Week 4 Homework Submission File: Linux Systems Administration

Please edit this file by adding the solution commands on the line below the prompt.

Save and submit the completed file for your homework submission.

Step 1: Ensure/Double Check Permissions on Sensitive Files

1. Permissions on `/etc/shadow` should allow only `root` read and write access.
    - Command to inspect permissions: `ls -l shadow`
    - Command to set permissions (if needed): `sudo chmod 600 shadow`
2. Permissions on `/etc/gshadow` should allow only `root` read and write access.
    - Command to inspect permissions: `ls -l gshadow`
    - Command to set permissions (if needed): `sudo chmod 600 gshadow`
3. Permissions on `/etc/group` should allow `root` read and write access, and allow everyone else read access only.
    - Command to inspect permissions: `ls -l group`
    - Command to set permissions (if needed): `sudo chmod 644 group`
4. Permissions on `/etc/passwd` should allow `root` read and write access, and allow everyone else read access only.
    - Command to inspect permissions: `ls -l passwd`
    - Command to set permissions (if needed): `sudo chmod 644 passwd`

Step 2: Create User Accounts

1. Add user accounts for `sam`, `joe`, `amy`, `sara`, and `admin`.

- Command to add each user account (include all five users): `sudo adduser sam` `sudo adduser joe` `sudo adduser amy` `sudo adduser sara` `sudo adduser admin`

2. Ensure that only the `admin` has general sudo access.
   - Command to add `admin` to the `sudo` group: `sudo -lU admin` `sudo usermod -G sudo admin`

Step 3: Create User Group and Collaborative Folder

1. Add an `engineers` group to the system.
   - Command to add group: `sudo addgroup engineers`
2. Add users `sam`, `joe`, `amy`, and `sara` to the managed group.
   - Command to add users to `engineers` group (include all four users): `sudo usermod -G engineers sam` `sudo usermod -G engineers joe` `sudo usermod -G engineers amy` `sudo usermod -G engineers sara`
     `*add option "a" to append user to the group vs change them to only the "engineers" group without changing their current one(s)`
3. Create a shared folder for this group at `/home/engineers`.
   - Command to create the shared folder: `sudo mkdir -p /home/engineers`
4. Change ownership on the new engineers' shared folder to the `engineers` group.
   - Command to change ownership of engineer's shared folder to engineer group: `sudo chgrp -R engineers /home/engineers` or `sudo chown engineers /home/engineers`

Step 4: Lynis Auditing

1. Command to install Lynis: `sudo apt install lynis`
2. Command to see documentation and instructions: `man lynis` or `sudo lynis --help`
3. Command to run an audit: `sudo lynis audit system`
4. Provide a report from the Lynis output on what can be done to harden the system.
   - Screenshot of report output: `*See additional pages at the end...`

Bonus

1. Command to install chkrootkit: `sudo apt install chkrootkit`
2. Command to see documentation and instructions: `man chkrootkit` or `sudo chkrootkit --help`
3. Command to run expert mode: `sudo chrootkit -x [test ...]`

4. Provide a report from the chrootkit output on what can be done to harden the system.

    - Screenshot of end of sample output:

```
sysadmin@ubuntuucb:~$ sudo chkrootkit -x | tail
/usr/sbin/chkrootkit: 608: /usr/sbin/chkrootkit: exportmode_output: not found
/usr/sbin/chkrootkit: 609: /usr/sbin/chkrootkit: exportmode_output: not found
! root        27427 pts/0  sh -c ps axk "tty,ruser,args" -o "tty,pid,ruser,args"
! root        26989 pts/0  sudo chkrootkit -x
! sysadmin     3238 pts/0  bash
! sysadmin     8222 pts/0  bash
! sysadmin     7690 pts/0  su admin
! sysadmin    26990 pts/0  tail
! sysadmin     5381 pts/1  bash
! sysadmin     6049 pts/2  bash
chkutmp: nothing deleted
not tested
sysadmin@ubuntuucb:~$
```

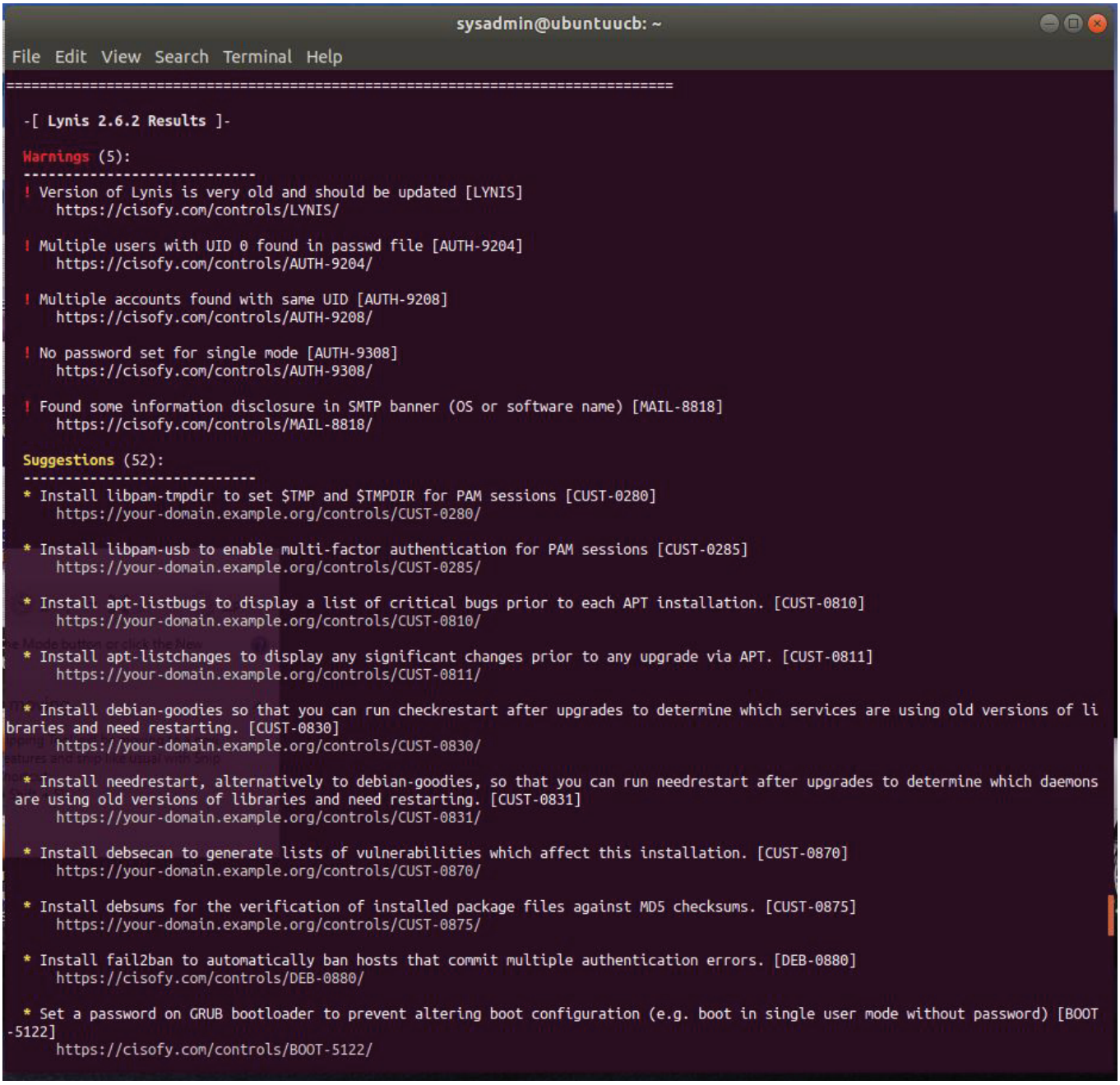
*Alternatively, rkhunter could also be used for checking for rootkits

`sudo rkhunter --check`

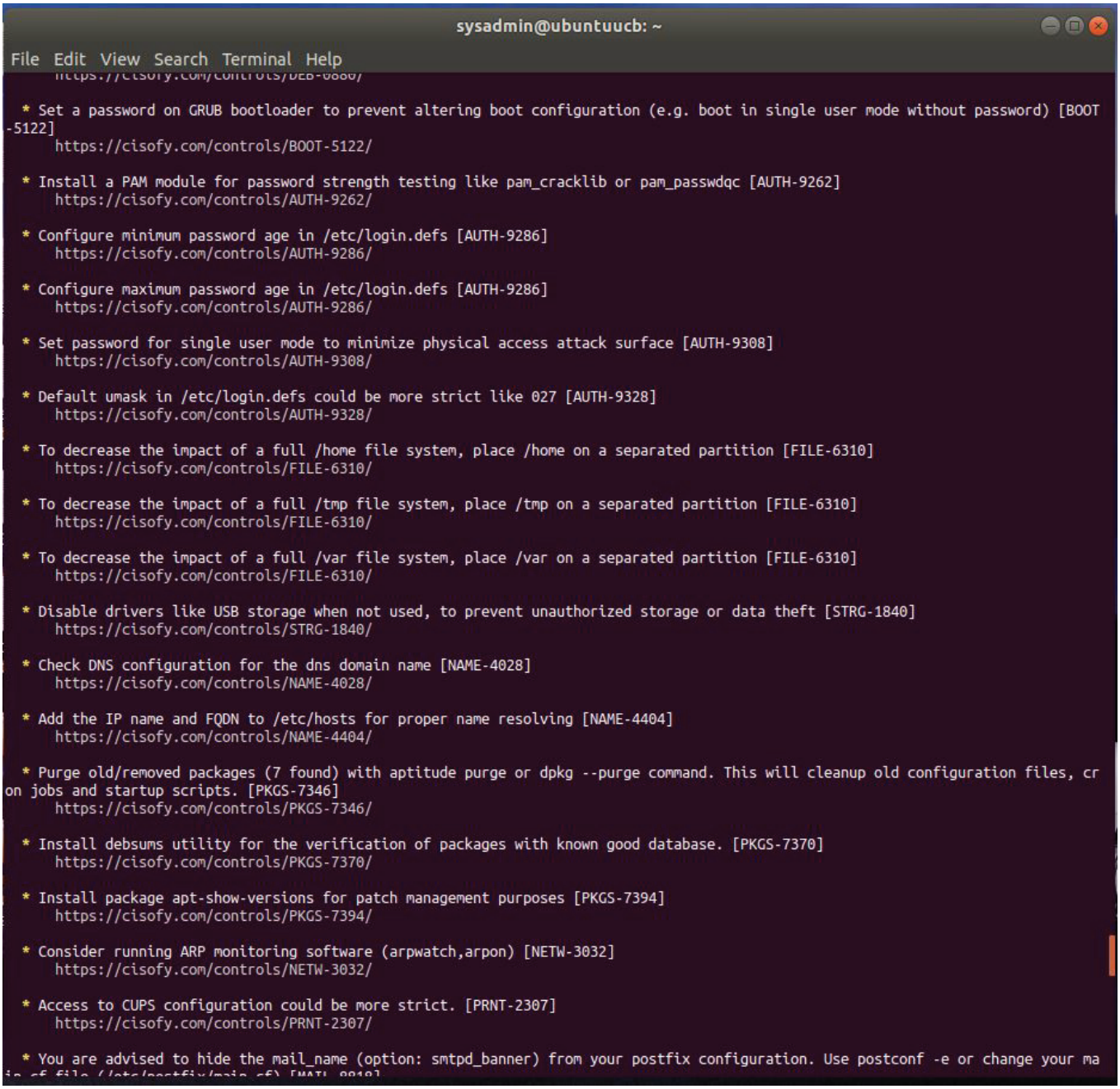
```
sysadmin@ubuntuucb:~$ sudo rkhunter --check
[sudo] password for sysadmin:
[ Rootkit Hunter version 1.4.6 ]

Checking system commands...

  Performing 'strings' command checks
    Checking 'strings' command                               [ OK ]

  Performing 'shared libraries' checks
    Checking for preloading variables                        [ None found ]
    Checking for preloaded libraries                         [ None found ]
    Checking LD_LIBRARY_PATH variable                        [ Not found ]

  Performing file properties checks
    Checking for prerequisites                               [ OK ]
    /usr/sbin/adduser                                        [ OK ]
    /usr/sbin/chroot                                         [ OK ]
```

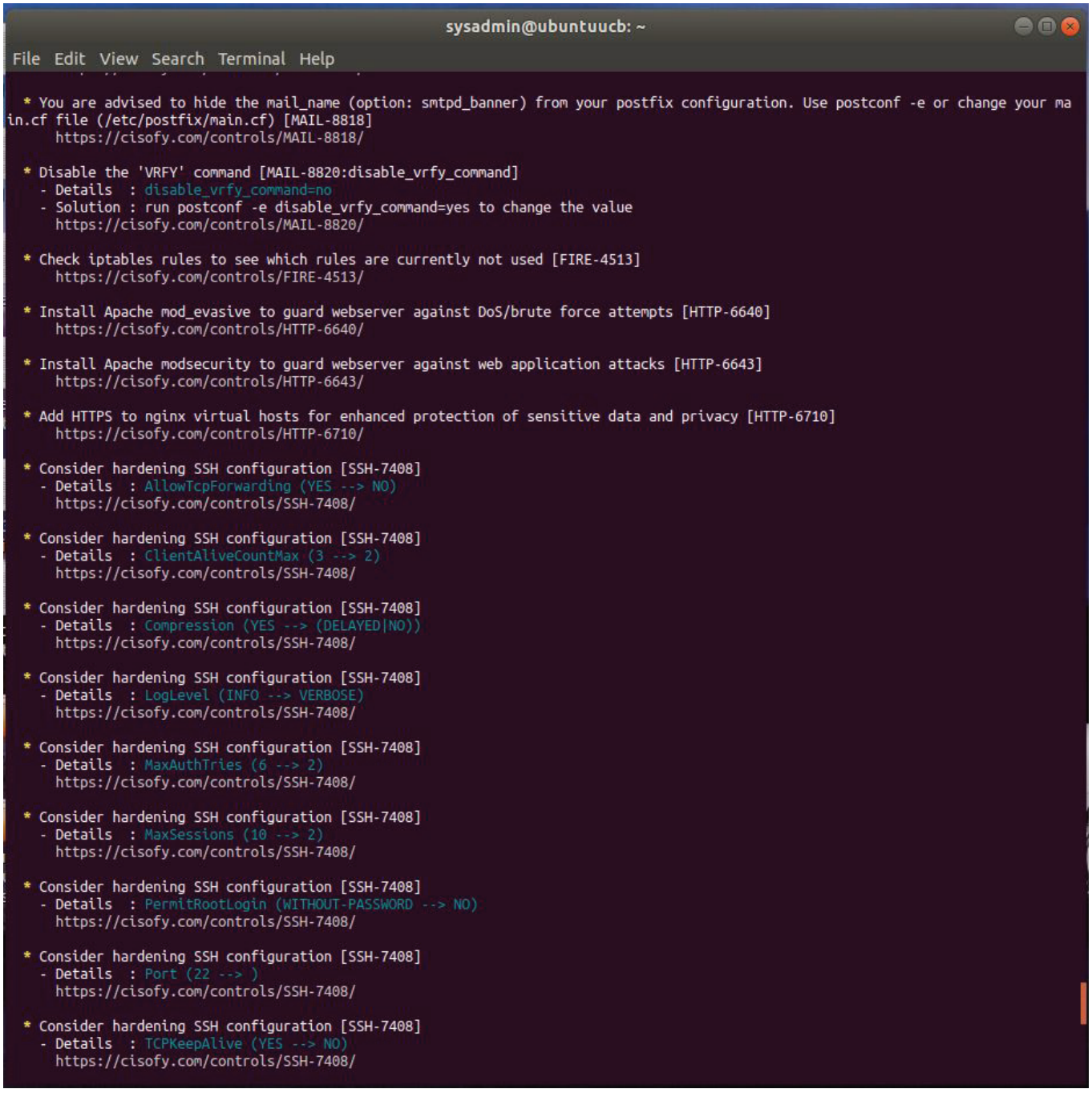
```
System checks summary
=====================

File properties checks...
    Files checked: 152
    Suspect files: 1

Rootkit checks...
    Rootkits checked : 500
    Possible rootkits: 10

Applications checks...
    All checks skipped

The system checks took: 3 minutes and 12 seconds

All results have been written to the log file: /var/log/rkhunter.log

One or more warnings have been found while checking the system.
Please check the log file (/var/log/rkhunter.log)

sysadmin@ubuntuucb:~$
```

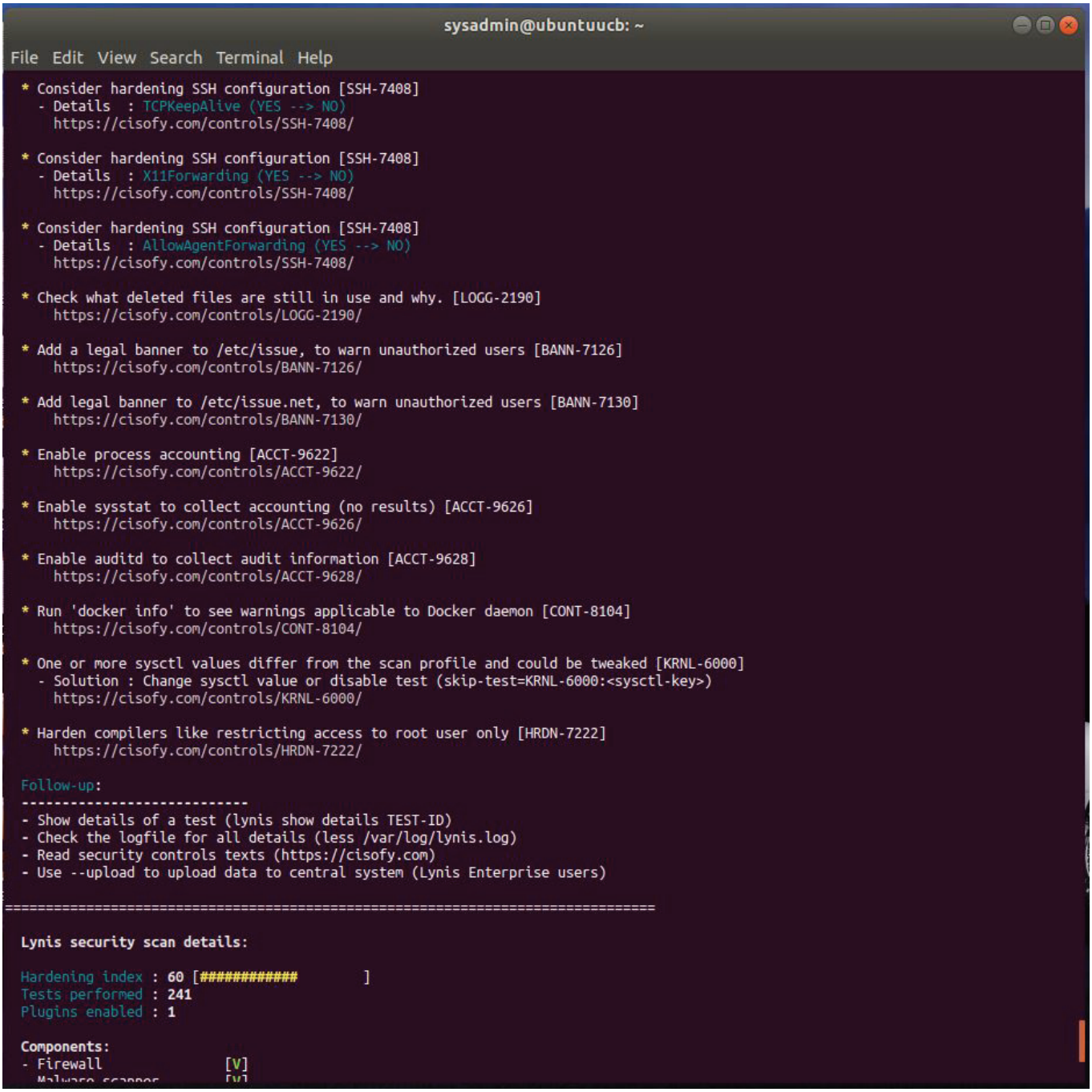
Lynis Output Screenshots:

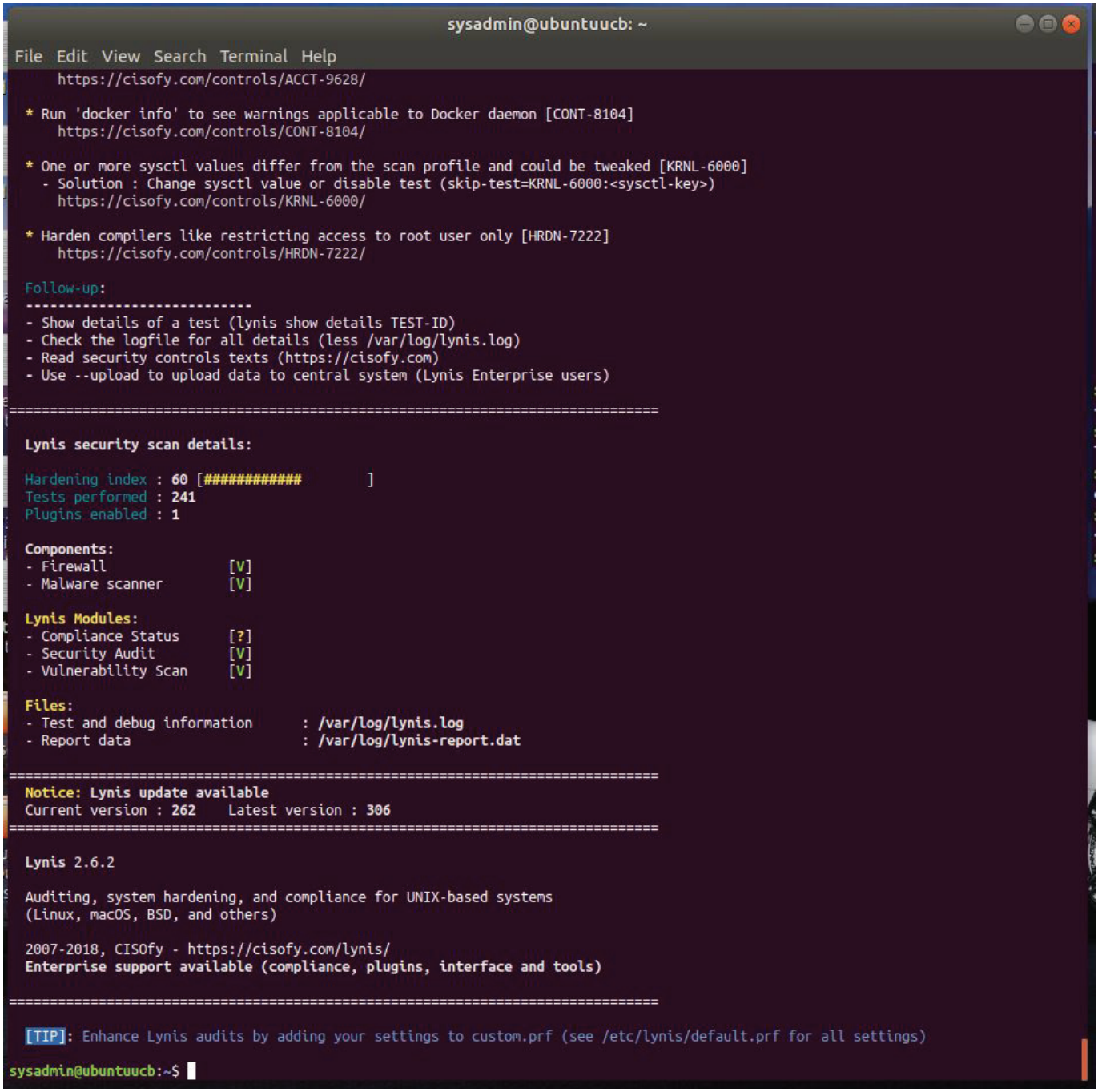


Lynis Output Screenshot 1/5


sysadmin@ubuntuucb: ~
File Edit View Search Terminal Help
* Set a password on GRUB bootloader to prevent altering boot configuration (e.g. boot in single user mode without password) [BOOT-5122]
https://cisofy.com/controls/BOOT-5122/
* Install a PAM module for password strength testing like pam_cracklib or pam_passwdqc [AUTH-9262]
https://cisofy.com/controls/AUTH-9262/
* Configure minimum password age in /etc/login.defs [AUTH-9286]
https://cisofy.com/controls/AUTH-9286/
* Configure maximum password age in /etc/login.defs [AUTH-9286]
https://cisofy.com/controls/AUTH-9286/
* Set password for single user mode to minimize physical access attack surface [AUTH-9308]
https://cisofy.com/controls/AUTH-9308/
* Default umask in /etc/login.defs could be more strict like 027 [AUTH-9328]
https://cisofy.com/controls/AUTH-9328/
* To decrease the impact of a full /home file system, place /home on a separated partition [FILE-6310]
https://cisofy.com/controls/FILE-6310/
* To decrease the impact of a full /tmp file system, place /tmp on a separated partition [FILE-6310]
https://cisofy.com/controls/FILE-6310/
* To decrease the impact of a full /var file system, place /var on a separated partition [FILE-6310]
https://cisofy.com/controls/FILE-6310/
* Disable drivers like USB storage when not used, to prevent unauthorized storage or data theft [STRG-1840]
https://cisofy.com/controls/STRG-1840/
* Check DNS configuration for the dns domain name [NAME-4028]
https://cisofy.com/controls/NAME-4028/
* Add the IP name and FQDN to /etc/hosts for proper name resolving [NAME-4404]
https://cisofy.com/controls/NAME-4404/
* Purge old/removed packages (7 found) with aptitude purge or dpkg --purge command. This will cleanup old configuration files, cron jobs and startup scripts. [PKGS-7346]
https://cisofy.com/controls/PKGS-7346/
* Install debsums utility for the verification of packages with known good database. [PKGS-7370]
https://cisofy.com/controls/PKGS-7370/
* Install package apt-show-versions for patch management purposes [PKGS-7394]
https://cisofy.com/controls/PKGS-7394/
* Consider running ARP monitoring software (arpwatch,arpon) [NETW-3032]
https://cisofy.com/controls/NETW-3032/
* Access to CUPS configuration could be more strict. [PRNT-2307]
https://cisofy.com/controls/PRNT-2307/
* You are advised to hide the mail_name (option: smtpd_banner) from your postfix configuration. Use postconf -e or change your ma


sysadmin@ubuntuucb: ~
File Edit View Search Terminal Help
* You are advised to hide the mail_name (option: smtpd_banner) from your postfix configuration. Use postconf -e or change your main.cf file (/etc/postfix/main.cf) [MAIL-8818]
https://cisofy.com/controls/MAIL-8818/
* Disable the 'VRFY' command [MAIL-8820:disable_vrfy_command]
- Details : disable_vrfy_command=no
- Solution : run postconf -e disable_vrfy_command=yes to change the value
https://cisofy.com/controls/MAIL-8820/
* Check iptables rules to see which rules are currently not used [FIRE-4513]
https://cisofy.com/controls/FIRE-4513/
* Install Apache mod_evasive to guard webserver against DoS/brute force attempts [HTTP-6640]
https://cisofy.com/controls/HTTP-6640/
* Install Apache modsecurity to guard webserver against web application attacks [HTTP-6643]
https://cisofy.com/controls/HTTP-6643/
* Add HTTPS to nginx virtual hosts for enhanced protection of sensitive data and privacy [HTTP-6710]
https://cisofy.com/controls/HTTP-6710/
* Consider hardening SSH configuration [SSH-7408]
- Details : AllowTcpForwarding (YES --> NO)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : ClientAliveCountMax (3 --> 2)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : Compression (YES --> (DELAYED|NO))
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : LogLevel (INFO --> VERBOSE)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : MaxAuthTries (6 --> 2)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : MaxSessions (10 --> 2)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : PermitRootLogin (WITHOUT-PASSWORD --> NO)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : Port (22 -->)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : TCPKeepAlive (YES --> NO)
https://cisofy.com/controls/SSH-7408/


sysadmin@ubuntuucb: ~
File Edit View Search Terminal Help
* Consider hardening SSH configuration [SSH-7408]
- Details : TCPKeepAlive (YES --> NO)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : X11Forwarding (YES --> NO)
https://cisofy.com/controls/SSH-7408/
* Consider hardening SSH configuration [SSH-7408]
- Details : AllowAgentForwarding (YES --> NO)
https://cisofy.com/controls/SSH-7408/
* Check what deleted files are still in use and why. [LOGG-2190]
https://cisofy.com/controls/LOGG-2190/
* Add a legal banner to /etc/issue, to warn unauthorized users [BANN-7126]
https://cisofy.com/controls/BANN-7126/
* Add legal banner to /etc/issue.net, to warn unauthorized users [BANN-7130]
https://cisofy.com/controls/BANN-7130/
* Enable process accounting [ACCT-9622]
https://cisofy.com/controls/ACCT-9622/
* Enable sysstat to collect accounting (no results) [ACCT-9626]
https://cisofy.com/controls/ACCT-9626/
* Enable auditd to collect audit information [ACCT-9628]
https://cisofy.com/controls/ACCT-9628/
* Run 'docker info' to see warnings applicable to Docker daemon [CONT-8104]
https://cisofy.com/controls/CONT-8104/
* One or more sysctl values differ from the scan profile and could be tweaked [KRNL-6000]
- Solution : Change sysctl value or disable test (skip-test=KRNL-6000:<sysctl-key>)
https://cisofy.com/controls/KRNL-6000/
* Harden compilers like restricting access to root user only [HRDN-7222]
https://cisofy.com/controls/HRDN-7222/
Follow-up:
- Show details of a test (lynis show details TEST-ID)
- Check the logfile for all details (less /var/log/lynis.log)
- Read security controls texts (https://cisofy.com)
- Use --upload to upload data to central system (Lynis Enterprise users)
Lynis security scan details:
Hardening index : 60 [############]
Tests performed : 241
Plugins enabled : 1
Components:
- Firewall [V]



Lynis Output Screenshot 5/5