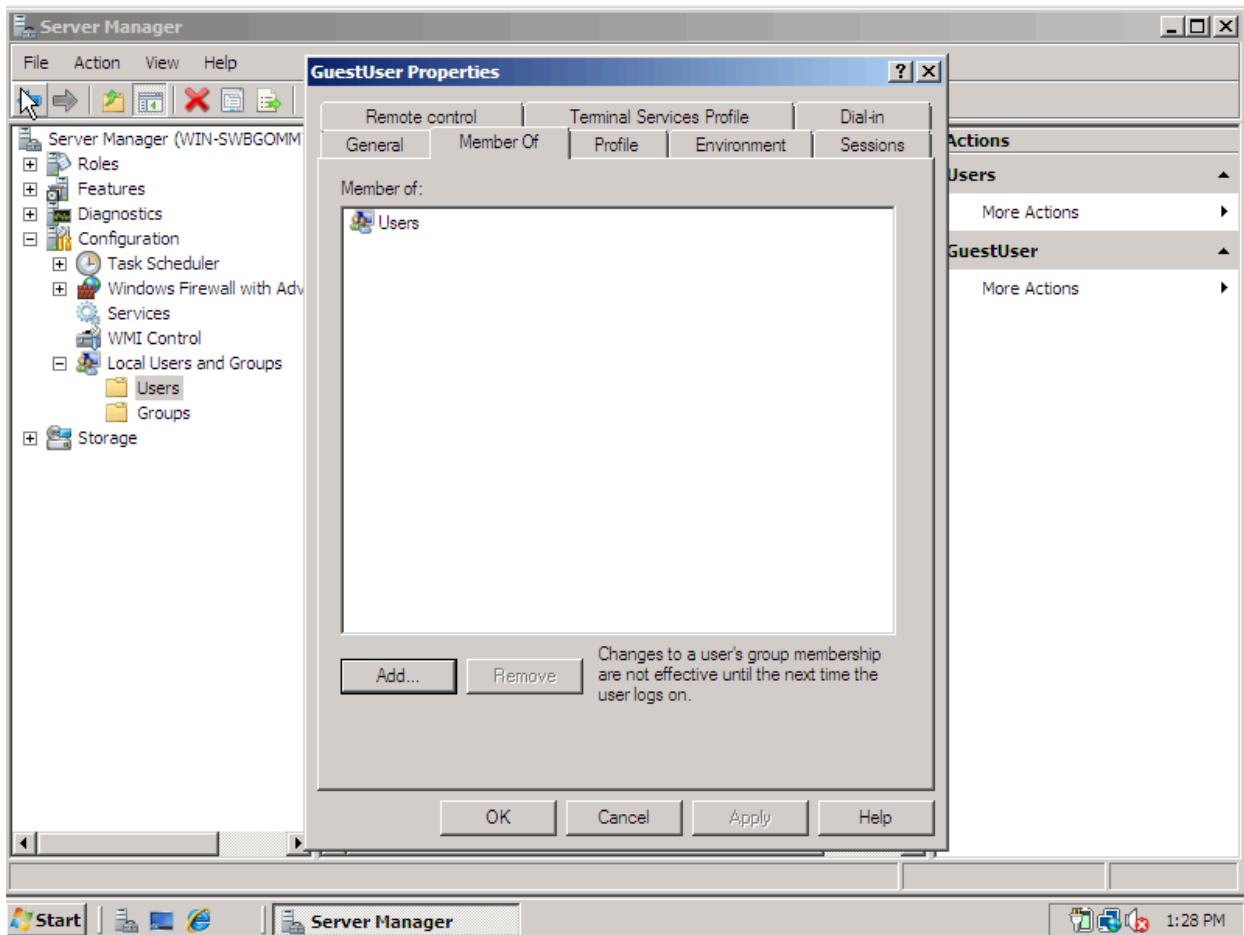
2. Then inside the Guests Properties you can see that the StandardUser is in the Guests.



Step 19: To modify the account permissions, right-click the “GuestUser” and then click “Properties”.



Step 20: Inside that, click the “**Member of**” tab, you can see that the GuestUser account is already under the Users group so you don’t need to modify it.

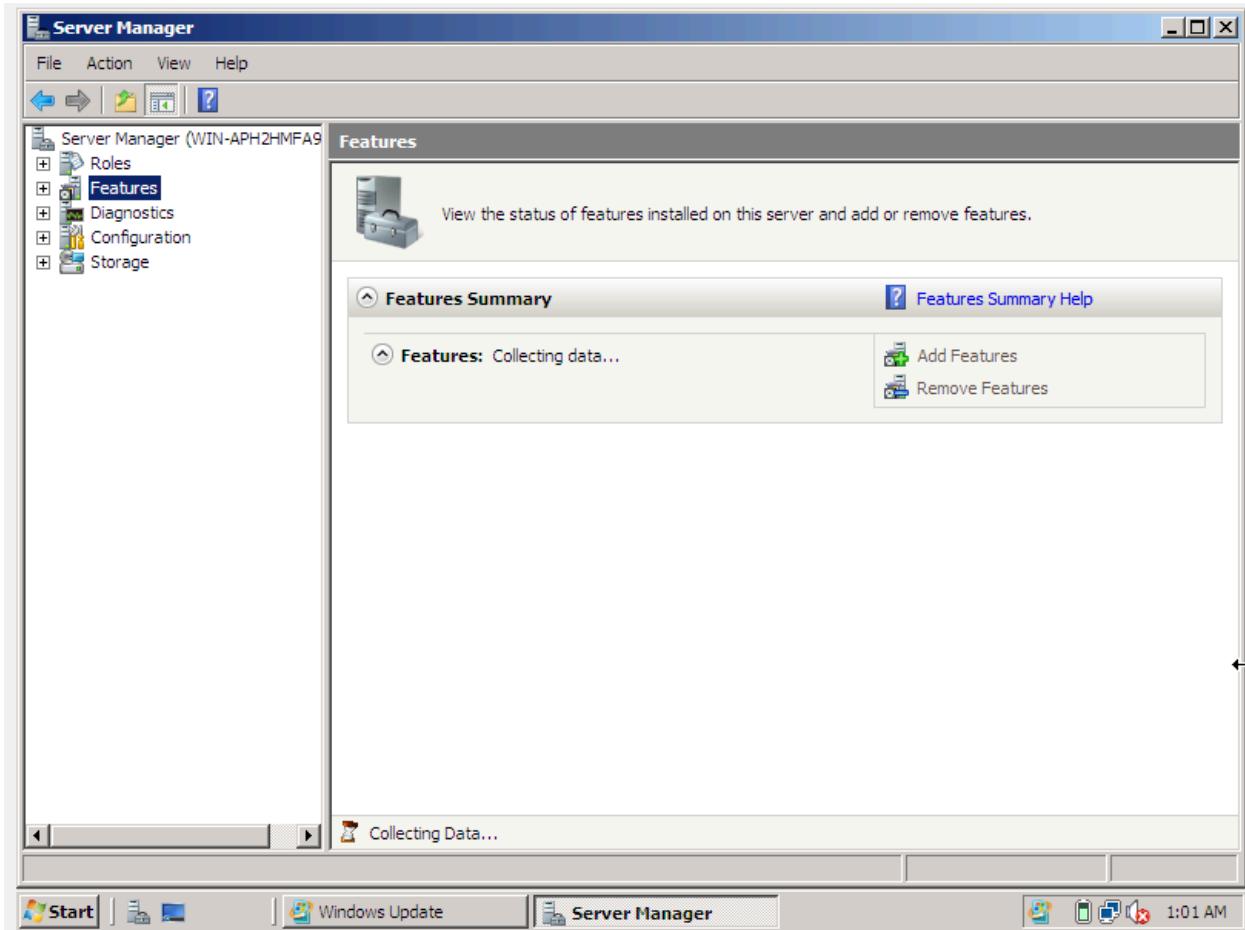


System Maintenance Tasks

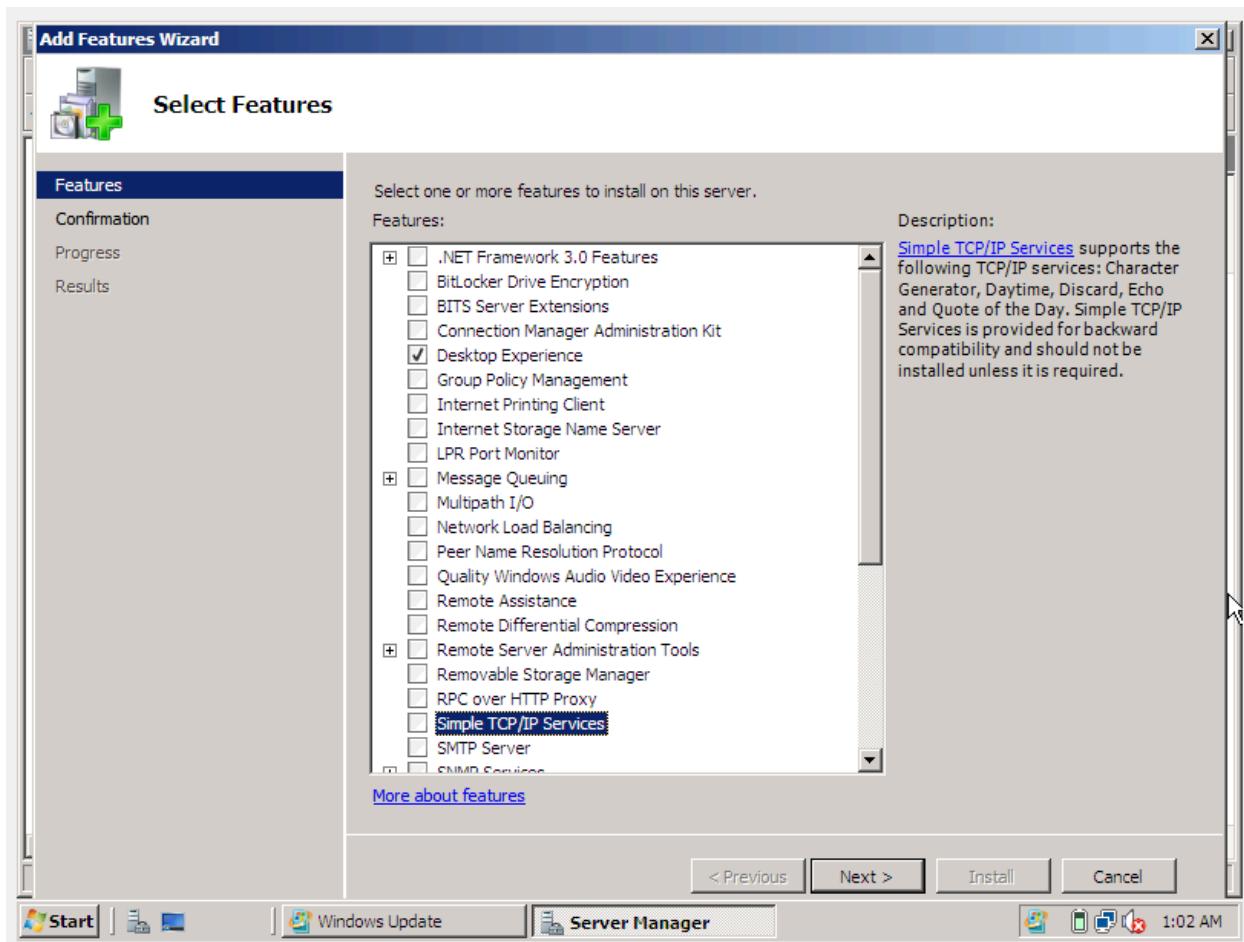
Disk Cleanup

- Perform a disk cleanup operation to remove unnecessary files.
- Document the steps taken and the amount of space recovered.

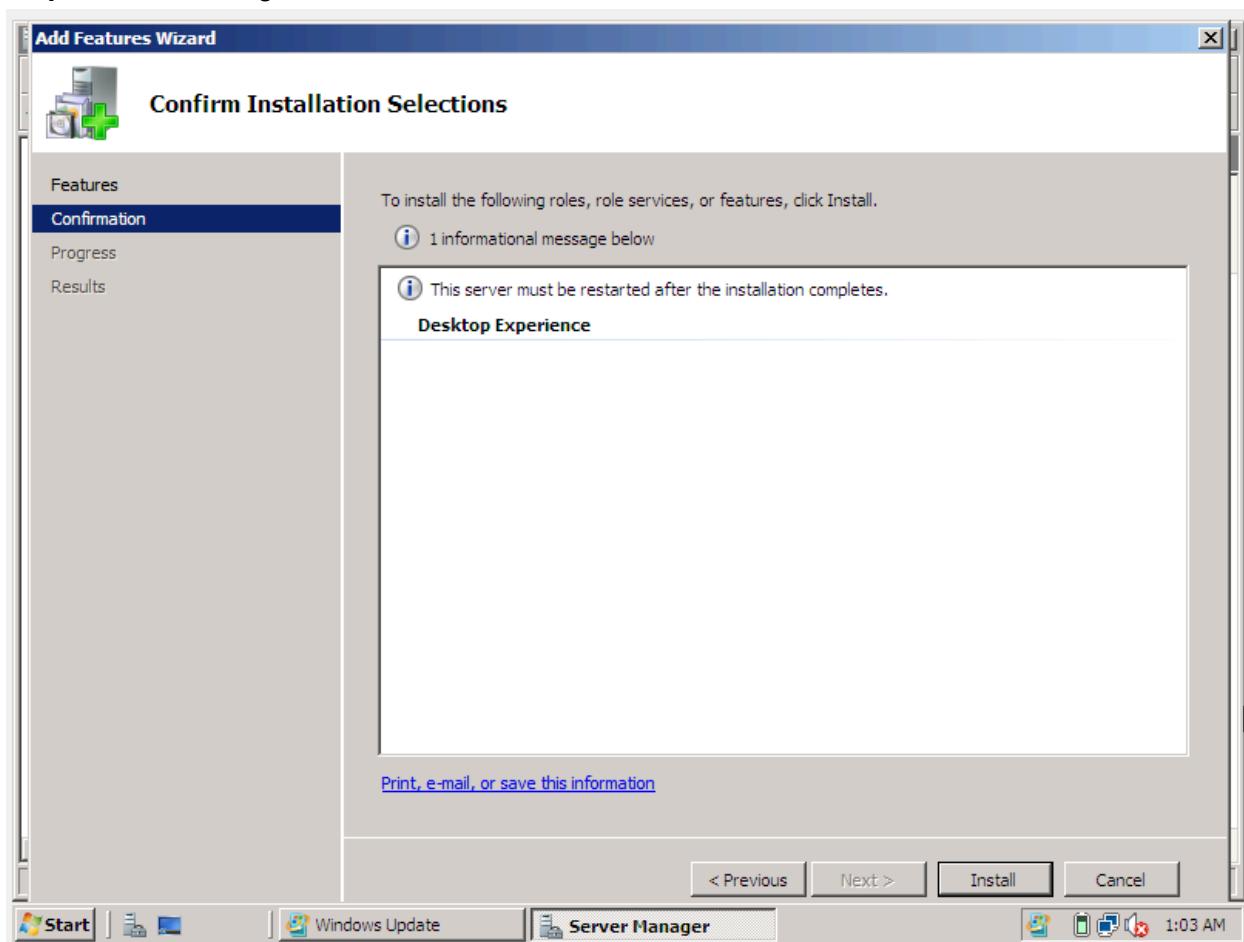
Step 1: Since there's no disk cleanup we will install it, Inside Server Manager, click Features then click "Add Features".



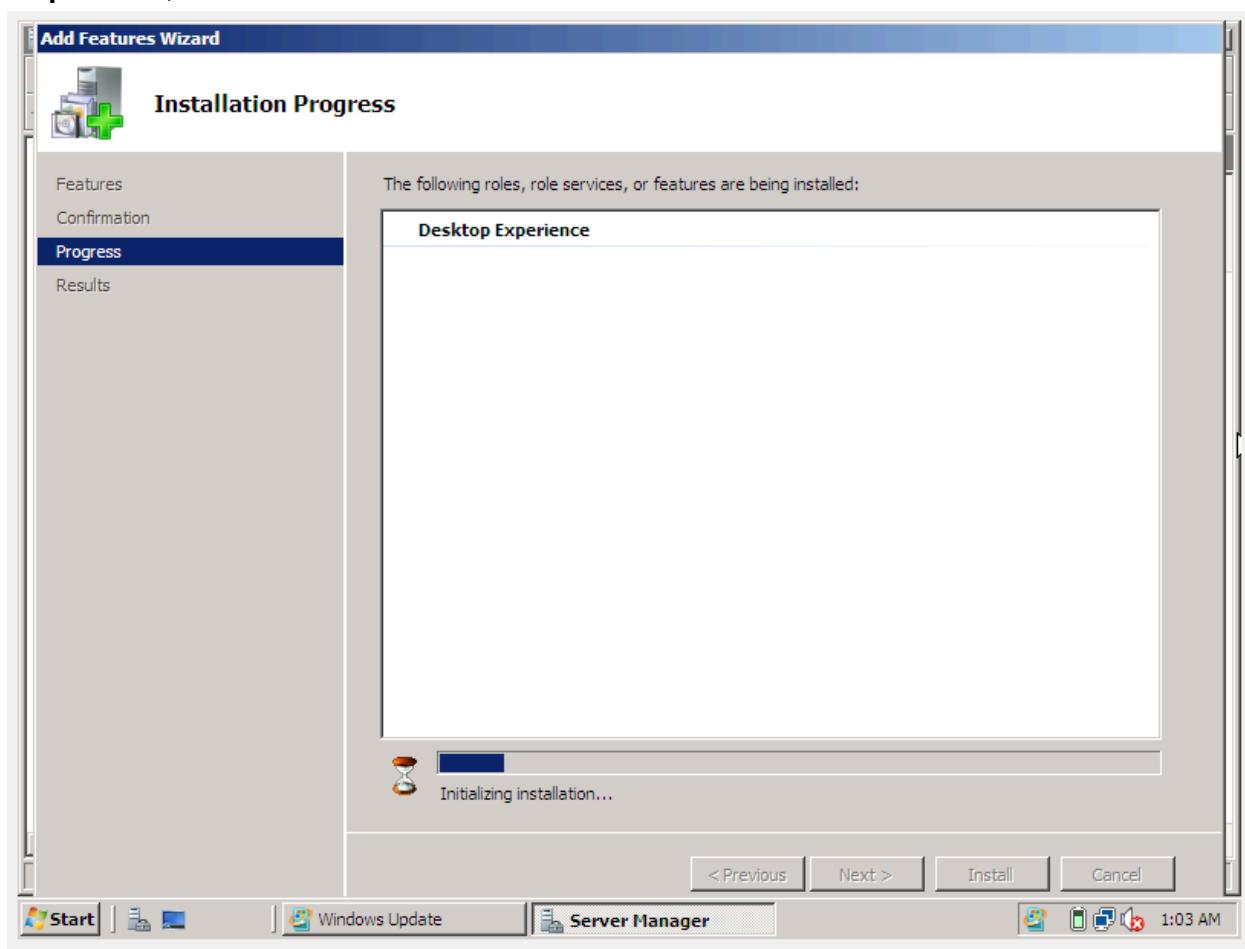
Step 2: Inside the Add Features Wizard, then check the “Desktop Experience” after that click the Next button.



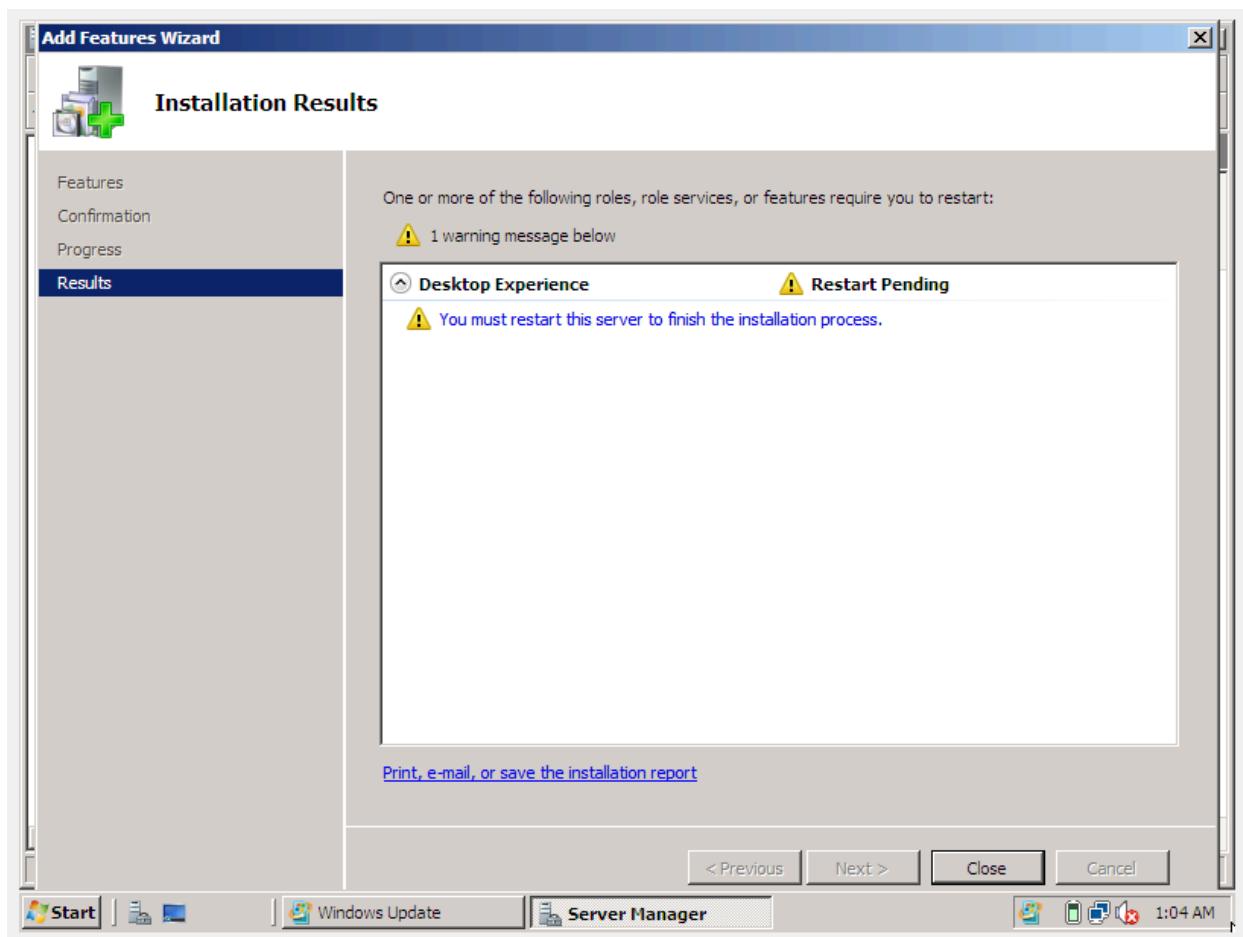
Step 3: After clicking the next button, click the “Install” button.



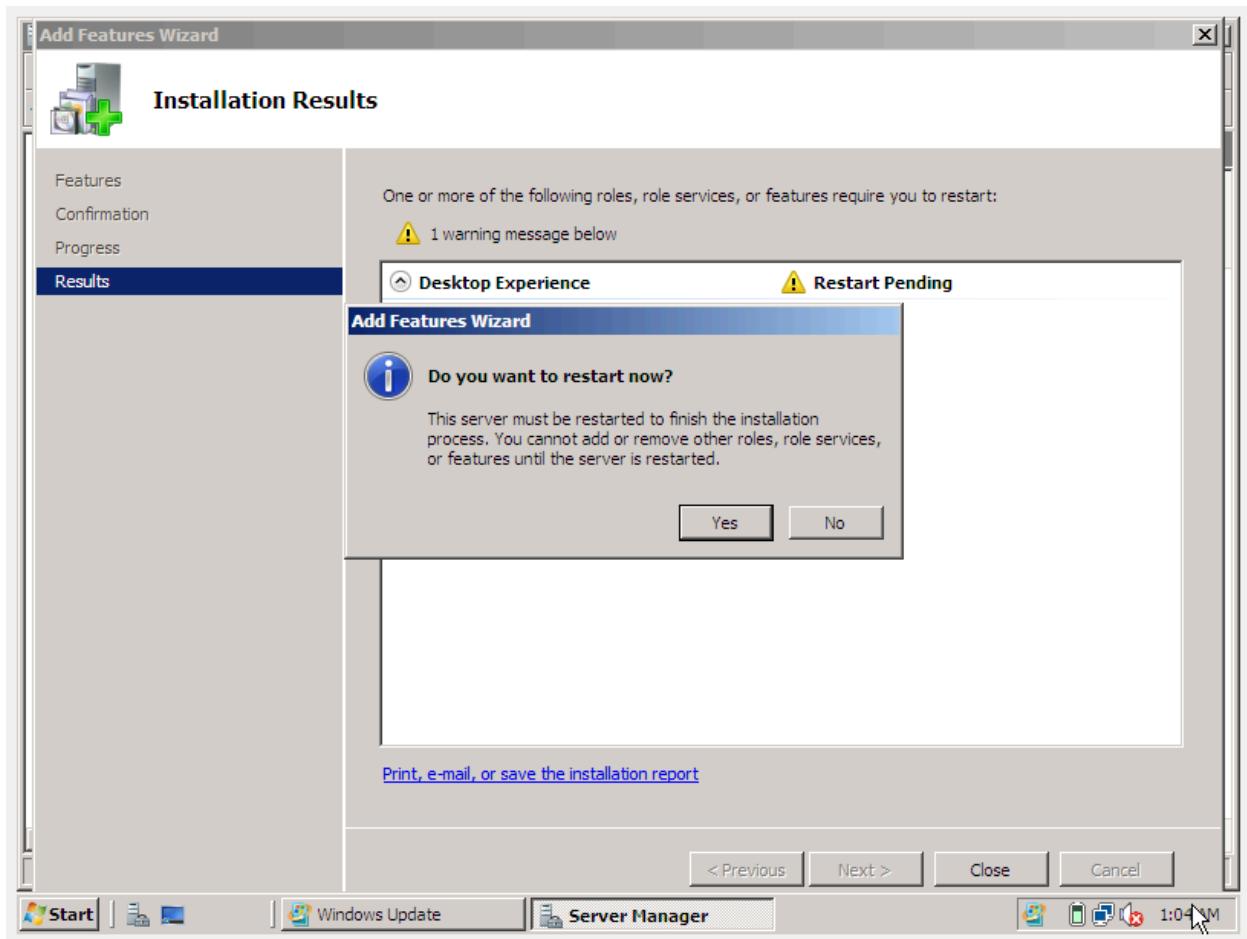
Step 4: Now, wait for it to install.



Step 5: After waiting for it to install, click the “You must restart this server to finish the installation process.”



Step 6: A modal will pop out, just click the “Yes” button.



Step 7: It will now configure updates so just stay put and don't turn off the computer.

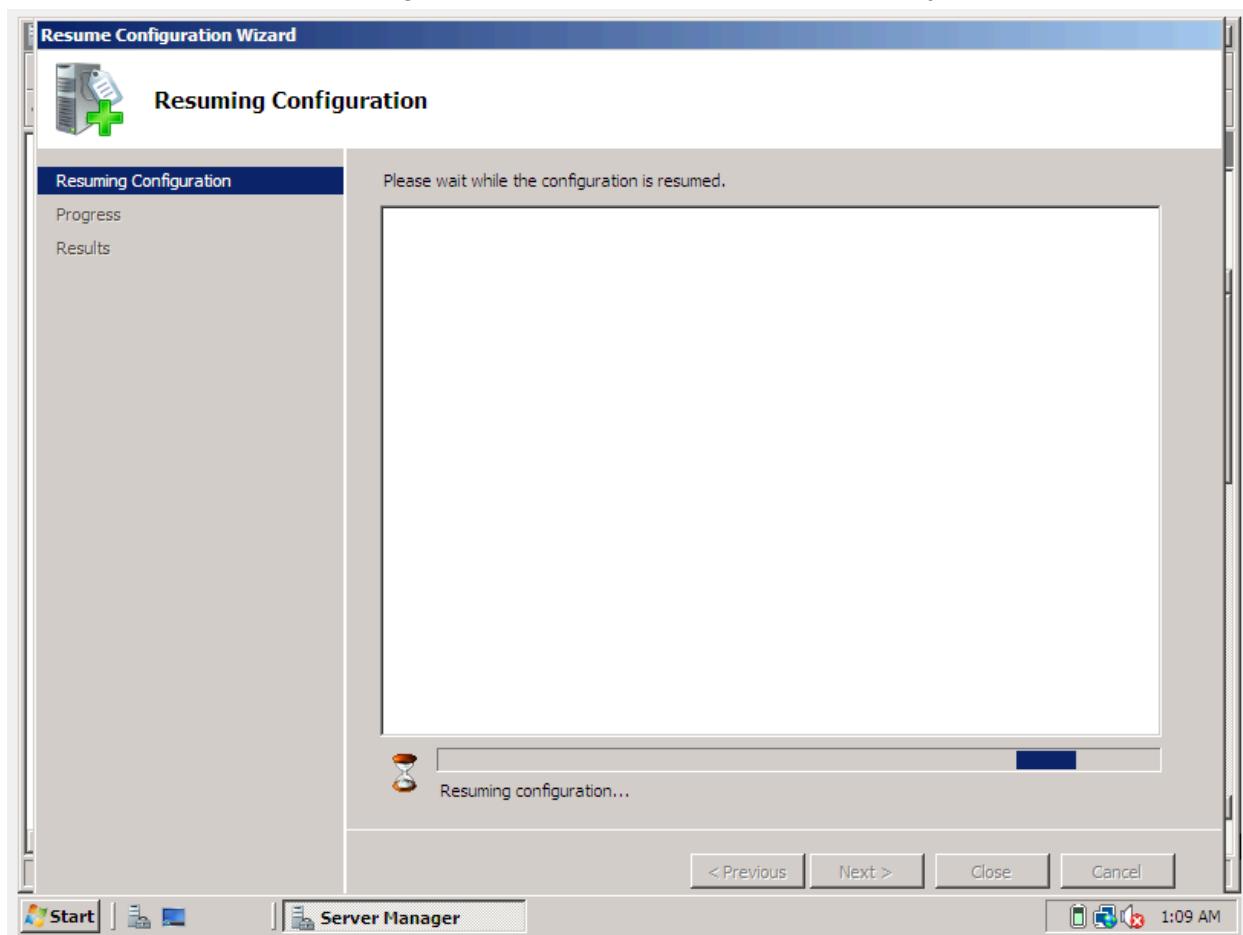
Configuring updates: Stage 2 of 3 - 100% complete.
Do not turn off your computer.



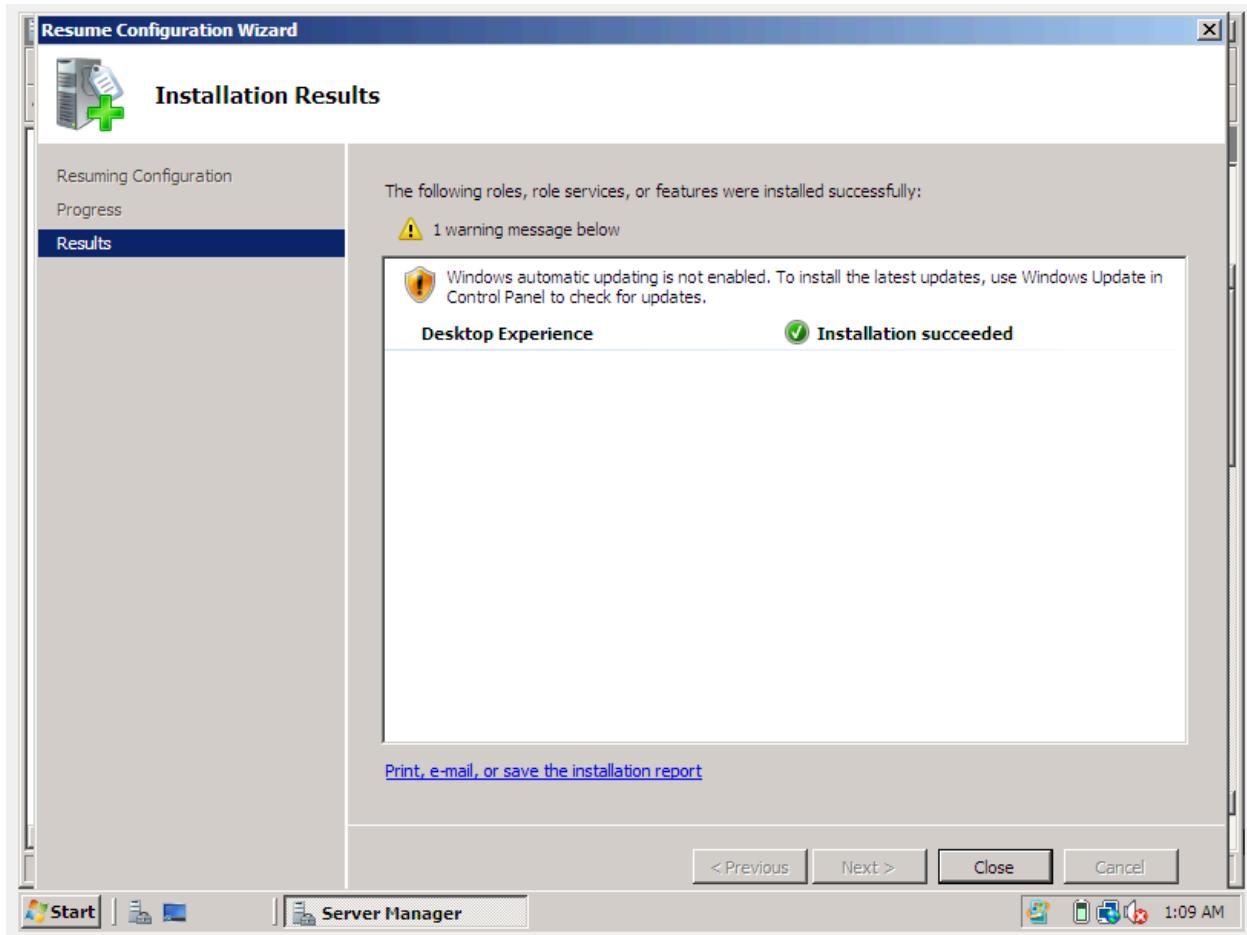
Step 8: Same with the previous step, wait for it to configure the updates and follow what the screen says.



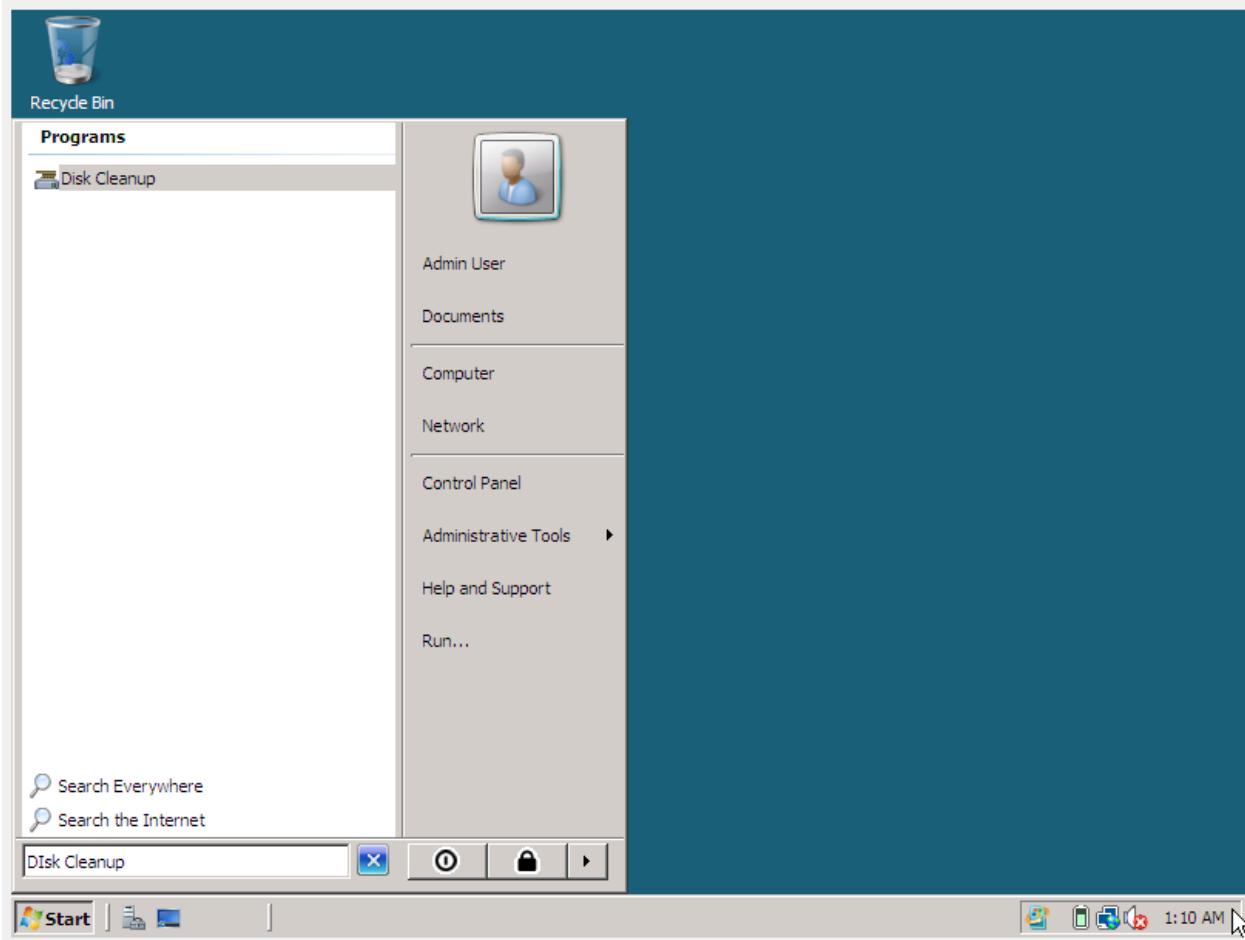
Step 9: After restarting, log in with the same account that was used in installing the Desktop Experience, the Resume Configuration Wizard Window will pop up and just wait for it.



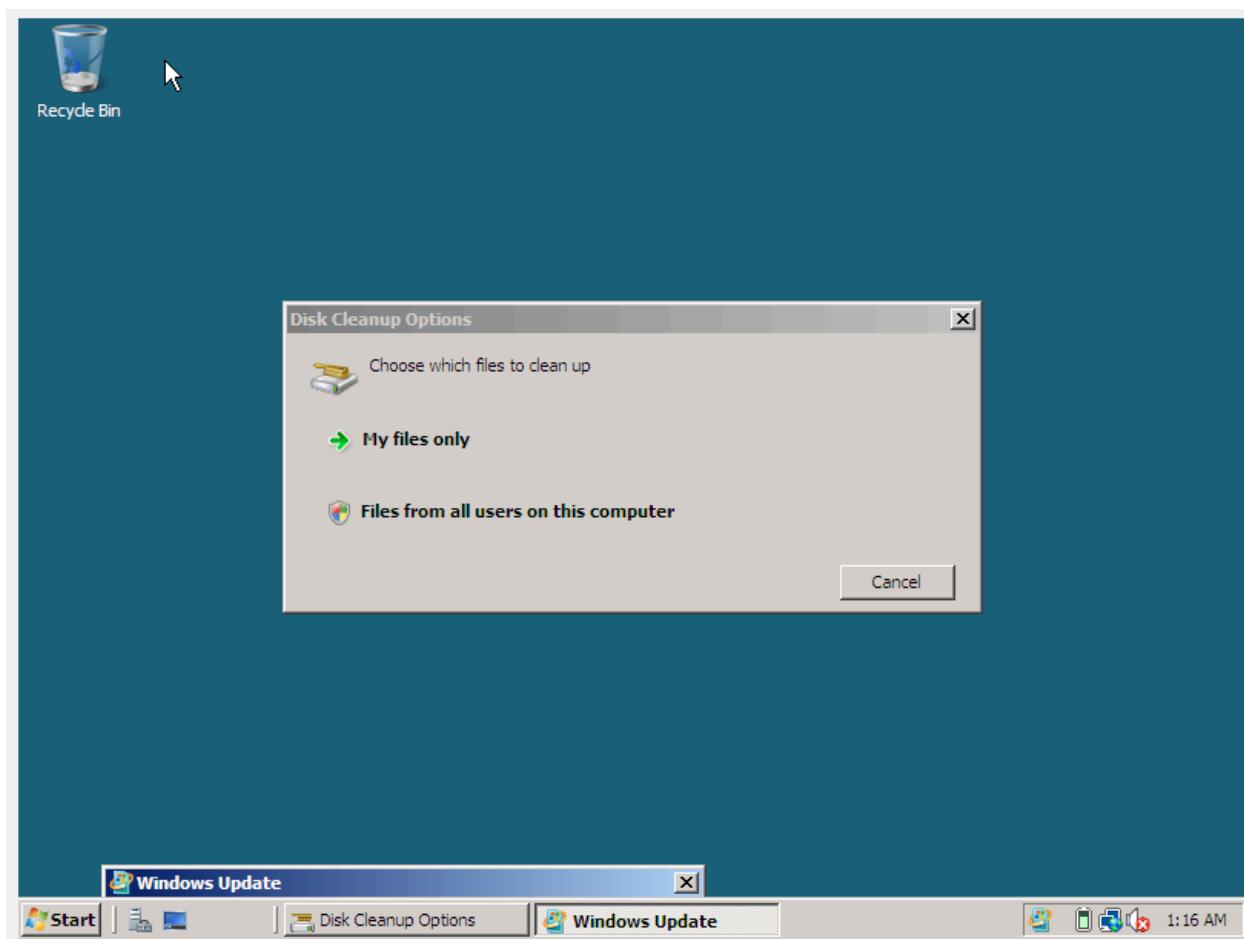
Step 10: After configuration, the window will show that the installation succeeded so just click the “Close” button.



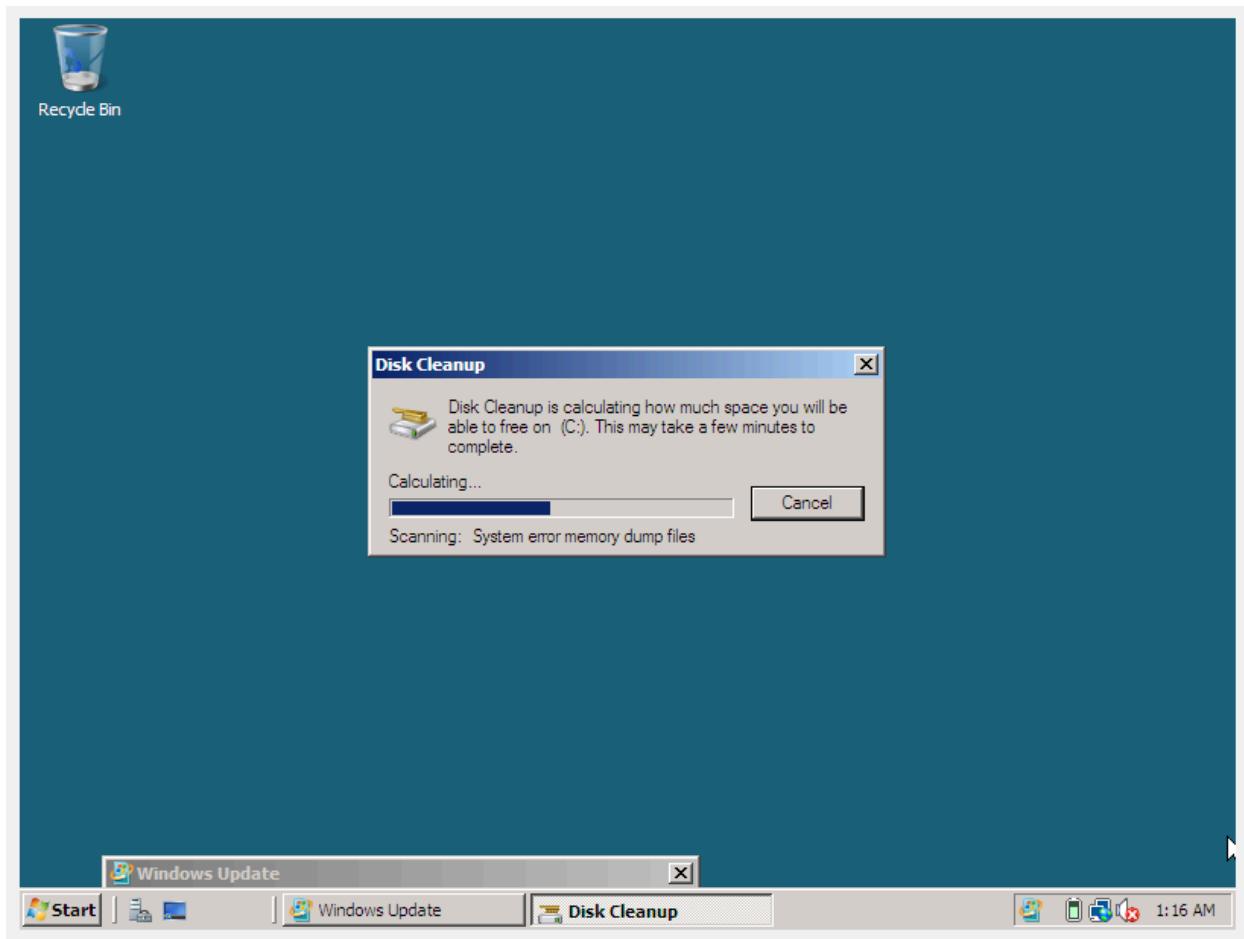
Step 11: Click the “Start” button then search “Disk Cleanup” in the search bar. A Disk Cleanup program will appear and just click it.



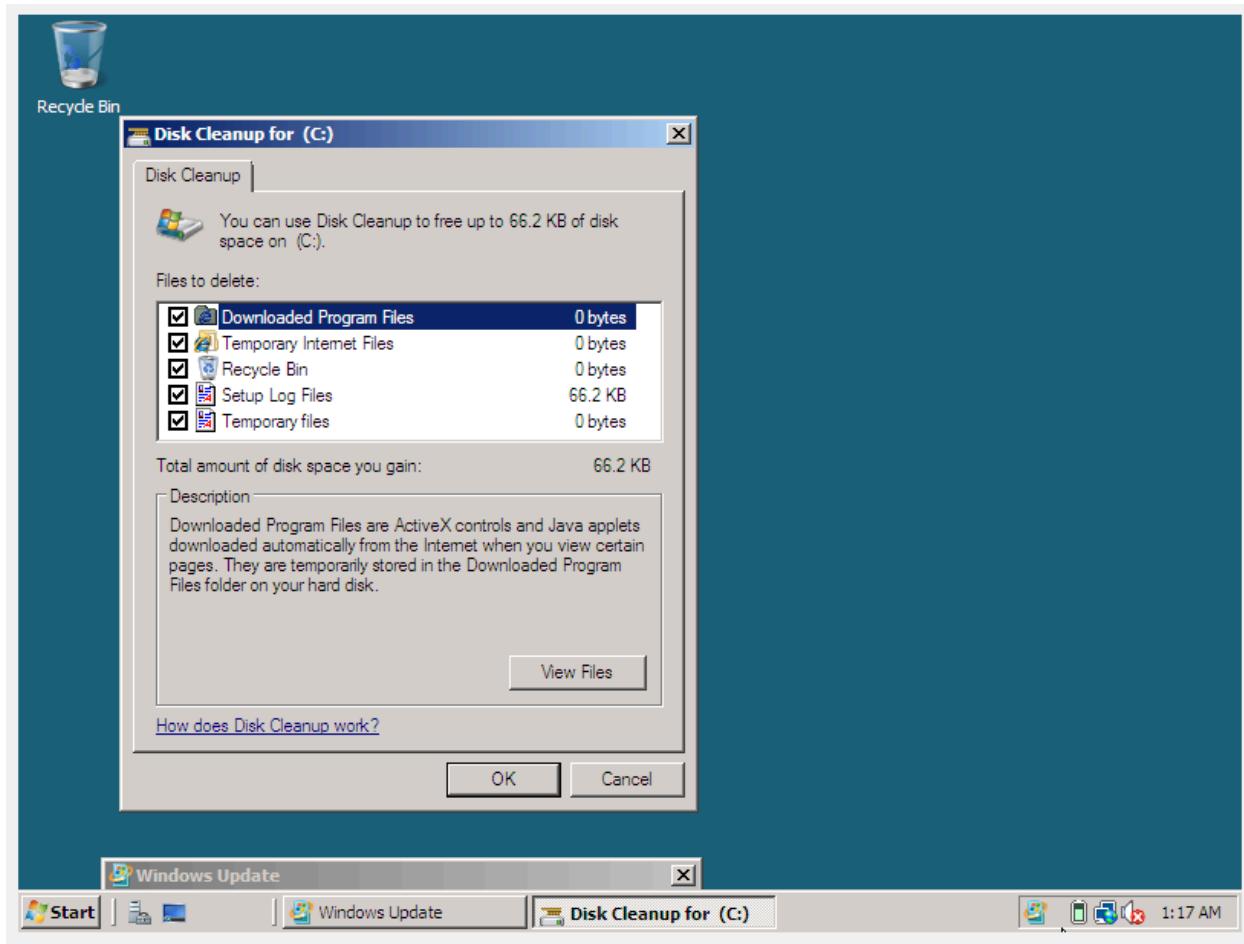
Step 12: It will pop up a window of Disk Cleanup Options wherein the user can choose what files to clean.



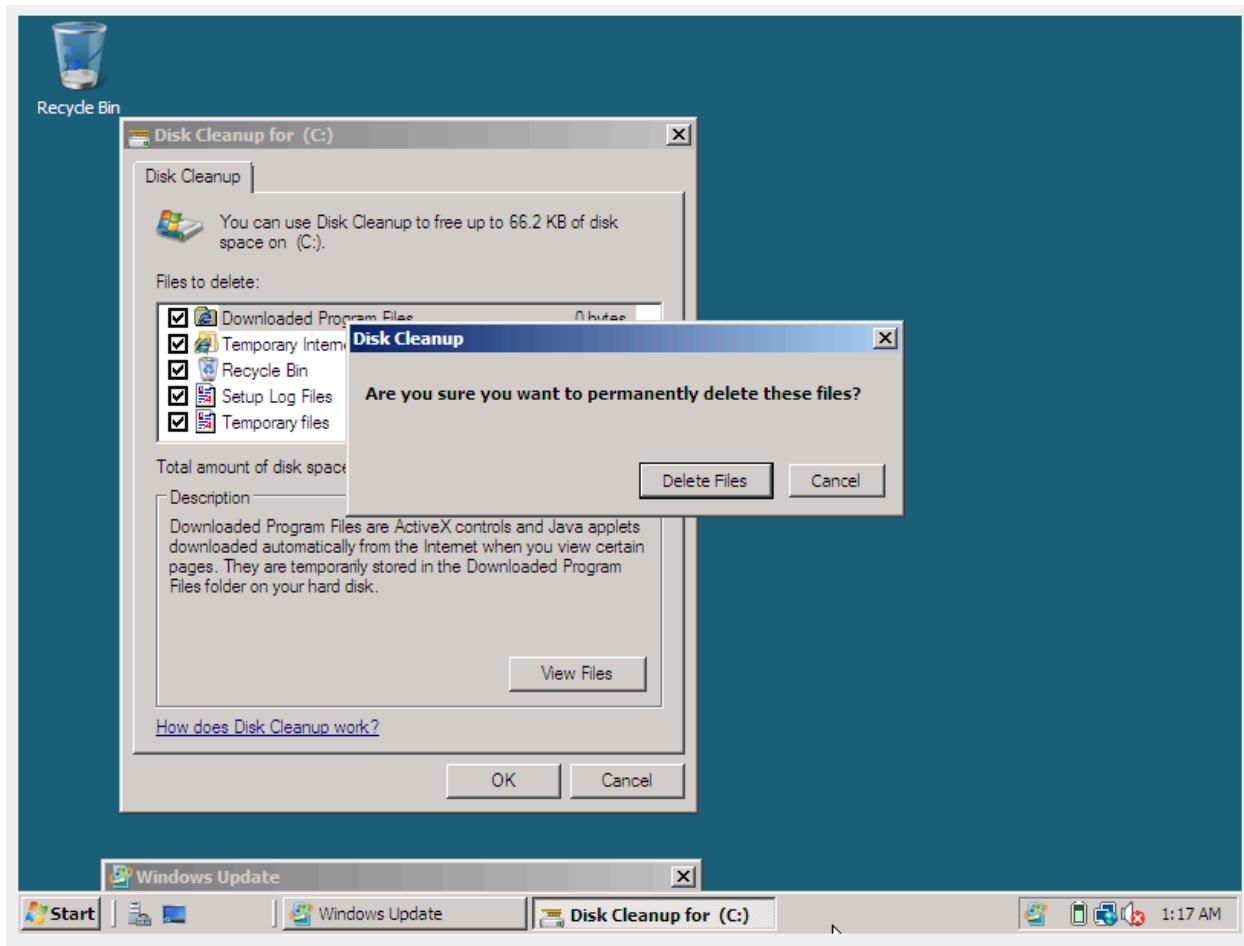
Step 13: After choosing which files to clean, just wait for it to finish calculating.



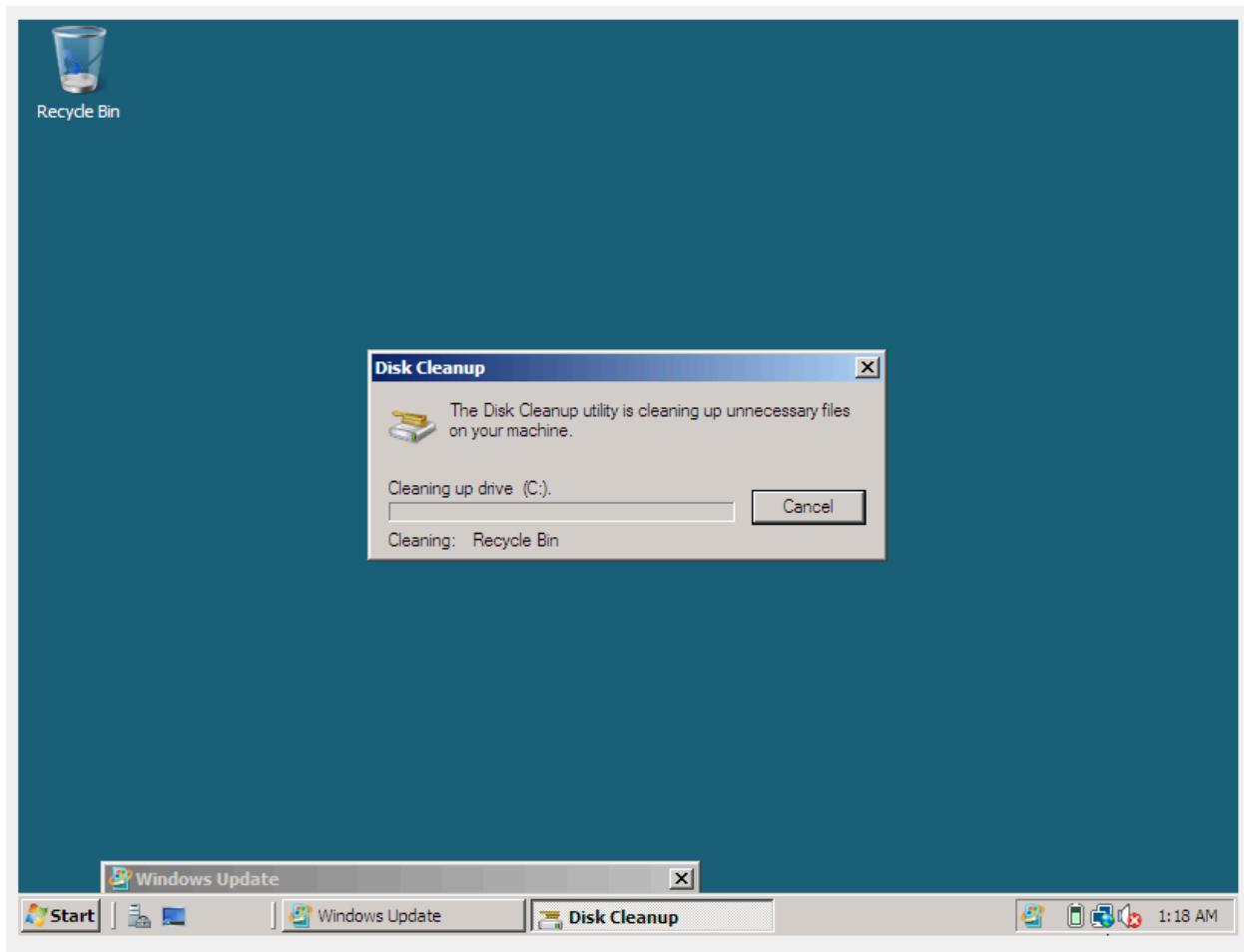
Step 14: The user can now choose specifically which files to clean and whatnot.



Step 15: A modal will appear asking the user for confirmation on deleting the selected files. Just click “Delete Files” to proceed.



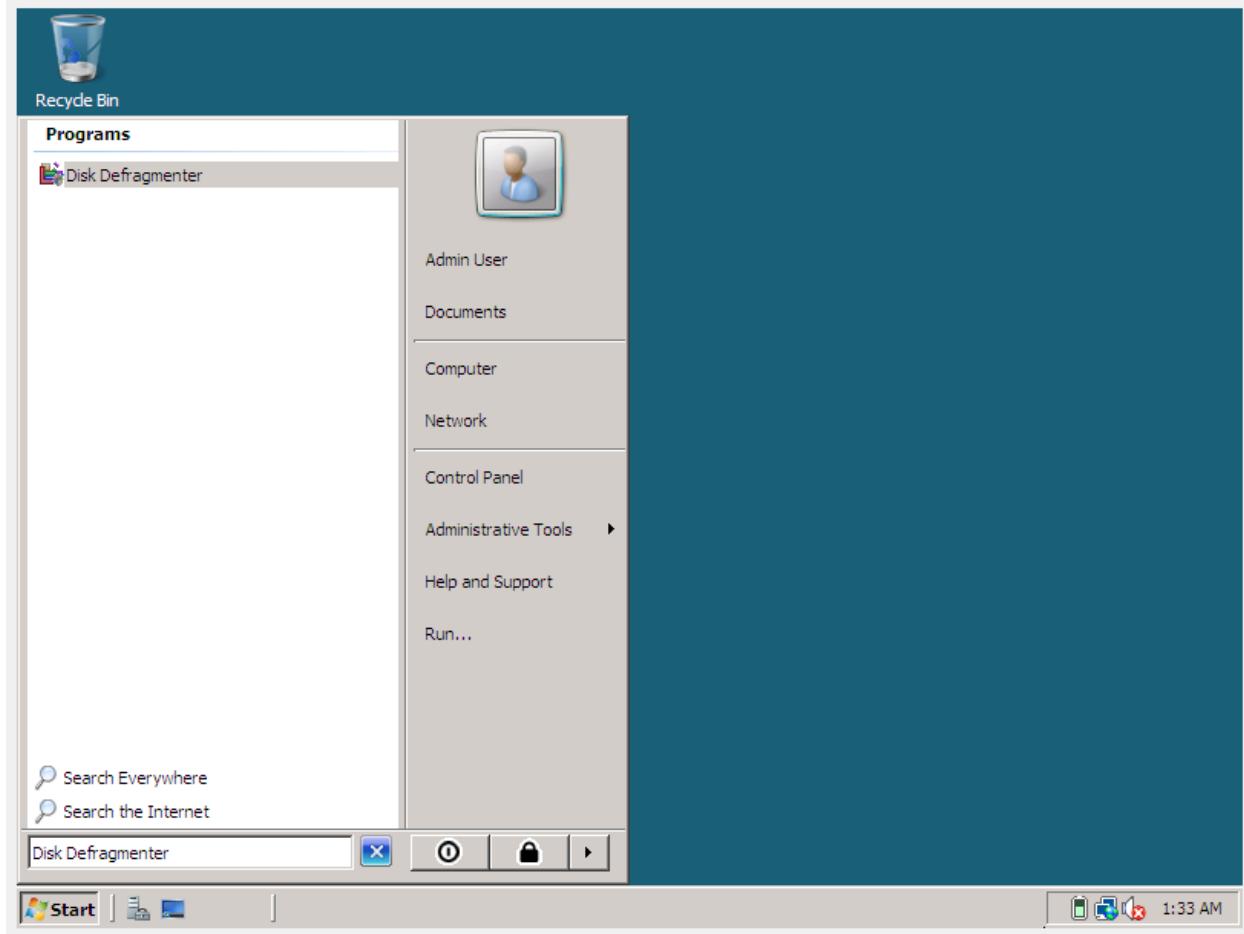
Step 17: After confirming, it will now clean the selected files. Wait for it to finish and done.



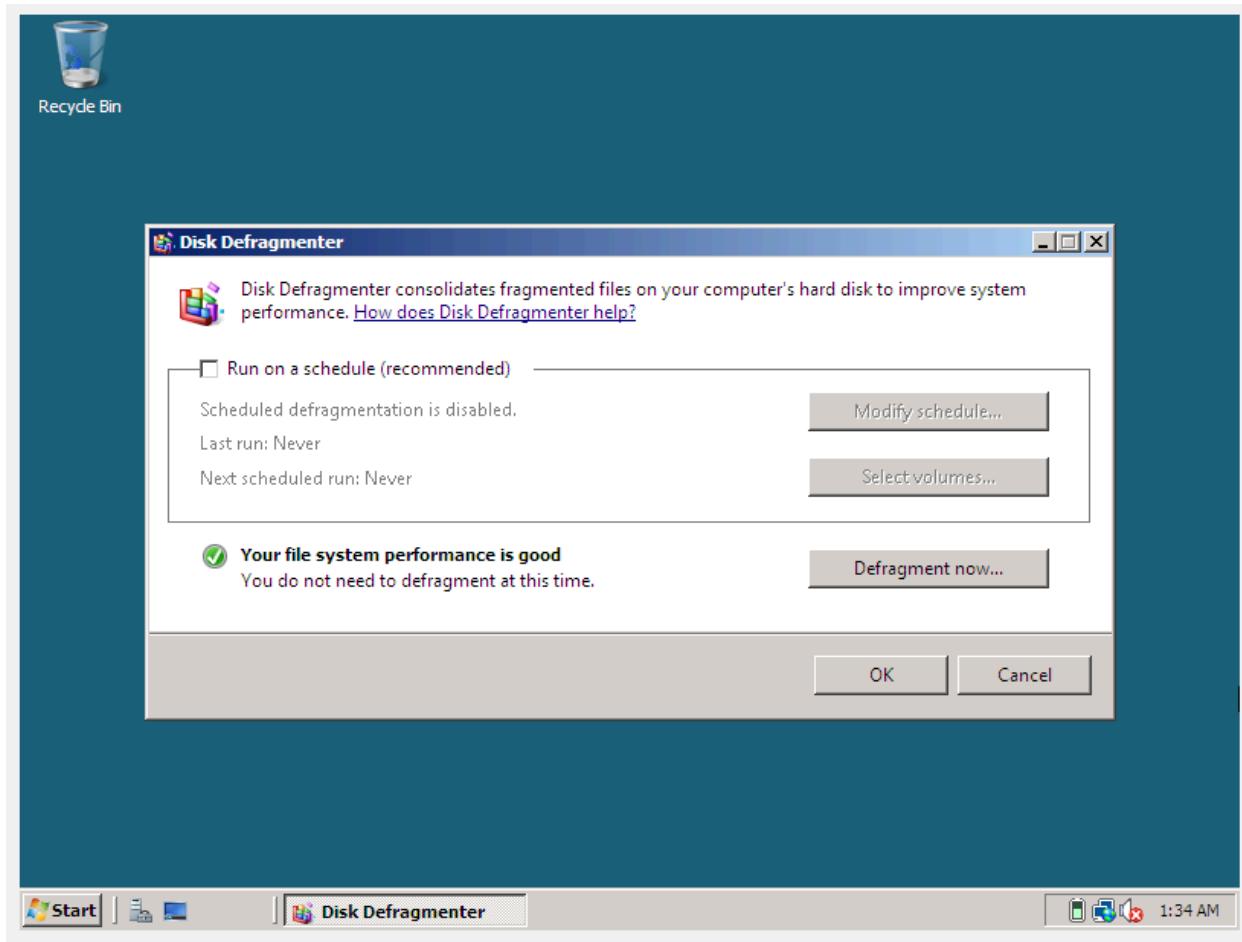
Defragmentation (if applicable)

- For students using a Windows virtual machine, run the disk defragmentation tool.
- Explain what defragmentation does and why it is important.

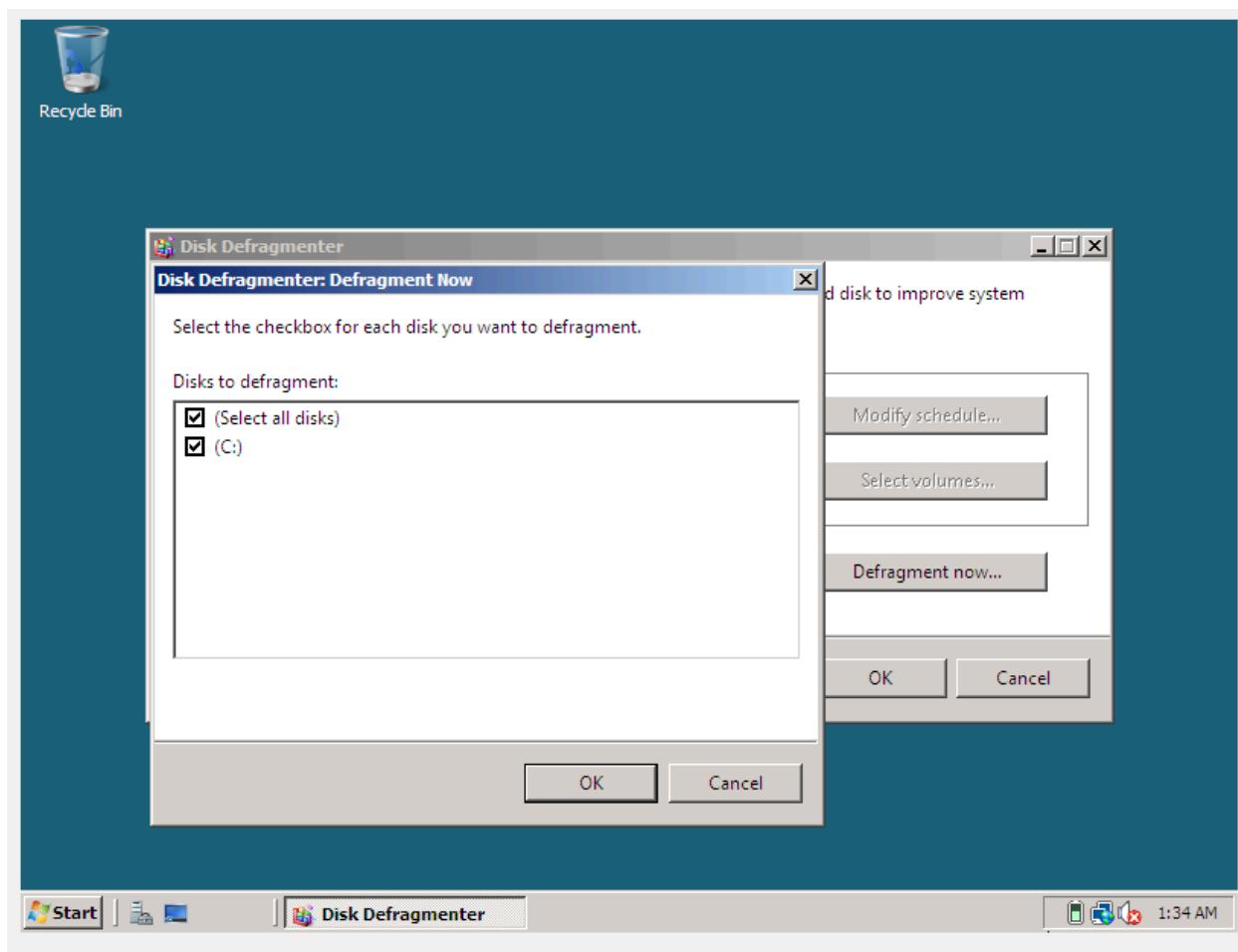
Step 1: Click the “Start” button, then search “Disk Defragmenter” in the search bar and once the program appeared, click it.



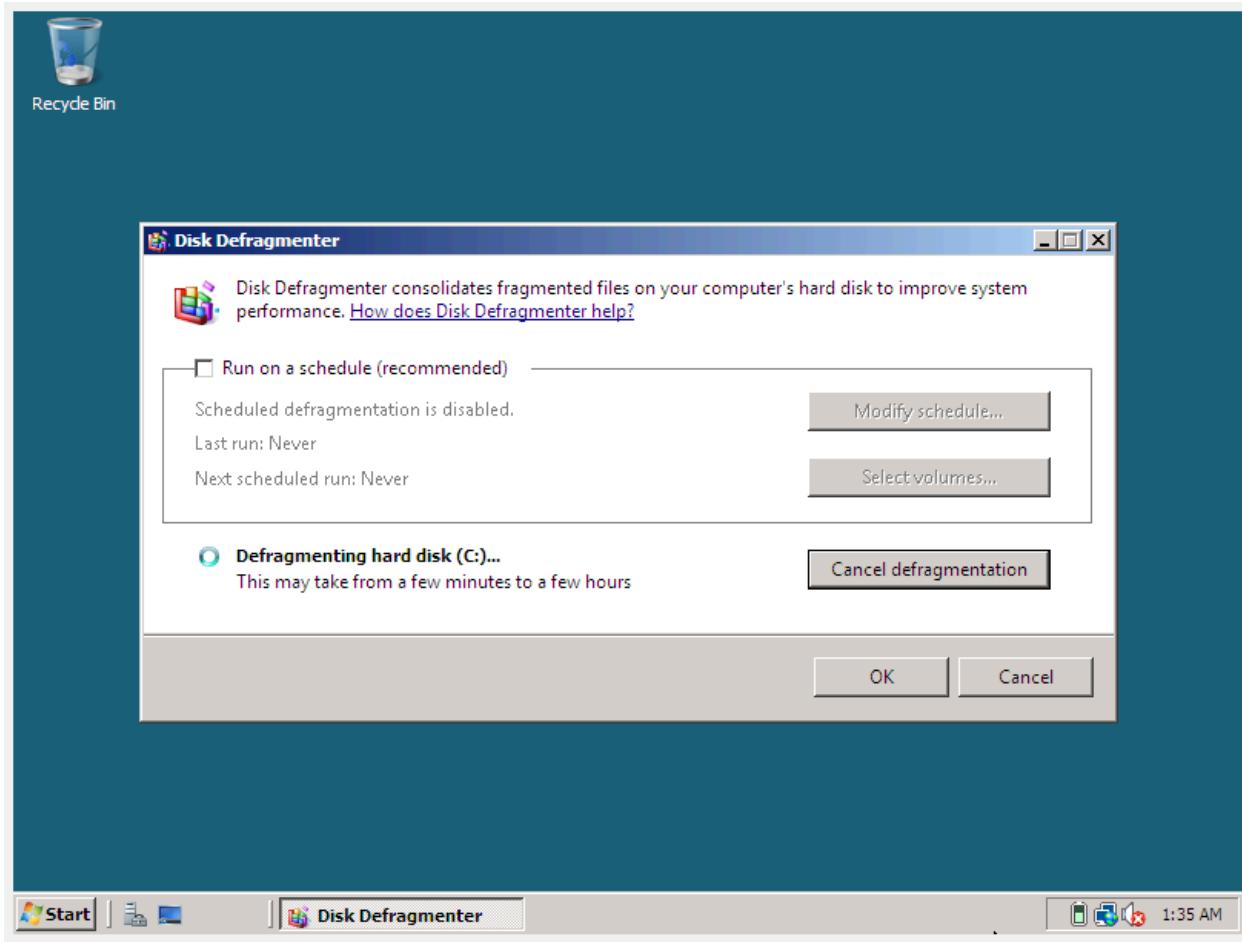
Step 2: The Disk Defragmenter window will appear, just click the “Defragment now...” button.



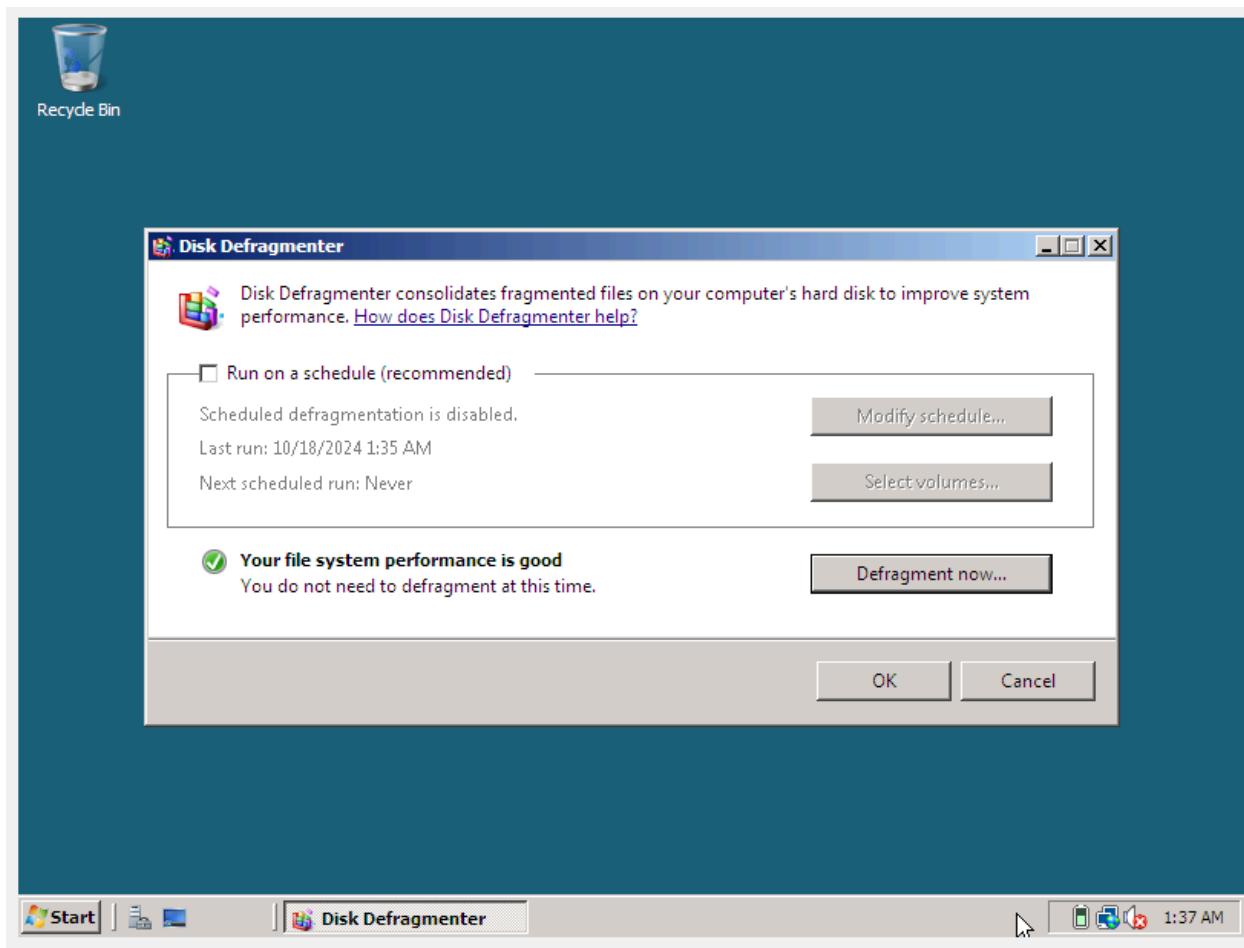
Step 3: After clicking it, the user can now select which disk to defragment. After selecting, just click the “OK” button.



Step 4: It will now start defragmenting the disks selected, so just wait for it to finish.



Step 5: After defragmenting, the user will be redirected to the first step so just close the window and done.



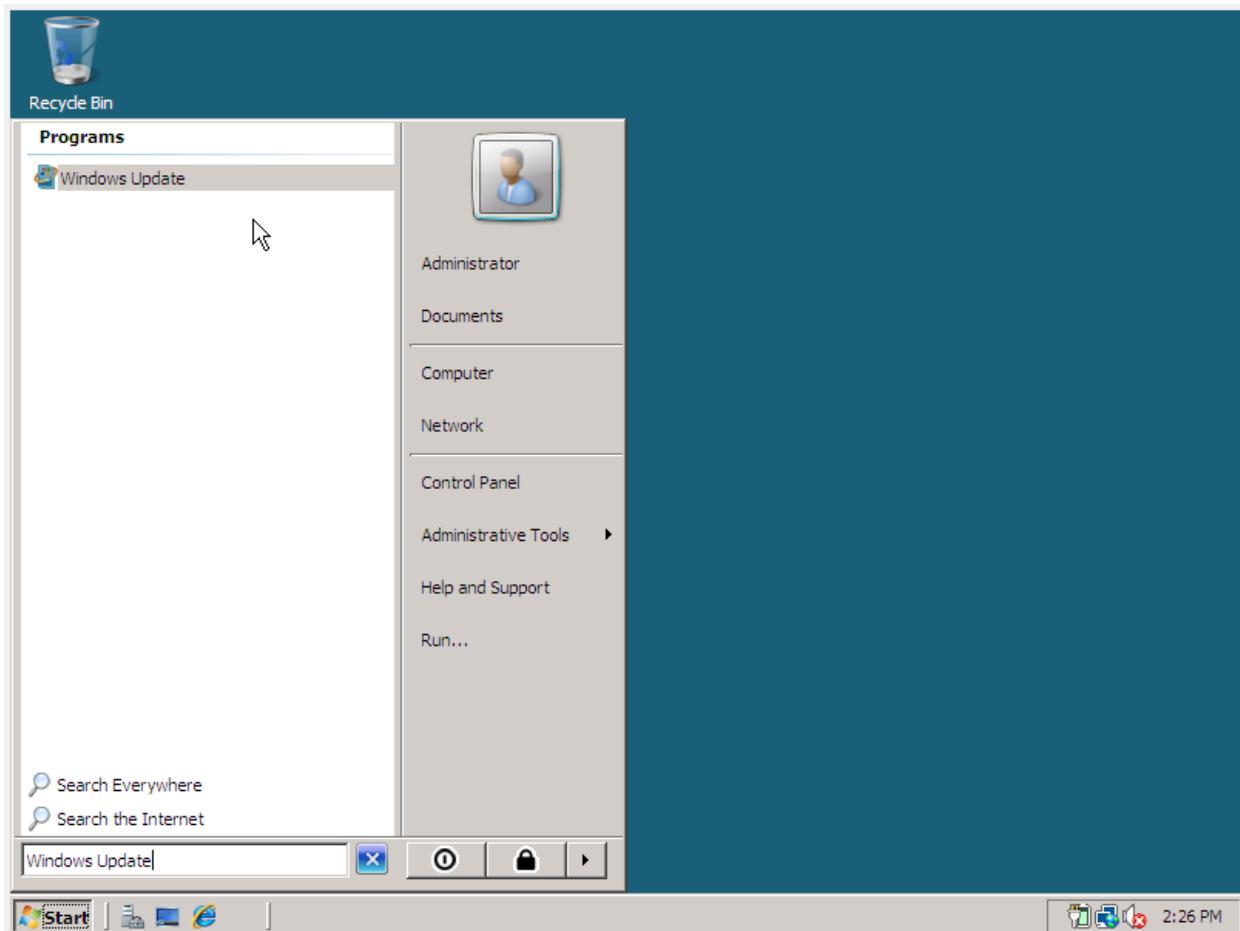
Explain what defragmentation does and why it is important.

- It basically refers to rearranging data files that are defragmented on a hard drive so that related pieces of files are closer together. In this way, the amount of time taken by the read/write head of the drive in locating and accessing the data decreases significantly, thus the system performs better. The process of proper defragmentation therefore works well since it optimizes the disk space used, enhances the speed at which data retrieval happens, and prolongs the life of the hard drive through reducing unnecessary movement of mechanical components.

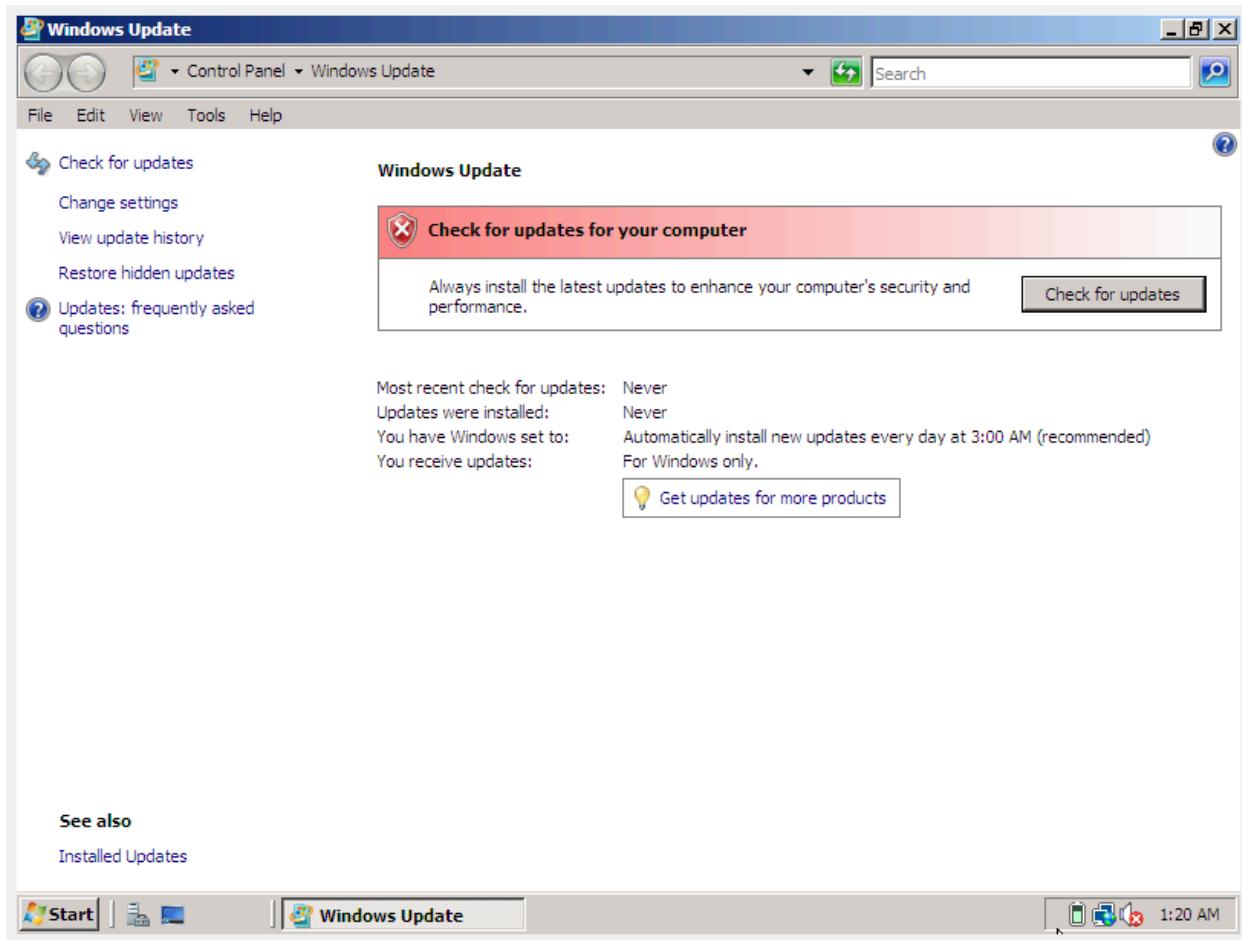
Update Software

- Check for and install any available operating system updates.
- Document the update process and any changes made to the system.

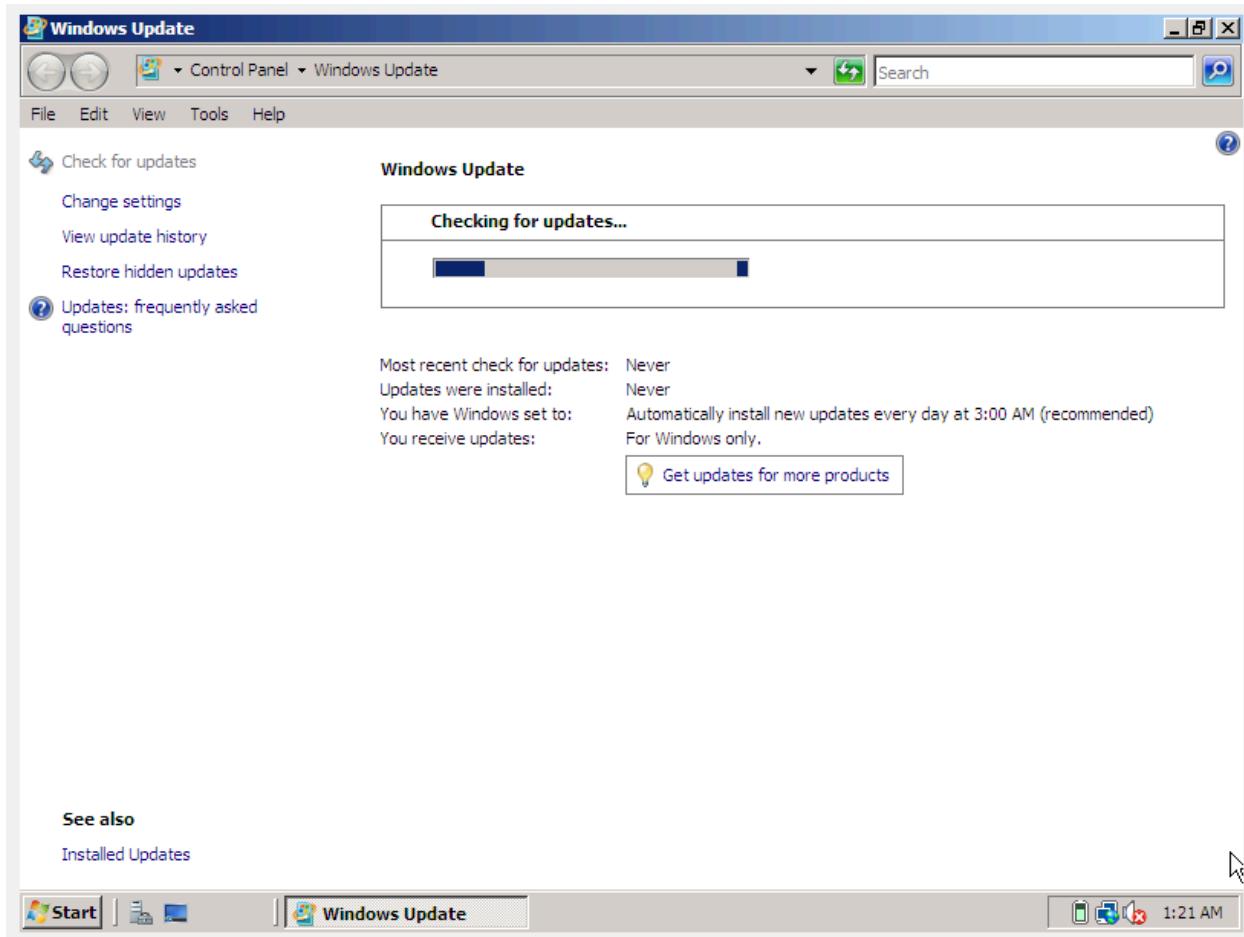
Step 1: Click the “Start” button. Type “Windows Update” in the search bar. Click the Windows Update program.



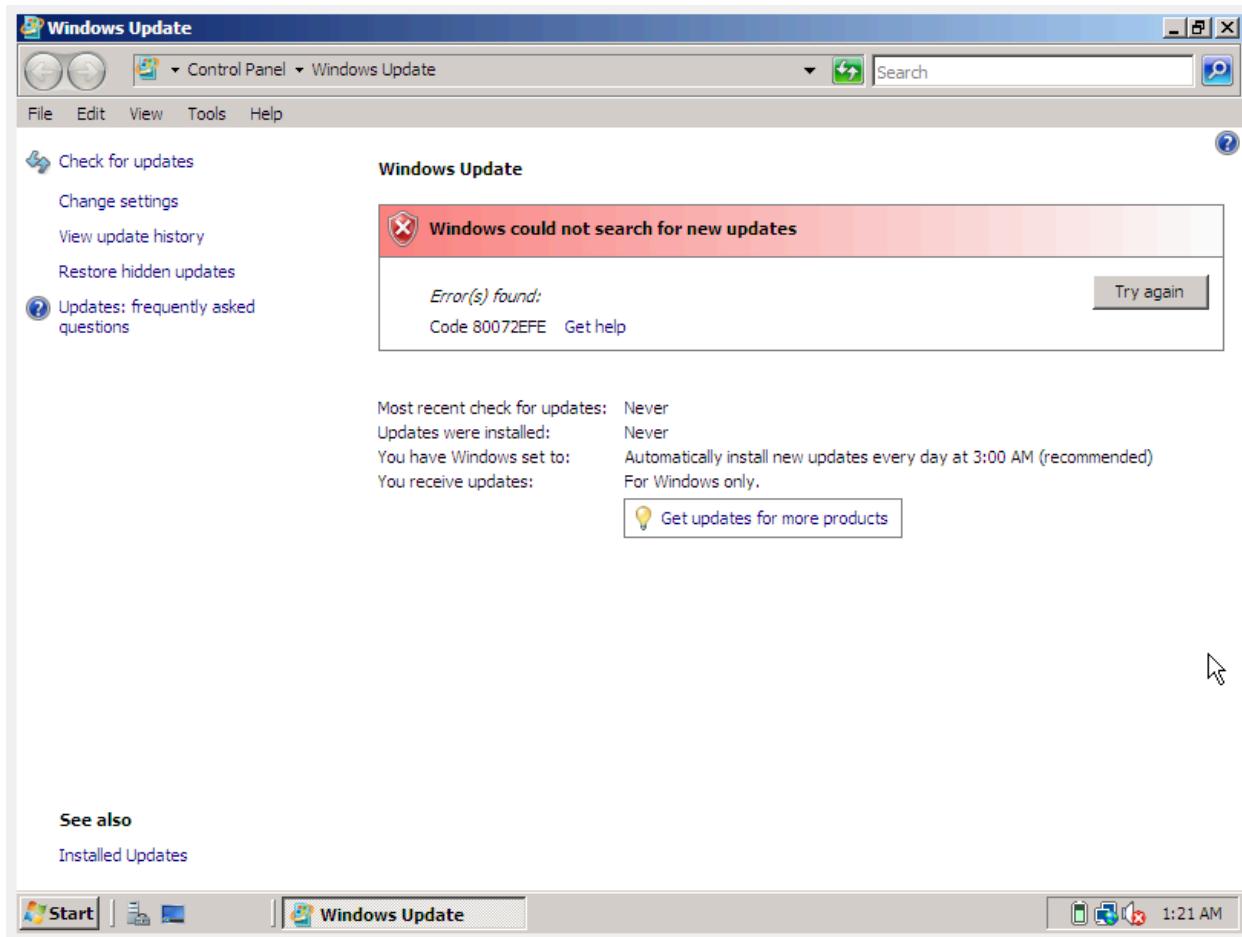
Step 2: The window will appear, just click the “Check for updates” to check for any available software updates.



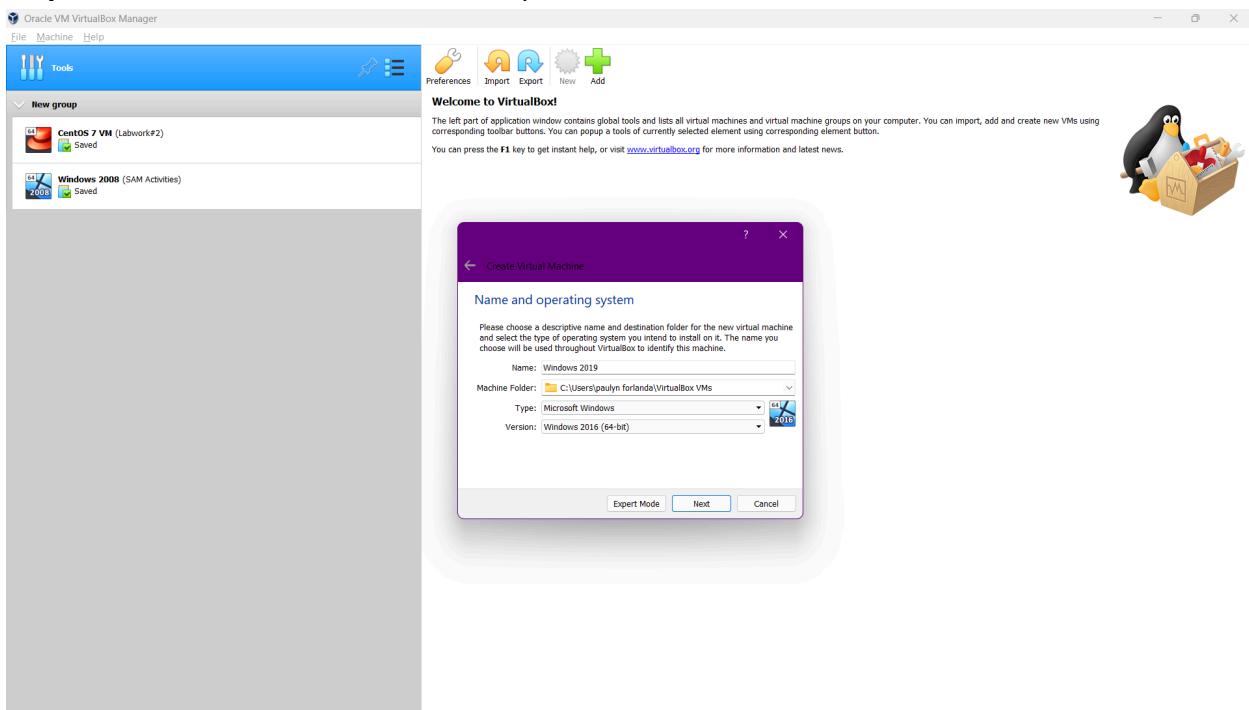
Step 3: Wait for it to finish checking for any update.



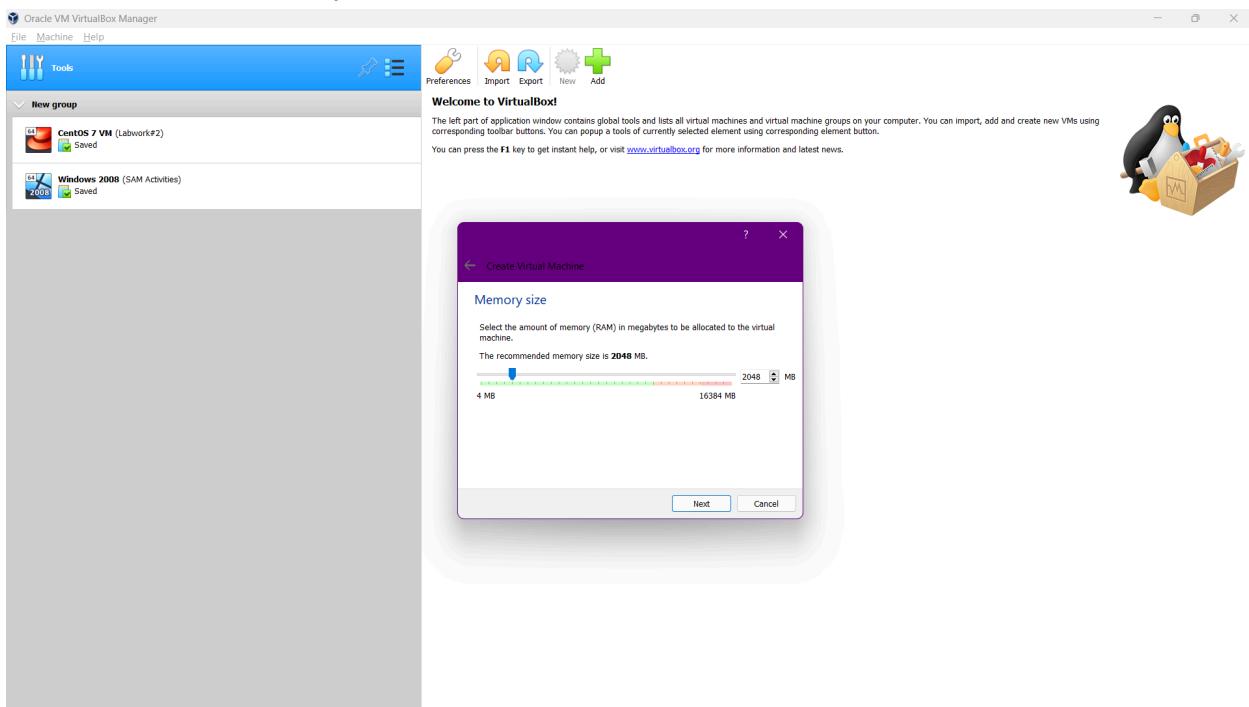
Step 4: If there's any available update, it will show up. In this case, there's no update available hence showing "Windows could not search for new updates"



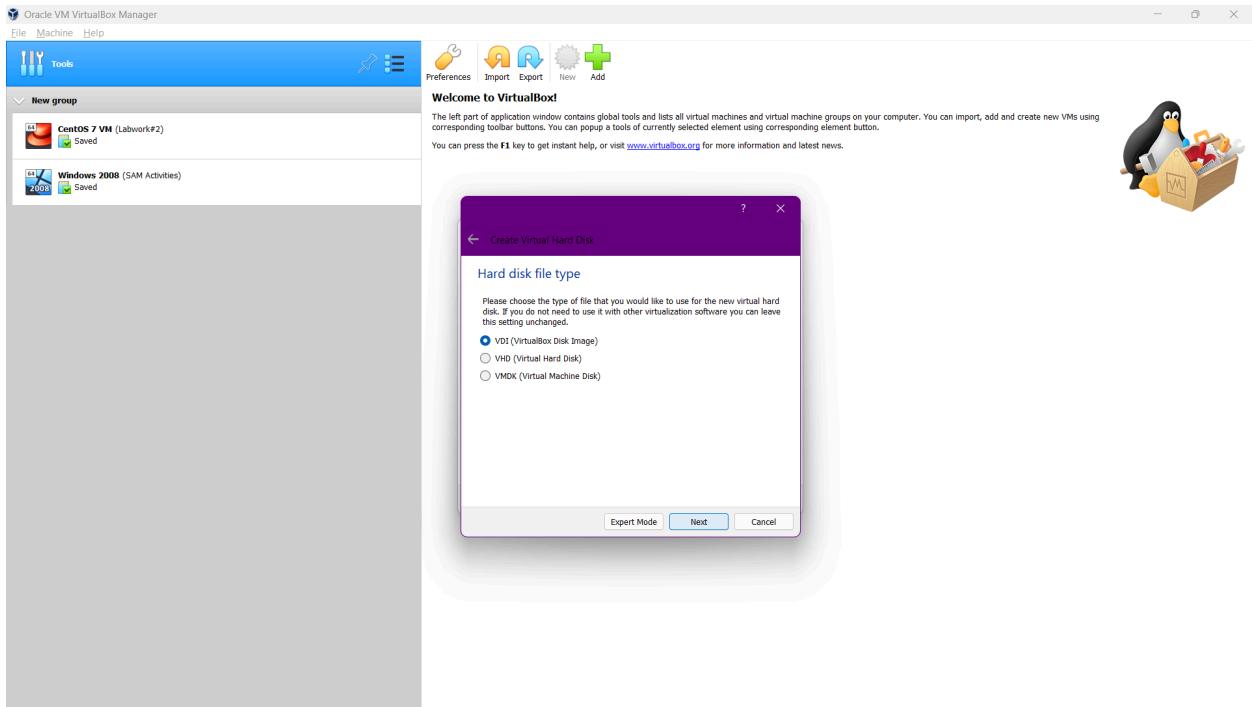
Step 5: Click the “New” button then fill up the information needed.



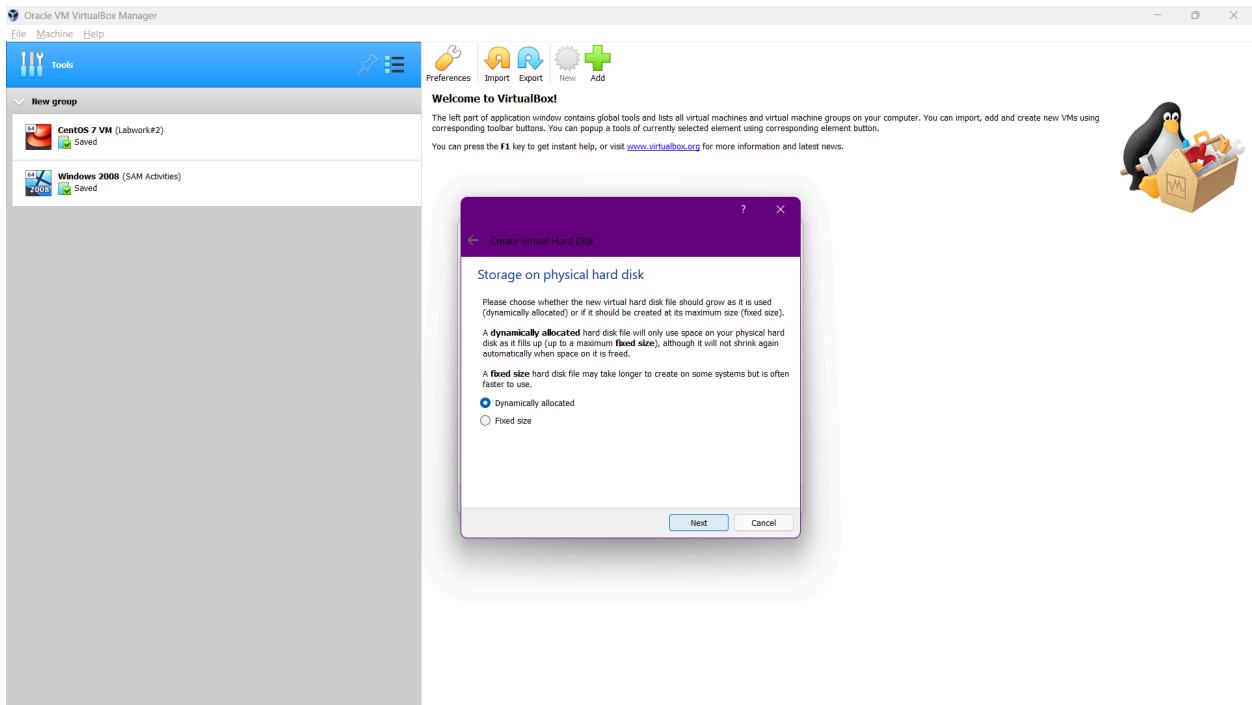
Step 6: Setup the memory size then click the “next” button.



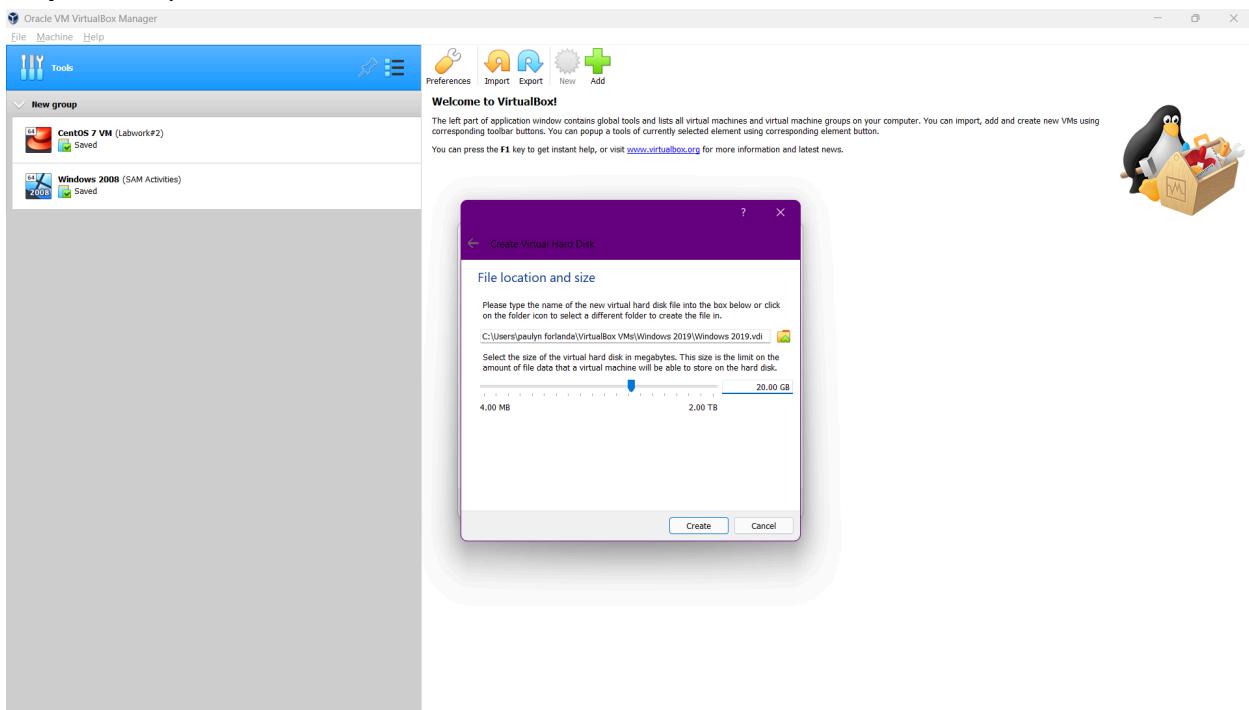
Step 7: Choose “Virtual Disk Image” then click the “next” button.



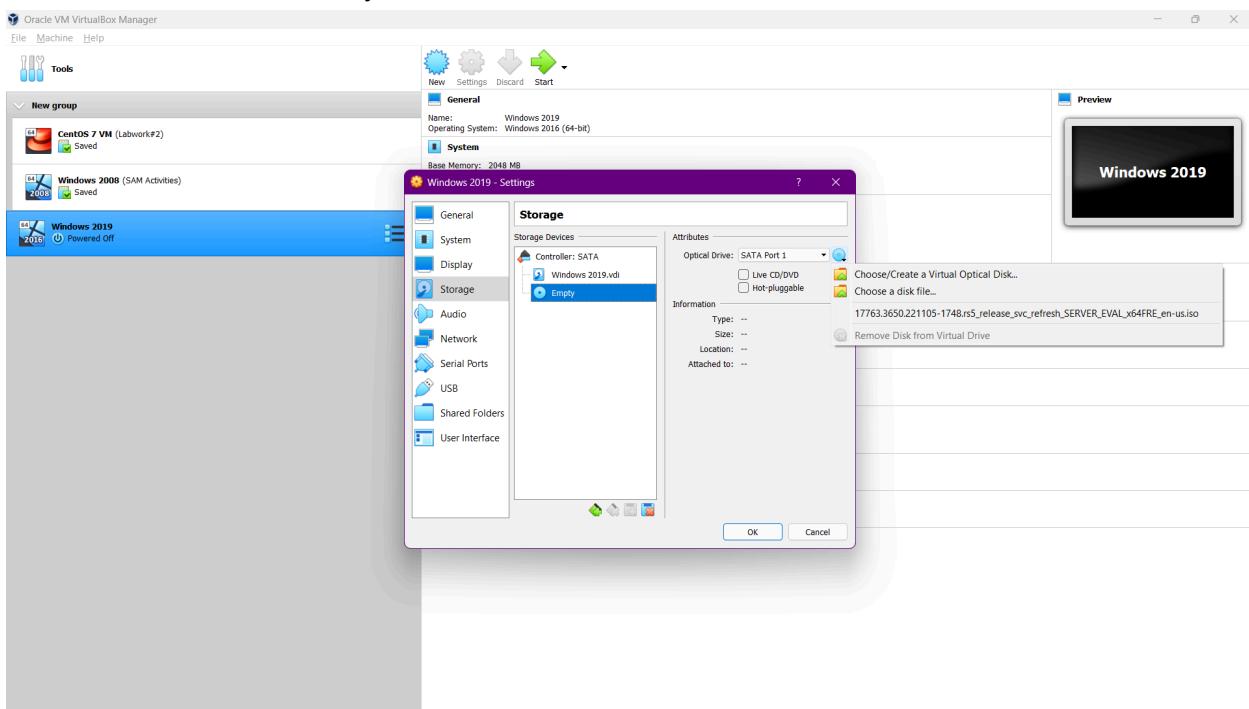
Step 8: Choose “Dynamically allocated” then click the “next” button.



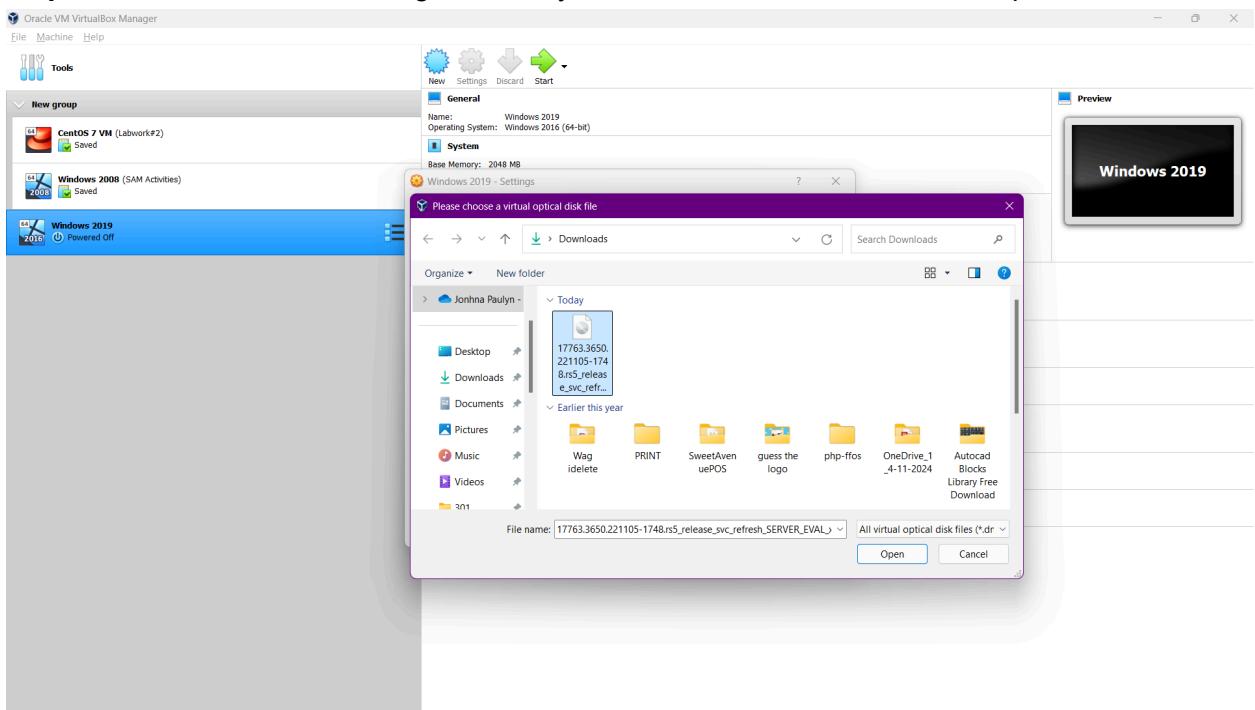
Step 9: Setup the file location and size, then click the “create” button.



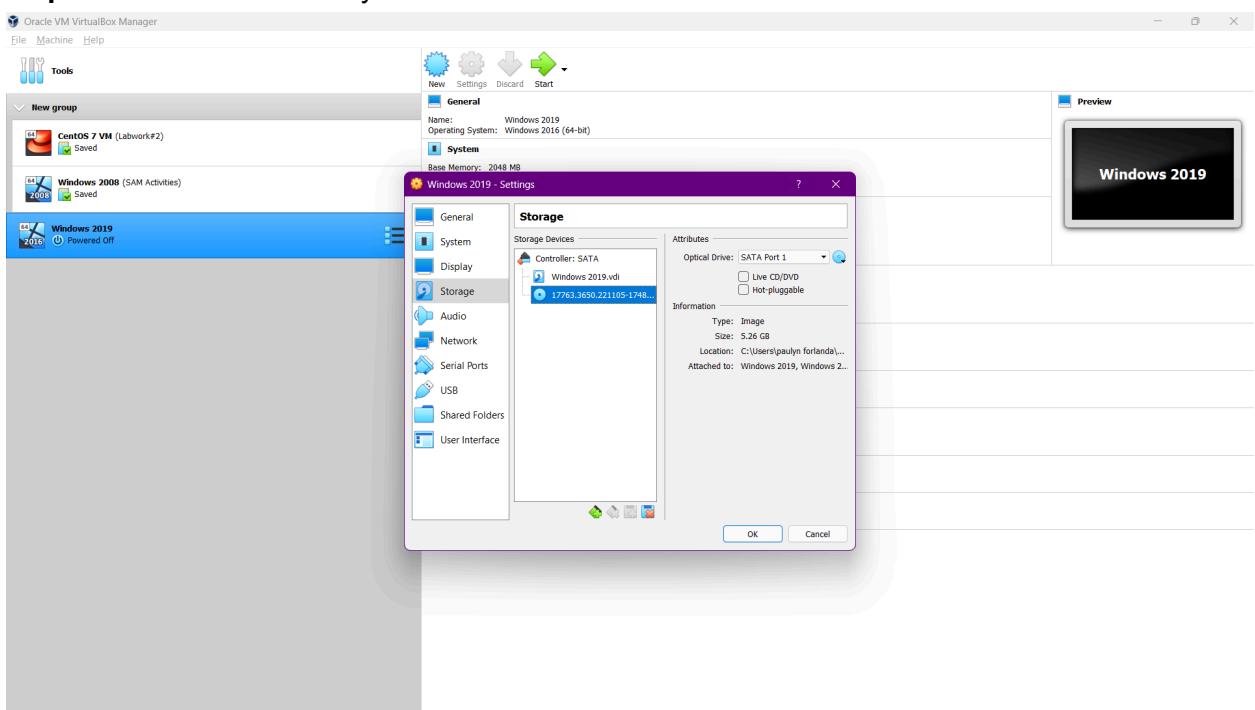
Step 10: To proceed, click the "Settings" button, select "Storage," click on the empty disk, then click the disk icon, and finally, click the "Choose a disk file."



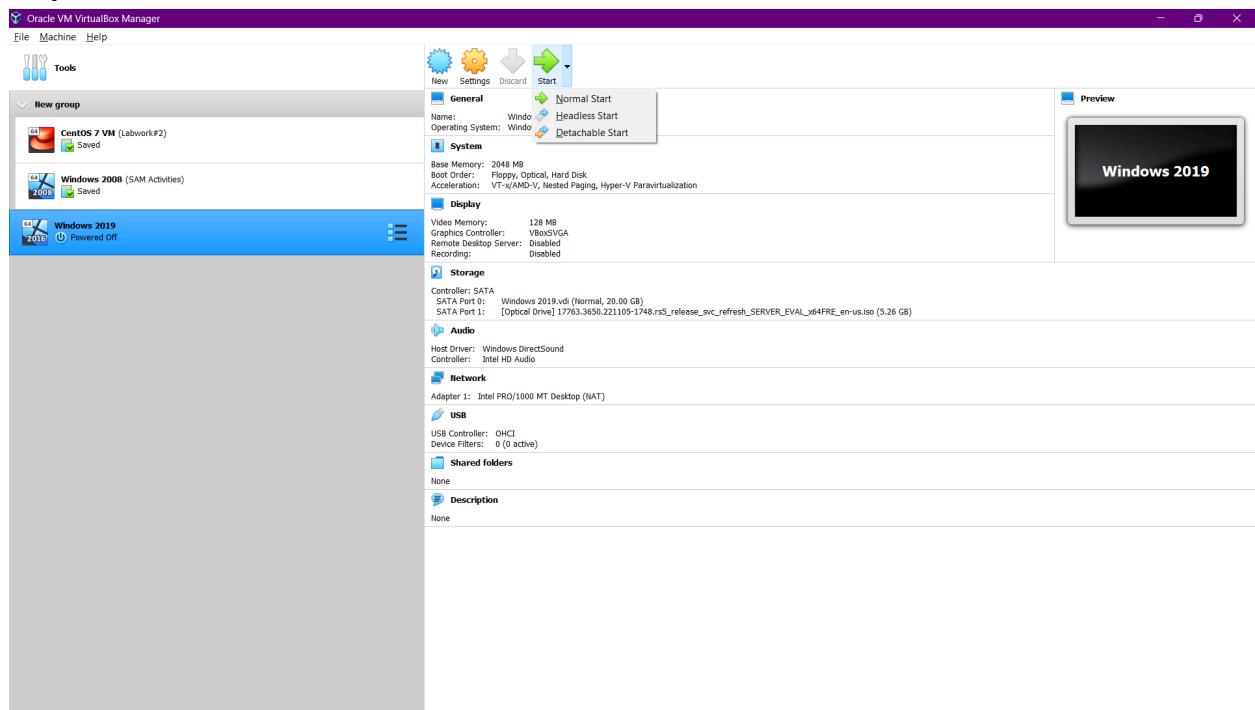
Step 11: Then select a disk image file that you've downloaded then click the open button.



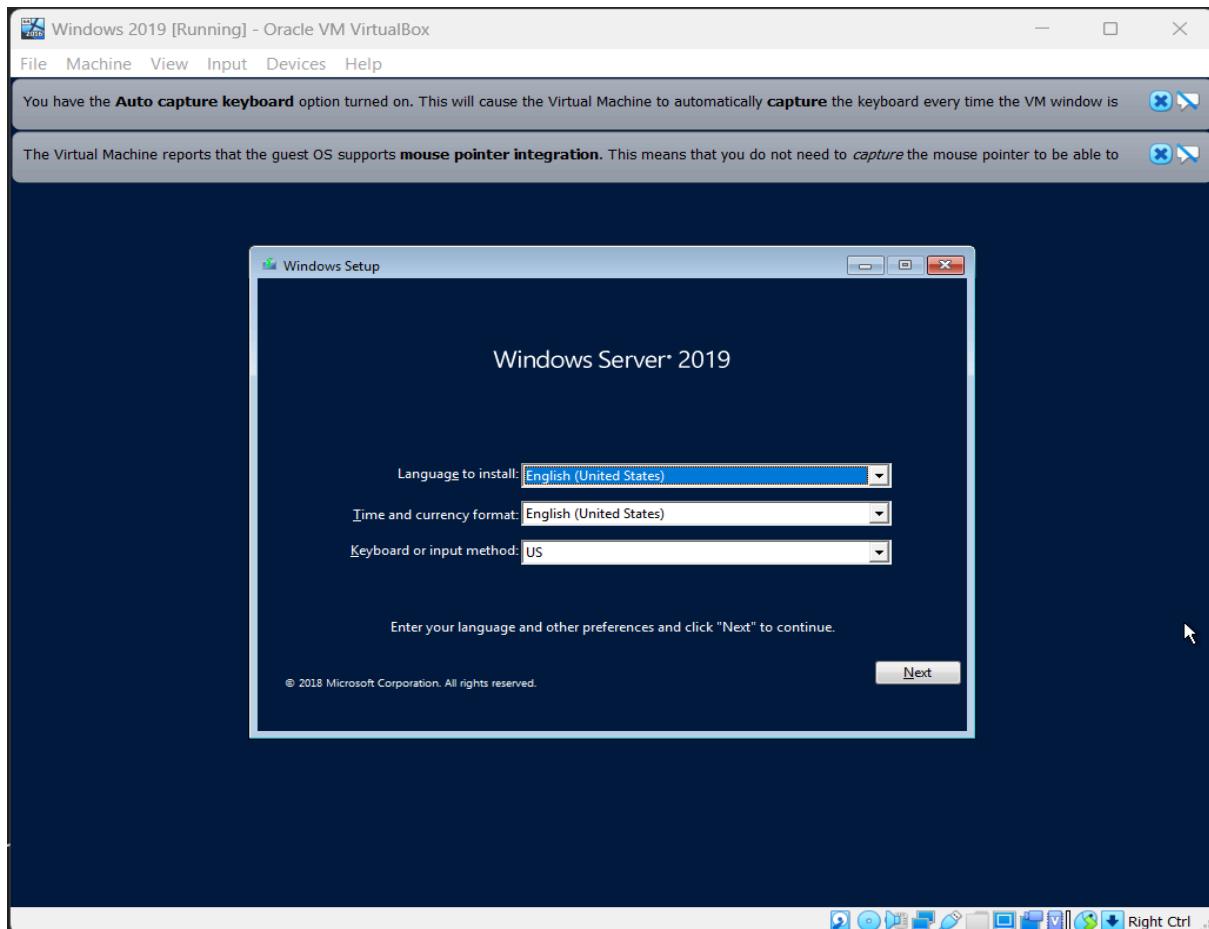
Step 12: Then click the okay button.



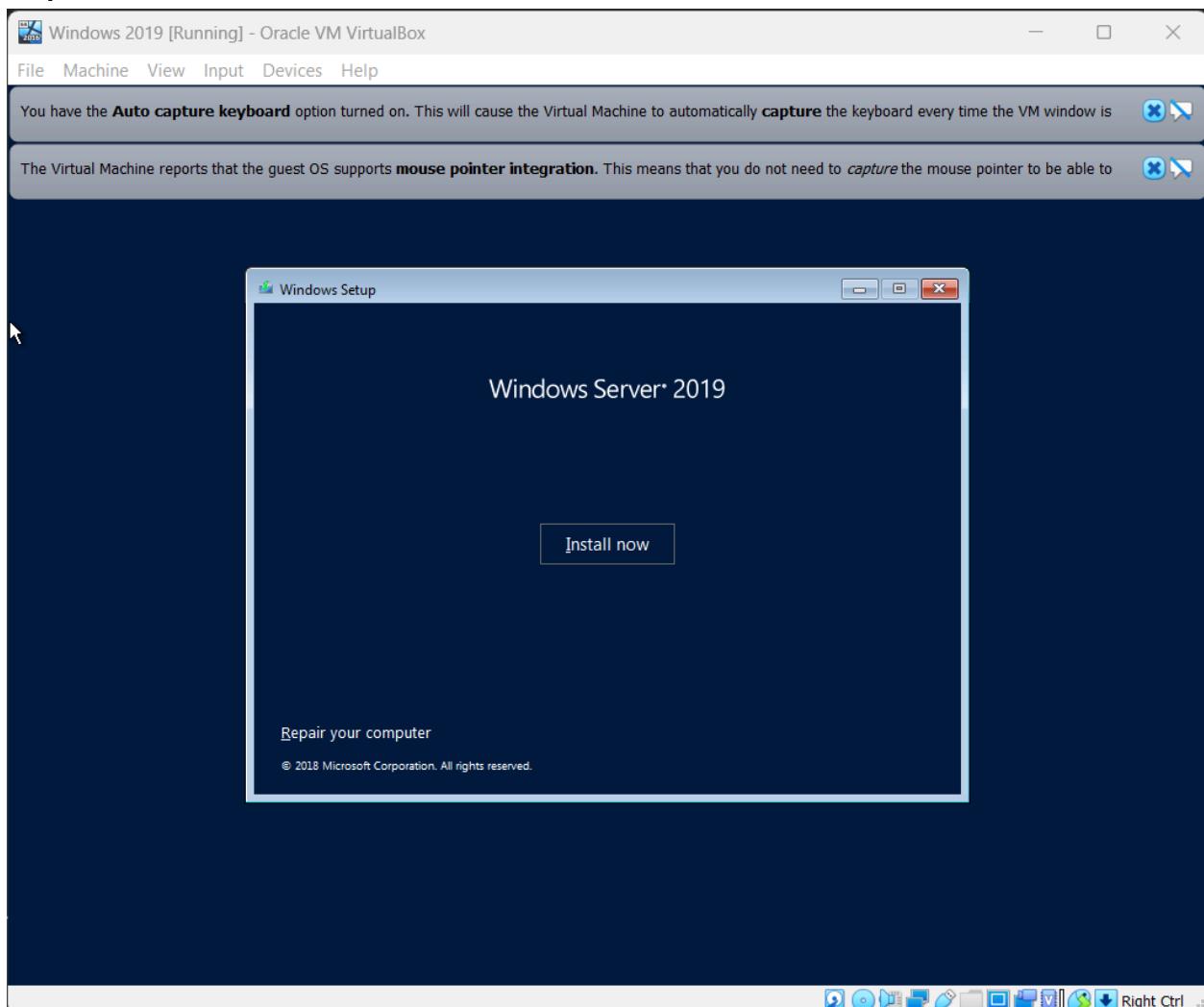
Step 13: To start the windows 2019, click the “Normal Start” button.



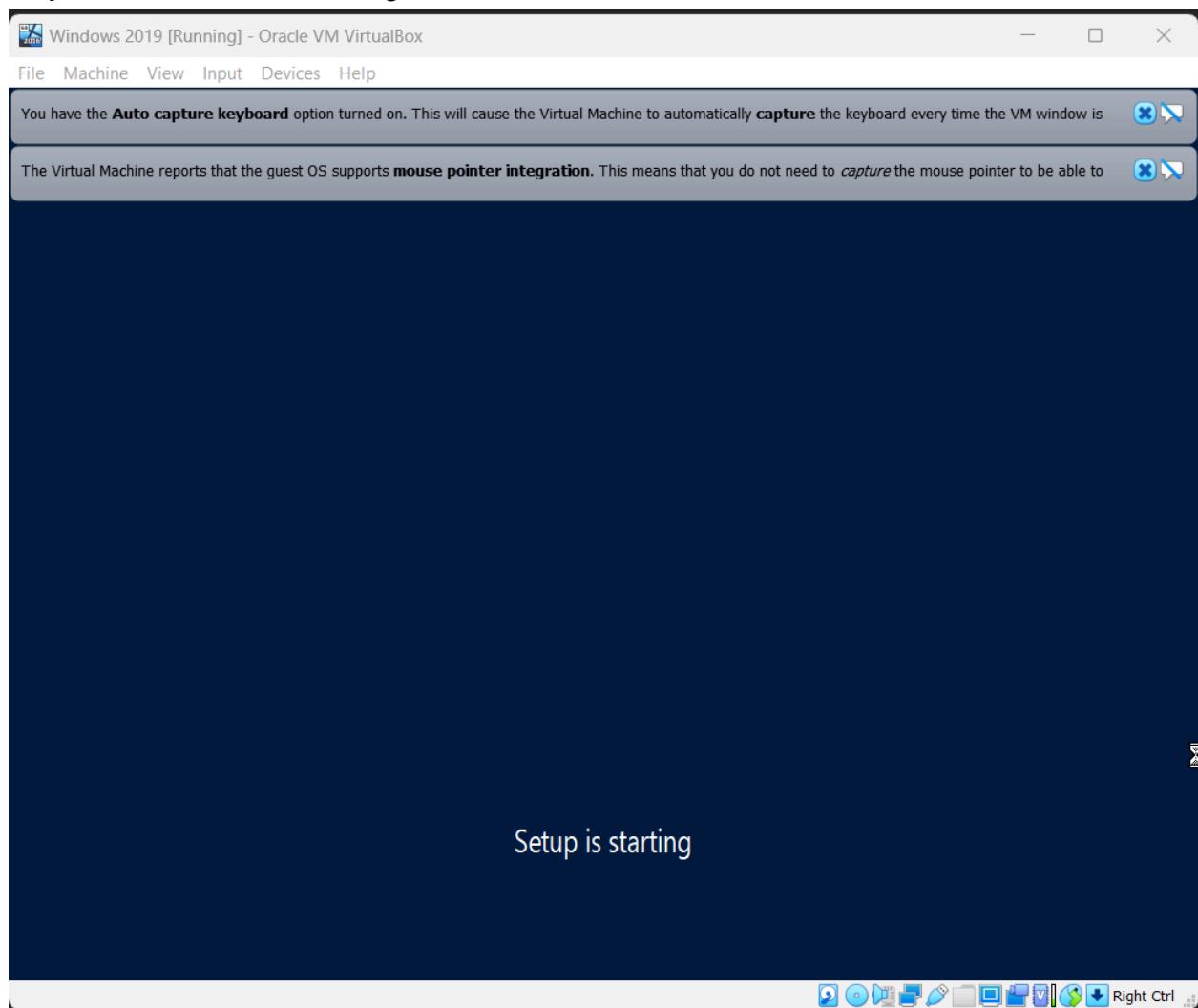
Step 14: Set up your preferred language, time and currency format, and keyboard or input method. Once you've configured these settings, click Next to proceed.



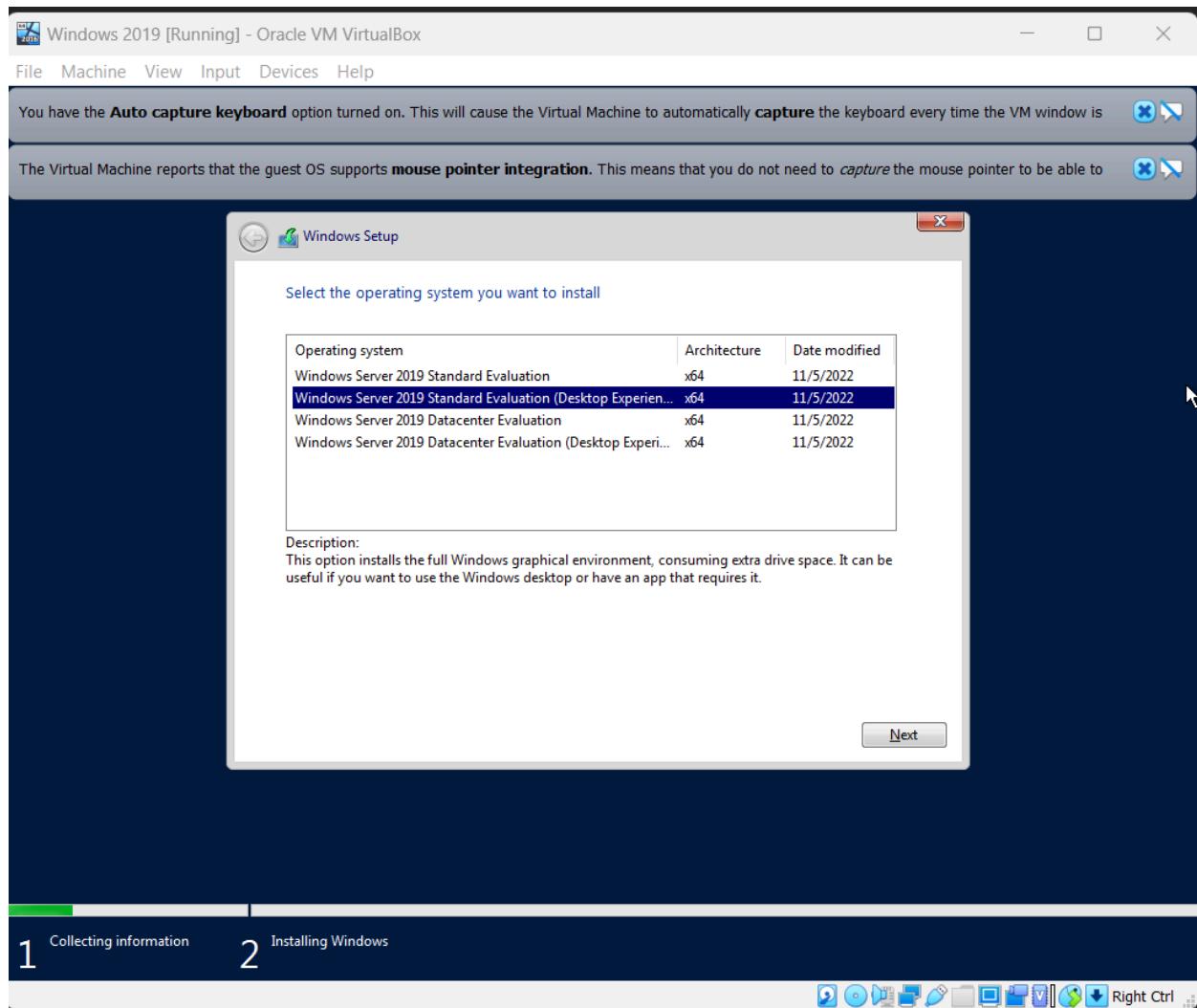
Step 15: Click the “Install Now” to start the installation.



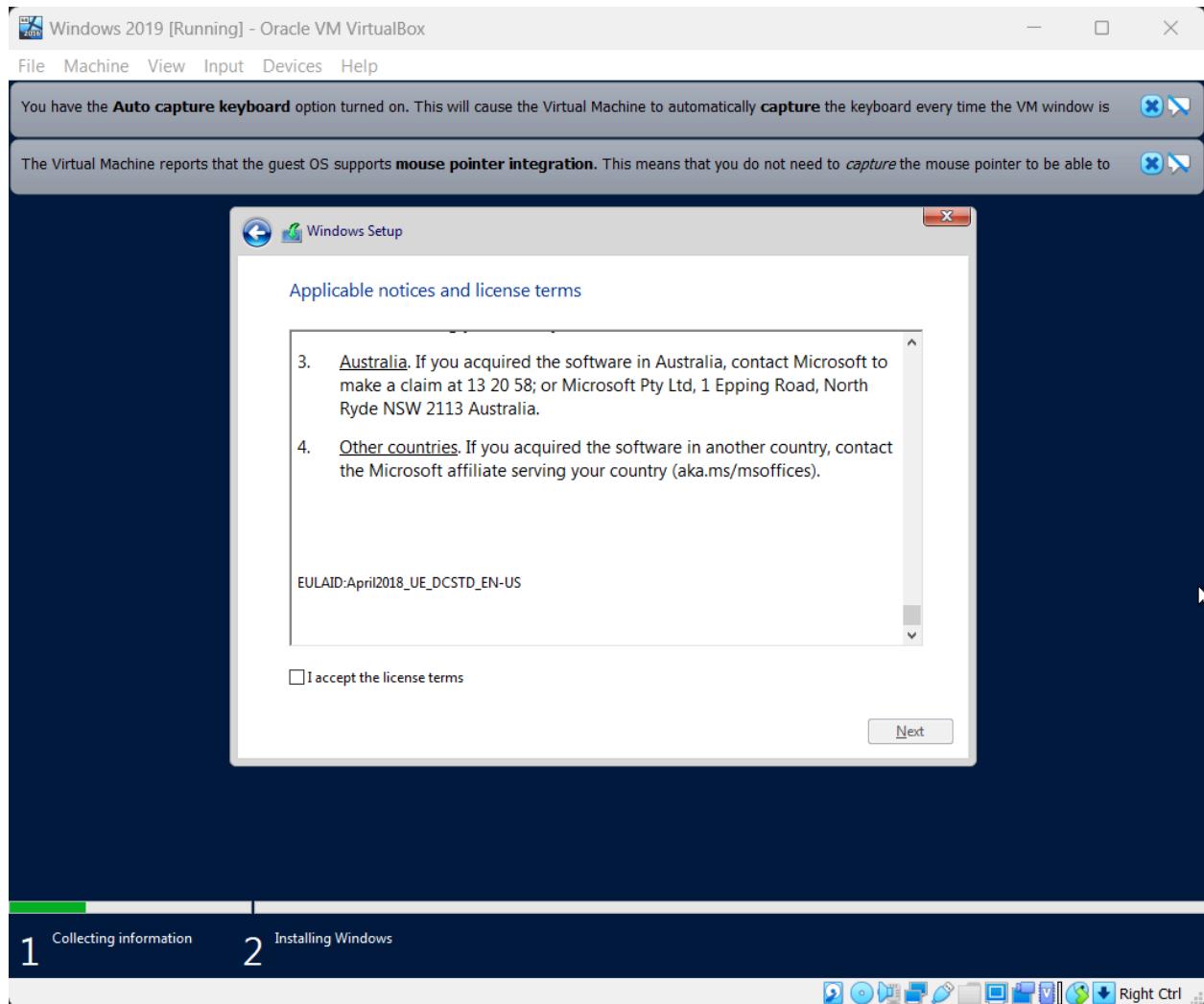
Step 16: Just wait for the configuration to finish.



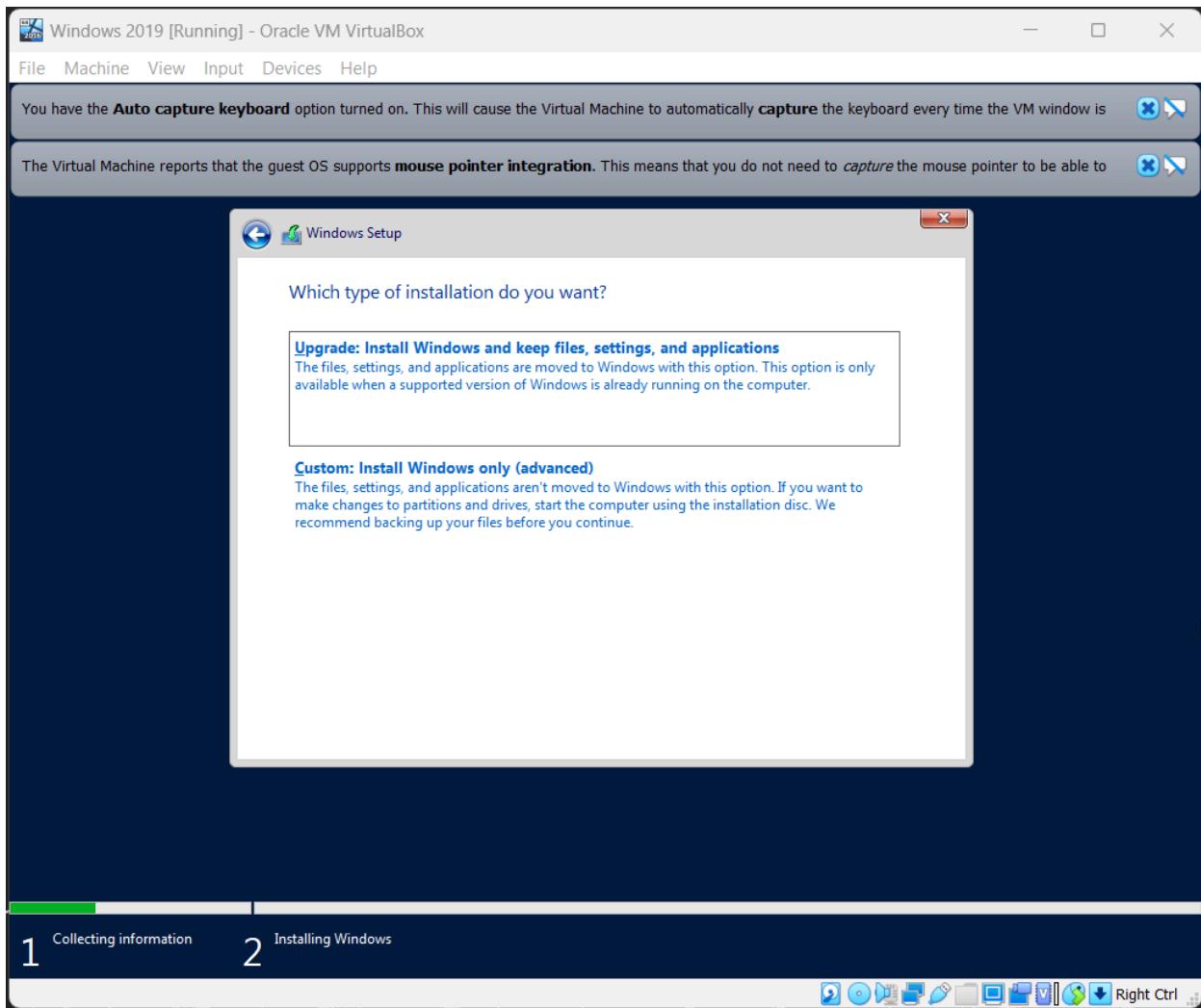
Step 17: Click the second option which is the “Windows Server 2019 Standard Evaluation/Desktop Experience), the click “next” to proceed.



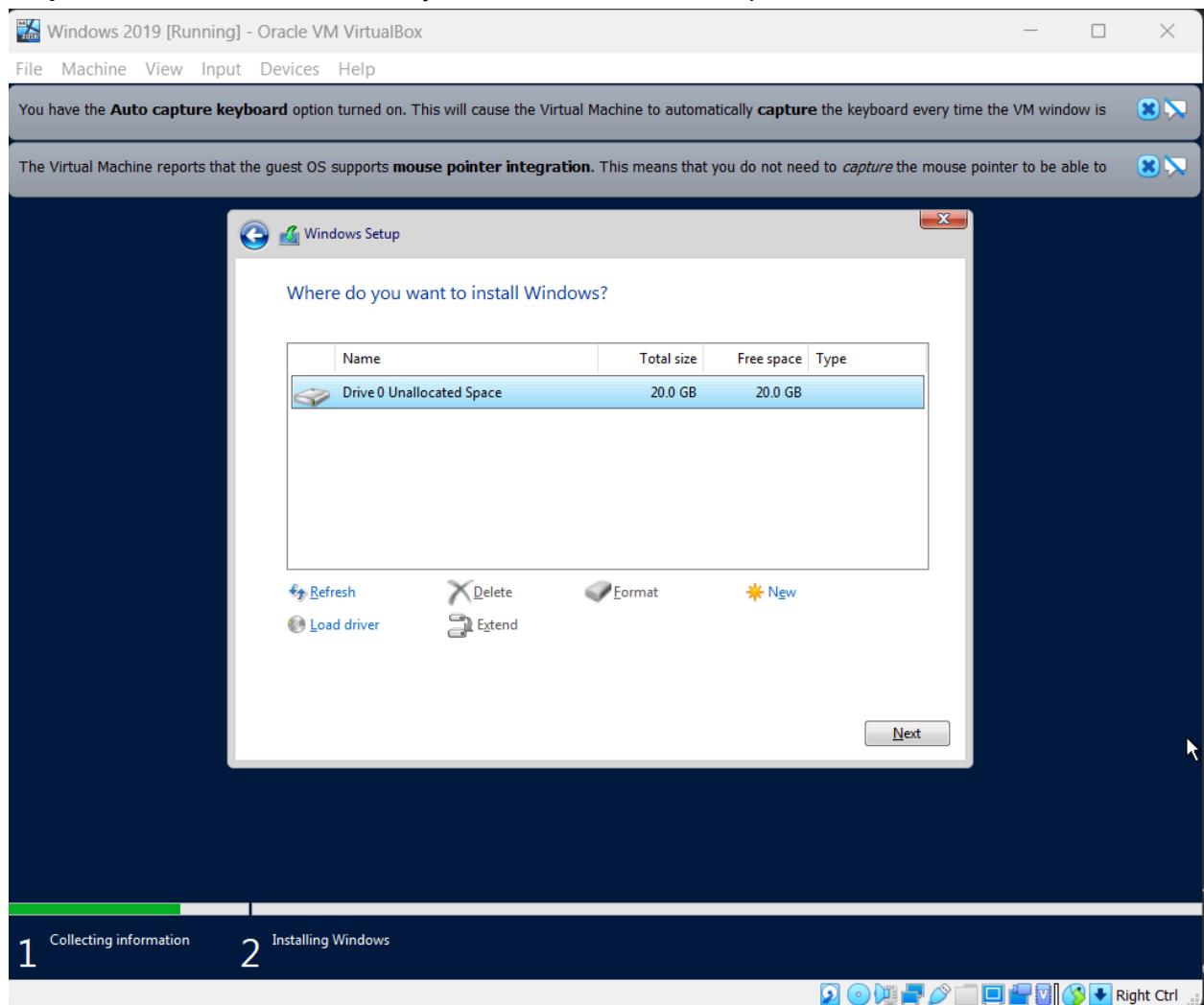
Step 18: Ensure that you check the box to accept the license terms, so that you can click Next to proceed.



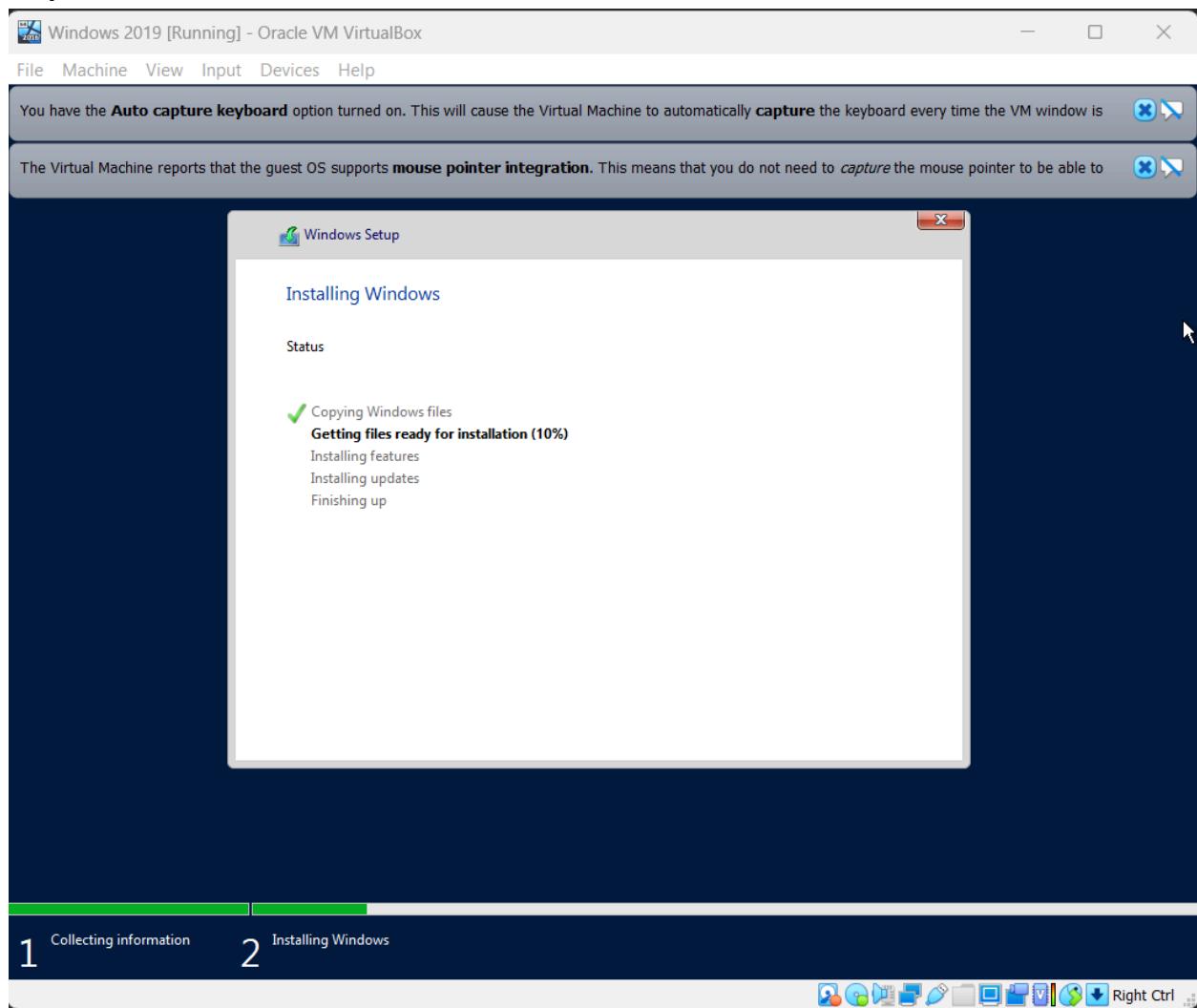
Step 19: Choose “Custom: Install Windows only”.



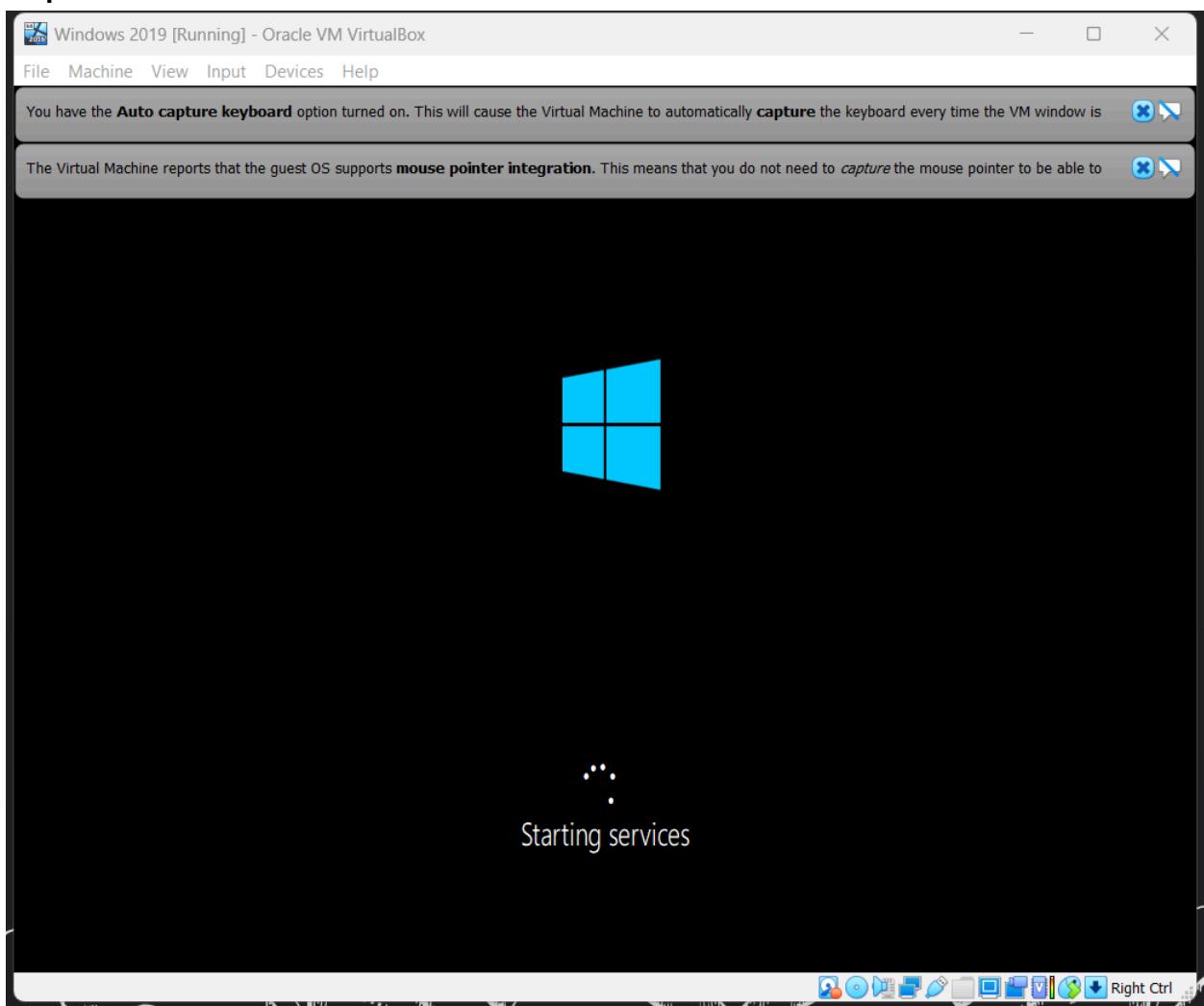
Step 20: Click the drive 0 so that you can click the “next” to proceed.



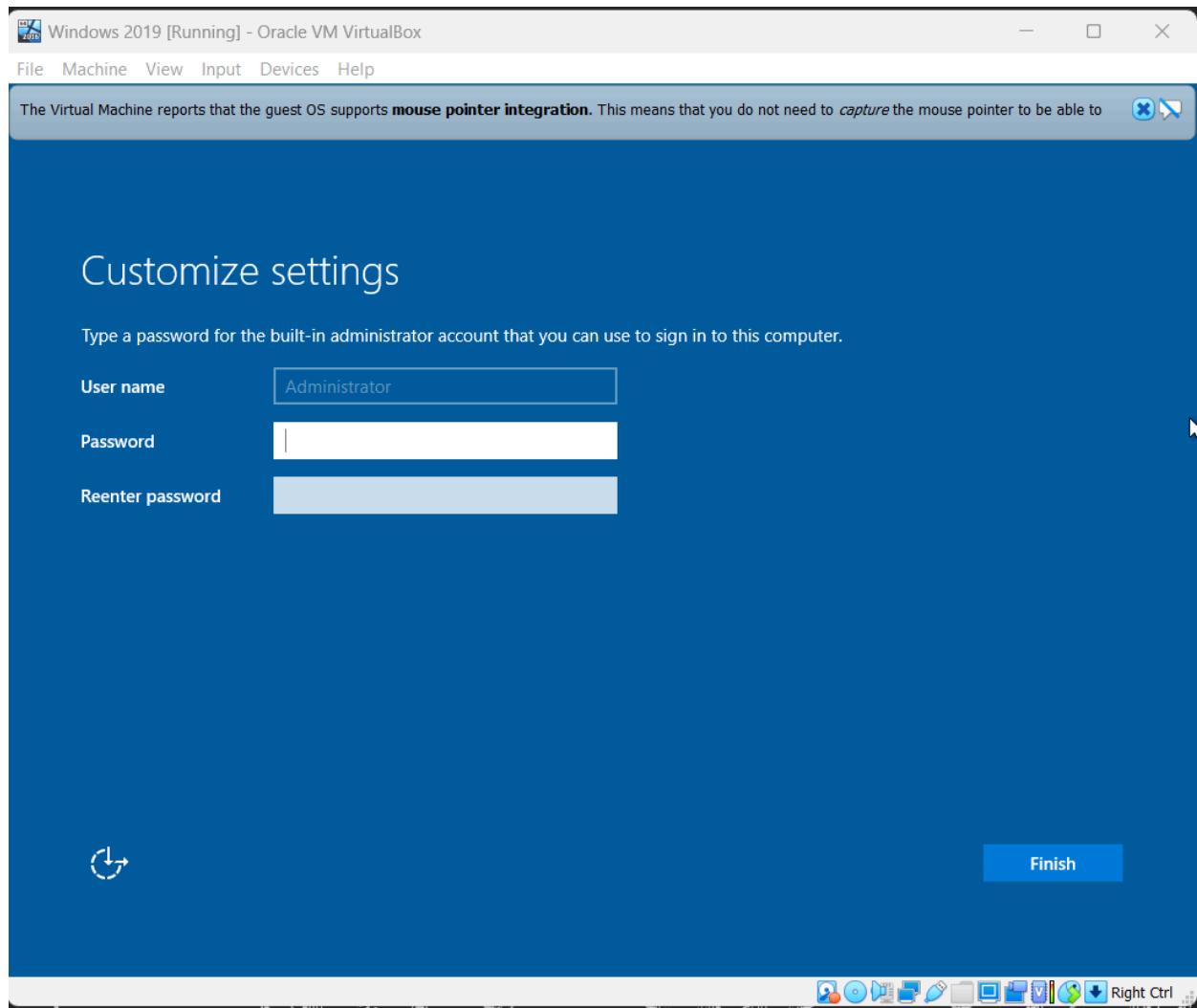
Step 21: Just wait for the installation.



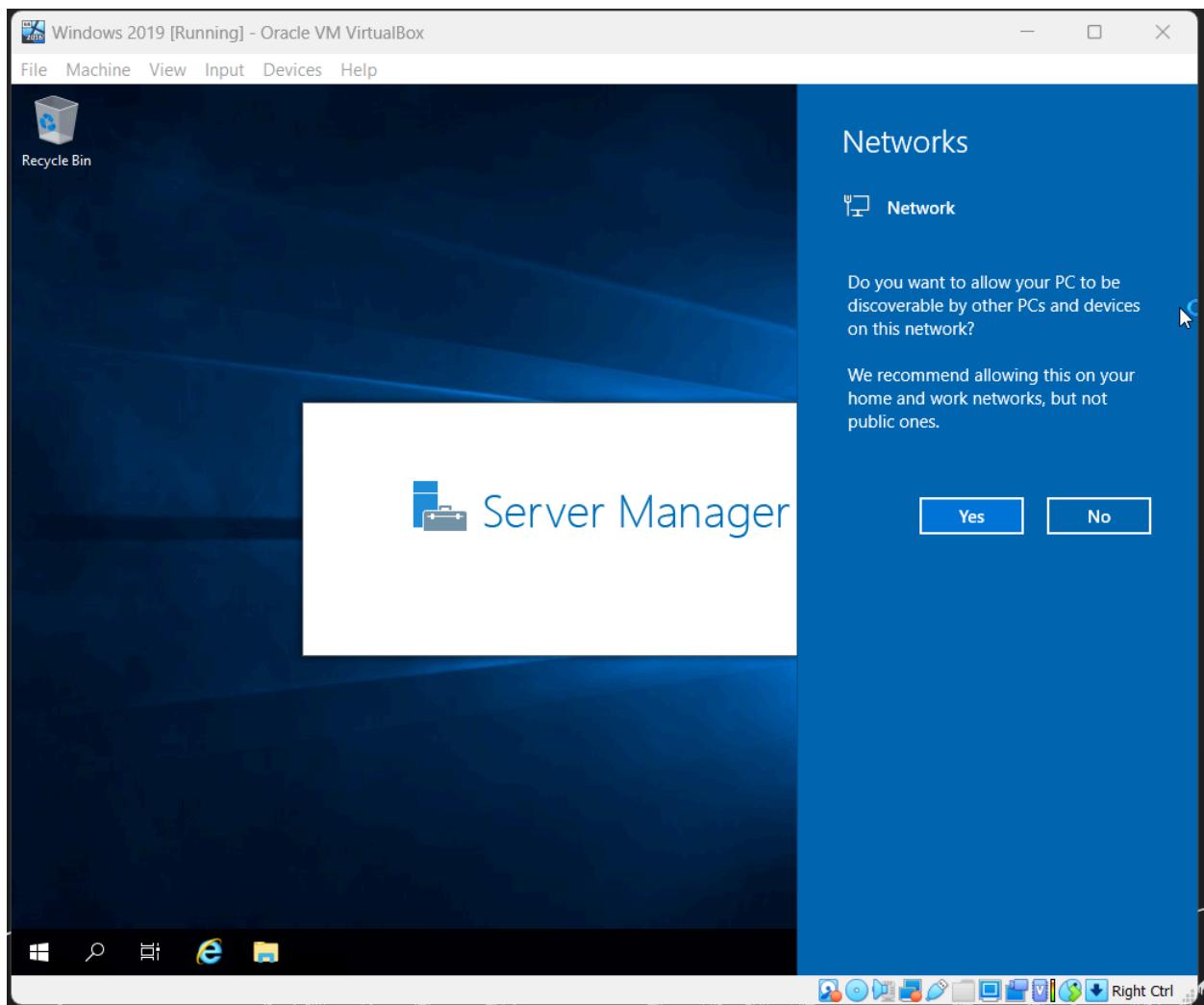
Step 22: Just wait to start the windows.



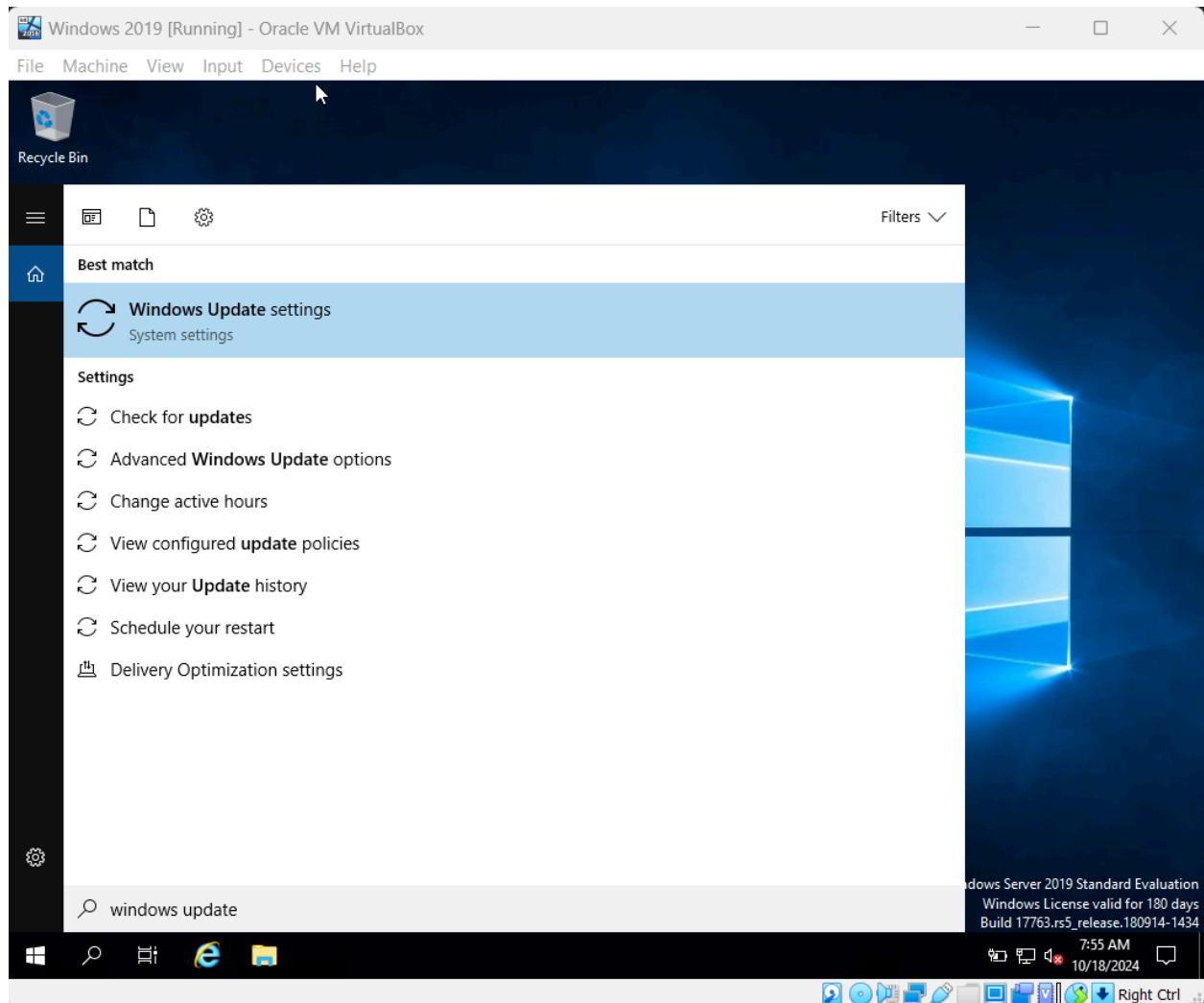
Step 23: Setup a password to the administrator, make sure to remember your password. Then click “finish” to proceed.



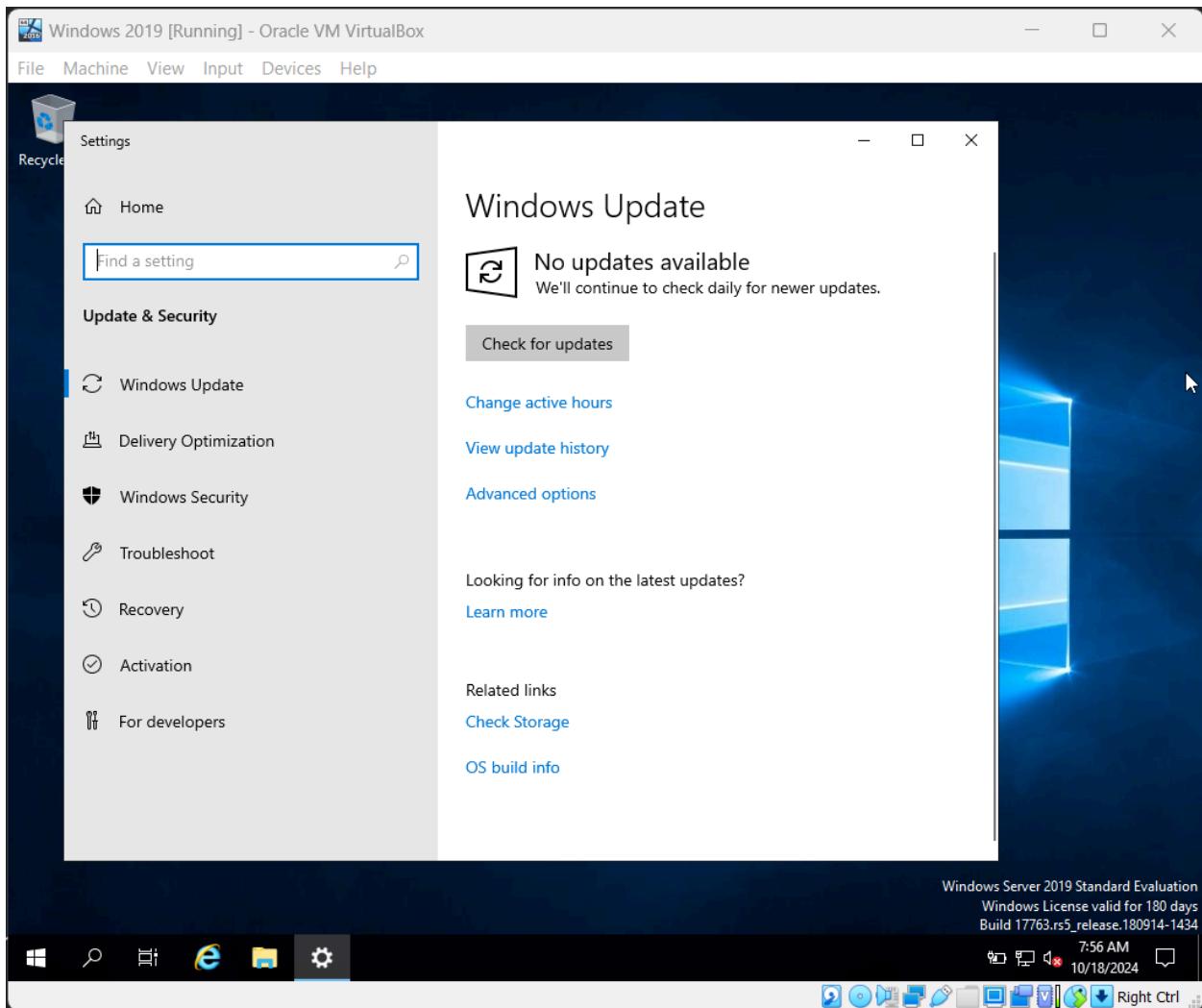
Step 24: You may disregard the Server Manager and the network settings, or choose to click Yes or No to close the network popup.



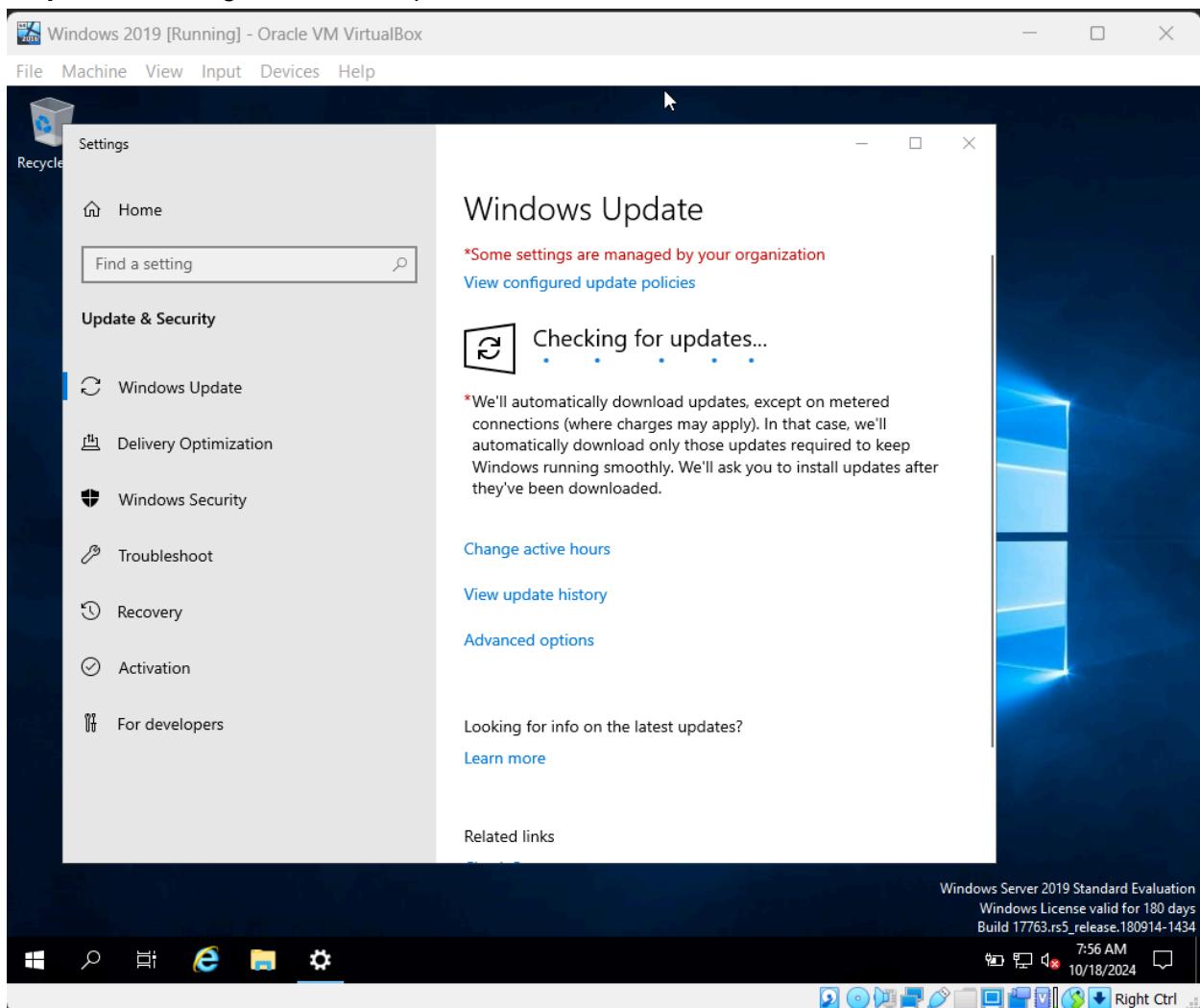
Step 25: Click the windows icon, then search for the windows update settings. Click the windows update settings to proceed.



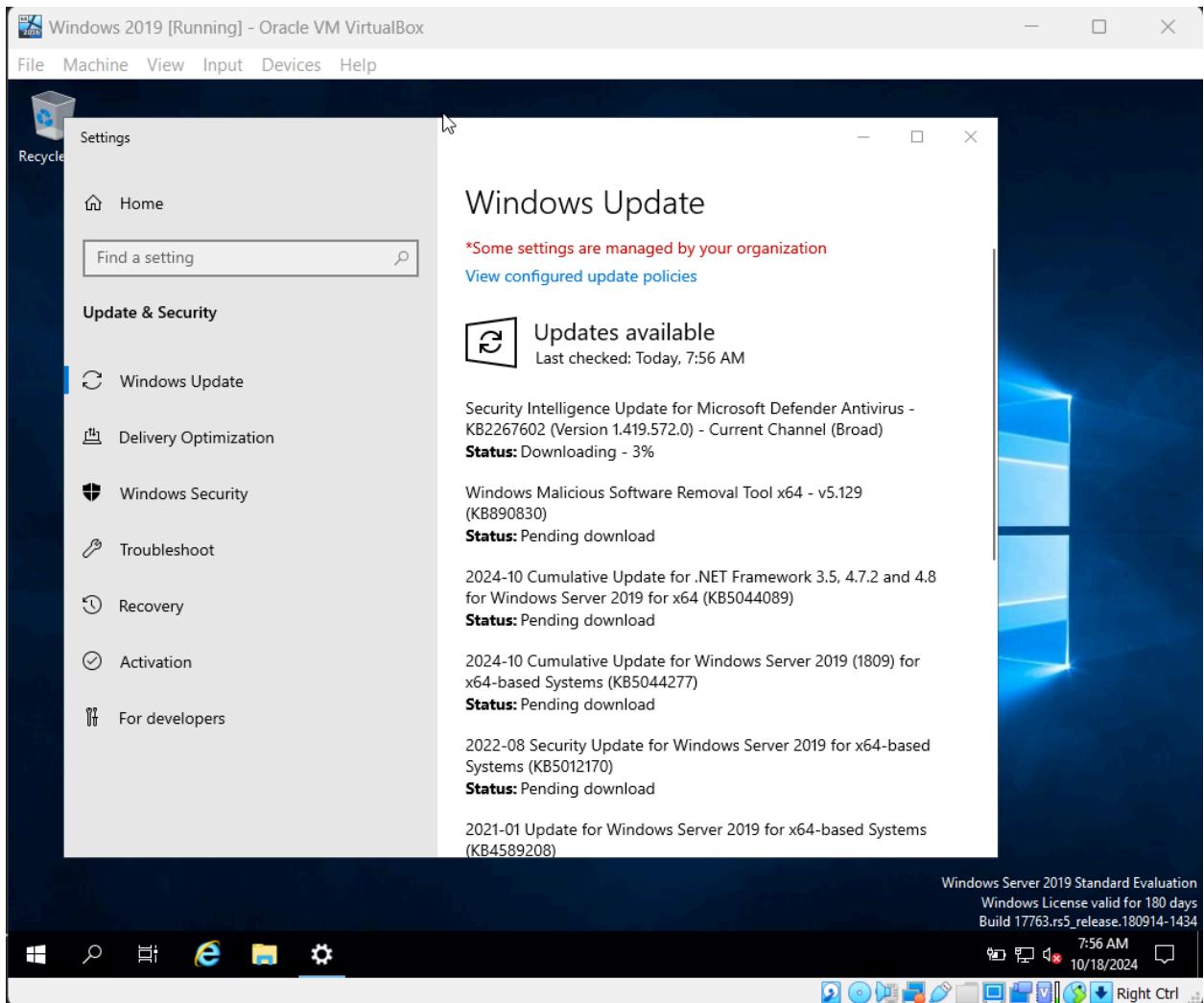
Step 26: As you can see there's a button to check for updates, you can click that to see if there's an update or nothing.



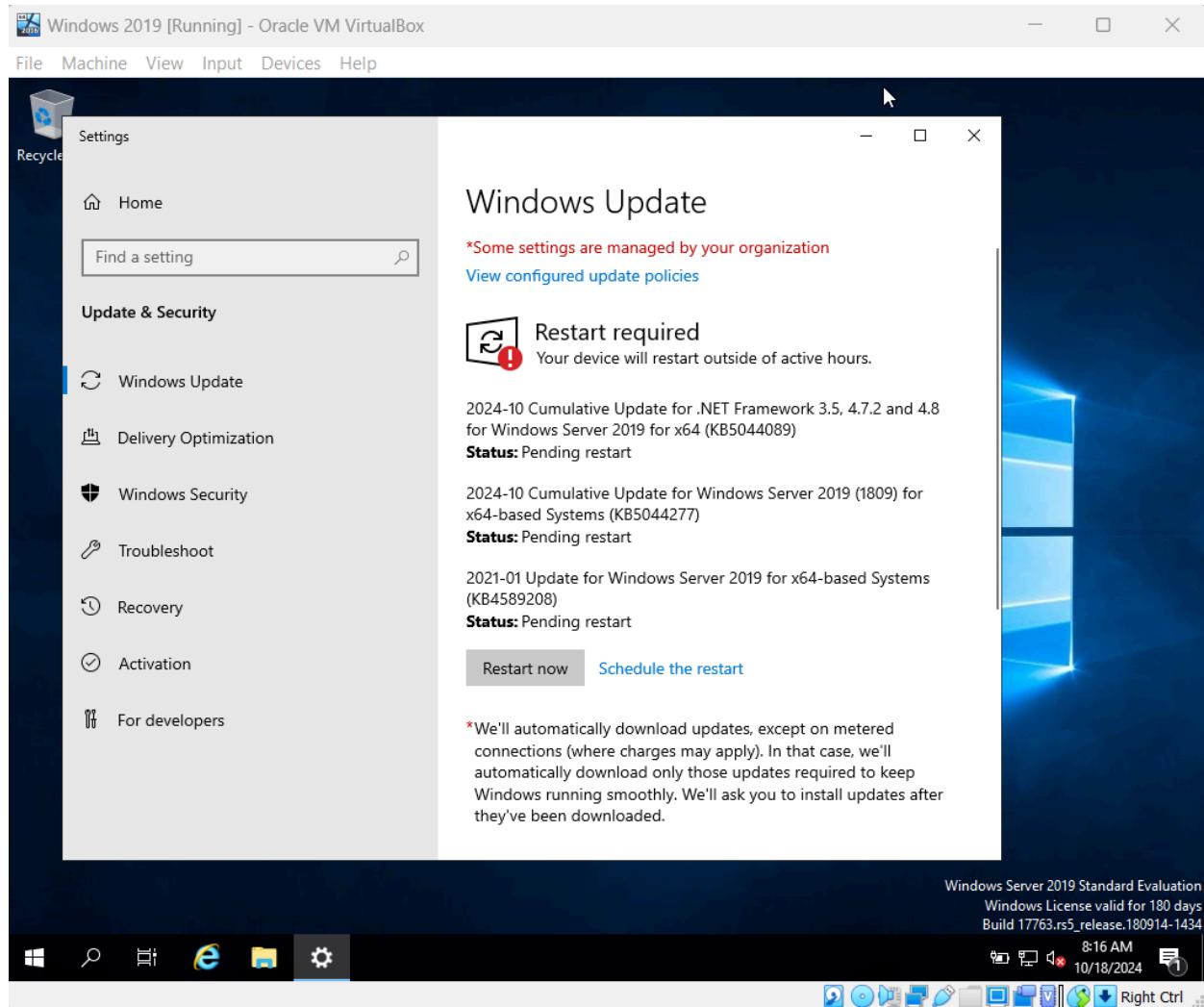
Step 27: Checking if there's an update for windows.



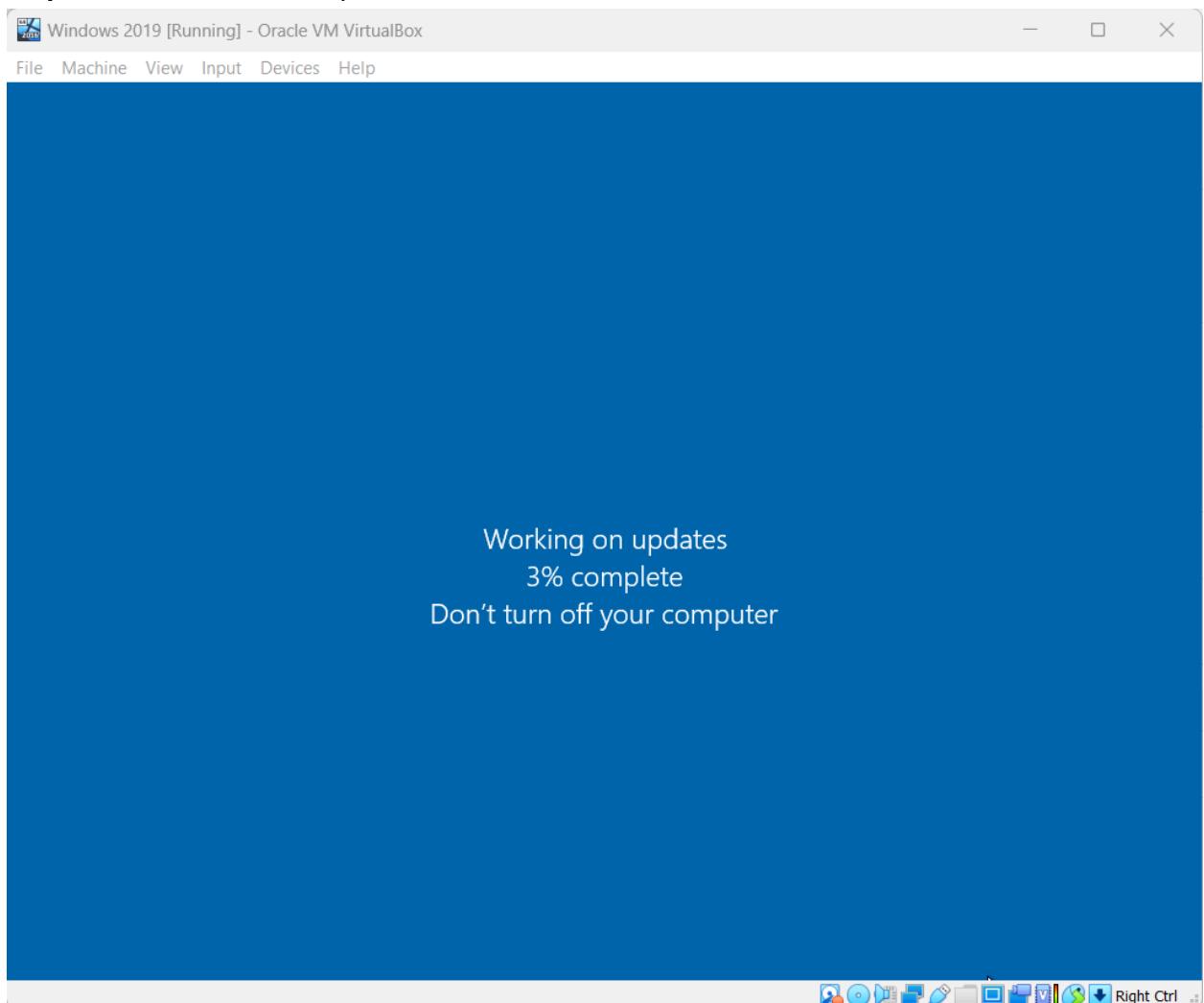
Step 28: As you can see there's an update, so that it will automatically downloaded once you click the "Check for updates" button.



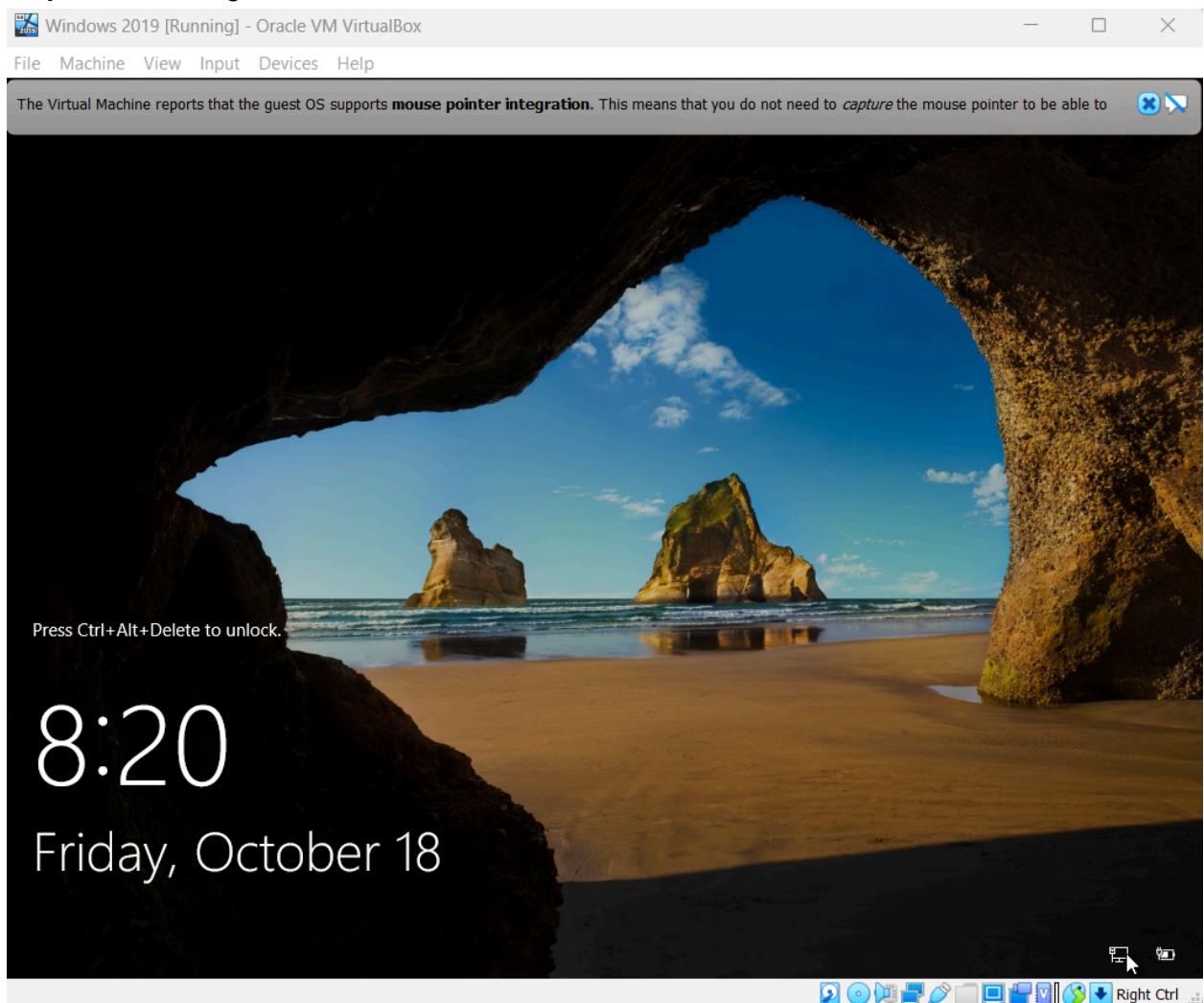
Step 29: After the downloading process, you must restart Windows because some of the updates required a restart to successfully install them. Click the “Restart now” to restart it.



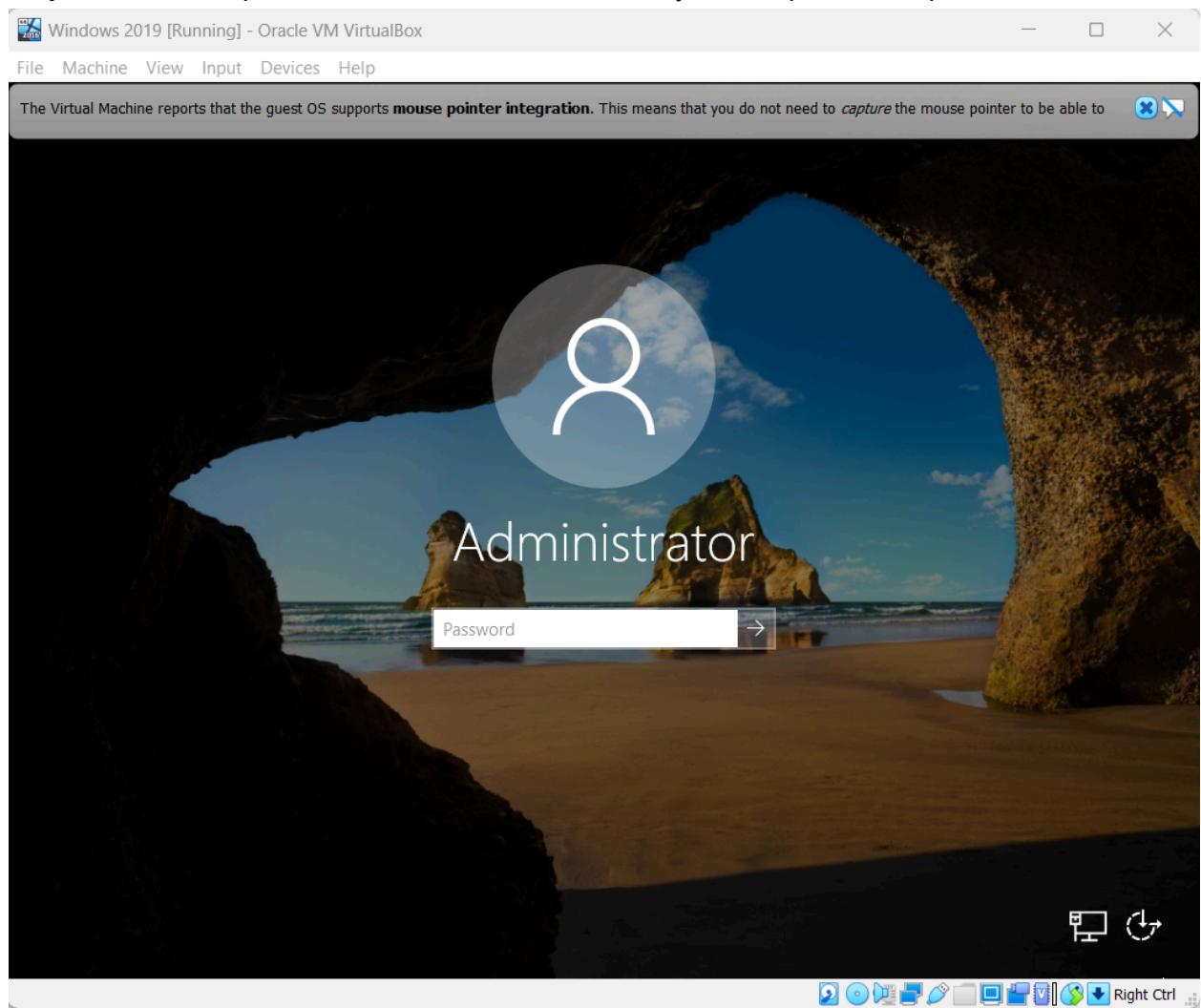
Step 30: Just wait for the updates to be finished.



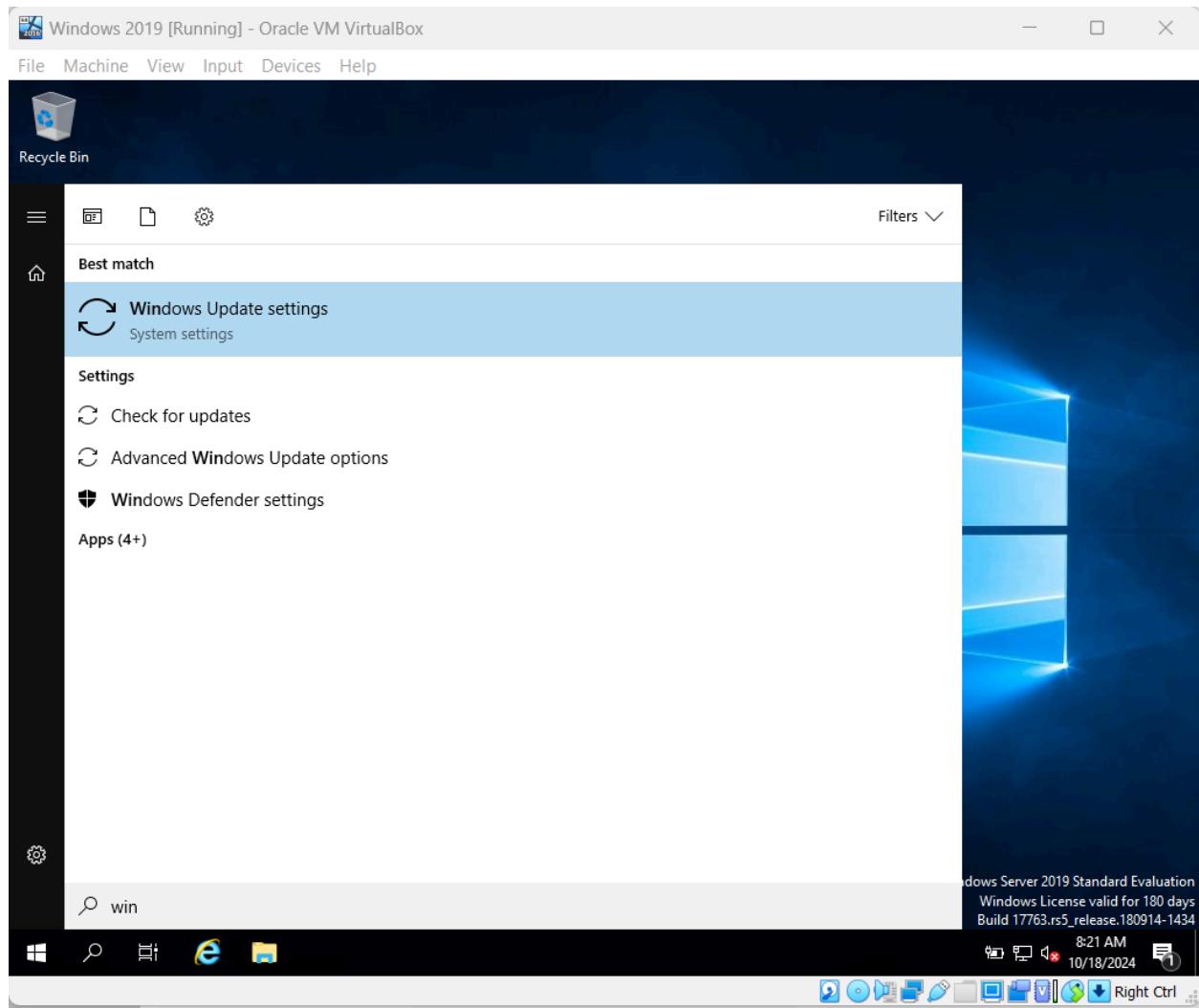
Step 31: Press Right Ctrl + Del in Virtual Box



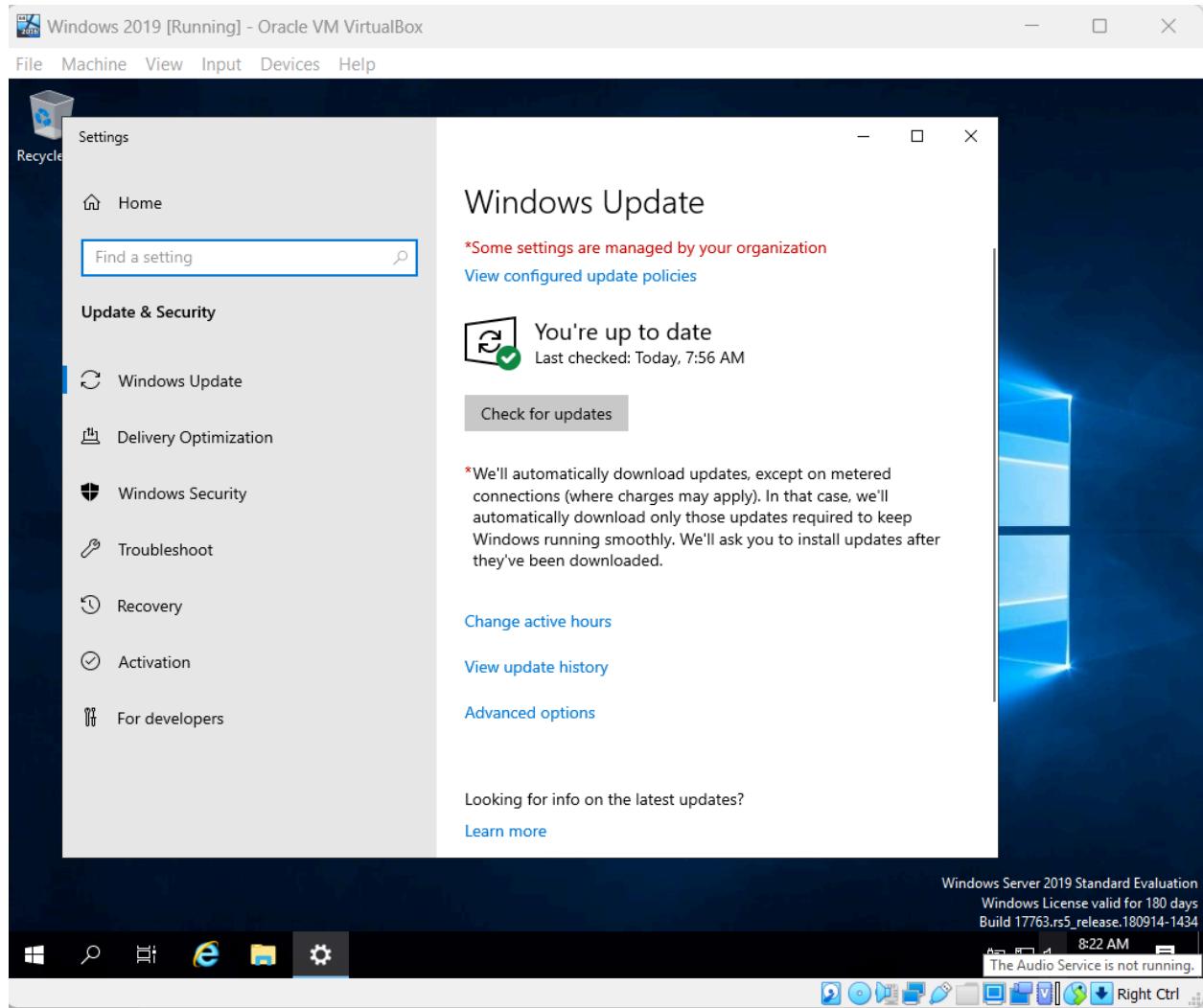
Step 32: Enter the password of the Administrator that you set up earlier to proceed.



Step 33: Click the Windows icon and search again for windows update settings, then click it to proceed.



Step 35: As you can see, the windows were updated.

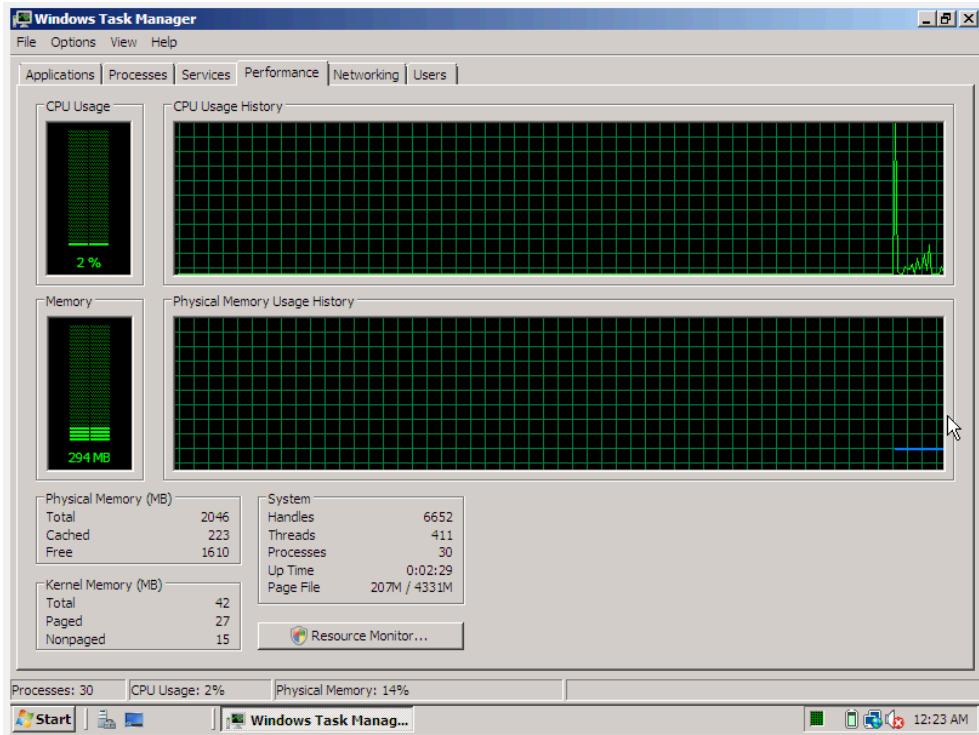


System Monitoring Tasks

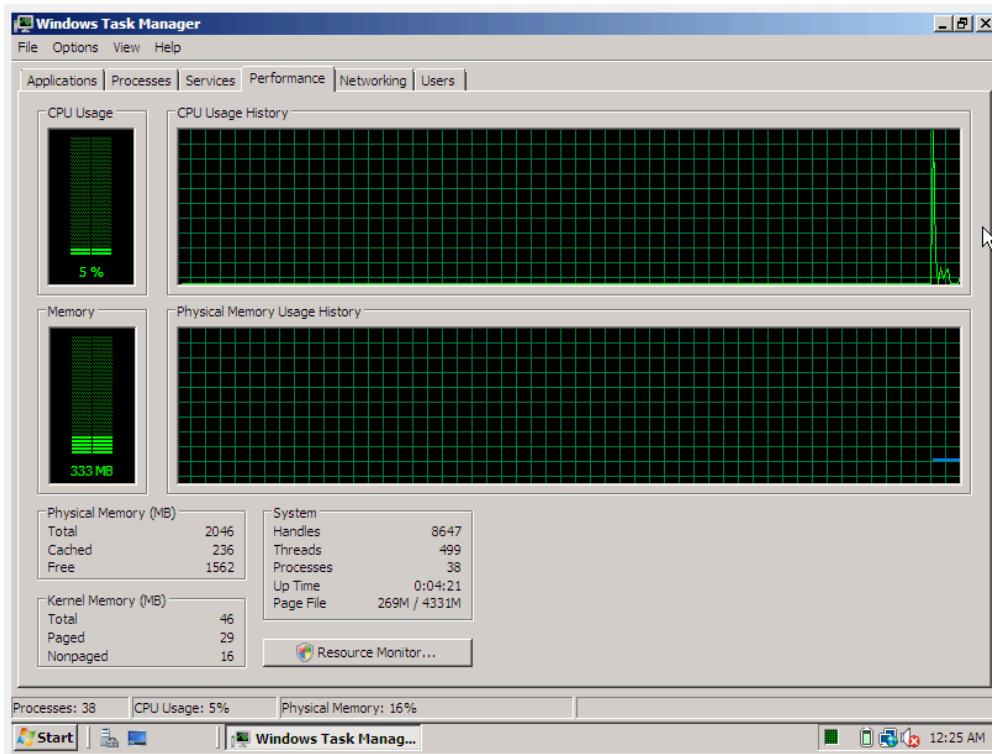
Monitor System Performance

- Use the Task Manager (Windows) or System Monitor (Linux) to observe CPU, memory, and disk usage.
- Take screenshots of the performance metrics.

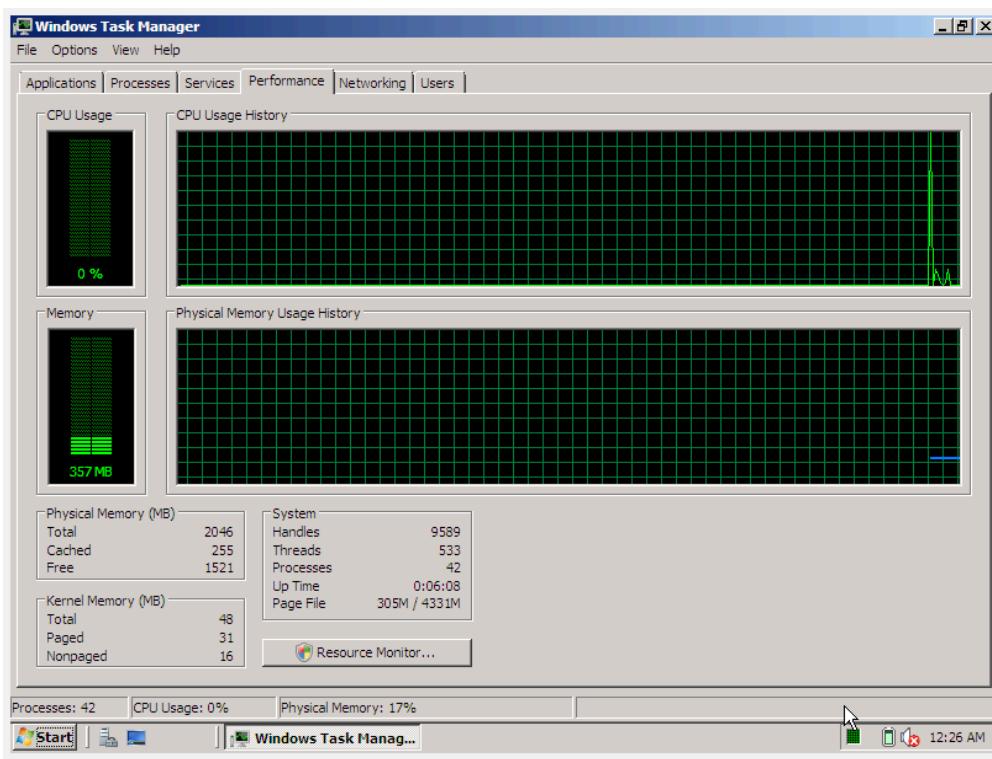
Admin User:



Standard User:



Guest User:



Analyze Resource Usage (Report)

- Write a brief report (300-500 words) summarizing the performance metrics observed, including any findings about how different user accounts impact system performance.

The performance metrics observed under three different user accounts—Administrator, Standard, and Guest—show clear differences in resource usage. Each account offers different levels of access and functionality, but all maintain low CPU activity overall. However, memory usage and the number of processes increase gradually from the Administrator to the Standard user, and then to the Guest account. This helps us understand how system resources are used differently based on the account type.

Starting with the Administrator account, the system shows minimal activity, reflecting low resource demand. CPU usage is just 2%, and memory consumption is 294 MB, which is 14% of the system's physical memory. There are 30 active processes, meaning only a few applications or background services are running. Handles and threads, which represent system resources used by these processes, are also low at 6652 and 411, respectively. These metrics suggest that although the Administrator account has full control over the system, it doesn't use much in terms of resources unless heavier tasks are performed.

In the Standard user account, resource usage is slightly higher. CPU usage increases to 5%, and memory usage rises to 333 MB, or 16% of the total memory. The number of processes goes up to 38, likely due to additional applications or background services that start automatically with this account. Handles and threads also increase to 8647 and 499, respectively. While the Standard user has fewer permissions compared to the Administrator, the system seems to use more resources to manage this user's access, probably to enforce security and permissions. Although the system load grows under this account, performance remains efficient.

The Guest account, usually the most limited in terms of access, surprisingly shows the highest resource usage. Although CPU usage was 0% at the time of observation, memory usage rose to 357 MB or 17% of the system's total. The number of processes also increased to 42, the highest among all accounts. Handles and threads peaked at 9589 and 533, suggesting increased system activity. This could be due to additional security or monitoring processes meant to tightly control guest access. Even though the Guest account has the least access, it appears to place the most demands on the system, likely because of the need to manage restrictions and monitor activity.

In summary, while CPU usage remains low across all accounts, memory usage and the number of processes increase from Administrator to Standard user, and finally to Guest user. The higher resource usage in the Guest account could be due to the system's need to manage restrictions, leading to more background processes. Limiting unnecessary background tasks for guest users could help improve system performance further.

LINUX

User Management Tasks

Create User Accounts

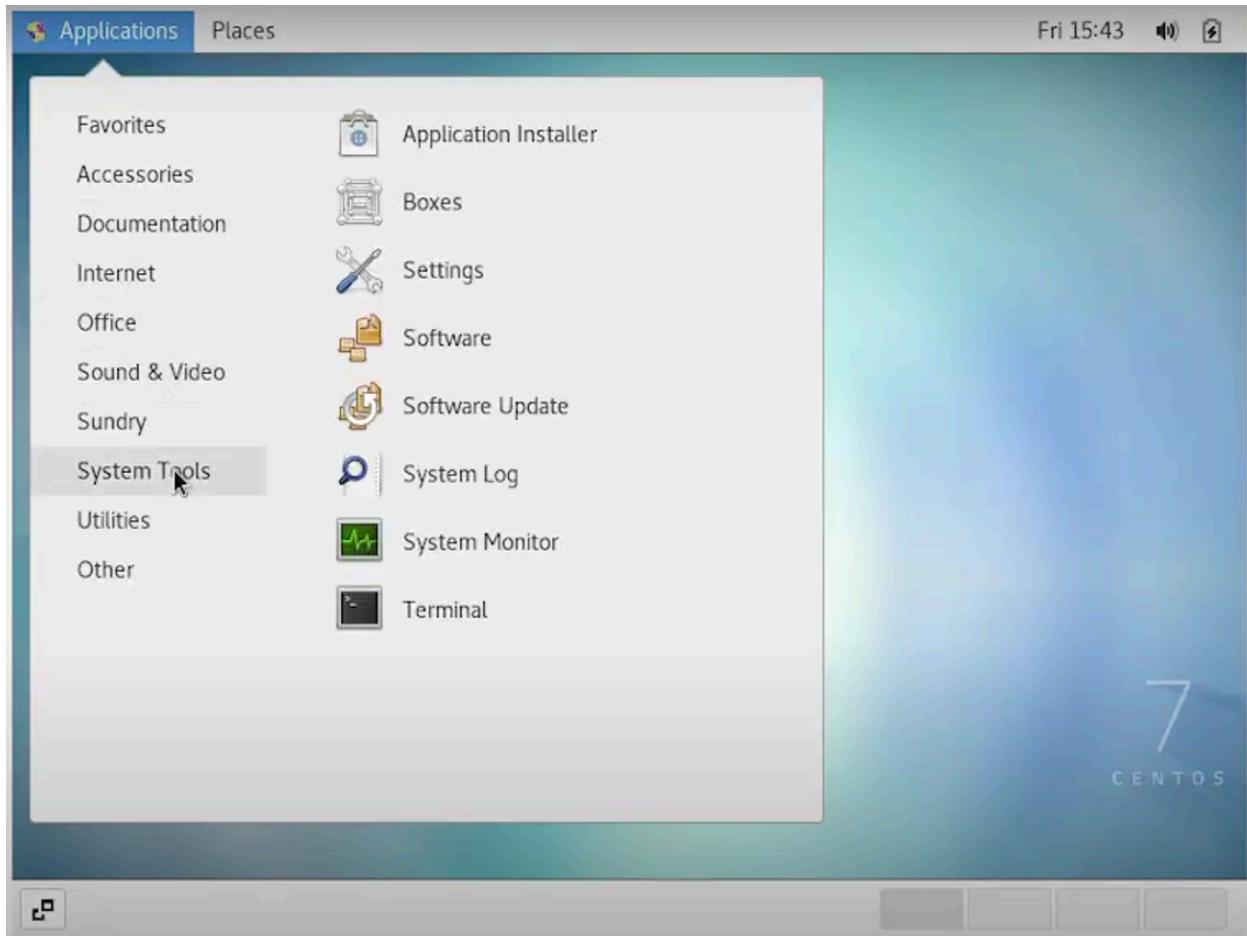
- Create at least three user accounts: an Administrator account, a Standard user account, and a Guest account.

- Assign different permissions to each account (e.g., allow the Administrator account full access, restrict the Guest account).

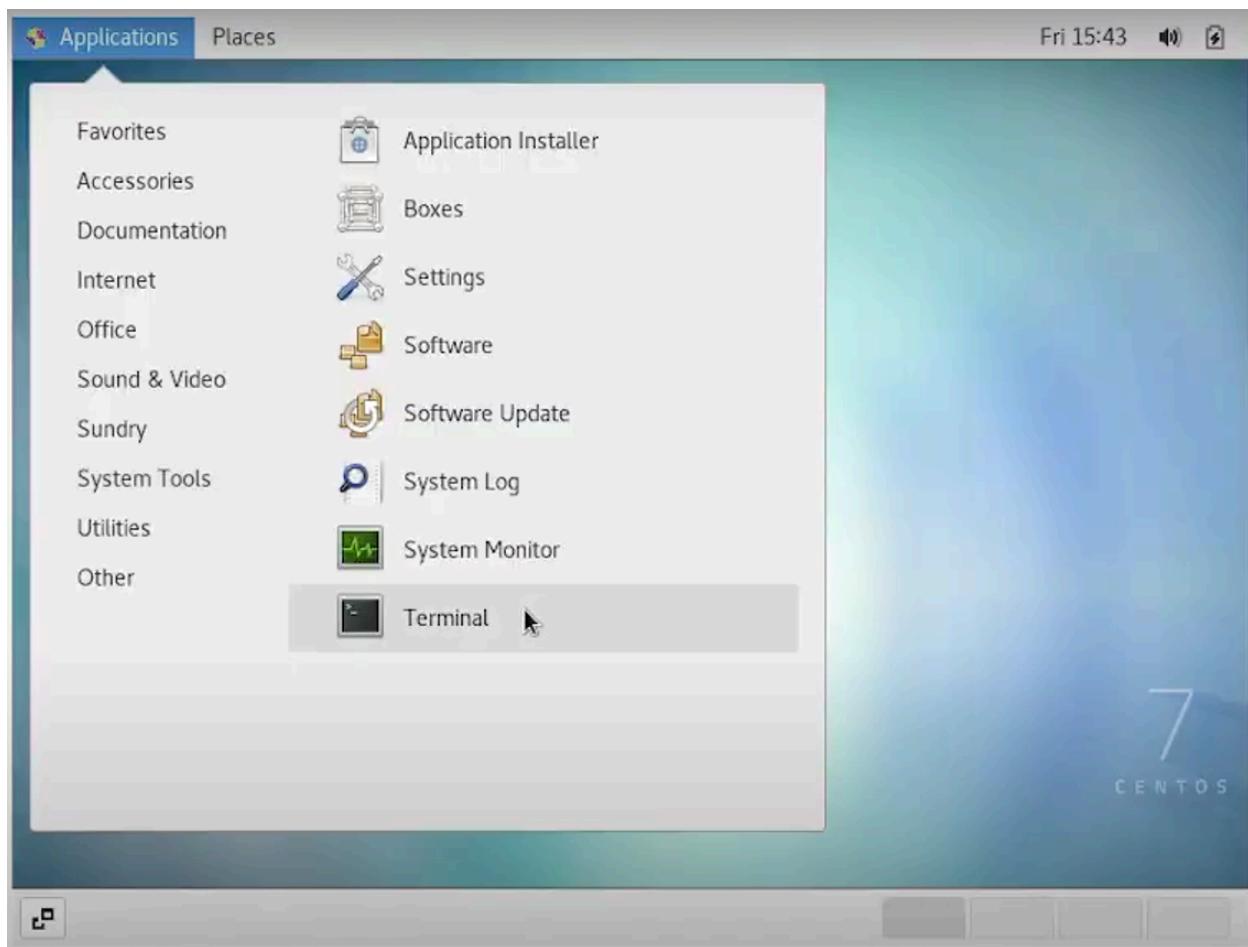
Modify User Permissions

- Change the permissions of one user account (for example, elevate a Standard user to Administrator temporarily).
- Document the steps taken to modify the permissions.

Step 1: First, click the Application tab then hover over System Tools.



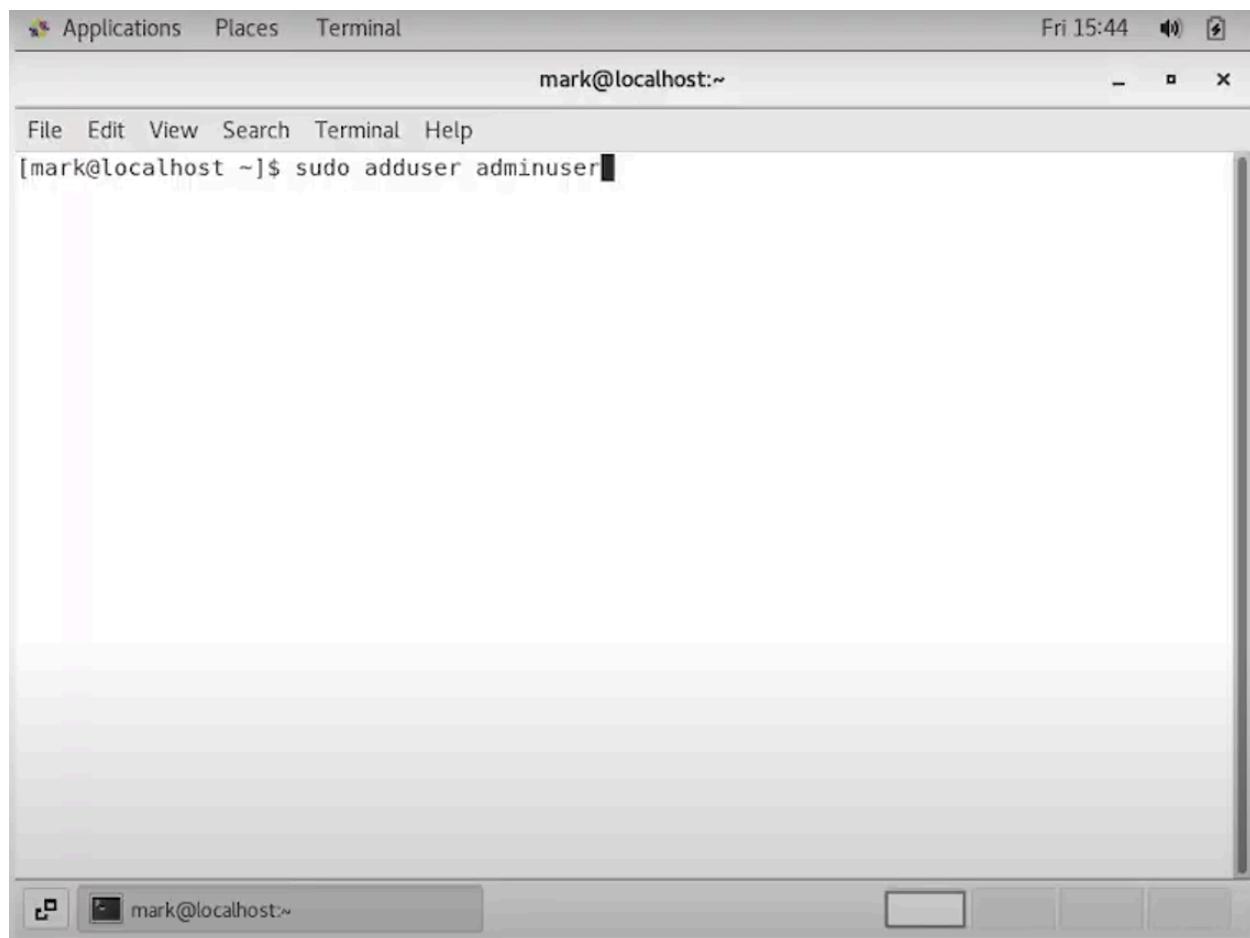
Step 2: After that, look for the Terminal then click it.



Step 3: Create an Administrator Account

In CentOS 7, an "administrator" is a regular user granted `sudo` (superuser) privileges.

To create the administrator account (e.g., `adminuser`):



A screenshot of a CentOS 7 desktop environment. At the top, there is a horizontal menu bar with icons for Applications, Places, and Terminal. The date and time are shown as Fri 15:44. Below the menu bar is a terminal window titled 'mark@localhost:~'. The window has standard window controls (minimize, maximize, close) at the top right. The terminal's menu bar includes File, Edit, View, Search, Terminal, and Help. The command `[mark@localhost ~]$ sudo adduser adminuser` is typed into the terminal, with the cursor at the end of the line. The desktop background is a light grey with a subtle grid pattern. The taskbar at the bottom shows the terminal window as the active application, along with other icons for the desktop environment.

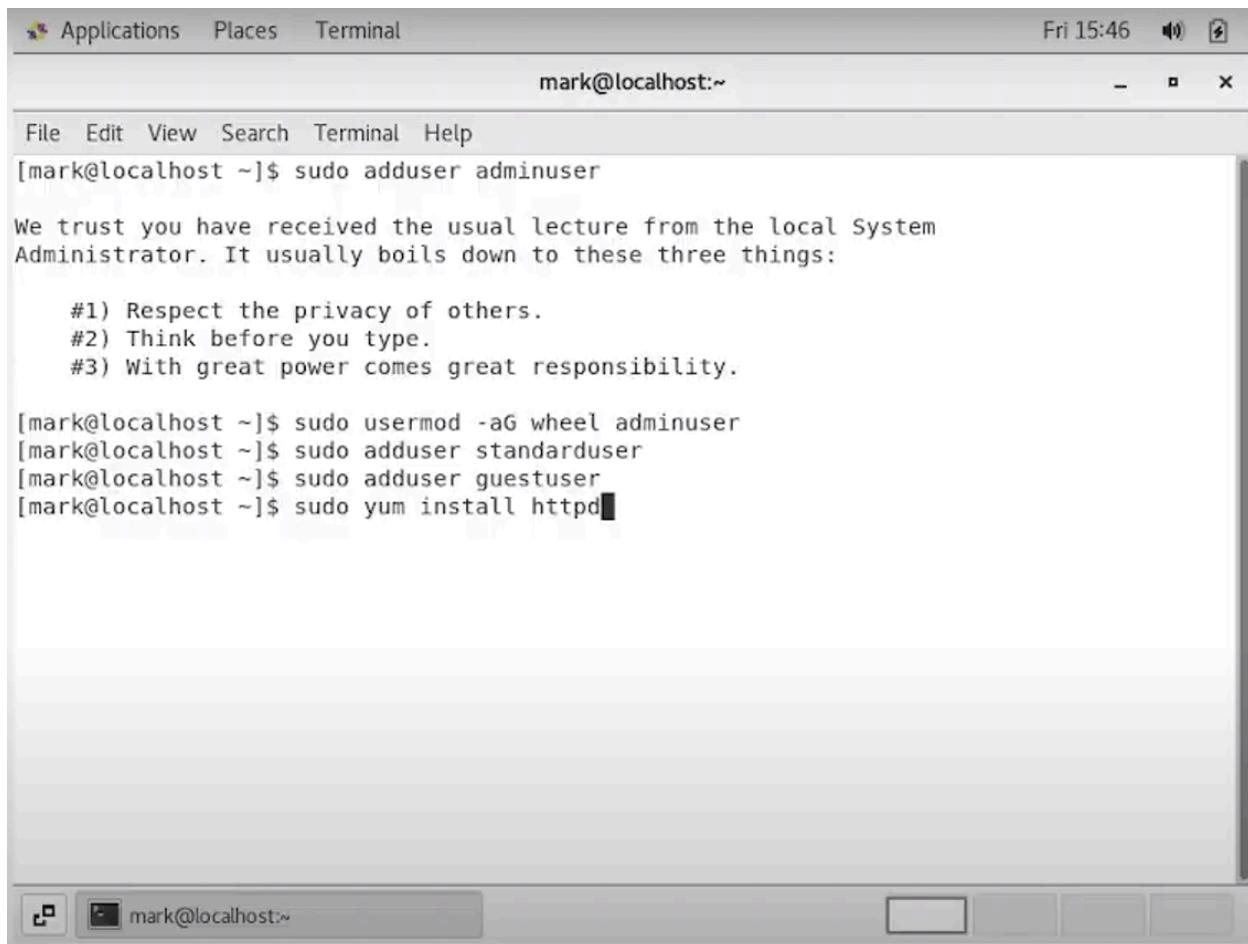
```
mark@localhost:~$ sudo adduser adminuser
```

Step 4: Grant `sudo` privileges by adding the user to the `wheel` group (which has `sudo` rights by default):

Now, the user `adminuser` will have administrative privileges and can execute commands with `sudo`.

Create a Standard Account & create a guest user account (e.g., `guestuser`):

Permissions on Linux are primarily managed via file and directory ownership, and the `sudo` access of users. For this guide, permissions will be assigned to represent typical roles for an administrator, standard user, and guest.



The screenshot shows a terminal window titled "mark@localhost:~". The window includes a menu bar with File, Edit, View, Search, Terminal, and Help. The title bar also displays the user name "mark@localhost:~". The terminal content shows the following command being run:

```
[mark@localhost ~]$ sudo adduser adminuser
```

Followed by a message:

```
We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:
```

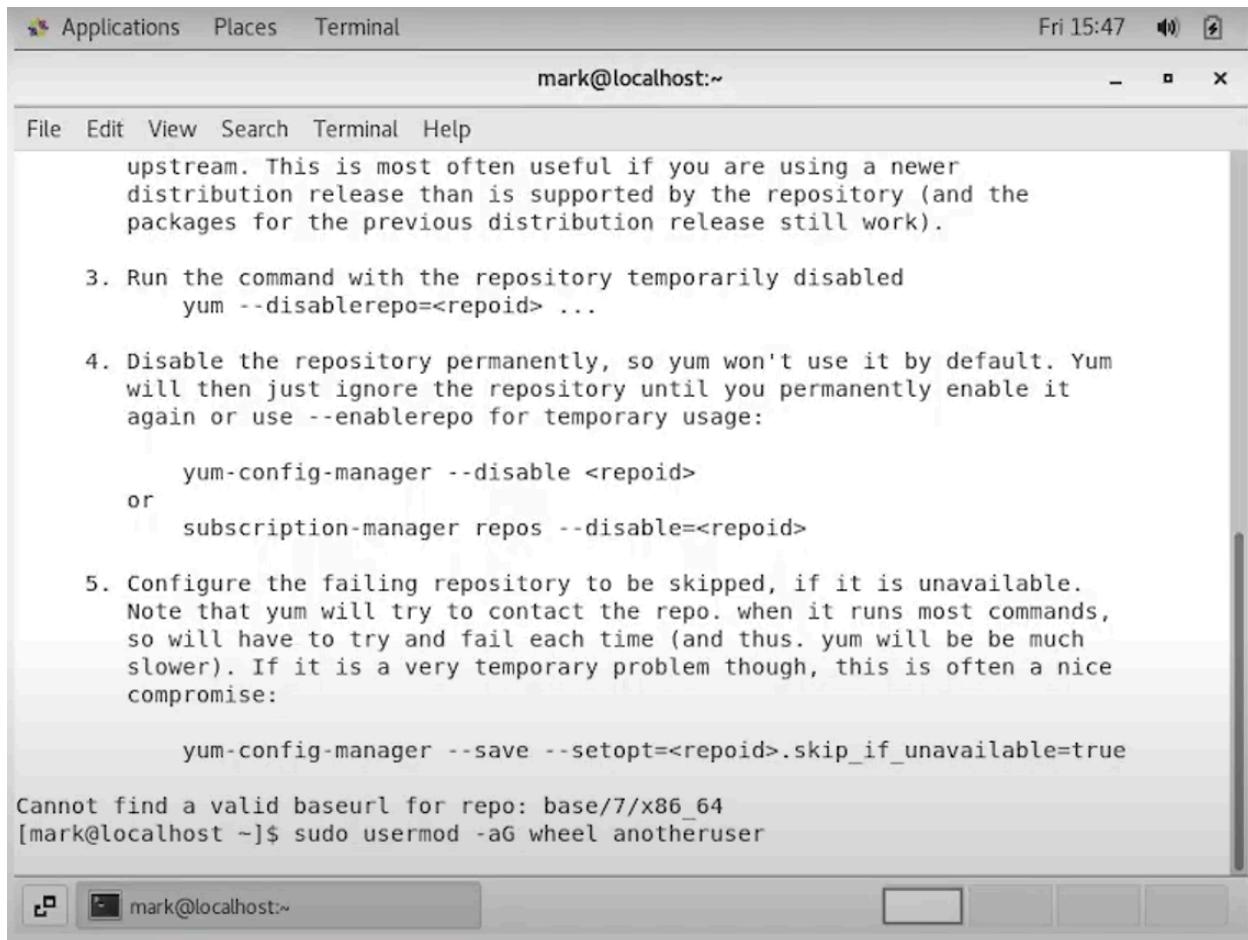
- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.

```
[mark@localhost ~]$ sudo usermod -aG wheel adminuser
[mark@localhost ~]$ sudo adduser standarduser
[mark@localhost ~]$ sudo adduser guestuser
[mark@localhost ~]$ sudo yum install httpd
```

Step 5: Administrator Account Permissions (`adminuser`)

- Sudo access: This account has full administrative rights by using the `sudo` command, which allows execution of any command as root.
- File Permissions: As an administrator, the user can modify files owned by the system by invoking `sudo` when necessary.

Example: Admin can use the `sudo` command to install software, manage users, or edit system files:



The screenshot shows a terminal window titled "mark@localhost:~". The window contains the following text:

```

upstream. This is most often useful if you are using a newer
distribution release than is supported by the repository (and the
packages for the previous distribution release still work).

3. Run the command with the repository temporarily disabled
   yum --disablerepo=<repoid> ...

4. Disable the repository permanently, so yum won't use it by default. Yum
   will then just ignore the repository until you permanently enable it
   again or use --enablerepo for temporary usage:

   yum-config-manager --disable <repoid>
   or
   subscription-manager repos --disable=<repoid>

5. Configure the failing repository to be skipped, if it is unavailable.
   Note that yum will try to contact the repo. when it runs most commands,
   so will have to try and fail each time (and thus, yum will be much
   slower). If it is a very temporary problem though, this is often a nice
   compromise:

   yum-config-manager --save --setopt=<repoid>.skip_if_unavailable=true

Cannot find a valid baseurl for repo: base/7/x86_64
[mark@localhost ~]$ sudo usermod -aG wheel anotheruser

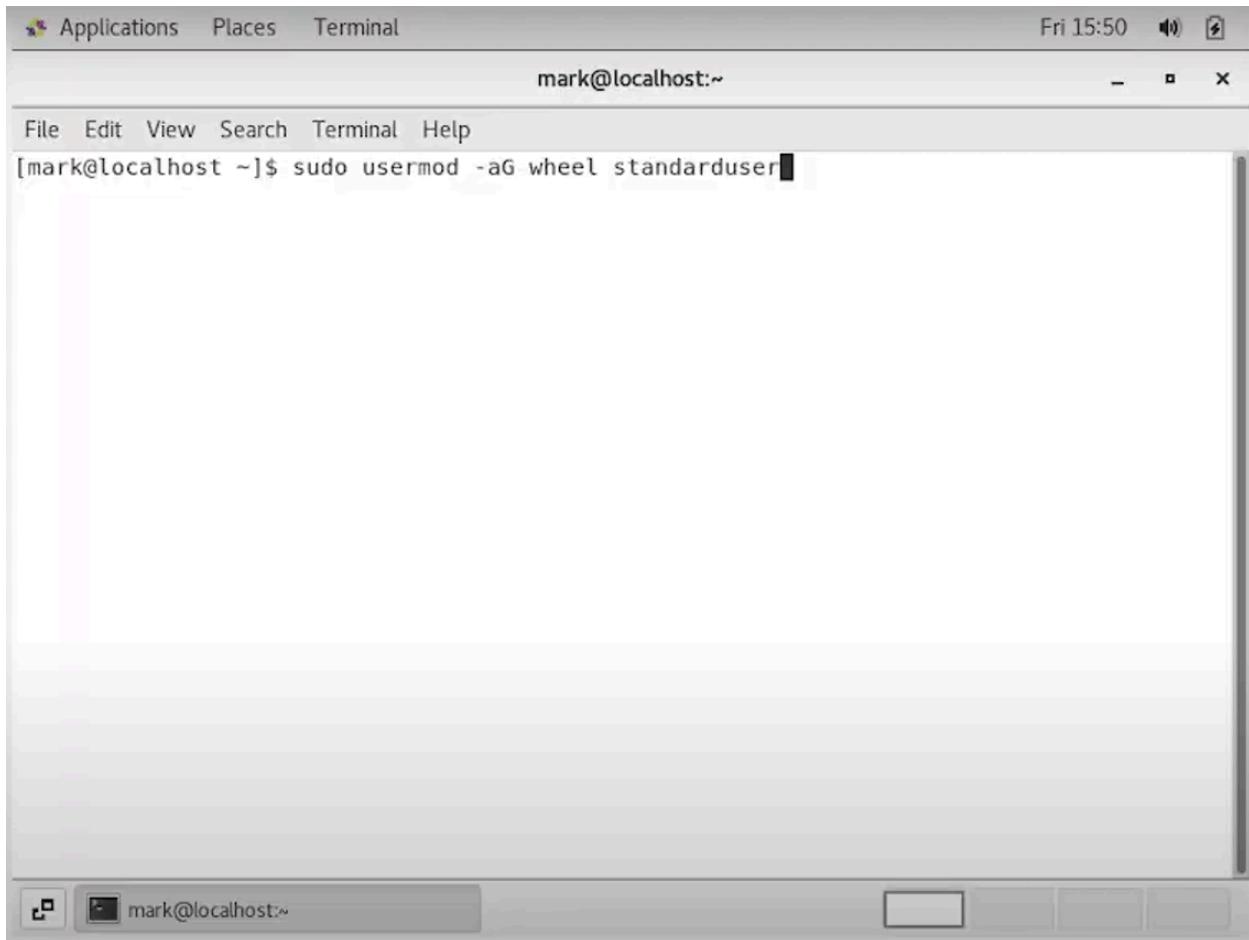
```

Step 6: Changing Permissions of an Existing User Account

For this guide, let's change the permissions of the `standarduser` to grant them access to a specific directory and give them limited administrative capabilities.

3.1. Grant Sudo Access to `standarduser`

To give the standard user limited administrative rights, add them to the `sudo` group:



A screenshot of a Linux desktop environment showing a terminal window. The window title is "Terminal". The terminal prompt is "mark@localhost:~". The user has typed the command "[mark@localhost ~]\$ sudo usermod -aG wheel standarduser" into the terminal. The window has a standard title bar with icons for Applications, Places, Terminal, and a date/time indicator "Fri 15:50". The bottom of the window shows a taskbar with icons for the terminal and other open applications.

Step 7: First, change the ownership of the directory to `standarduser`:

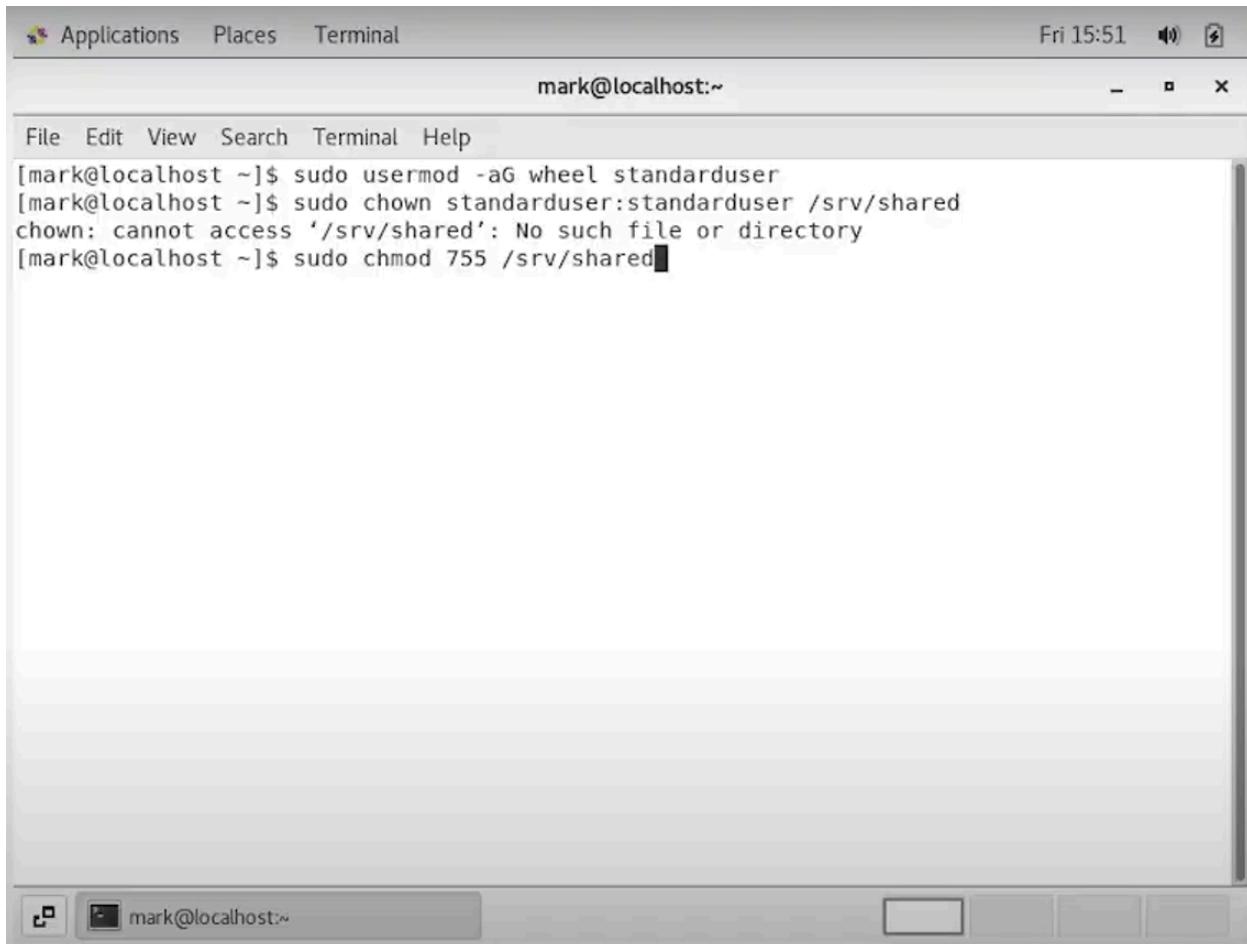
A screenshot of a Linux desktop environment. At the top, there is a horizontal menu bar with icons for Applications, Places, and Terminal. To the right of the menu, it shows the date and time as Fri 15:51, along with system status icons for battery, signal, and power. Below the menu is a terminal window titled "mark@localhost:~". The terminal window has a standard window title bar with minimize, maximize, and close buttons. The main area of the terminal shows command-line output:

```
[mark@localhost ~]$ sudo usermod -aG wheel standarduser
[mark@localhost ~]$ sudo chown standarduser:standarduser /srv/shared
chown: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$
```

The terminal window is set against a light gray background. At the bottom of the screen, there is a dock with several application icons. The terminal window is the active application, indicated by its highlighted title bar.

Step 8: Next, modify the directory permissions so that only standarduser can read and write, but others can still list the contents:

Now, `standarduser` will have read, write, and execute access to `/srv/shared`, while others will only have read and execute permissions.

A screenshot of a terminal window titled "mark@localhost:~". The window shows a command-line interface with the following text:

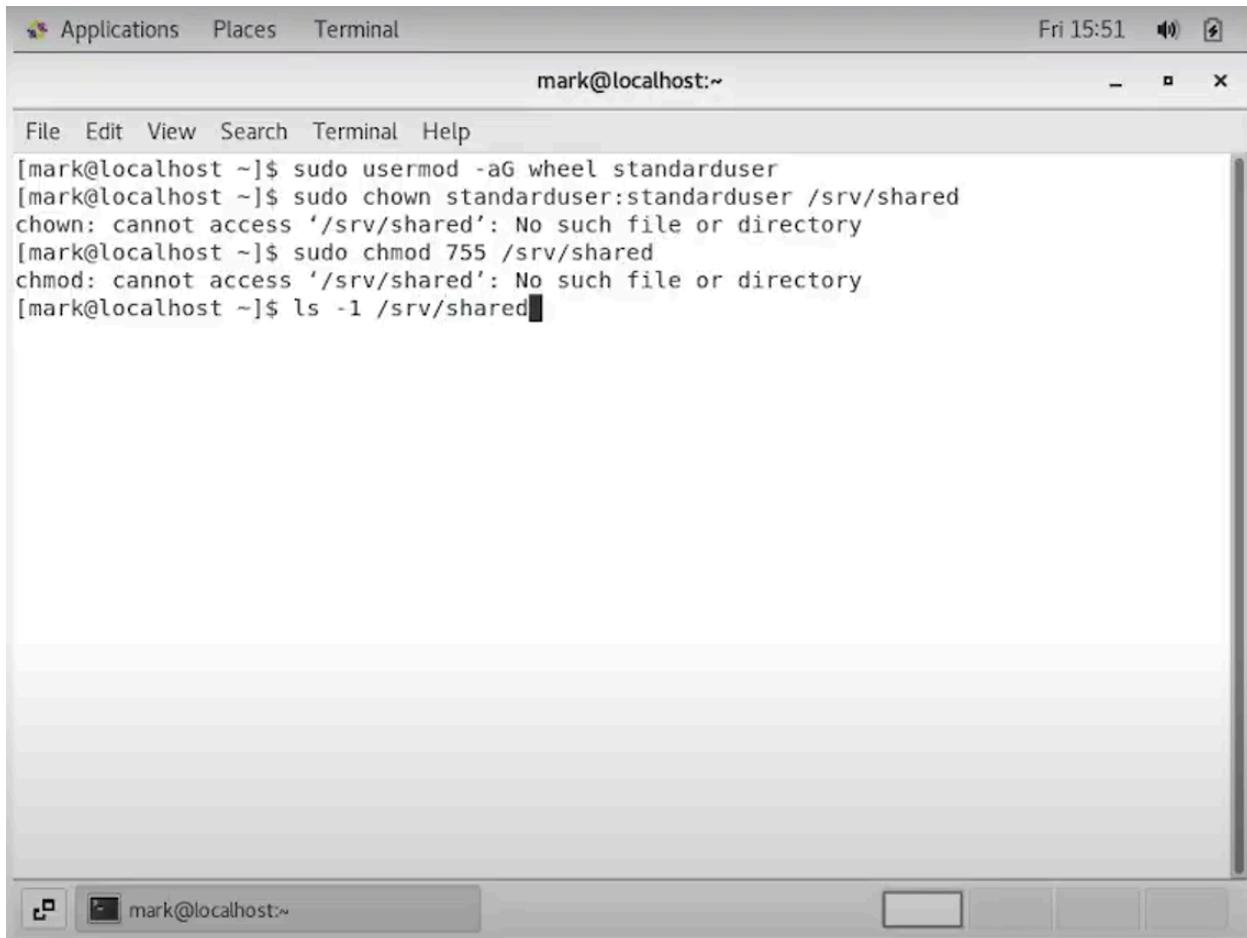
```
[mark@localhost ~]$ sudo usermod -aG wheel standarduser
[mark@localhost ~]$ sudo chown standarduser:standarduser /srv/shared
chown: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ sudo chmod 755 /srv/shared
```

The terminal is running on a desktop environment, as evidenced by the window title bar and the taskbar at the bottom.

Step 9: Verifying Permissions

To verify the permissions for a given directory or file, use the `ls -l` command:

This will display the permissions in the format rwxr-xr-x (for the example where **standarduser** has full access and others have restricted access).



The screenshot shows a terminal window titled "mark@localhost:~". The window contains the following command history:

```
[mark@localhost ~]$ sudo usermod -aG wheel standarduser
[mark@localhost ~]$ sudo chown standarduser:standarduser /srv/shared
chown: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ sudo chmod 755 /srv/shared
chmod: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ ls -l /srv/shared
```

The terminal window is part of a desktop environment, with a menu bar at the top and a taskbar at the bottom.

Step 10: To verify the groups of a user (to check if **standarduser now belongs to **wheel**), use the **groups** command:**

A screenshot of a Linux desktop environment. At the top, there is a horizontal menu bar with icons for Applications, Places, and Terminal. The date and time "Fri 15:51" are displayed on the right. Below the menu bar is a terminal window titled "mark@localhost:~". The terminal window has a title bar with the same title and standard window controls (minimize, maximize, close). The main area of the terminal shows a command-line session:

```
[mark@localhost ~]$ sudo usermod -aG wheel standarduser
[mark@localhost ~]$ sudo chown standarduser:standarduser /srv/shared
chown: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ sudo chmod 755 /srv/shared
chmod: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ ls -l /srv/shared
ls: cannot access /srv/shared: No such file or directory
[mark@localhost ~]$ groups standarduser
```

A second screenshot of a Linux desktop environment, identical in layout to the first. It features a terminal window titled "mark@localhost:~" showing the same command-line session as the first screenshot. The terminal output is identical:

```
[mark@localhost ~]$ sudo usermod -aG wheel standarduser
[mark@localhost ~]$ sudo chown standarduser:standarduser /srv/shared
chown: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ sudo chmod 755 /srv/shared
chmod: cannot access '/srv/shared': No such file or directory
[mark@localhost ~]$ ls -l /srv/shared
ls: cannot access /srv/shared: No such file or directory
[mark@localhost ~]$ groups standarduser
standarduser : standarduser wheel
[mark@localhost ~]$
```

System Maintenance Tasks

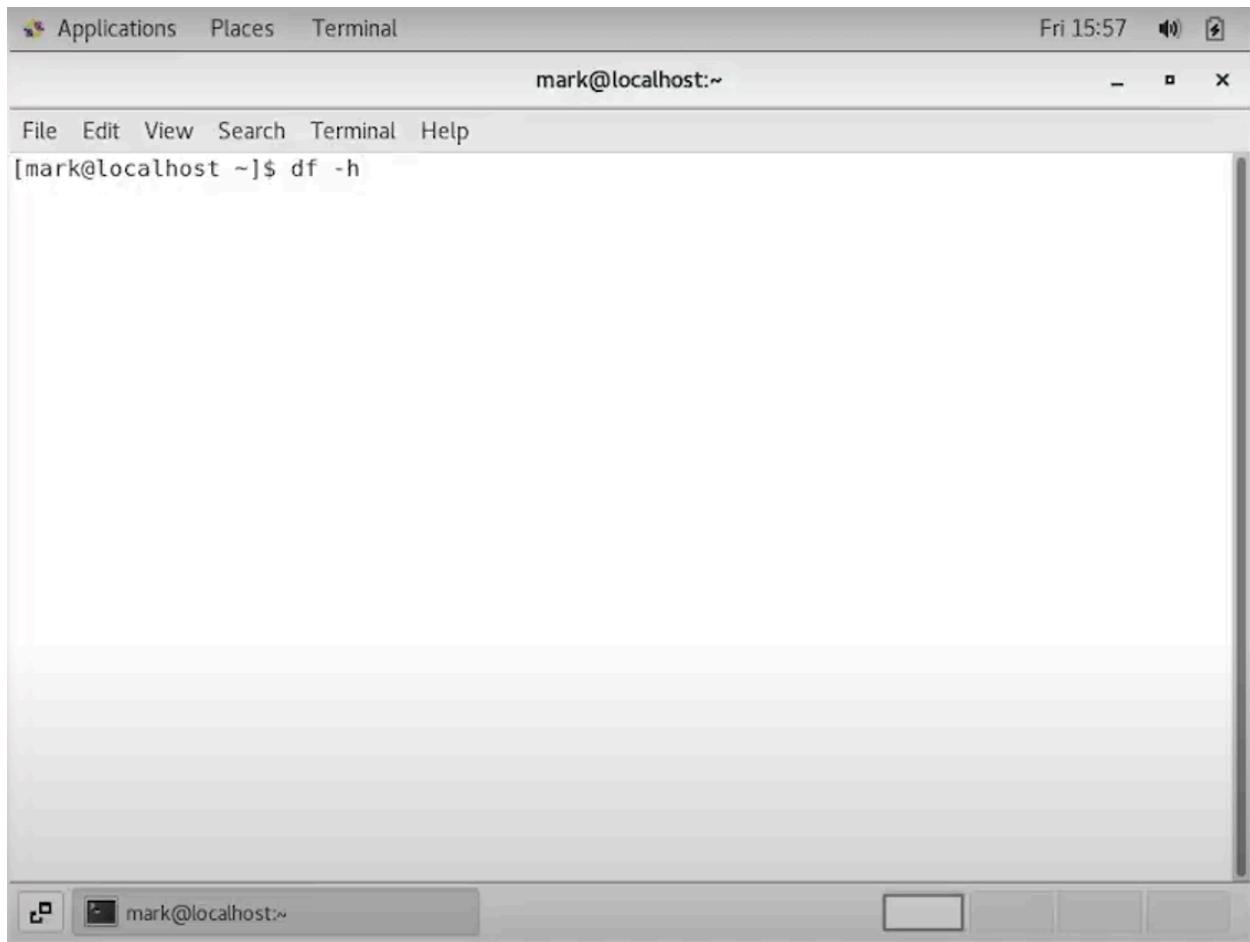
Disk Cleanup

- Perform a disk cleanup operation to remove unnecessary files.
- Document the steps taken and the amount of space recovered.

Step 1: Check Disk Usage

Before performing disk cleanup, it is helpful to check the current disk usage to identify what is consuming space.

Run the following command to check disk usage:



The screenshot shows a terminal window titled 'mark@localhost:~'. The window has a standard window title bar with icons for Applications, Places, Terminal, and a date/time indicator (Fri 15:57). The main area of the terminal displays the command 'df -h' followed by its output, which is currently empty. The terminal window is set against a light gray background with a dark gray header and footer bar.

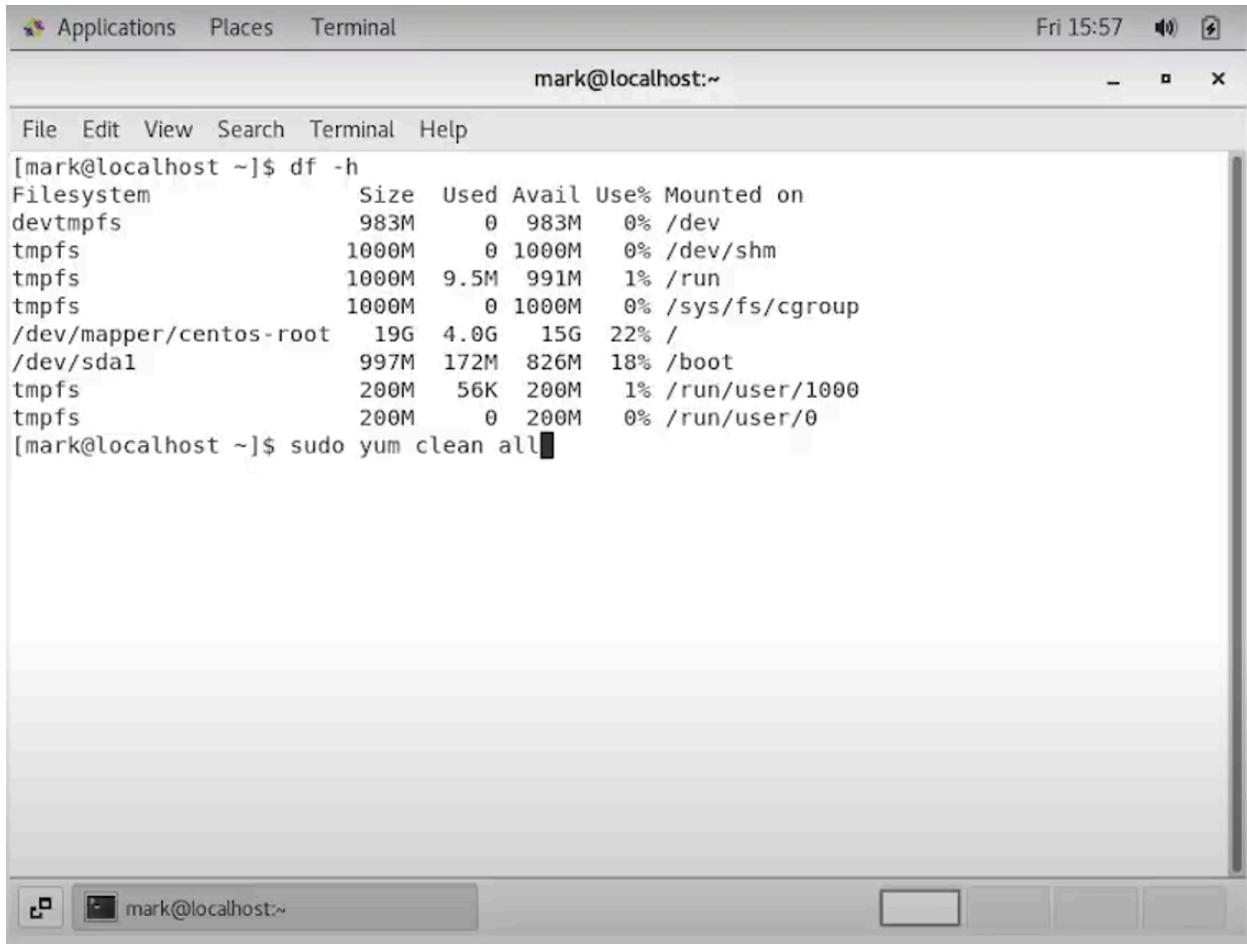
```
[mark@localhost ~]$ df -h
```

Step 2: Remove Unused Packages

CentOS, like other Linux distributions, sometimes retains unnecessary or unused packages. To clean these up:

2.1. Clean yum cache

YUM is the package manager for CentOS. Over time, it accumulates cached package files that can consume disk space. Run the following command to clean the yum cache:



The screenshot shows a terminal window titled "mark@localhost:~". The window contains the following text:

```
[mark@localhost ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        983M    0  983M   0% /dev
tmpfs          1000M    0 1000M   0% /dev/shm
tmpfs          1000M  9.5M 991M   1% /run
tmpfs          1000M    0 1000M   0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G  15G  22% /
/dev/sdal       997M 172M  826M  18% /boot
tmpfs          200M   56K  200M   1% /run/user/1000
tmpfs          200M    0  200M   0% /run/user/0
[mark@localhost ~]$ sudo yum clean all
```

Step 3: Remove Unnecessary Packages

To remove packages that are no longer required by any installed software, run:

The screenshot shows a terminal window titled "mark@localhost:~". The window contains the following command-line session:

```
[mark@localhost ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        983M    0  983M   0% /dev
tmpfs          1000M    0 1000M   0% /dev/shm
tmpfs          1000M  9.5M 991M   1% /run
tmpfs          1000M    0 1000M   0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G  15G  22% /
/dev/sda1       997M 172M  826M  18% /boot
tmpfs          200M   56K 200M   1% /run/user/1000
tmpfs          200M    0 200M   0% /run/user/0
[mark@localhost ~]$ sudo yum clean all
Loaded plugins: fastestmirror, langpacks
Cleaning repos: base extras updates
Cleaning up list of fastest mirrors
[mark@localhost ~]$ sudo package-cleanup --leaves
```

Step 4: It will list the orphaned packages. To automatically remove these packages, you can run:

The screenshot shows a terminal window titled 'mark@localhost:~'. The terminal displays the following commands and their output:

```
[mark@localhost ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        983M   0  983M  0% /dev
tmpfs          1000M   0 1000M  0% /dev/shm
tmpfs          1000M  9.5M 991M  1% /run
tmpfs          1000M   0 1000M  0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G  15G  22% /
/dev/sda1       997M 172M  826M  18% /boot
tmpfs          200M  56K  200M  1% /run/user/1000
tmpfs          200M   0  200M  0% /run/user/0

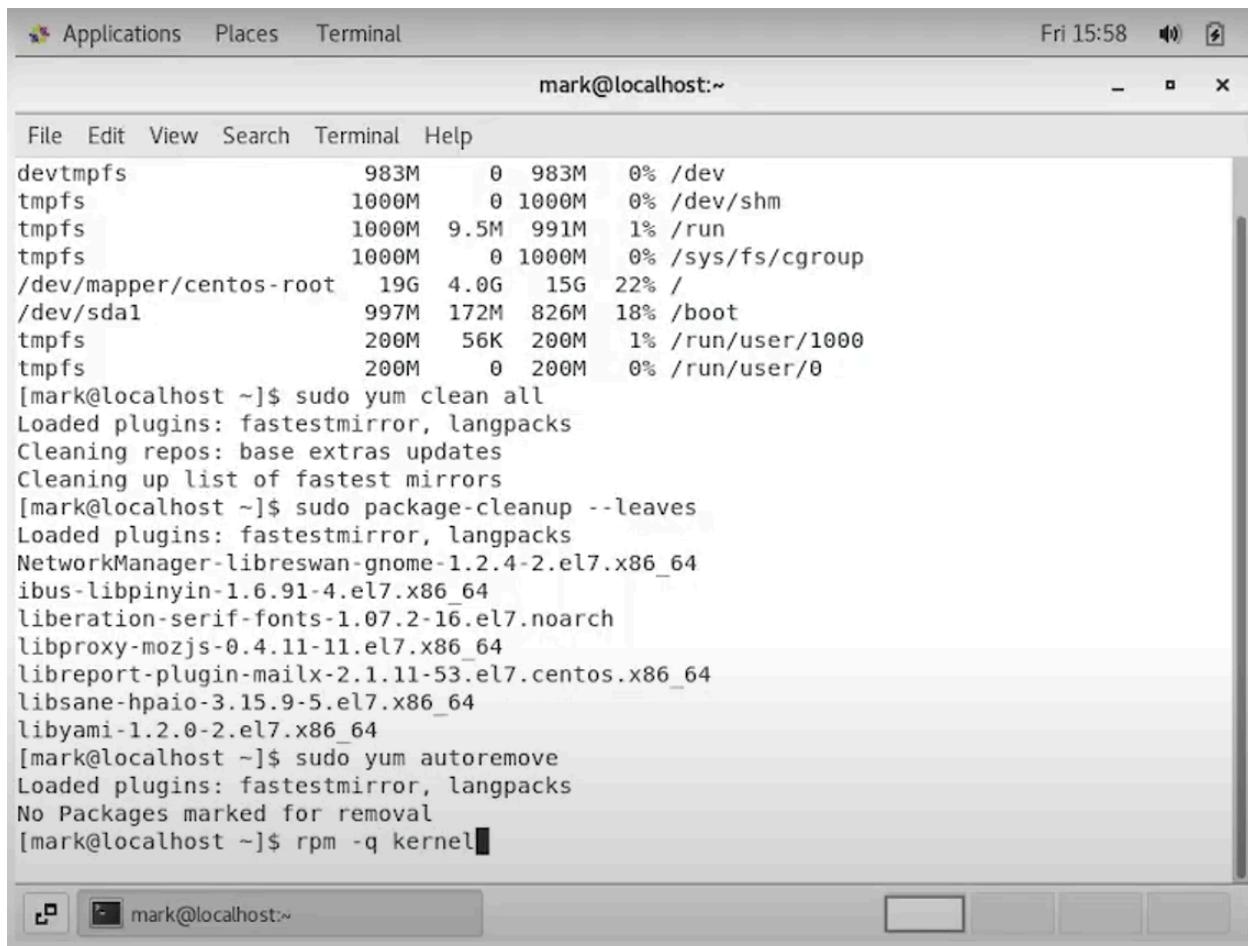
[mark@localhost ~]$ sudo yum clean all
Loaded plugins: fastestmirror, langpacks
Cleaning repos: base extras updates
Cleaning up list of fastest mirrors
[mark@localhost ~]$ sudo package-cleanup --leaves
Loaded plugins: fastestmirror, langpacks
NetworkManager-libreswan-gnome-1.2.4-2.el7.x86_64
ibus-libpinyin-1.6.91-4.el7.x86_64
liberation-serif-fonts-1.07.2-16.el7.noarch
libproxy-mozjs-0.4.11-11.el7.x86_64
libreport-plugin-mailx-2.1.11-53.el7.centos.x86_64
libsane-hpaio-3.15.9-5.el7.x86_64
libyami-1.2.0-2.el7.x86_64
[mark@localhost ~]$ sudo yum autoremove
```

The terminal window has a title bar with 'Applications', 'Places', 'Terminal' and a date/time 'Fri 15:58'. The bottom status bar shows the user 'mark@localhost:~'.

Step 5: Remove Old Kernels

CentOS often retains older versions of the Linux kernel after updates. Removing these unused kernels can free up disk space.

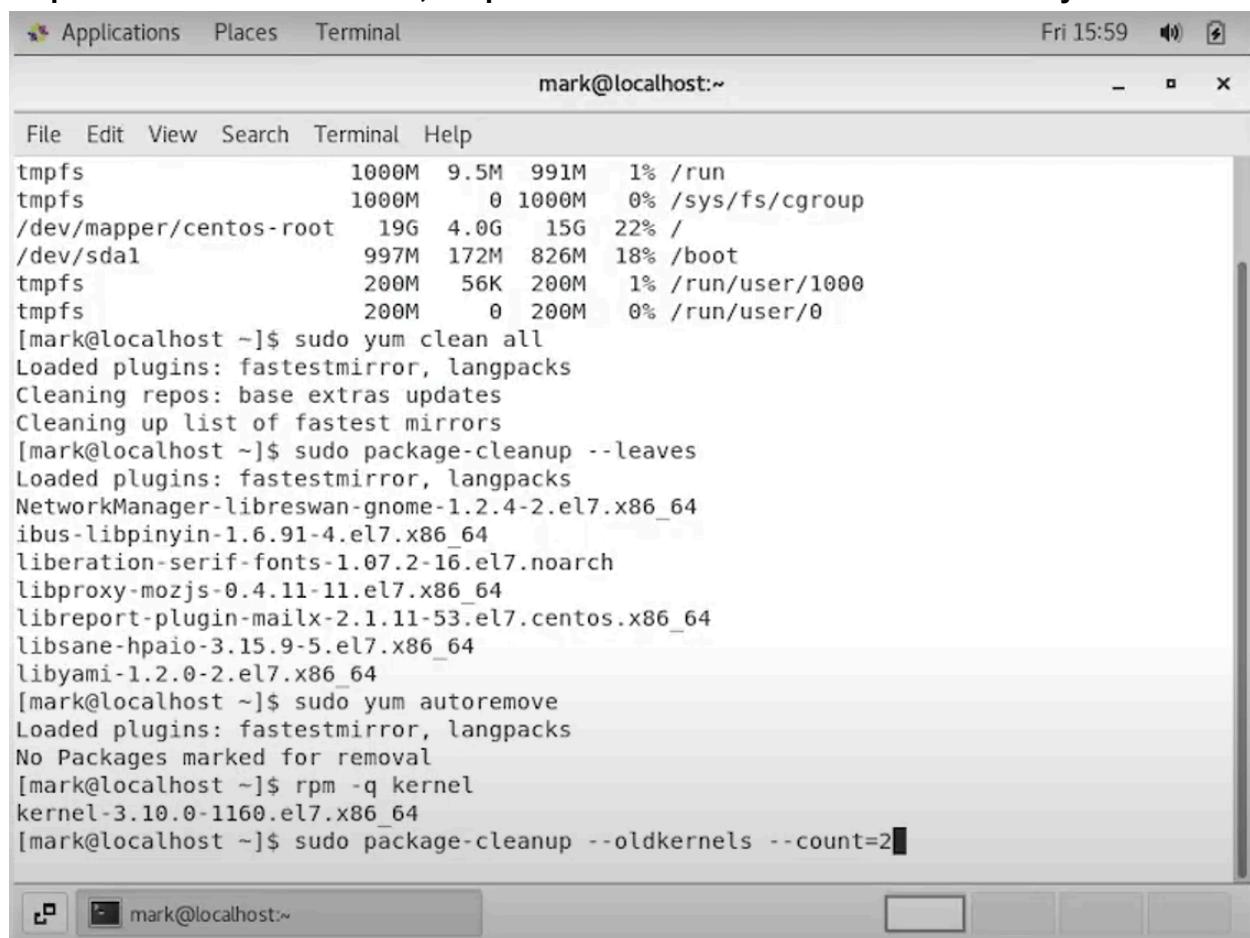
List all installed kernels:



The screenshot shows a terminal window titled "mark@localhost:~". The window contains the following text:

```
File Edit View Search Terminal Help
devtmpfs          983M    0  983M  0% /dev
tmpfs             1000M   0 1000M  0% /dev/shm
tmpfs             1000M  9.5M 991M  1% /run
tmpfs             1000M   0 1000M  0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G 15G  22% /
/dev/sda1         997M 172M 826M 18% /boot
tmpfs             200M   56K 200M  1% /run/user/1000
tmpfs             200M    0 200M  0% /run/user/0
[mark@localhost ~]$ sudo yum clean all
Loaded plugins: fastestmirror, langpacks
Cleaning repos: base extras updates
Cleaning up list of fastest mirrors
[mark@localhost ~]$ sudo package-cleanup --leaves
Loaded plugins: fastestmirror, langpacks
NetworkManager-libreswan-gnome-1.2.4-2.el7.x86_64
ibus-libpinyin-1.6.91-4.el7.x86_64
liberation-serif-fonts-1.07.2-16.el7.noarch
libproxy-mozjs-0.4.11-11.el7.x86_64
libreport-plugin-mailx-2.1.11-53.el7.centos.x86_64
libsane-hpaio-3.15.9-5.el7.x86_64
libyami-1.2.0-2.el7.x86_64
[mark@localhost ~]$ sudo yum autoremove
Loaded plugins: fastestmirror, langpacks
No Packages marked for removal
[mark@localhost ~]$ rpm -q kernel
```

Step 6: To remove old kernels, keep at least the latest two versions for safety:



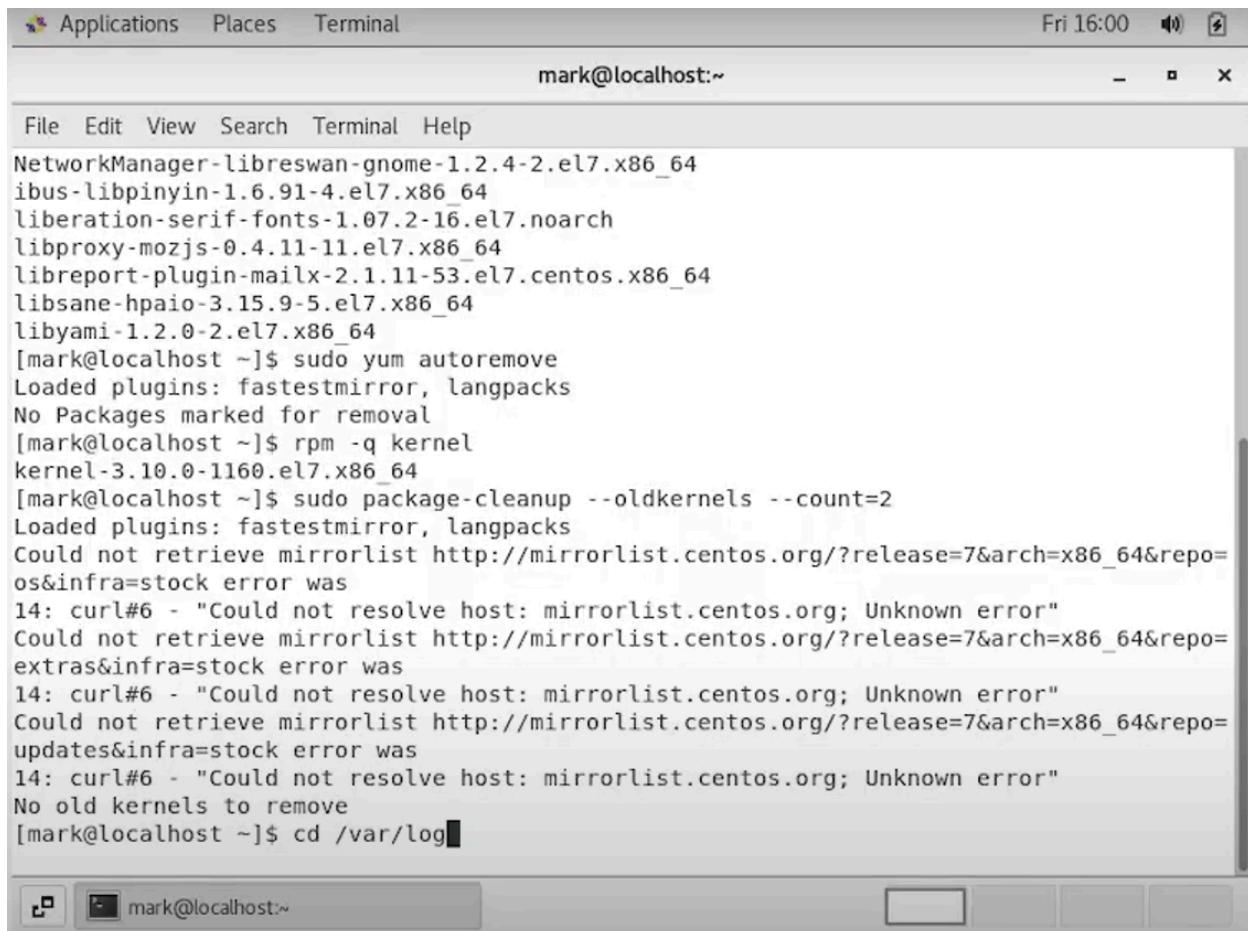
The screenshot shows a terminal window titled "mark@localhost:~". The window contains a command-line session for managing system kernels. It starts with a file system usage report, followed by several commands to clean up old kernels using YUM and RPM.

```
File Edit View Search Terminal Help
tmpfs           1000M  9.5M  991M  1% /run
tmpfs           1000M  0     1000M  0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G  15G  22% /
/dev/sdal      997M  172M  826M  18% /boot
tmpfs           200M   56K   200M  1% /run/user/1000
tmpfs           200M   0     200M  0% /run/user/0
[mark@localhost ~]$ sudo yum clean all
Loaded plugins: fastestmirror, langpacks
Cleaning repos: base extras updates
Cleaning up list of fastest mirrors
[mark@localhost ~]$ sudo package-cleanup --leaves
Loaded plugins: fastestmirror, langpacks
NetworkManager-libreswan-gnome-1.2.4-2.el7.x86_64
ibus-libpinyin-1.6.91-4.el7.x86_64
liberation-serif-fonts-1.07.2-16.el7.noarch
libproxy-mozjs-0.4.11-11.el7.x86_64
libreport-plugin-mailx-2.1.11-53.el7.centos.x86_64
libsane-hpaio-3.15.9-5.el7.x86_64
libyami-1.2.0-2.el7.x86_64
[mark@localhost ~]$ sudo yum autoremove
Loaded plugins: fastestmirror, langpacks
No Packages marked for removal
[mark@localhost ~]$ rpm -q kernel
kernel-3.10.0-1160.el7.x86_64
[mark@localhost ~]$ sudo package-cleanup --oldkernels --count=2
```

Step 7: Clean Up Log Files

System log files can grow large over time. These logs are typically stored in the `/var/log` directory.

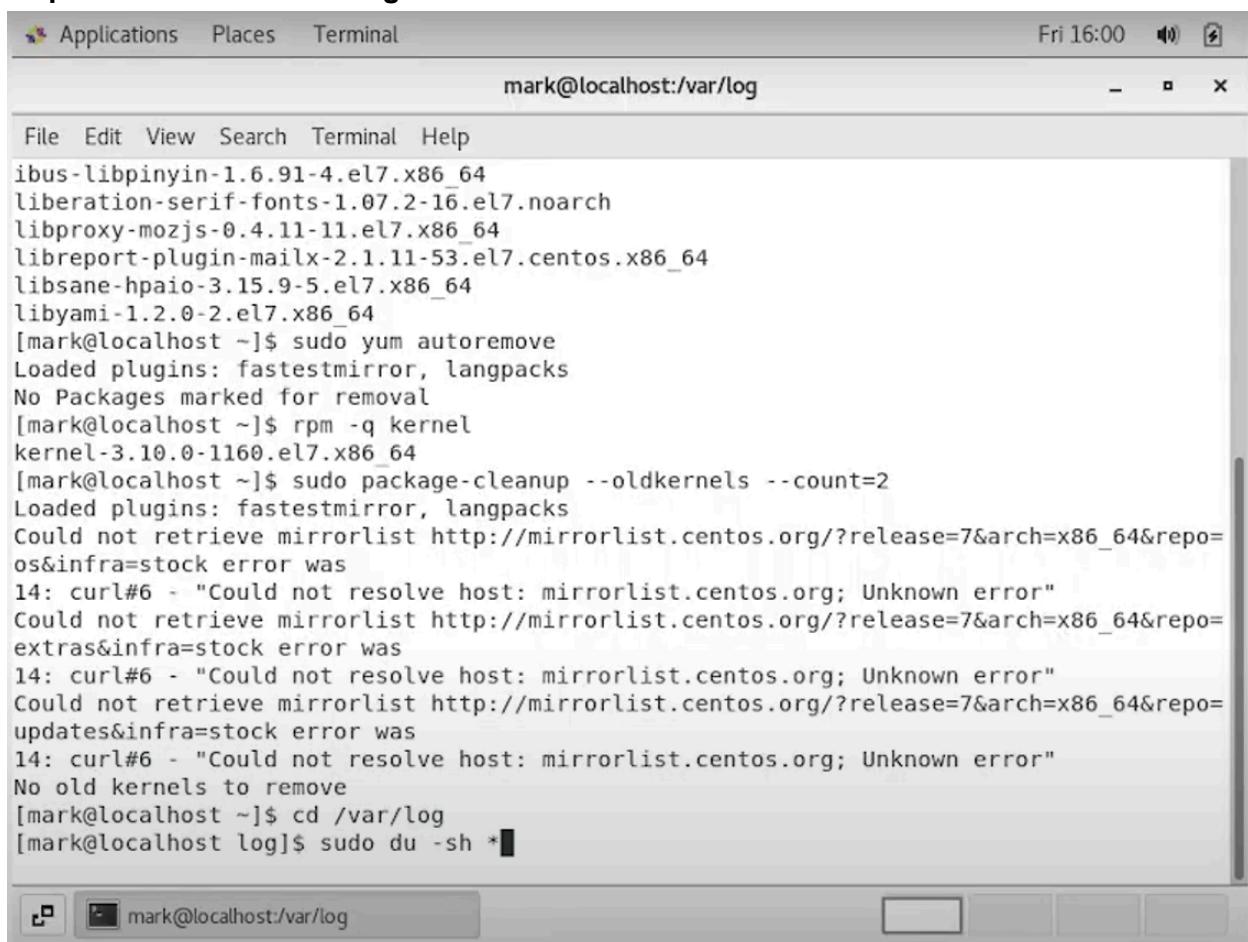
Navigate to the logs directory:



The screenshot shows a terminal window titled "mark@localhost:~". The window contains a command-line session where the user is cleaning up old log files. The session starts with listing several packages, then using sudo yum autoremove to remove loaded plugins, followed by rpm -q kernel to check for old kernels, and finally sudo package-cleanup --oldkernels --count=2 to remove old kernels. The user then changes directory to /var/log.

```
NetworkManager-libreswan-gnome-1.2.4-2.el7.x86_64
ibus-libpinyin-1.6.91-4.el7.x86_64
liberation-serif-fonts-1.07.2-16.el7.noarch
libproxy-mozjs-0.4.11-11.el7.x86_64
libreport-plugin-mailx-2.1.11-53.el7.centos.x86_64
libsane-hpaio-3.15.9-5.el7.x86_64
libyami-1.2.0-2.el7.x86_64
[mark@localhost ~]$ sudo yum autoremove
Loaded plugins: fastestmirror, langpacks
No Packages marked for removal
[mark@localhost ~]$ rpm -q kernel
kernel-3.10.0-1160.el7.x86_64
[mark@localhost ~]$ sudo package-cleanup --oldkernels --count=2
Loaded plugins: fastestmirror, langpacks
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=os&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=extras&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=updates&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
No old kernels to remove
[mark@localhost ~]$ cd /var/log
```

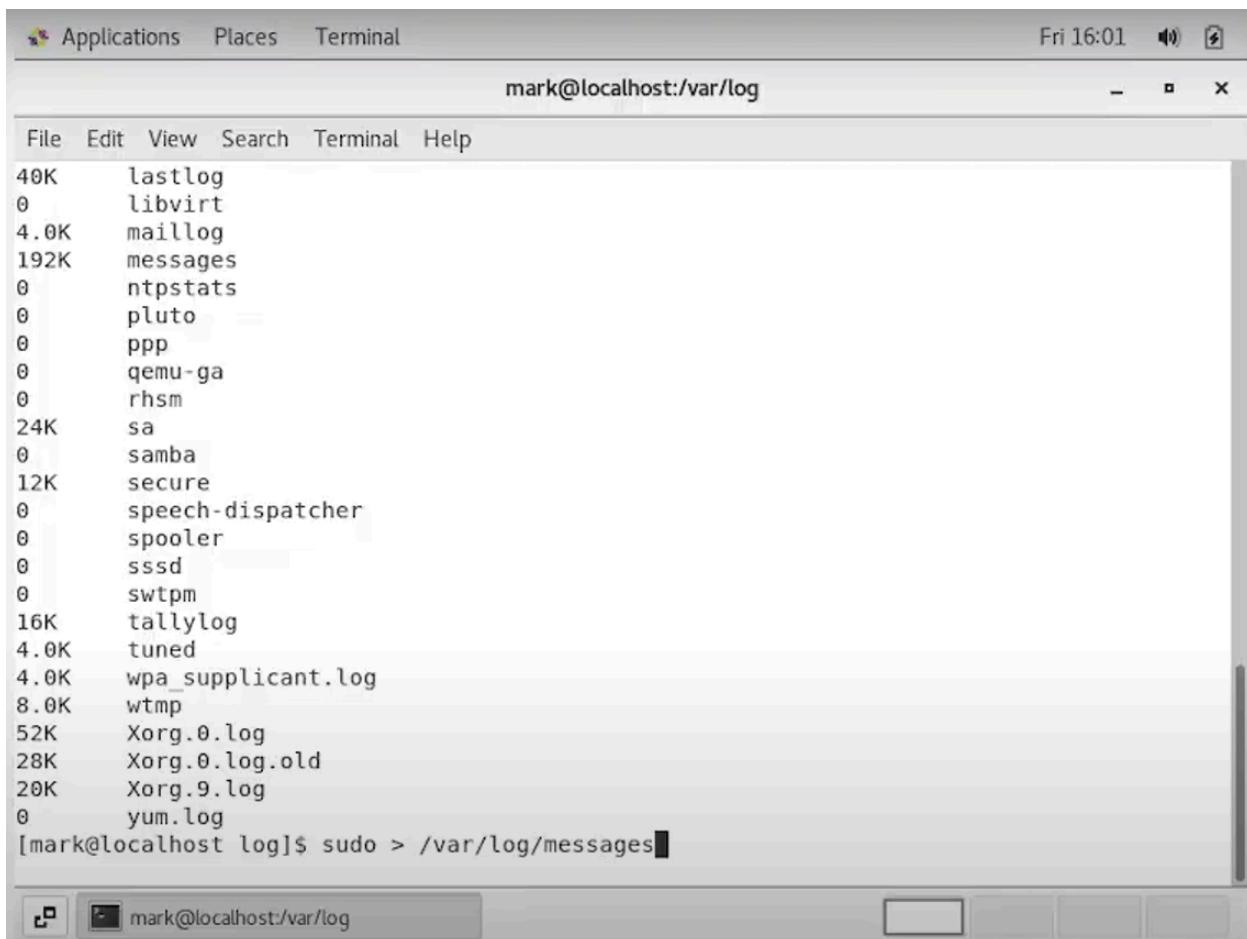
Step 8: Check the size of log files:



The screenshot shows a terminal window titled "mark@localhost:/var/log". The window has a standard Linux desktop interface with a title bar, menu bar, and status bar. The terminal content displays a series of commands run by the user "mark" to check for old kernels and log files.

```
ibus-libpinyin-1.6.91-4.el7.x86_64
liberation-serif-fonts-1.07.2-16.el7.noarch
libproxy-mozjs-0.4.11-11.el7.x86_64
libreport-plugin-mailx-2.1.11-53.el7.centos.x86_64
libsane-hpaio-3.15.9-5.el7.x86_64
libyami-1.2.0-2.el7.x86_64
[mark@localhost ~]$ sudo yum autoremove
Loaded plugins: fastestmirror, langpacks
No Packages marked for removal
[mark@localhost ~]$ rpm -q kernel
kernel-3.10.0-1160.el7.x86_64
[mark@localhost ~]$ sudo package-cleanup --oldkernels --count=2
Loaded plugins: fastestmirror, langpacks
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=os&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=extras&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
Could not retrieve mirrorlist http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=updates&infra=stock error was
14: curl#6 - "Could not resolve host: mirrorlist.centos.org; Unknown error"
No old kernels to remove
[mark@localhost ~]$ cd /var/log
[mark@localhost log]$ sudo du -sh *
```

Step 9: You can clear large logs manually by using > filename, which will truncate the file (but keep it):



The screenshot shows a terminal window titled "mark@localhost:/var/log". The window contains a list of log files with their sizes and names. A command is being typed at the bottom of the window.

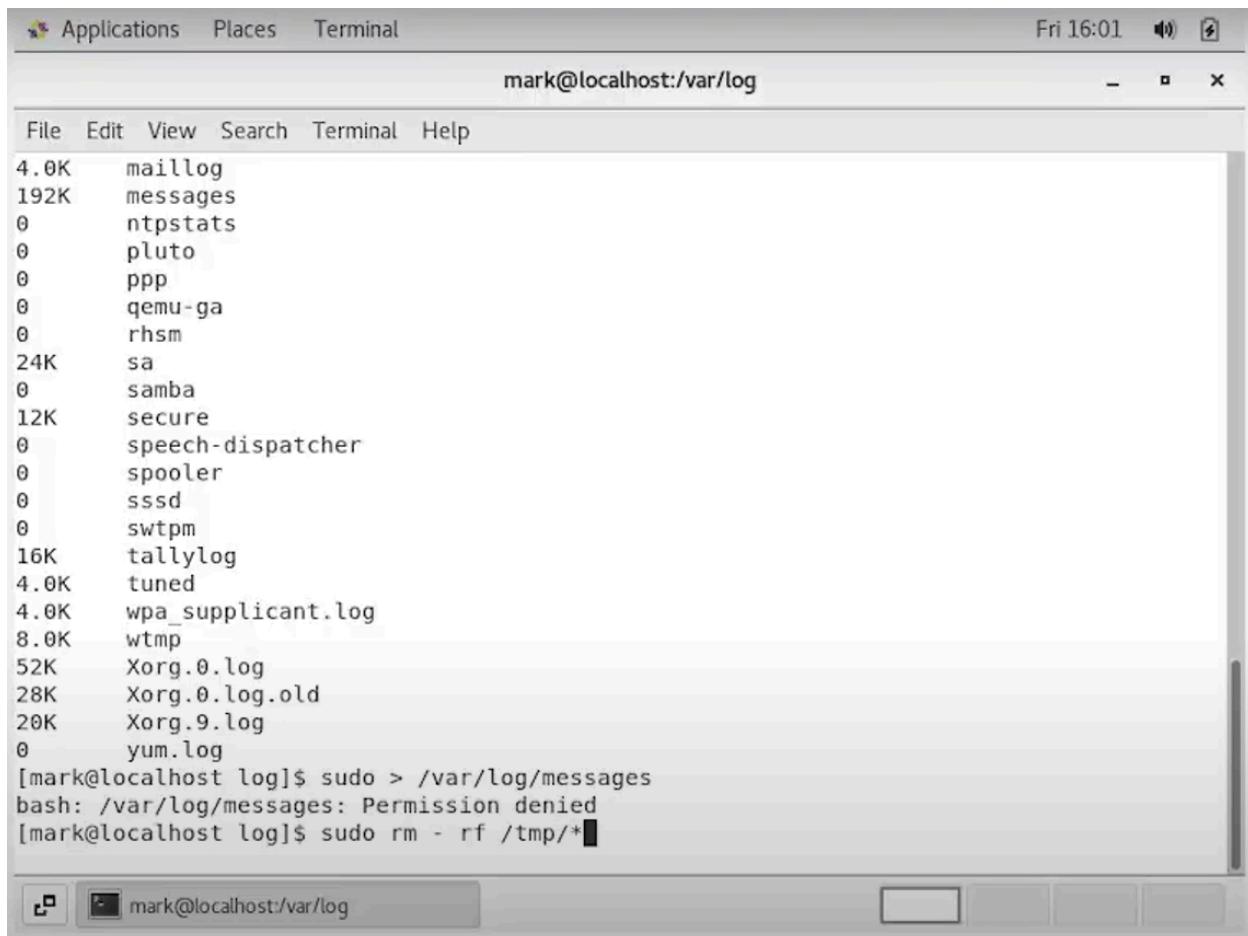
File	Size	Name
40K		lastlog
0		libvirt
4.0K		maillog
192K		messages
0		ntpstats
0		pluto
0		ppp
0		qemu-ga
0		rhsm
24K		sa
0		samba
12K		secure
0		speech-dispatcher
0		spooler
0		sssd
0		swtpm
16K		tallylog
4.0K		tuned
4.0K		wpa_supplicant.log
8.0K		wtmp
52K		Xorg.0.log
28K		Xorg.0.log.old
20K		Xorg.9.log
0		yum.log

[mark@localhost log]\$ sudo > /var/log/messages

Step 10: Remove Temporary Files

Temporary files can accumulate in various directories, such as `/tmp`. To clean these:

Delete the contents of `/tmp`:



The screenshot shows a terminal window titled "mark@localhost:/var/log". The window has a menu bar with File, Edit, View, Search, Terminal, and Help. The title bar shows the user "mark@localhost" and the path "/var/log". The status bar at the bottom shows the terminal icon and the text "mark@localhost:/var/log". The main area of the terminal displays a file listing from the "/var/log" directory. The files listed are: maillog, messages, ntpstats, pluto, ppp, qemu-ga, rhsm, sa, samba, secure, speech-dispatcher, spooler, sssd, swtpm, tallylog, tuned, wpa_supplicant.log, wtmp, Xorg.0.log, Xorg.0.log.old, Xorg.9.log, and yum.log. Below the file listing, there are two command entries: "sudo > /var/log/messages" followed by "bash: /var/log/messages: Permission denied", and "[mark@localhost log]\$ sudo rm - rf /tmp/*".

```
mark@localhost:/var/log
File Edit View Search Terminal Help
4.0K maillog
192K messages
0 ntpstats
0 pluto
0 ppp
0 qemu-ga
0 rhsm
24K sa
0 samba
12K secure
0 speech-dispatcher
0 spooler
0 sssd
0 swtpm
16K tallylog
4.0K tuned
4.0K wpa_supplicant.log
8.0K wtmp
52K Xorg.0.log
28K Xorg.0.log.old
20K Xorg.9.log
0 yum.log
[mark@localhost log]$ sudo > /var/log/messages
bash: /var/log/messages: Permission denied
[mark@localhost log]$ sudo rm - rf /tmp/*
```

Step 11: You can also clean the cache in the home directory:

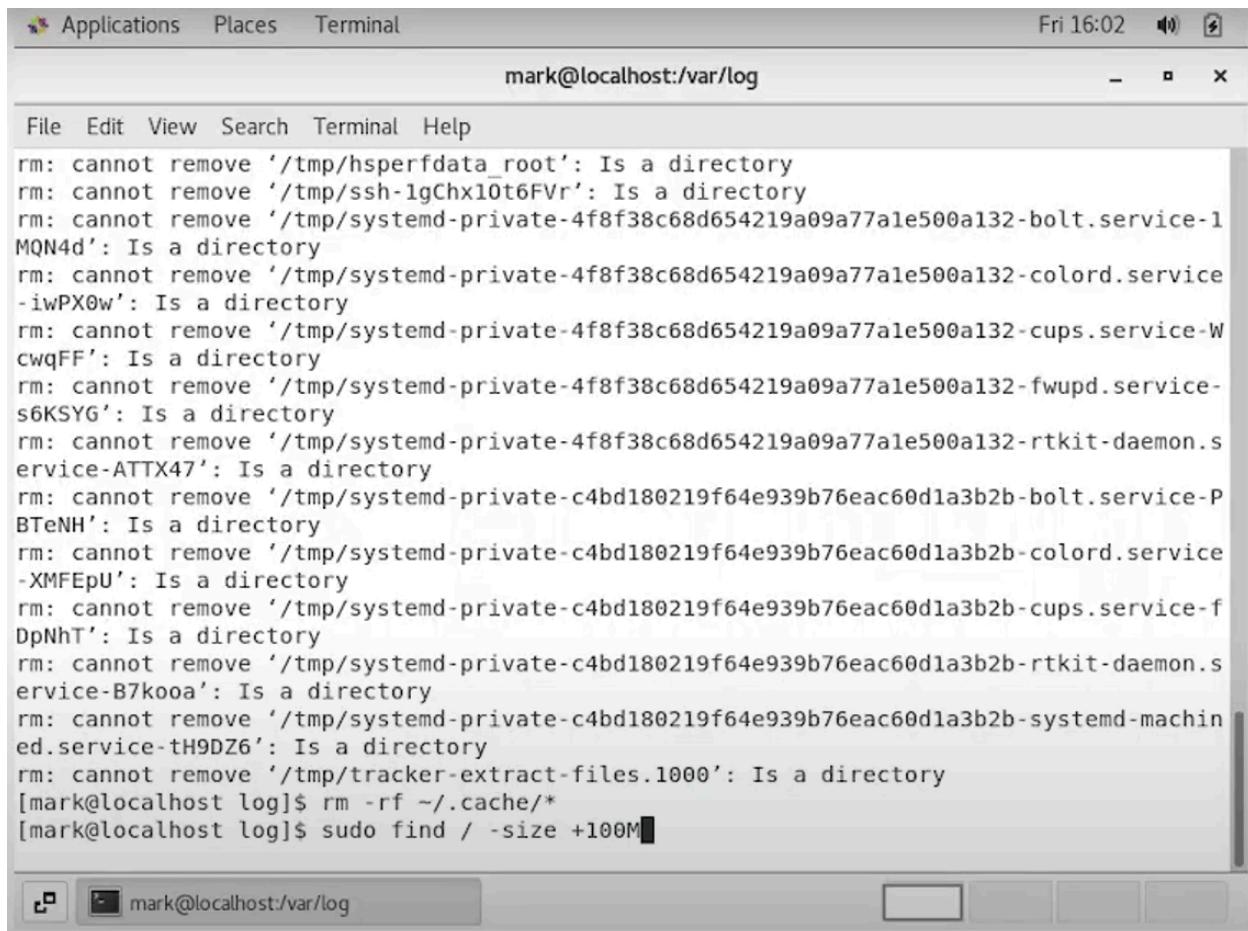
A screenshot of a terminal window titled "mark@localhost:/var/log". The window shows the command "rm -rf ~/.cache/*" being run, which results in numerous errors indicating that many files and directories in the "~/.cache/" directory are either non-existent or are system files. The terminal interface includes a menu bar with File, Edit, View, Search, Terminal, and Help, and a status bar at the bottom.

```
File Edit View Search Terminal Help
rm: cannot remove 'rf': No such file or directory
rm: cannot remove '/tmp/hspferdata_root': Is a directory
rm: cannot remove '/tmp/ssh-1gChx10t6FVr': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-bolt.service-1
MQN4d': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-colord.service
-iwPX0w': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-cups.service-W
cwqFF': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-fwupd.service-
s6KSYG': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-rtkit-daemon.s
ervice-ATTX47': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-bolt.service-P
BTeNH': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-colord.service
-XMFEpU': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-cups.service-f
DpNhT': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-rtkit-daemon.s
ervice-B7kooa': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-systemd-machin
ed.service-th9DZ6': Is a directory
rm: cannot remove '/tmp/tracker-extract-files.1000': Is a directory
[mark@localhost log]$ rm -rf ~/.cache/*
```

Step 12: Find and Remove Large Files

You can search for large files that may be consuming disk space using the `find` command.

To find all files larger than 100MB:



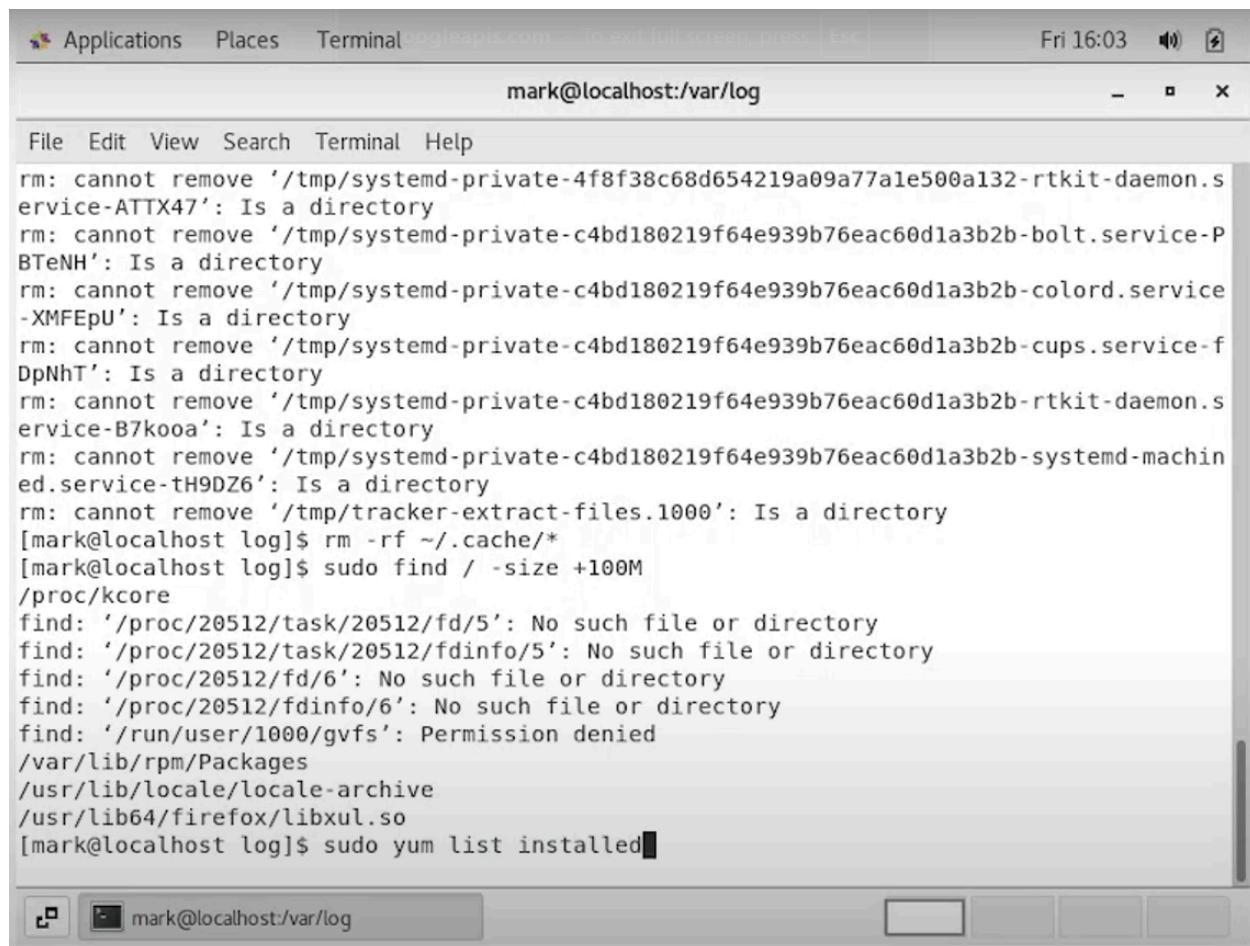
The screenshot shows a terminal window titled "mark@localhost:/var/log". The window has a standard Linux desktop interface with a title bar, menu bar, and status bar. The status bar shows the date and time as "Fri 16:02". The terminal window contains the following text:

```
File Edit View Search Terminal Help
rm: cannot remove '/tmp/hspferddata_root': Is a directory
rm: cannot remove '/tmp/ssh-1gChx10t6FVr': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-bolt.service-1
MQN4d': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-colord.service
-iwPX0w': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-cups.service-W
cwqFF': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-fwupd.service-
s6KSYG': Is a directory
rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-rtkit-daemon.s
ervice-ATTX47': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-bolt.service-P
BTeNH': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-colord.service
-XMFEpU': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-cups.service-f
DpNhT': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-rtkit-daemon.s
ervice-B7kooa': Is a directory
rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-systemd-machin
ed.service-tH9DZ6': Is a directory
rm: cannot remove '/tmp/tracker-extract-files.1000': Is a directory
[mark@localhost log]$ rm -rf ~/.cache/*
[mark@localhost log]$ sudo find / -size +100M
```

The terminal window has a toolbar at the bottom with icons for copy, paste, and other functions. The title bar also displays the terminal path "mark@localhost:/var/log".

Step 13: Uninstall Unused Applications

Unused applications take up valuable space. To list all installed applications:



The screenshot shows a terminal window titled "mark@localhost:/var/log". The window contains a list of commands and their outputs related to system cleanup. The commands include:

- rm: cannot remove '/tmp/systemd-private-4f8f38c68d654219a09a77a1e500a132-rtkit-daemon.service-ATTX47': Is a directory
- rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-bolt.service-PBTeNH': Is a directory
- rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-colord.service-XMFEpU': Is a directory
- rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-cups.service-fDpNhT': Is a directory
- rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-rtkit-daemon.service-B7kooa': Is a directory
- rm: cannot remove '/tmp/systemd-private-c4bd180219f64e939b76eac60d1a3b2b-systemd-machined.service-tH9DZ6': Is a directory
- rm: cannot remove '/tmp/tracker-extract-files.1000': Is a directory
- [mark@localhost log]\$ rm -rf ~/.cache/*
- [mark@localhost log]\$ sudo find / -size +100M
- /proc/kcore
- find: '/proc/20512/task/20512/fd/5': No such file or directory
- find: '/proc/20512/task/20512/fdinfo/5': No such file or directory
- find: '/proc/20512/fd/6': No such file or directory
- find: '/proc/20512/fdinfo/6': No such file or directory
- find: '/run/user/1000/gvfs': Permission denied
- /var/lib/rpm/Packages
- /usr/lib/locale/locale-archive
- /usr/lib64/firefox/libxul.so
- [mark@localhost log]\$ sudo yum list installed

Step 14: Verify Free Space

After performing the cleanup, check the disk space again to verify that space has been freed:

Applications Places Terminal Fri 16:04

mark@localhost:/var/log

File Edit View Search Terminal Help

```
packages for the previous distribution release still work).

3. Run the command with the repository temporarily disabled
   yum --disablerepo=<repoid> ...

4. Disable the repository permanently, so yum won't use it by default. Yum
   will then just ignore the repository until you permanently enable it
   again or use --enablerepo for temporary usage:

   yum-config-manager --disable <repoid>
   or
   subscription-manager repos --disable=<repoid>

5. Configure the failing repository to be skipped, if it is unavailable.
   Note that yum will try to contact the repo. when it runs most commands,
   so will have to try and fail each time (and thus, yum will be much
   slower). If it is a very temporary problem though, this is often a nice
   compromise:

   yum-config-manager --save --setopt=<repoid>.skip_if_unavailable=true

Cannot find a valid baseurl for repo: base/7/x86_64
[mark@localhost log]$ dh -h
bash: dh: command not found...
[mark@localhost log]$ df -h
```

The screenshot shows a terminal window titled "mark@localhost:/var/log". The window includes a menu bar with File, Edit, View, Search, Terminal, Help, and a toolbar with icons for Applications, Places, and Terminal. The terminal content displays several command-line entries:

```
File Edit View Search Terminal Help
or
subscription-manager repos --disable=<repoid>

5. Configure the failing repository to be skipped, if it is unavailable.
Note that yum will try to contact the repo. when it runs most commands,
so will have to try and fail each time (and thus. yum will be much
slower). If it is a very temporary problem though, this is often a nice
compromise:

yum-config-manager --save --setopt=<repoid>.skip_if_unavailable=true

Cannot find a valid baseurl for repo: base/7/x86_64
[mark@localhost log]$ dh -h
bash: dh: command not found...
[mark@localhost log]$ df -h
Filesystem           Size   Used Avail Use% Mounted on
/devtmpfs            983M    0  983M  0% /dev
tmpfs                1000M   0 1000M  0% /dev/shm
tmpfs                1000M  9.5M 991M  1% /run
tmpfs                1000M   0 1000M  0% /sys/fs/cgroup
/dev/mapper/centos-root  19G  4.0G  15G 22% /
/dev/sda1             997M 172M  826M 18% /boot
tmpfs                200M   56K 200M  1% /run/user/1000
tmpfs                200M    0 200M  0% /run/user/0
[mark@localhost log]$
```

Defragmentation (if applicable)

- For students using a Windows virtual machine, run the disk defragmentation tool.
- Explain what defragmentation does and why it is important.

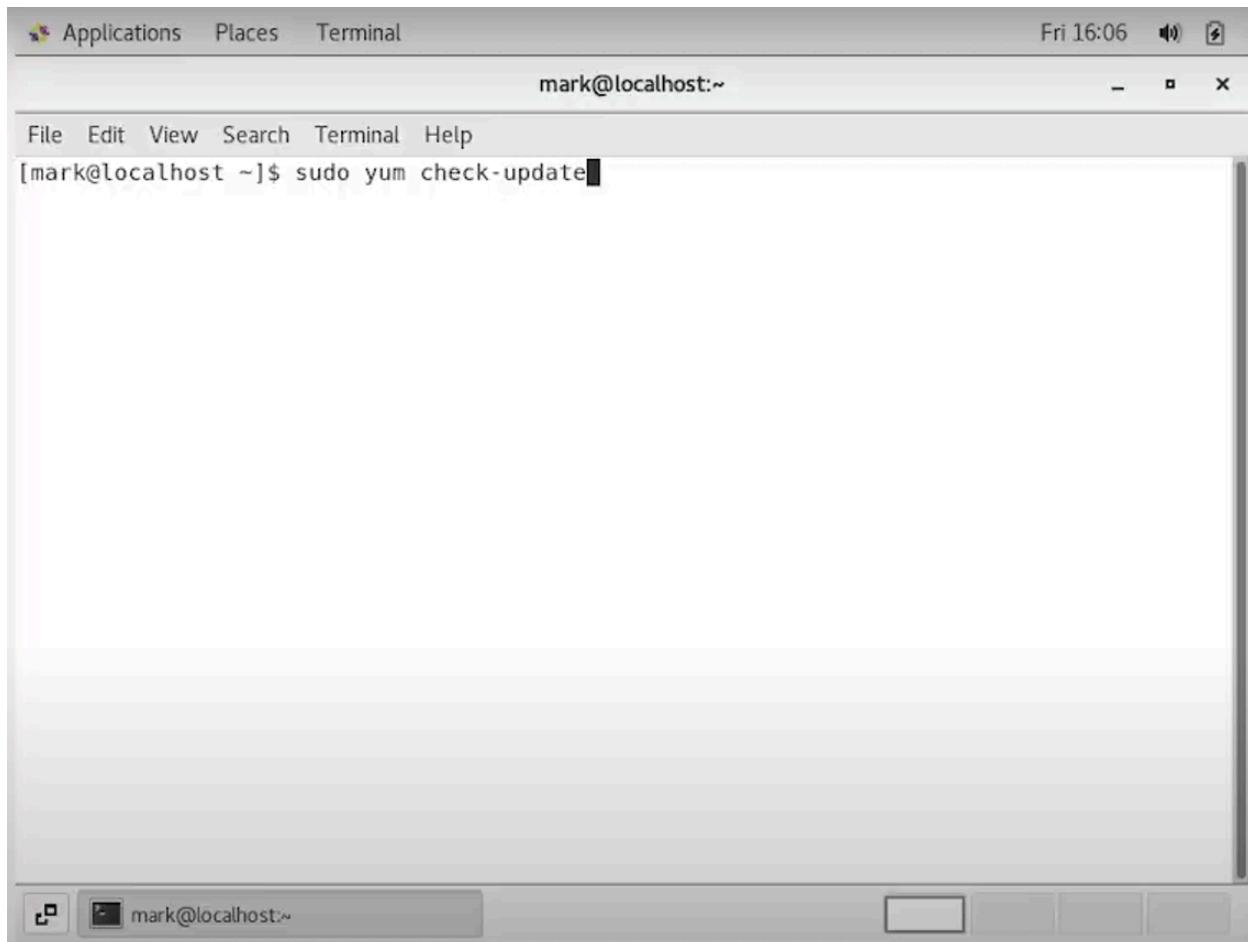
It basically refers to rearranging data files that are defragmented on a hard drive so that related pieces of files are closer together. In this way, the amount of time taken by the read/write head of the drive to locate and access the data decreases significantly, thus the system performs better. The process of proper defragmentation therefore works well since it optimizes the disk space used, enhances the speed at which data retrieval happens, and prolongs the life of the hard drive by reducing unnecessary movement of mechanical components.

Update Software

- Check for and install any available operating system updates.
- Document the update process and any changes made to the system.

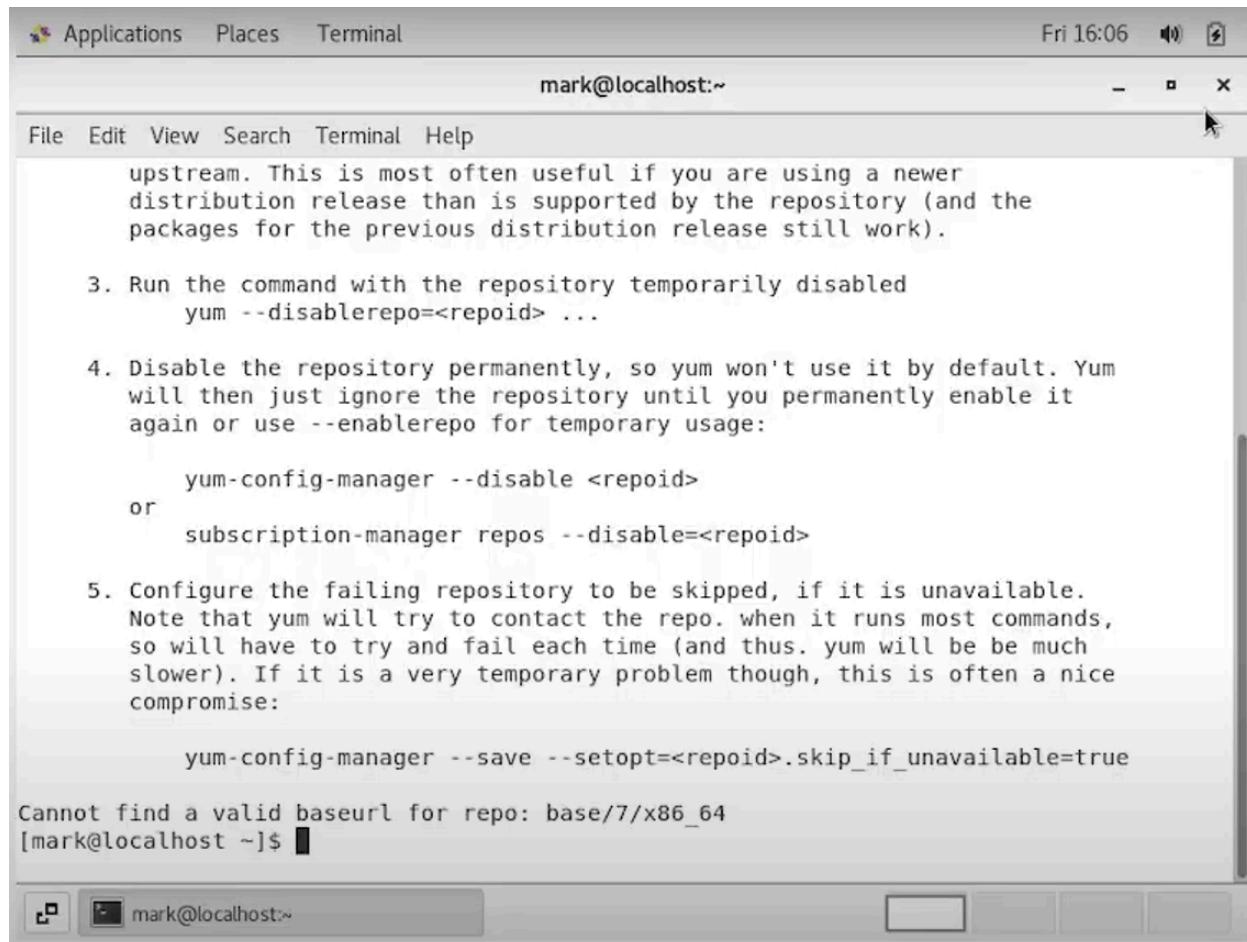
Step 1: Check for Updates

First, update the local package repository information to ensure you're working with the most recent versions available. To do this, open a terminal and run the following command:

A screenshot of a Linux desktop environment, likely Kali Linux, showing a terminal window. The terminal window has a title bar with "Applications", "Places", and "Terminal" buttons, and a status bar showing "Fri 16:06". The main window title is "mark@localhost:~". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The command line shows "[mark@localhost ~]\$ sudo yum check-update" entered. The terminal is currently empty of output.

```
mark@localhost:~$ sudo yum check-update
```

No visible updates are available



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window has a title bar "mark@localhost:~" and a menu bar "File Edit View Search Terminal Help". The main area of the terminal contains text from a guide about handling failing repositories:

upstream. This is most often useful if you are using a newer distribution release than is supported by the repository (and the packages for the previous distribution release still work).

3. Run the command with the repository temporarily disabled
yum --disablerepo=<repoid> ...

4. Disable the repository permanently, so yum won't use it by default. Yum will then just ignore the repository until you permanently enable it again or use --enablerepo for temporary usage:

yum-config-manager --disable <repoid>
or
subscription-manager repos --disable=<repoid>

5. Configure the failing repository to be skipped, if it is unavailable. Note that yum will try to contact the repo. when it runs most commands, so will have to try and fail each time (and thus, yum will be much slower). If it is a very temporary problem though, this is often a nice compromise:

yum-config-manager --save --setopt=<repoid>.skip_if_unavailable=true

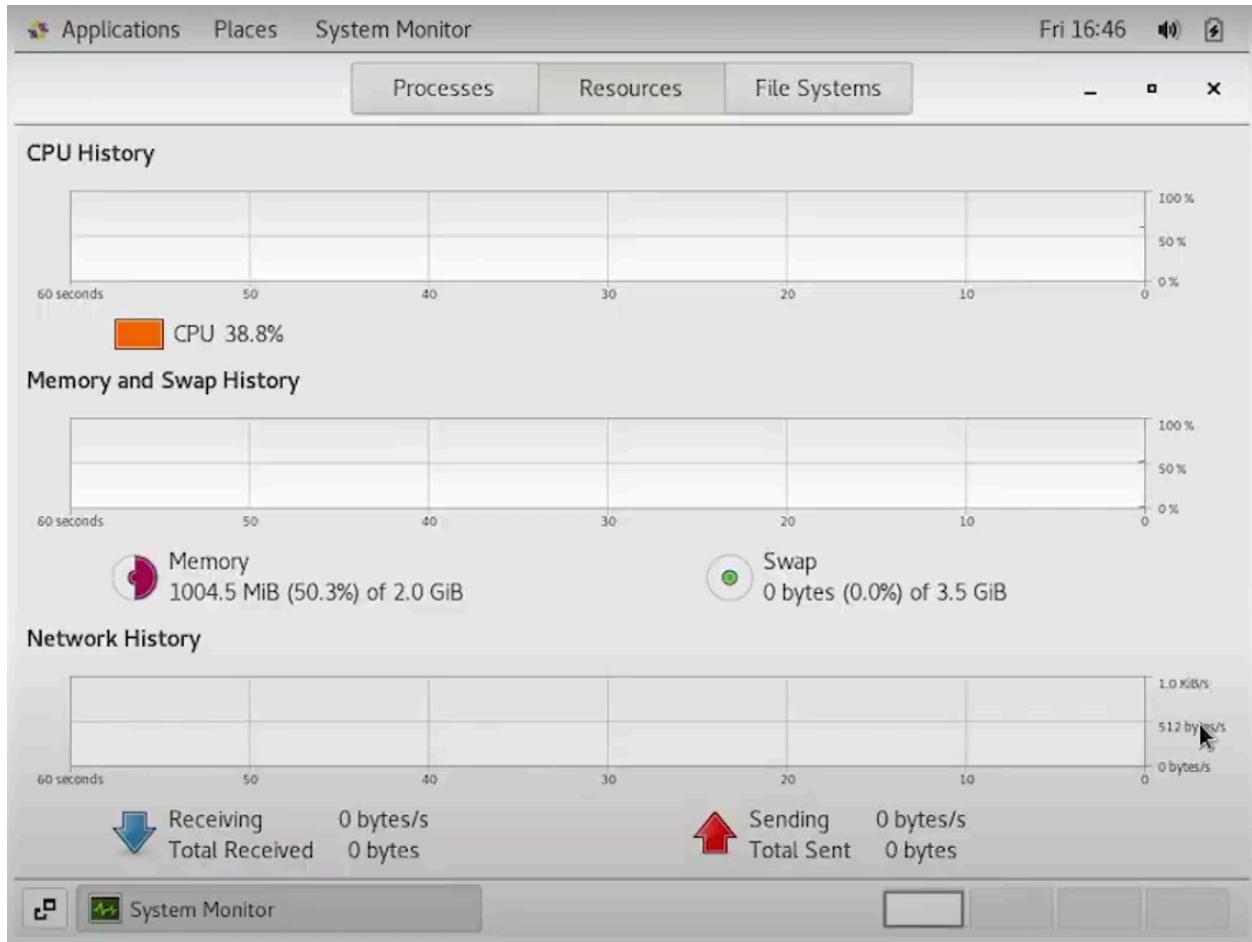
```
Cannot find a valid baseurl for repo: base/7/x86_64
[mark@localhost ~]$
```

System Monitoring Tasks

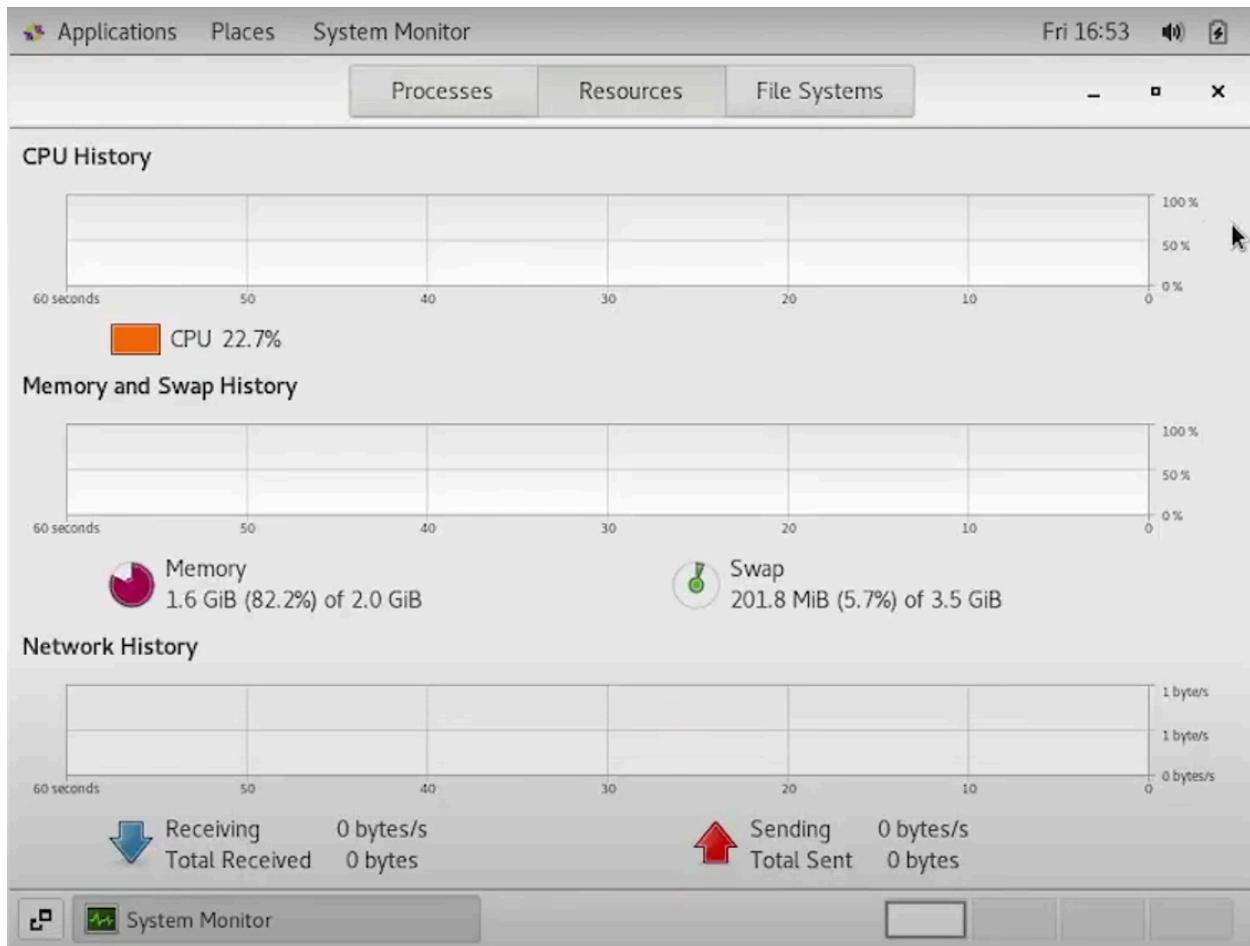
Monitor System Performance

- Use the Task Manager (Windows) or System Monitor (Linux) to observe CPU, memory, and disk usage.
- Take screenshots of the performance metrics.

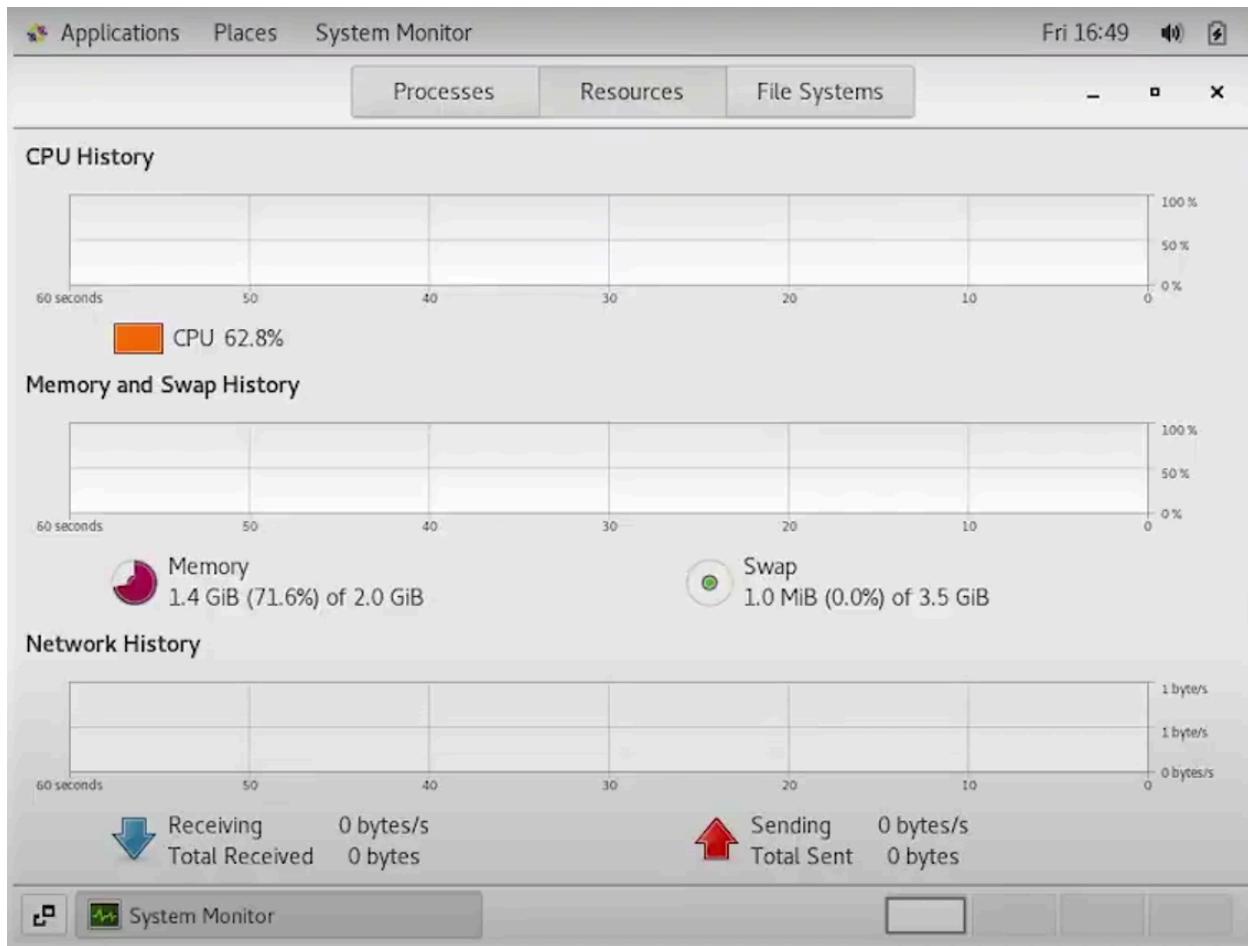
AdminUser:



StandardUser:



GuestUser:



Analyze Resource Usage (Report)

- Write a brief report (300-500 words) summarizing the performance metrics observed, including any findings about how different user accounts impact system performance.

The system performance of three user accounts on a Linux machine—administrator, standard, and guest—showed clear differences in how resources were used. The data highlights how CPU, memory, and swap space are managed differently depending on the type of user and the tasks being performed.

The administrator account had relatively low resource usage. CPU usage was 38.8%, while memory usage was 1004.5 MiB, or 50.3% of the 2.0 GiB available. No swap space was in use, and there was no network activity. This suggests that the administrator account was not running any resource-heavy tasks at the time. This is typical for an account used for system management, where fewer programs or processes run simultaneously. The system was lightly loaded, reflecting the administrative focus of this account.

The standard user account showed the highest CPU usage at 62.8%. Memory usage was also higher, at 1.4 GiB or 71.6% of the available memory. Swap usage remained low at 1.0 MiB, but overall, the system was working harder. The high CPU and memory usage suggests the standard user was running more demanding tasks, possibly multiple programs or software requiring more processing power. This matches the typical use of a standard user account for everyday work, which often involves more active applications.

The guest user account had the highest memory usage, at 1.6 GiB or 82.2% of the total available memory. Swap space usage increased to 201.8 MiB, meaning the system had to offload some memory to disk. However, CPU usage was lower at 22.7%, indicating that the guest was not running very processor-heavy tasks. The high memory and swap usage could be due to the temporary nature of guest accounts, where certain processes might be run in the background, leading to high memory demand without heavy CPU use.

There was no network activity in any of the accounts, with 0 bytes sent or received across the board. This indicates that all system activity was focused on local tasks during this time. The data shows clear differences in how the system allocates resources based on the user account type. The standard user placed the heaviest load on the CPU, likely due to running more complex tasks, while the guest user used the most memory, possibly due to temporary processes. The administrator account had the lightest resource usage overall, as expected for a system management role. These findings highlight how Linux handles resource allocation based on user roles and usage patterns.