UNIVERSITY INSTITUTE of COMPUTING
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PROJECT REPORT

ON

"SHELL SCRIPTING AUTOMATION"

Program Name: BCA

LINUX ADMINISTRATION LAB

23 CAP-305

SUBMITED BY:

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Semester: 5th

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Desigination: Assistant Professor **sign: _____**

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BONAFIDE CERTIFICATE

Certified that this project report "**SHELL SCRIPTING AUTOMATION**" is the Bonafide work of" **PRIDHI PUJARA"** under UID **"23BCA10799"** who carried out the project work under my supervision **.**

……

SIGNATURE

UIC DEPARTMENT

ASSISTANT PROFESSOR

RAJAT KAPOOR

SHELL SCRIPTING AUTOMATION

1. Aim of the Project:

The project aims to create automated shell scripts to handle routine Linux administrative tasks. It helps reduce manual work, save time, and prevent human errors during system maintenance.

2. Performing task-

The project performs automation of key system tasks such as file backup, cleanup, and monitoring. These scripts run automatically, ensuring smooth, fast, and efficient system management.

Introduction:

Linux is widely recognized for its stability, security, and open-source flexibility, making it a preferred choice for enterprise servers and system environments. However, system administration in Linux often involves executing repetitive and time-consuming commands such as file management, process monitoring, software updates, and data backups. To overcome these challenges, shell scripting serves as an effective automation tool. A shell script consists of a sequence of commands written in a file that can be executed automatically by the shell, reducing the need for manual intervention. Through this automation, administrators can improve efficiency, maintain consistency, and schedule essential maintenance tasks to run periodically. In this project, a series of shell scripts were developed to automate key system administration functions. These scripts were tested successfully on Ubuntu 22.04 and integrated with cron jobs to ensure scheduled and reliable execution.

Objectives:

1. To gain a clear understanding of the Linux shell environment and the fundamentals of shell scripting.

2. To automate essential system administration tasks such as data backup, system updates, and log file cleanup.

3. To effectively utilize Bash scripting concepts like variables, loops, and conditional statements for automation.

4. To develop reusable and easily customizable shell scripts for various administrative purposes.

5. To improve overall productivity and efficiency by minimizing manual effort through automation.

Tools and Technologies Used

- **Operating System:** Ubuntu / Kali Linux
- **Shell Used:** Bash (Bourne Again Shell)
- **Editor:** Nano, Vim, or Visual Studio Code
- **Scheduler:** Cron Jobs
- **Commands & Utilities:** echo, grep, awk, tar, df, du, chmod, rsync, find, etc.
- **Testing Environment:** Terminal / Command-line Interface

3. Steps Include :

S1) Identify repetitive administrative tasks (e.g., backup, cleanup, report generation).
S2) Write a shell script using Bash syntax for each task.
S3) Add permissions using chmod +x scriptname.sh.

S4) Execute and test the script in terminal.
S5) Schedule the script automatically using crontab -e.
S6) Log the results and verify successful automation.

4. Algorithm / Logic / Flow chart:

1. Start
2. Accept input parameters if needed (e.g., source path)
3. Define destination folder for output or logs
4. Check if required directories exist; if not, create them
5. Execute Linux commands for automation
6. Save output messages in a log file
7. Display completion message
8. End

Example Flow:

START → Define Task → Write Script → Grant Permission → Execute → Verify Output → Schedule via Cron → E

5. Code Overview:

1. #!/bin/bash
2. # system_maintenance_automation.sh
3. # Automates server setup (Apache, NGINX, MySQL, DNS, FTP) and system maintenance tasks.

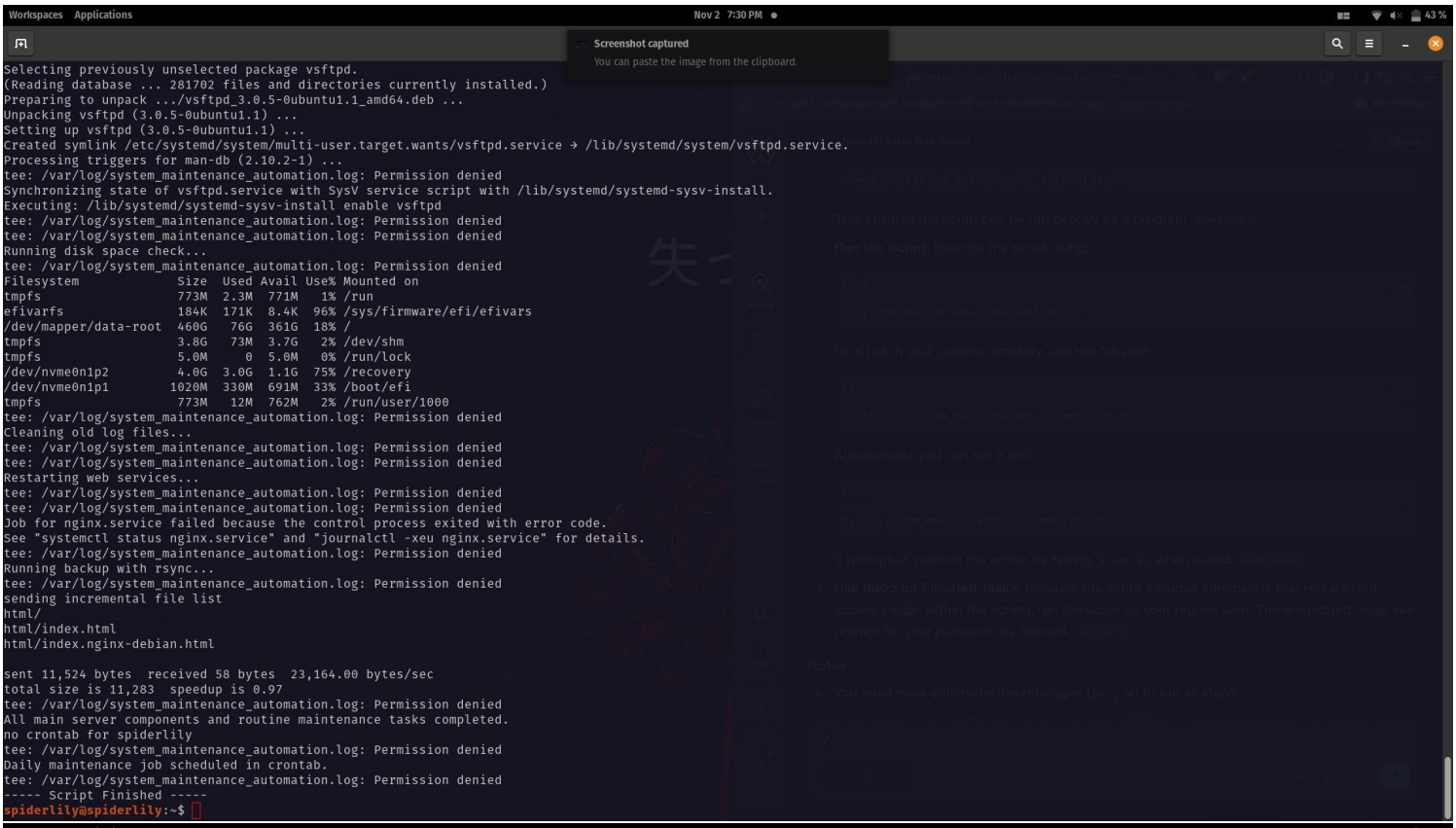
```
4.
5. LOG="/var/log/system_maintenance_automation.log"
6. echo "----- System Maintenance Automation -----" | tee -a $LOG
7.
8.          # Confirm
9.          read -p "Proceed with full system setup and maintenance
            automation? (y/n) " confirm
10.         if [[ $confirm != [yY] ]]; then
11.         echo "Aborting script." | tee -a $LOG
12.         exit 1
13.         fi
14.
15.     # Update packages
16.     echo "Updating packages..." | tee -a $LOG
17.     sudo apt update -y | tee -a $LOG
18.
19.     # Apache Installation
20.     echo "Installing Apache..." | tee -a $LOG
21.     sudo apt install apache2 -y | tee -a $LOG
22.     sudo systemctl enable apache2 | tee -a $LOG
23.     sudo systemctl start apache2 | tee -a $LOG
24.     sudo chown -R www-data:www-data /var/www/html | tee -a $LOG
```

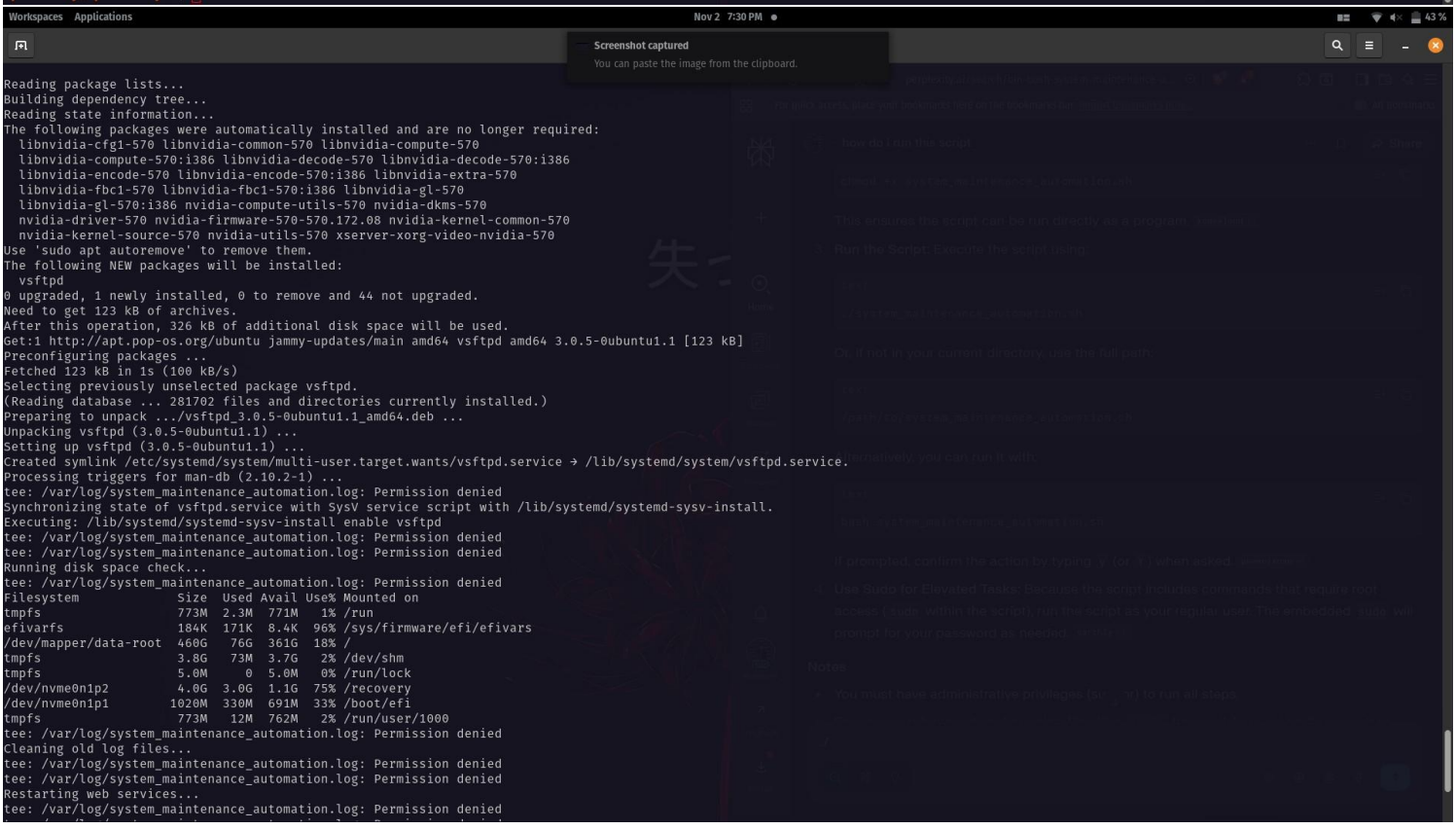
```
sudo chmod -R 755 /var/www/html | tee -a $LOG

# NGINX Installation
echo "Installing NGINX..." | tee -a $LOG
sudo apt install nginx -y | tee -a $LOG
sudo systemctl enable nginx | tee -a $LOG
sudo systemctl start nginx | tee -a $LOG

# MySQL Installation and Secure Setup
echo "Installing MySQL..." | tee -a $LOG
sudo apt install mysql-server -y | tee -a $LOG
sudo systemctl enable mysql | tee -a $LOG
sudo systemctl start mysql | tee -a $LOG
echo -e "\nY\npassword123\npassword123\nY\nY\nY\nY\n" | sudo mysql_secure_installation | tee -a $LOG

# DNS Server (Bind9) Installation
echo "Installing Bind9 DNS server..." | tee -a $LOG
sudo apt install bind9 -y | tee -a $LOG
sudo systemctl enable bind9 | tee -a $LOG
sudo systemctl start bind9 | tee -a $LOG
```

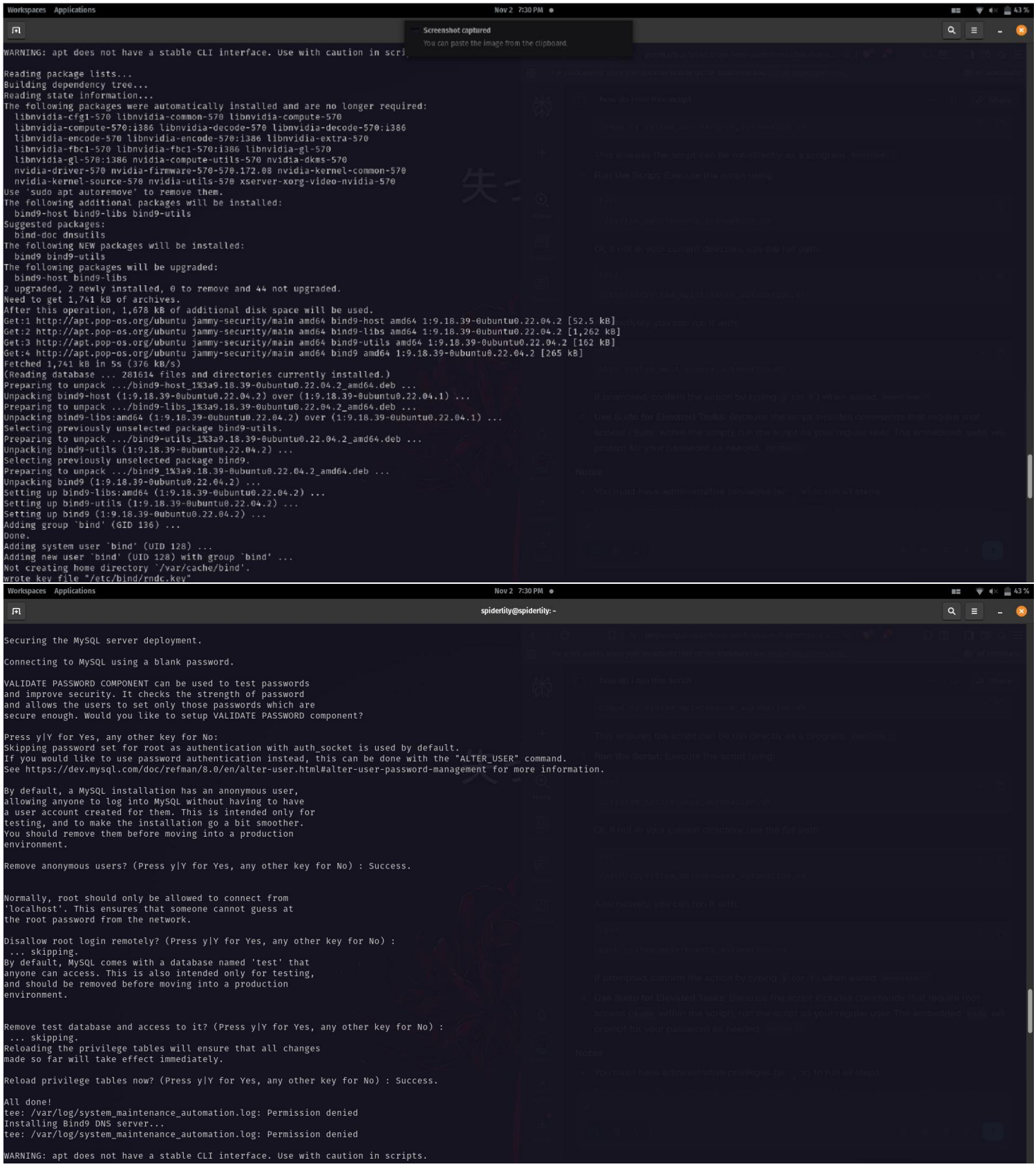
```
# FTP Server (vsftpd) Installation
echo "Installing FTP server..." | tee -a $LOG
sudo apt install vsftpd -y | tee -a $LOG
sudo systemctl enable vsftpd | tee -a $LOG
sudo systemctl start vsftpd | tee -a $LOG

# System Maintenance Tasks
echo "Running disk space check..." | tee -a $LOG
df -h | tee -a $LOG

echo "Cleaning old log files..." | tee -a $LOG
sudo find /var/log/ -type f -name "*.log" -mtime +30 -delete | tee -a $LOG
echo "Restarting web services..." | tee -a $LOG
sudo systemctl restart apache2 | tee -a $LOG
sudo systemctl restart nginx | tee -a $LOG

echo "Running backup with rsync..." | tee -a $LOG
sudo mkdir -p /backup/apache_www_backup
sudo rsync -av /var/www/html /backup/apache_www_backup/ | tee -a $LOG
```

```
echo "All main server components and routine maintenance tasks completed." | tee -a $LOG

# Scheduling daily maintenance (add to crontab)
CRONJOB="0 0 * * * /bin/bash $(pwd)/system_maintenance_automation.sh"
(crontab -l ; echo "$CRONJOB") | sort - | uniq - | crontab -
echo "Daily maintenance job scheduled in crontab." | tee -a $LOG

# Send report (requires mailutils/mailx configured)
# Uncomment the next line after configuring email
# mailx -a $LOG -s "Daily System Maintenance Report" sysadmin@example.com

echo "----- Script Finished -----" | tee -a $LOG
```

6 . Output: (Screenshots) :


Workspaces Applications
Nov 2 7:30 PM
43 %
Screenshot captured
You can paste the image from the clipboard.
Selecting previously unselected package vsftpd.
(Reading database ... 281702 files and directories currently installed.)
Preparing to unpack .../vsftpd_3.0.5-0ubuntu1.1_amd64.deb ...
Unpacking vsftpd (3.0.5-0ubuntu1.1) ...
Setting up vsftpd (3.0.5-0ubuntu1.1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /lib/systemd/system/vsftpd.service.
Processing triggers for man-db (2.10.2-1) ...
tee: /var/log/system_maintenance_automation.log: Permission denied
Synchronizing state of vsftpd.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable vsftpd
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Running disk space check...
tee: /var/log/system_maintenance_automation.log: Permission denied
Filesystem Size Used Avail Use% Mounted on
tmpfs 773M 2.3M 771M 1% /run
efivarfs 184K 171K 8.4K 96% /sys/firmware/efi/efivars
/dev/mapper/data-root 460G 76G 361G 18% /
tmpfs 3.8G 73M 3.7G 2% /dev/shm
tmpfs 5.0M 0 5.0M 0% /run/lock
/dev/nvme0n1p2 4.0G 3.0G 1.1G 75% /recovery
/dev/nvme0n1p1 1020M 330M 691M 33% /boot/efi
tmpfs 773M 12M 762M 2% /run/user/1000
tee: /var/log/system_maintenance_automation.log: Permission denied
Cleaning old log files...
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Restarting web services...
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Job for nginx.service failed because the control process exited with error code.
See "systemctl status nginx.service" and "journalctl -xeu nginx.service" for details.
tee: /var/log/system_maintenance_automation.log: Permission denied
Running backup with rsync...
tee: /var/log/system_maintenance_automation.log: Permission denied
sending incremental file list
html/
html/index.html
html/index.nginx-debian.html
sent 11,524 bytes received 58 bytes 23,164.00 bytes/sec
total size is 11,283 speedup is 0.97
tee: /var/log/system_maintenance_automation.log: Permission denied
All main server components and routine maintenance tasks completed.
no crontab for spiderlily
tee: /var/log/system_maintenance_automation.log: Permission denied
Daily maintenance job scheduled in crontab.
tee: /var/log/system_maintenance_automation.log: Permission denied
----- Script Finished -----
spiderlily@spiderlily:~$


Workspaces Applications
Nov 2 7:30 PM
43 %
Screenshot captured
You can paste the image from the clipboard.
Reading package lists...
Building dependency tree...
Reading state information...
The following packages were automatically installed and are no longer required:
libnvidia-cfg1-570 libnvidia-common-570 libnvidia-compute-570
libnvidia-compute-570:i386 libnvidia-decode-570 libnvidia-decode-570:i386
libnvidia-encode-570 libnvidia-encode-570:i386 libnvidia-extra-570
libnvidia-fbc1-570 libnvidia-fbc1-570:i386 libnvidia-gl-570
libnvidia-gl-570:i386 nvidia-compute-utils-570 nvidia-dkms-570
nvidia-driver-570 nvidia-firmware-570-570.172.08 nvidia-kernel-common-570
nvidia-kernel-source-570 nvidia-utils-570 xserver-xorg-video-nvidia-570
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
vsftpd
0 upgraded, 1 newly installed, 0 to remove and 44 not upgraded.
Need to get 123 kB of archives.
After this operation, 326 kB of additional disk space will be used.
Get:1 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 vsftpd amd64 3.0.5-0ubuntu1.1 [123 kB]
Preconfiguring packages ...
Fetched 123 kB in 1s (100 kB/s)
Selecting previously unselected package vsftpd.
(Reading database ... 281702 files and directories currently installed.)
Preparing to unpack .../vsftpd_3.0.5-0ubuntu1.1_amd64.deb ...
Unpacking vsftpd (3.0.5-0ubuntu1.1) ...
Setting up vsftpd (3.0.5-0ubuntu1.1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /lib/systemd/system/vsftpd.service.
Processing triggers for man-db (2.10.2-1) ...
tee: /var/log/system_maintenance_automation.log: Permission denied
Synchronizing state of vsftpd.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable vsftpd
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Running disk space check...
tee: /var/log/system_maintenance_automation.log: Permission denied
Filesystem Size Used Avail Use% Mounted on
tmpfs 773M 2.3M 771M 1% /run
efivarfs 184K 171K 8.4K 96% /sys/firmware/efi/efivars
/dev/mapper/data-root 460G 76G 361G 18% /
tmpfs 3.8G 73M 3.7G 2% /dev/shm
tmpfs 5.0M 0 5.0M 0% /run/lock
/dev/nvme0n1p2 4.0G 3.0G 1.1G 75% /recovery
/dev/nvme0n1p1 1020M 330M 691M 33% /boot/efi
tmpfs 773M 12M 762M 2% /run/user/1000
tee: /var/log/system_maintenance_automation.log: Permission denied
Cleaning old log files...
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Restarting web services...
tee: /var/log/system_maintenance_automation.log: Permission denied



```
Workspaces  Applications                    Nov 2  7:30 PM                    43 %

Screenshot captured
You can paste the image from the clipboard.

WARNING: apt does not have a stable CLI interface. Use with caution in scri

Reading package lists...
Building dependency tree...
Reading state information...
The following packages were automatically installed and are no longer required:
  libnvidia-cfg1-570 libnvidia-common-570 libnvidia-compute-570
  libnvidia-compute-570:i386 libnvidia-decode-570 libnvidia-decode-570:i386
  libnvidia-encode-570 libnvidia-encode-570:i386 libnvidia-extra-570
  libnvidia-fbc1-570 libnvidia-fbc1-570:i386 libnvidia-gl-570
  libnvidia-gl-570:i386 nvidia-compute-utils-570 nvidia-dkms-570
  nvidia-driver-570 nvidia-firmware-570-570.172.08 nvidia-kernel-common-570
  nvidia-kernel-source-570 nvidia-utils-570 xserver-xorg-video-nvidia-570
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bind9-host bind9-libs bind9-utils
Suggested packages:
  bind-doc dnsutils
The following NEW packages will be installed:
  bind9 bind9-utils
The following packages will be upgraded:
  bind9-host bind9-libs
2 upgraded, 2 newly installed, 0 to remove and 44 not upgraded.
Need to get 1,741 kB of archives.
After this operation, 1,678 kB of additional disk space will be used.
Get:1 http://apt.pop-os.org/ubuntu jammy-security/main amd64 bind9-host amd64 1:9.18.39-0ubuntu0.22.04.2 [52.5 kB]
Get:2 http://apt.pop-os.org/ubuntu jammy-security/main amd64 bind9-libs amd64 1:9.18.39-0ubuntu0.22.04.2 [1,262 kB]
Get:3 http://apt.pop-os.org/ubuntu jammy-security/main amd64 bind9-utils amd64 1:9.18.39-0ubuntu0.22.04.2 [162 kB]
Get:4 http://apt.pop-os.org/ubuntu jammy-security/main amd64 bind9 amd64 1:9.18.39-0ubuntu0.22.04.2 [265 kB]
Fetched 1,741 kB in 5s (376 kB/s)
(Reading database ... 281614 files and directories currently installed.)
Preparing to unpack .../bind9-host_1%3a9.18.39-0ubuntu0.22.04.2_amd64.deb ...
Unpacking bind9-host (1:9.18.39-0ubuntu0.22.04.2) over (1:9.18.39-0ubuntu0.22.04.1) ...
Preparing to unpack .../bind9-libs_1%3a9.18.39-0ubuntu0.22.04.2_amd64.deb ...
Unpacking bind9-libs:amd64 (1:9.18.39-0ubuntu0.22.04.2) over (1:9.18.39-0ubuntu0.22.04.1) ...
Selecting previously unselected package bind9-utils.
Preparing to unpack .../bind9-utils_1%3a9.18.39-0ubuntu0.22.04.2_amd64.deb ...
Unpacking bind9-utils (1:9.18.39-0ubuntu0.22.04.2) ...
Selecting previously unselected package bind9.
Preparing to unpack .../bind9_1%3a9.18.39-0ubuntu0.22.04.2_amd64.deb ...
Unpacking bind9 (1:9.18.39-0ubuntu0.22.04.2) ...
Setting up bind9-libs:amd64 (1:9.18.39-0ubuntu0.22.04.2) ...
Setting up bind9-utils (1:9.18.39-0ubuntu0.22.04.2) ...
Setting up bind9 (1:9.18.39-0ubuntu0.22.04.2) ...
Adding group `bind' (GID 136) ...
Done.
Adding system user `bind' (UID 128) ...
Adding new user `bind' (UID 128) with group `bind' ...
Not creating home directory `/var/cache/bind'.
wrote key file "/etc/bind/rndc.key"
```



```
Workspaces  Applications                    Nov 2  7:30 PM                    43 %
spidertily@spidertily: ~

Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No:
Skipping password set for root as authentication with auth_socket is used by default.
If you would like to use password authentication instead, this can be done with the "ALTER_USER" command.
See https://dev.mysql.com/doc/refman/8.0/en/alter-user.html#alter-user-password-management for more information.

By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No) : Success.


Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

Disallow root login remotely? (Press y|Y for Yes, any other key for No) :
 ... skipping.
By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.


Remove test database and access to it? (Press y|Y for Yes, any other key for No) :
 ... skipping.
Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : Success.

All done!
tee: /var/log/system_maintenance_automation.log: Permission denied
Installing Bind9 DNS server...
tee: /var/log/system_maintenance_automation.log: Permission denied

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.
```

Workspaces Applications Nov 2 7:30 PM 43 %

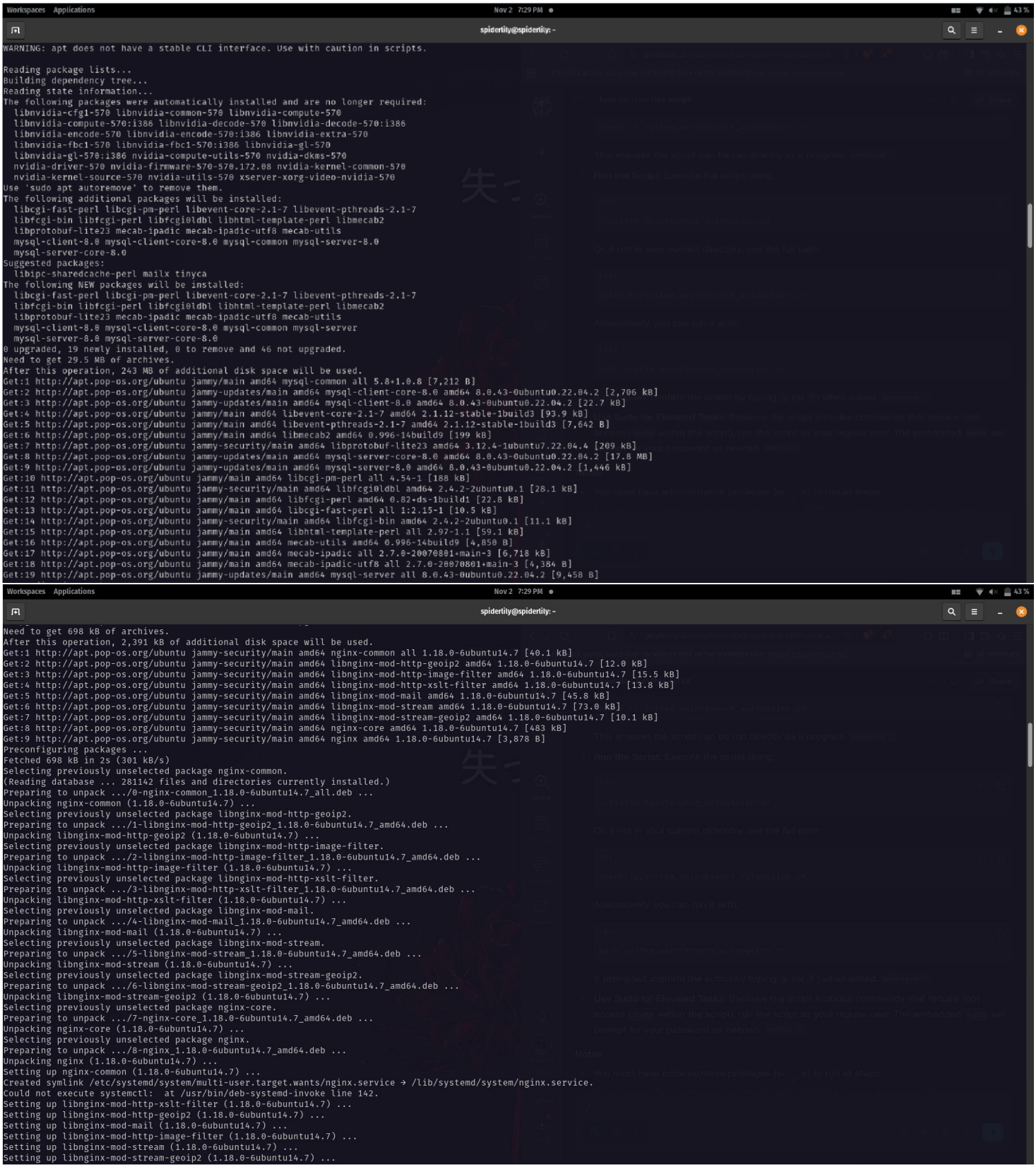
spidertily@spidertily: ~

```
reading /usr/share/mecab/dic/ipadic/Prefix.csv ... 221
reading /usr/share/mecab/dic/ipadic/Conjunction.csv ... 171
emitting double-array: 100% |###########################################|
reading /usr/share/mecab/dic/ipadic/matrix.def ... 1316x1316
emitting matrix      : 100% |###########################################|

done!
update-alternatives: using /var/lib/mecab/dic/ipadic to provide /var/lib/mecab/dic/debian (mecab-dictionary) in auto mode
Setting up libcgi-fast-perl (1:2.15-1) ...
Setting up mysql-server-core-8.0 (8.0.43-0ubuntu0.22.04.2) ...
Setting up mecab-ipadic-utf8 (2.7.0-20070801+main-3) ...
Compiling IPA dictionary for Mecab.  This takes long time...
reading /usr/share/mecab/dic/ipadic/unk.def ... 40
emitting double-array: 100% |###########################################|
/usr/share/mecab/dic/ipadic/model.def is not found. skipped.
reading /usr/share/mecab/dic/ipadic/Noun.adverbal.csv ... 795
reading /usr/share/mecab/dic/ipadic/Adj.csv ... 27210
reading /usr/share/mecab/dic/ipadic/Postp-col.csv ... 91
reading /usr/share/mecab/dic/ipadic/Adverb.csv ... 3032
reading /usr/share/mecab/dic/ipadic/Noun.adjv.csv ... 3328
reading /usr/share/mecab/dic/ipadic/Noun.proper.csv ... 27328
reading /usr/share/mecab/dic/ipadic/Noun.verbal.csv ... 12146
reading /usr/share/mecab/dic/ipadic/Suffix.csv ... 1393
reading /usr/share/mecab/dic/ipadic/Filler.csv ... 19
reading /usr/share/mecab/dic/ipadic/Adnominal.csv ... 135
reading /usr/share/mecab/dic/ipadic/Verb.csv ... 130750
reading /usr/share/mecab/dic/ipadic/Noun.place.csv ... 72999
reading /usr/share/mecab/dic/ipadic/Noun.csv ... 60477
reading /usr/share/mecab/dic/ipadic/Symbol.csv ... 208
reading /usr/share/mecab/dic/ipadic/Noun.nai.csv ... 42
reading /usr/share/mecab/dic/ipadic/Others.csv ... 2
reading /usr/share/mecab/dic/ipadic/Postp.csv ... 146
reading /usr/share/mecab/dic/ipadic/Noun.name.csv ... 34202
reading /usr/share/mecab/dic/ipadic/Noun.others.csv ... 151
reading /usr/share/mecab/dic/ipadic/Noun.demonst.csv ... 120
reading /usr/share/mecab/dic/ipadic/Noun.org.csv ... 16668
reading /usr/share/mecab/dic/ipadic/Auxil.csv ... 199
reading /usr/share/mecab/dic/ipadic/Noun.number.csv ... 42
reading /usr/share/mecab/dic/ipadic/Interjection.csv ... 252
reading /usr/share/mecab/dic/ipadic/Prefix.csv ... 221
reading /usr/share/mecab/dic/ipadic/Conjunction.csv ... 171
emitting double-array: 100% |###########################################|
reading /usr/share/mecab/dic/ipadic/matrix.def ... 1316x1316
emitting matrix      : 100% |###########################################|

done!
update-alternatives: using /var/lib/mecab/dic/ipadic-utf8 to provide /var/lib/mecab/dic/debian (mecab-dictionary) in auto mode
Setting up mysql-server-8.0 (8.0.43-0ubuntu0.22.04.2) ...
update-alternatives: using /etc/mysql/mysql.cnf to provide /etc/mysql/my.cnf (my.cnf) in auto mode
Renaming removed key_buffer and myisam-recover options (if present)
```

Workspaces Applications Nov 2 7:29 PM 43 %

Screenshot captured
You can paste the image from the clipboard.

```
Fetched 29.5 MB in 14s (2,054 kB/s)
Selecting previously unselected package mysql-common.
(Reading database ... 281228 files and directories currently installed.)
Preparing to unpack .../0-mysql-common_5.8+1.0.8_all.deb ...
Unpacking mysql-common (5.8+1.0.8) ...
Selecting previously unselected package mysql-client-core-8.0.
Preparing to unpack .../1-mysql-client-core-8.0_8.0.43-0ubuntu0.22.04.2_amd64.deb ...
Unpacking mysql-client-core-8.0 (8.0.43-0ubuntu0.22.04.2) ...
Selecting previously unselected package mysql-client-8.0.
Preparing to unpack .../2-mysql-client-8.0_8.0.43-0ubuntu0.22.04.2_amd64.deb ...
Unpacking mysql-client-8.0 (8.0.43-0ubuntu0.22.04.2) ...
Selecting previously unselected package libevent-core-2.1-7:amd64.
Preparing to unpack .../3-libevent-core-2.1-7_2.1.12-stable-1build3_amd64.deb ...
Unpacking libevent-core-2.1-7:amd64 (2.1.12-stable-1build3) ...
Selecting previously unselected package libevent-pthreads-2.1-7:amd64.
Preparing to unpack .../4-libevent-pthreads-2.1-7_2.1.12-stable-1build3_amd64.deb ...
Unpacking libevent-pthreads-2.1-7:amd64 (2.1.12-stable-1build3) ...
Selecting previously unselected package libmecab2:amd64.
Preparing to unpack .../5-libmecab2_0.996-14build9_amd64.deb ...
Unpacking libmecab2:amd64 (0.996-14build9) ...
Selecting previously unselected package libprotobuf-lite23:amd64.
Preparing to unpack .../6-libprotobuf-lite23_3.12.4-1ubuntu7.22.04.4_amd64.deb ...
Unpacking libprotobuf-lite23:amd64 (3.12.4-1ubuntu7.22.04.4) ...
Selecting previously unselected package mysql-server-core-8.0.
Preparing to unpack .../7-mysql-server-core-8.0_8.0.43-0ubuntu0.22.04.2_amd64.deb ...
Unpacking mysql-server-core-8.0 (8.0.43-0ubuntu0.22.04.2) ...
Setting up mysql-common (5.8+1.0.8) ...
update-alternatives: using /etc/mysql/my.cnf.fallback to provide /etc/mysql/my.cnf (my.cnf) in auto mode
Selecting previously unselected package mysql-server-8.0.
(Reading database ... 281447 files and directories currently installed.)
Preparing to unpack .../00-mysql-server-8.0_8.0.43-0ubuntu0.22.04.2_amd64.deb ...
Unpacking mysql-server-8.0 (8.0.43-0ubuntu0.22.04.2) ...
Selecting previously unselected package libcgi-pm-perl.
Preparing to unpack .../01-libcgi-pm-perl_4.54-1_all.deb ...
Unpacking libcgi-pm-perl (4.54-1) ...
Selecting previously unselected package libfcgi0ldbl:amd64.
Preparing to unpack .../02-libfcgi0ldbl_2.4.2-2ubuntu0.1_amd64.deb ...
Unpacking libfcgi0ldbl:amd64 (2.4.2-2ubuntu0.1) ...
Selecting previously unselected package libfcgi-perl:amd64.
Preparing to unpack .../03-libfcgi-perl_0.82+ds-1build1_amd64.deb ...
Unpacking libfcgi-perl:amd64 (0.82+ds-1build1) ...
Selecting previously unselected package libcgi-fast-perl.
Preparing to unpack .../04-libcgi-fast-perl_1%3a2.15-1_all.deb ...
Unpacking libcgi-fast-perl (1:2.15-1) ...
Selecting previously unselected package libfcgi-bin.
Preparing to unpack .../05-libfcgi-bin_2.4.2-2ubuntu0.1_amd64.deb ...
Unpacking libfcgi-bin (2.4.2-2ubuntu0.1) ...
Selecting previously unselected package libhtml-template-perl.
Preparing to unpack .../06-libhtml-template-perl_2.97-1.1_all.deb ...
Unpacking libhtml-template-perl (2.97-1.1) ...
Selecting previously unselected package mecab-utils.
```


Workspaces Applications
Nov 2 7:29 PM
43 %
spidertily@spidertily: ~
WARNING: apt does not have a stable CLI interface. Use with caution in scripts.
Reading package lists...
Building dependency tree...
Reading state information...
The following packages were automatically installed and are no longer required:
libnvidia-cfg1-570 libnvidia-common-570 libnvidia-compute-570
libnvidia-compute-570:i386 libnvidia-decode-570 libnvidia-decode-570:i386
libnvidia-encode-570 libnvidia-encode-570:i386 libnvidia-extra-570
libnvidia-fbc1-570 libnvidia-fbc1-570:i386 libnvidia-gl-570
libnvidia-gl-570:i386 nvidia-compute-utils-570 nvidia-dkms-570
nvidia-driver-570 nvidia-firmware-570-570.172.08 nvidia-kernel-common-570
nvidia-kernel-source-570 nvidia-utils-570 xserver-xorg-video-nvidia-570
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
libcgi-fast-perl libcgi-pm-perl libevent-core-2.1-7 libevent-pthreads-2.1-7
libfcgi-bin libfcgi-perl libfcgi0ldbl libhtml-template-perl libmecab2
libprotobuf-lite23 mecab-ipadic mecab-ipadic-utf8 mecab-utils
mysql-client-8.0 mysql-client-core-8.0 mysql-common mysql-server-8.0
mysql-server-core-8.0
Suggested packages:
libipc-sharedcache-perl mailx tinyca
The following NEW packages will be installed:
libcgi-fast-perl libcgi-pm-perl libevent-core-2.1-7 libevent-pthreads-2.1-7
libfcgi-bin libfcgi-perl libfcgi0ldbl libhtml-template-perl libmecab2
libprotobuf-lite23 mecab-ipadic mecab-ipadic-utf8 mecab-utils
mysql-client-8.0 mysql-client-core-8.0 mysql-common mysql-server
mysql-server-8.0 mysql-server-core-8.0
0 upgraded, 19 newly installed, 0 to remove and 46 not upgraded.
Need to get 29.5 MB of archives.
After this operation, 243 MB of additional disk space will be used.
Get:1 http://apt.pop-os.org/ubuntu jammy/main amd64 mysql-common all 5.8+1.0.8 [7,212 B]
Get:2 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 mysql-client-core-8.0 amd64 8.0.43-0ubuntu0.22.04.2 [2,706 kB]
Get:3 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 mysql-client-8.0 amd64 8.0.43-0ubuntu0.22.04.2 [22.7 kB]
Get:4 http://apt.pop-os.org/ubuntu jammy/main amd64 libevent-core-2.1-7 amd64 2.1.12-stable-1build3 [93.9 kB]
Get:5 http://apt.pop-os.org/ubuntu jammy/main amd64 libevent-pthreads-2.1-7 amd64 2.1.12-stable-1build3 [7,642 B]
Get:6 http://apt.pop-os.org/ubuntu jammy/main amd64 libmecab2 amd64 0.996-14build9 [199 kB]
Get:7 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libprotobuf-lite23 amd64 3.12.4-1ubuntu7.22.04.4 [209 kB]
Get:8 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 mysql-server-core-8.0 amd64 8.0.43-0ubuntu0.22.04.2 [17.8 MB]
Get:9 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 mysql-server-8.0 amd64 8.0.43-0ubuntu0.22.04.2 [1,446 kB]
Get:10 http://apt.pop-os.org/ubuntu jammy/main amd64 libcgi-pm-perl all 4.54-1 [188 kB]
Get:11 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libfcgi0ldbl amd64 2.4.2-2ubuntu0.1 [28.1 kB]
Get:12 http://apt.pop-os.org/ubuntu jammy/main amd64 libfcgi-perl amd64 0.82+ds-1build1 [22.8 kB]
Get:13 http://apt.pop-os.org/ubuntu jammy/main amd64 libcgi-fast-perl all 1:2.15-1 [10.5 kB]
Get:14 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libfcgi-bin amd64 2.4.2-2ubuntu0.1 [11.1 kB]
Get:15 http://apt.pop-os.org/ubuntu jammy/main amd64 libhtml-template-perl all 2.97-1.1 [59.1 kB]
Get:16 http://apt.pop-os.org/ubuntu jammy/main amd64 mecab-utils amd64 0.996-14build9 [4,850 B]
Get:17 http://apt.pop-os.org/ubuntu jammy/main amd64 mecab-ipadic all 2.7.0-20070801+main-3 [6,718 kB]
Get:18 http://apt.pop-os.org/ubuntu jammy/main amd64 mecab-ipadic-utf8 all 2.7.0-20070801+main-3 [4,384 B]
Get:19 http://apt.pop-os.org/ubuntu jammy-updates/main amd64 mysql-server all 8.0.43-0ubuntu0.22.04.2 [9,458 B]

Workspaces Applications
Nov 2 7:29 PM
43 %
spidertily@spidertily: ~
Need to get 698 kB of archives.
After this operation, 2,391 kB of additional disk space will be used.
Get:1 http://apt.pop-os.org/ubuntu jammy-security/main amd64 nginx-common all 1.18.0-6ubuntu14.7 [40.1 kB]
Get:2 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-http-geoip2 amd64 1.18.0-6ubuntu14.7 [12.0 kB]
Get:3 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-http-image-filter amd64 1.18.0-6ubuntu14.7 [15.5 kB]
Get:4 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-http-xslt-filter amd64 1.18.0-6ubuntu14.7 [13.8 kB]
Get:5 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-mail amd64 1.18.0-6ubuntu14.7 [45.8 kB]
Get:6 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-stream amd64 1.18.0-6ubuntu14.7 [73.0 kB]
Get:7 http://apt.pop-os.org/ubuntu jammy-security/main amd64 libnginx-mod-stream-geoip2 amd64 1.18.0-6ubuntu14.7 [10.1 kB]
Get:8 http://apt.pop-os.org/ubuntu jammy-security/main amd64 nginx-core amd64 1.18.0-6ubuntu14.7 [483 kB]
Get:9 http://apt.pop-os.org/ubuntu jammy-security/main amd64 nginx amd64 1.18.0-6ubuntu14.7 [3,878 B]
Preconfiguring packages ...
Fetched 698 kB in 2s (301 kB/s)
Selecting previously unselected package nginx-common.
(Reading database ... 281142 files and directories currently installed.)
Preparing to unpack .../0-nginx-common_1.18.0-6ubuntu14.7_all.deb ...
Unpacking nginx-common (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-http-geoip2.
Preparing to unpack .../1-libnginx-mod-http-geoip2_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-http-geoip2 (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-http-image-filter.
Preparing to unpack .../2-libnginx-mod-http-image-filter_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-http-image-filter (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-http-xslt-filter.
Preparing to unpack .../3-libnginx-mod-http-xslt-filter_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-http-xslt-filter (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-mail.
Preparing to unpack .../4-libnginx-mod-mail_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-mail (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-stream.
Preparing to unpack .../5-libnginx-mod-stream_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-stream (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package libnginx-mod-stream-geoip2.
Preparing to unpack .../6-libnginx-mod-stream-geoip2_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking libnginx-mod-stream-geoip2 (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package nginx-core.
Preparing to unpack .../7-nginx-core_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking nginx-core (1.18.0-6ubuntu14.7) ...
Selecting previously unselected package nginx.
Preparing to unpack .../8-nginx_1.18.0-6ubuntu14.7_amd64.deb ...
Unpacking nginx (1.18.0-6ubuntu14.7) ...
Setting up nginx-common (1.18.0-6ubuntu14.7) ...
Created symlink /etc/systemd/system/multi-user.target.wants/nginx.service → /lib/systemd/system/nginx.service.
Could not execute systemctl: at /usr/bin/deb-systemd-invoke line 142.
Setting up libnginx-mod-http-xslt-filter (1.18.0-6ubuntu14.7) ...
Setting up libnginx-mod-http-geoip2 (1.18.0-6ubuntu14.7) ...
Setting up libnginx-mod-mail (1.18.0-6ubuntu14.7) ...
Setting up libnginx-mod-http-image-filter (1.18.0-6ubuntu14.7) ...
Setting up libnginx-mod-stream (1.18.0-6ubuntu14.7) ...
Setting up libnginx-mod-stream-geoip2 (1.18.0-6ubuntu14.7) ...

Workspaces Applications Nov 2 7:29 PM 43 %

spiderlily@spiderlily: ~

```
WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Reading package lists...
Building dependency tree...
Reading state information...
apache2 is already the newest version (2.4.52-1ubuntu4.16).
apache2 set to manually installed.
The following packages were automatically installed and are no longer required:
  libnvidia-cfg1-570 libnvidia-common-570 libnvidia-compute-570
  libnvidia-compute-570:i386 libnvidia-decode-570 libnvidia-decode-570:i386
  libnvidia-encode-570 libnvidia-encode-570:i386 libnvidia-extra-570
  libnvidia-fbc1-570 libnvidia-fbc1-570:i386 libnvidia-gl-570
  libnvidia-gl-570:i386 nvidia-compute-utils-570 nvidia-dkms-570
  nvidia-driver-570 nvidia-firmware-570-570.172.08 nvidia-kernel-common-570
  nvidia-kernel-source-570 nvidia-utils-570 xserver-xorg-video-nvidia-570
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 46 not upgraded.
tee: /var/log/system_maintenance_automation.log: Permission denied
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable apache2
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
tee: /var/log/system_maintenance_automation.log: Permission denied
Installing NGINX...
tee: /var/log/system_maintenance_automation.log: Permission denied

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Reading package lists...
Building dependency tree...
Reading state information...
The following packages were automatically installed and are no longer required:
  libnvidia-cfg1-570 libnvidia-common-570 libnvidia-compute-570
  libnvidia-compute-570:i386 libnvidia-decode-570 libnvidia-decode-570:i386
  libnvidia-encode-570 libnvidia-encode-570:i386 libnvidia-extra-570
  libnvidia-fbc1-570 libnvidia-fbc1-570:i386 libnvidia-gl-570
  libnvidia-gl-570:i386 nvidia-compute-utils-570 nvidia-dkms-570
  nvidia-driver-570 nvidia-firmware-570-570.172.08 nvidia-kernel-common-570
  nvidia-kernel-source-570 nvidia-utils-570 xserver-xorg-video-nvidia-570
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libnginx-mod-http-geoip2 libnginx-mod-http-image-filter
  libnginx-mod-http-xslt-filter libnginx-mod-mail libnginx-mod-stream
  libnginx-mod-stream-geoip2 nginx-common nginx-core
Suggested packages:
  fcgiwrap nginx-doc
The following NEW packages will be installed:
  libnginx-mod-http-geoip2 libnginx-mod-http-image-filter
  libnginx-mod-http-xslt-filter libnginx-mod-mail libnginx-mod-stream
```

Workspaces Applications Nov 2 7:29 PM 43 %

spiderlily@spiderlily: ~

```
       _,met$$$$$gg.          Uptime: 5 days, 5 hours, 13 mins
    ,g$$$$$$$$$$$$$$$P.       Shell: bash 5.1.16
  ,g$$P"     """Y$$.".        Icons: Blueberry-Numix-2021 [GTK2/3]
 ,$$P'              `$$$.     Terminal: gnome-terminal
',$$P       ,ggs.     `$$b:   CPU: 11th Gen Intel i5-11300H (8) @ 4.400GHz
`d$$'     ,$P"'   .    $$$    GPU: NVIDIA GeForce GTX 1650 Mobile / Max-Q
 $$P      d$'     ,    $$P    GPU: Intel TigerLake-LP GT2 [Iris Xe Graphics]
 $$:      $$.   -    ,d$$'    Memory: 5410MiB / 7722MiB
 $$;      Y$b._   _,d$P'
 Y$$.    `.`"Y$$$$P"'
 `$$b      "-.__
  `Y$$
   `Y$$.
     `$$b.
       `Y$$b.
          `"Y$b._
              `"""

spiderlily@spiderlily:~$ nano system.sh
spiderlily@spiderlily:~$ chdmod +x system.sh
Command 'chdmod' not found, did you mean:
  command 'chmod' from deb coreutils (8.32-4.1ubuntu1.2)
Try: sudo apt install <deb name>
spiderlily@spiderlily:~$ chmod +x system.sh
spiderlily@spiderlily:~$ ./ system.sh
bash: ./: Is a directory
spiderlily@spiderlily:~$ system.sh
system.sh: command not found
spiderlily@spiderlily:~$ bash system.sh
tee: /var/log/system_maintenance_automation.log: Permission denied
----- System Maintenance Automation -----
Proceed with full system setup and maintenance automation? (y/n) y
tee: /var/log/system_maintenance_automation.log: Permission denied
Updating packages...
tee: /var/log/system_maintenance_automation.log: Permission denied
[sudo] password for spiderlily:

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Hit:1 https://brave-browser-apt-release.s3.brave.com stable InRelease
Hit:2 https://packages.microsoft.com/repos/code stable InRelease
Hit:3 http://apt.pop-os.org/proprietary jammy InRelease
Hit:4 http://apt.pop-os.org/release jammy InRelease
Hit:5 http://apt.pop-os.org/ubuntu jammy InRelease
Hit:6 http://apt.pop-os.org/ubuntu jammy-security InRelease
Hit:7 http://apt.pop-os.org/ubuntu jammy-updates InRelease
Hit:8 http://apt.pop-os.org/ubuntu jammy-backports InRelease
Reading package lists...
Building dependency tree...
Reading state information...
46 packages can be upgraded. Run 'apt list --upgradable' to see them.
tee: /var/log/system_maintenance_automation.log: Permission denied
Installing Apache...
tee: /var/log/system_maintenance_automation.log: Permission denied
```

6. Conclusion:

This project successfully showcases the power of Shell Scripting in automating administrative operations within a Linux environment. Through the development of efficient scripts, routine tasks such as file backup, system cleanup, and resource monitoring were automated effectively. This automation not only ensures accuracy and consistency but also saves significant time and effort in system maintenance. Overall, the project offered valuable hands-on experience in Bash scripting, cron job scheduling, and command-line system management—key skills essential for efficient Linux administration.

7. Learning Outcomes:

- Learned to create and execute shell scripts using Bash.
- Understood use of variables, loops, and conditionals in scripts.
- Gained experience in automating backups and monitoring tasks.
- Learned to schedule jobs using cron and manage system logs.
- Improved understanding of Linux administration and real-world automation scenarios.

8. Evaluation Grid:

Sr. No.	Parameters		Marks Obtained	Maximum Marks
1.	PROJECT TITLE			2 Marks
2.	DESIGN & IMPLEMENTATION			5 Marks

3.	GitHub Link			1 Marks
4.	LinkedIn Blog Link			1 Marks
5.	Portfolio link			1 Marks
6.	TOTAL			10 Marks
7.	AVG			6 Marks

Teacher Signature