



CyberPatriot Ubuntu 22

Training Image Answer Key



Welcome to the CyberPatriot Training Round! This image will provide you with information on how to solve common vulnerabilities on an Ubuntu operating system. In doing so, it will help you on your way as you build your cybersecurity skills.

The vulnerabilities in this image are some of the most basic ones found during a CyberPatriot competition. Even if you do very well with these vulnerabilities, you will experience greater difficulty as the season progresses. The README file on the desktop in this image may be more detailed than those you see during the competition. You will have to use your own knowledge, not just the hints in this file, to achieve a high score during the actual competition.

Below are the answers to the problems that are being scored in this image. Each one includes information on how the problem was found (if applicable), how it was solved, and why it is important from a cybersecurity standpoint.

It is also possible to lose points during the competition. Simple penalties that may arise are noted below the answers. There are many ways to solve some of the problems below. This answer key just shows one method in each case.

Coaches will be sent categories of vulnerabilities following each online round.

Answers

1. Forensics Question 1 Correct: 6 pts.

- How do I find this problem?

When you open an image, please read all the "Forensics Questions" thoroughly before modifying the image as you may change something that prevents you from answering the question correctly. There is a file on the Desktop here named "Forensics Question 1".

- How do I solve this problem?

The question asks you to decode the message left for you on your Desktop.

The message is encoded into base64.

To decode the message, use an online base64 decoder, like <https://www.base64decode.org/>

Here is the decoded message:

A special file was accidentally moved from perry's Downloads folder and is now in Documents. Your task is to find and open this file.

In the "Documents" folder, you will find a file called l.jpg .

The answer to this question is "lion"

- Why is fixing this problem important?

Having a grasp of simple encoding techniques, such as using base64, is a key skill. It allows us to uncover hidden messages that have been transformed using these techniques.

2. Forensics Question 2 Correct: 6 pts.

- How do I find this problem?

When you open an image, please read all the "Forensics Questions" thoroughly before modifying the image as you may change something that prevents you from answering the question correctly. There is a file on the Desktop here named "Forensics Question 2".

- How do I solve this problem?

This question asks you to find the absolute path of the directory containing prohibited MP3 files.

In a terminal type **locate '*.mp3'**. In the output of locate you can see the file system location of files with the extension .mp3. The mp3 files under linda's Music directory appear to be non-work related.

The answer to this question is the absolute path to the mp3 files starting with the root directory **/**.

- Why is fixing this problem important?

Knowing how to efficiently find files of different types on a Linux operating system will help you quickly identify many different types of security issues such as prohibited files and software, sensitive information, backdoors, services, and important configuration files.

3. Removed unauthorized user harry: 4 pts.

- How do I find this problem?

One of the first things you should do when starting an image during a competition is check the README file on the desktop. The authorized administrators and users listed in the README are

the only users that should exist on the system (aside from legitimate built-in system accounts and those used for services). All unauthorized user accounts should be removed.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher and click **Settings**. Scroll down and click on **Users**, then click **Unlock** in the upper right corner of the Settings window. If prompted type the password of your current user account. The password for your current user account can be found in the README. Select the user **harry**. Click on **Remove User...** Since this is a competition environment and a further analysis of this user's files is not necessary, click **Delete Files**.

- Why is fixing this problem important?

Computer access should be limited to just those who need to use it to complete their tasks. By leaving unauthorized user accounts on the image, unauthorized individuals may be able to log on to the computer and make changes that could affect the safety and security of legitimate users. Unauthorized user accounts also give adversaries a greater attack surface. For example, unauthorized user accounts increase the risk of having a user account compromised via password cracking.

4. User hamlet is not an administrator: 4 pts.

- How do I find this problem?

One of the first things you should do when starting an image during a competition is check the README file on the desktop. The authorized administrators listed in the README are the only users that are authorized have administrator level access. All users not in the list of authorized administrators should have their administrator level access removed.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher and click **Settings**. Scroll down and click on **Users**, then click **Unlock** in the upper right corner of the Settings window. If prompted type the password of your current user account. The password for your current user account can be found in the README. Select the user **cornelius**. Click on the toggle button next to **Administrator**.

- Why is fixing this problem important?

Administrator level access gives individuals the ability to modify critical system files and functions and should be limited to authorized individuals only. The more users with administrator level access, the higher your risk, since compromising an account with administrator level access gives an adversary complete control of the system.

5. Changed insecure password for user alice: 4 pts.

- How do I find this problem?

Ensuring users have strong passwords is an important principle of cybersecurity. In this instance the README tells you the passwords of the authorized administrators. In practice, security professionals use password auditing tools to help identify users with weak passwords.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher and click **Settings**. Scroll down and click on **Users**, then click **Unlock** in the upper right corner of the Settings window. If prompted type the password of your current user account. The password for your current user account can be found in the README. Select the user **alice**. Click the line labeled **Password**. Select **Set a password now**. Choose a secure password and type it into the **New Password** and **Confirm New Password** text boxes, and click **Change**.

- Why is fixing this problem important?

Weak passwords can be easily and quickly compromised by adversaries via various password cracking techniques. A compromised user account, even if it is not an administrator, can easily and quickly lead to a compromised system and network.

6. Added sybella to group pioneers: 7 pts.

- How do I find this problem?

The README requests that you add a user to a group.

- How do I solve this problem?

In a terminal, type **sudo gpasswd -a sybella pioneers**. If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README.

- Why is fixing this problem important?

One important aspect of working as a security or IT professional is supporting business operations and knowing how to do administrative tasks when requested. Additionally, knowing how system administration tasks are performed and the consequences of those actions is important as a security professional, because you must know in detail how an operating system works before you can defend it.

7. A minimum password length is required: 4pts.

- How do I find this problem?

Password policies are set in the `/etc/pam.d/common-password` file. This file shows password rules related to length, complexity, and history.

- How do I solve this problem?

In a terminal, type `sudo gedit /etc/pam.d/common-password` to edit the file. Find a line in the file that contains **password [success=2 default=ignore] pam_unix.so** and add in the text **minlen=10** . This will set the requirement that all users must have passwords that are at least 10 characters long. Click Save before closing out of the file to make sure your changes take effect. Any number can be added here to set the required password length, but 10 or higher is recommended.

- Why is fixing this problem important?

Having a password on a user account that is too short makes it extremely vulnerable to attacks by outside individuals. With a weak password, an attacker can more easily gain access to a user's files. Strong passwords make it much more likely that only the authorized user of the account can access it.

8. Null passwords do not authenticate: 6pts.

- How do I find this problem?

Account lockout policies are set in the `/etc/pam.d/common-auth` file. This file allows you to set rules and conditions for users to sign-in to their account using their password.

- How do I solve this problem?

In a terminal, type `sudo gedit /etc/pam.d/common-auth` to edit the authentication configuration file. Find the line that shows **auth [success=2 default=ignore] pam_unix.so nullok** . Remove the "nullok" text and save the file.

- Why is fixing this problem important?

The "nullok" text included in the common-auth file allows accounts with empty passwords to login without a password prompt. This would make it easy for an attacker to gain access to your user accounts without having a password.

9. IPv4 TCP SYN Cookies have been enabled: 5 pts.

- How do I find this problem?

Enforcing industry recommended security options is good cybersecurity practice.

- How do I solve this problem?

In a terminal, type `gedit admin:///etc/sysctl.conf`. If prompted type the password of the current user account. The password for the current user account can be found in the README. Change `net.ipv4.tcp_syncookies=0` to be `net.ipv4.tcp_syncookies=1`

Save the file and close gedit. In the terminal type `sudo sysctl --system` to apply the settings. If prompted for a password by sudo, type the current user's password. The password for the current user account can be found in the README.

- Why is fixing this problem important?

SYN cookies are a networking technique used to resist SYN flood attacks, a type of denial of service attack.

10. Uncomplicated Firewall (UFW) protection has been enabled: 6 pts.

- How do I find this problem?

Enabling a host-based firewall is very important to system security. The README tells you that the only company approved firewall is UFW. You can check the status of UFW by typing **`sudo ufw status`**. If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README.

- How do I solve this problem?

In a terminal, type **`sudo ufw enable`**. If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README.

- Why is fixing this problem important?

Enabling and properly configuring a firewall is critical to ensuring that you are only allowing known, authorized traffic in and out of your computer.

11. Insecure permissions on shadow file fixed: 5pts.

- How do I find this problem?

Auditing the permissions of files on your system is important to maintaining the security of your system.

- How do I solve this problem?

In a terminal, type `ls -alF /etc/shadow` to view the current permissions of the shadow file. Notice the shadow file is world readable. Type `sudo chmod 640 /etc/shadow` to remove all world permissions from the shadow file. If prompted by sudo for a password, type the current user's password. The password for the current user account can be found in the README.

- Why is fixing this problem important?

Insecure permissions on some files, including the shadow file, can lead to vulnerabilities. If the shadow file is world readable, anyone on your system can obtain password hashes and attempt to crack them.

12. GRUB Configuration is not world readable: 5 points

- How do I find this problem?

Auditing the permissions of files on your system is important to maintaining the security of your system.

- How do I solve this problem?

In a terminal, type `ls -alF /boot/grub/grub.cfg` to view the current permissions of the GRUB configuration file. Type `sudo chmod 600 /boot/grub/grub.cfg` to remove all world permissions from the file. If prompted by sudo for password, type the current user's password. The password for the current user account can be found in the README.

- Why is fixing this problem important?

Insecure permissions on some files, including the GRUB configuration file, can lead to vulnerabilities. If the GRUB configuration file is world readable, anyone can view the paths to critical files and other sensitive data that can be used for an attack on your system.

13. Nginx service has been disabled or removed: 5 pts.

- How do I find this problem?

Stopping and disabling insecure or unnecessary services is an important principle of good cybersecurity. Many services need to be running to ensure normal and secure operation of computer systems. Reading about the services on your system and doing research can help you determine the importance of a service and if it is necessary for normal operation. Additionally,

business-critical services listed in the README should remain running at all times. Running services can be found by running the command **systemctl list-units --type=service --state=active** in a terminal.

- How do I solve this problem?

In a terminal, type **sudo systemctl stop nginx** to stop the service. If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README. After stopping the service, type **sudo systemctl disable nginx** to prevent it from starting automatically in the future.

- Why is fixing this problem important?

Disabling unnecessary services can limit your attack surface. The fewer services an adversary has to attack and potentially exploit, the lower your risk. Adversaries may attack known or unknown vulnerabilities in services to obtain information, escalate privileges, or gain unauthorized access.

14. The system automatically checks for updates daily: 6 pts.

- How do I find this problem?

Automatically checking for security updates is an important cybersecurity principle. In Ubuntu, this can be checked and configured in the **Software & Updates** application.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher and click **Software & Updates** (you may select Settings on the pop-up box). In the **Updates** tab, select the dropdown box next to Automatically check for updates, and choose **Daily**. If prompted type the password of your current user account. The password for your current user account can be found in the README. Click **Close** (or Cancel if prompted to apply updates).

- Why is fixing this problem important?

When security vulnerabilities are found in software, the software vendor publishes updates that patch the security vulnerabilities. Adversaries can more easily compromise your system if software is present that has known security vulnerabilities. Ensuring software is up-to-date removes known security vulnerabilities.

This setting does not apply any updates to the software on the system, or configure what updates to check for, but it does automatically check for updates so that you may be notified when updates are available.

15. Firefox has been updated: 5 pts.

How do I find this problem?

Updating installed applications and services to fix security vulnerabilities is an important principle of good cybersecurity.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher on the bottom of the Launcher and click **Software Updater**. You may click **Install Now** to update all installed software, or to only update Firefox first select only **Firefox** under **Details**.

- Why is fixing this problem important?

When security vulnerabilities are found in software, the software vendor publishes updates that patch the security vulnerabilities. Adversaries can more easily compromise your system if software is present that has known security vulnerabilities. Ensuring software is up-to-date removes known security vulnerabilities.

16. Thunderbird has been updated: 5 pts.

- How do I find this problem?

Updating installed applications and services to fix security vulnerabilities is an important principle of good cybersecurity.

- How do I solve this problem?

Click the **Show Applications** button on the bottom of the Launcher and click **Software Updater**. You may click **Install Now** to update all installed software, or to only update Thunderbird first select only **Thunderbird** under **Details**.

- Why is fixing this problem important?

When security vulnerabilities are found in software, the software vendor publishes updates that patch the security vulnerabilities. Adversaries can more easily compromise your system if software is present that has known security vulnerabilities. Ensuring software is up-to-date removes known security vulnerabilities.

17. Prohibited MP3 files are removed: 6 pts.

- How do I find this problem?

The README specifically states that non-work related media files are prohibited. There are several ways and commands that can be used to find files and file types including **locate**, **find**, and **file**.

- How do I solve this problem?

In a terminal type **locate '*.mp3'**. In the output of locate you can see the file system location of files with the extension .mp3. The mp3 files under corey's Music directory appear to be non-work related. Type **sudo rm /home/corey /Music/*.mp3** If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README.

- Why is fixing this problem important?

In addition to being specifically prohibited in the README, media files can also be used to compromise media viewer/player software and could introduce unwanted legal and regulatory issues.

18. Prohibited software AisleRiot removed: 5 pts.

- How do I find this problem?

Removing unauthorized and potentially unwanted programs from a computer is an important cybersecurity principle. Third party software installed on the system should be limited to the software listed in the README, and software required for normal operation of the operating system and services. In this case you can see that AisleRiot is installed by clicking the **Show Applications** button and looking at all the programs.

- How do I solve this problem?

This program does not show up in Ubuntu Software. In a terminal type **sudo apt remove aisleriot** and press **Enter**. Type **Yes** or **y** to remove the application. Then, type **sudo apt autoremove -y** and **Enter**.

- Why is fixing this problem important?

Removing unauthorized software from your system is important for limiting your risk and reducing your attack surface. Unauthorized programs may leak confidential information, interfere with business-critical software and services, contain various malware and security vulnerabilities, or could introduce unwanted legal and regulatory issues.

19. SSH root login has been disabled: 6 pts.

- How do I find this problem?

OpenSSH Server is listed in the README as a critical service. It's important to research how to secure critical services without breaking the required functionality of the service.

- How do I solve this problem?

In a terminal type **sudo gedit /etc/ssh/sshd_config**. If prompted by sudo for a password, type your current user's password. The password for your current user account can be found in the README.

Change the line that says **PermitRootLogin yes** to **PermitRootLogin no**. Save the file and exit.

- Why is fixing this problem important?

The user root is a known user account on the vast majority of Linux and Unix systems giving adversaries an edge when trying to guess passwords for user accounts. Additionally, the root user is a superuser with the ability to do anything on the system. If the root user account gets compromised the entire system is compromised.

Penalties

1) OpenSSH service has been stopped or removed: -5 pts.

- Why is this a penalty?

The README specifies that the OpenSSH server is a critical service.

2) Firefox has been removed: -5 pts.

- Why is this a penalty?

The README states that Firefox is required software.

3) Thunderbird has been removed: -5 pts.

- Why is this a penalty?

The README states that Thunderbird is required software.

4) Perl has been removed: -5 pts.

- Why is this a penalty?

The README states that Perl is required software.