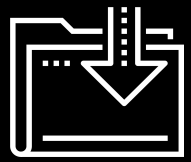
Access Controls

Cybersecurity Boot Camp

Linux SysAdmin Fundamentals Day 2



Class Objectives

By the end of today's class, you will be able to:

Audit passwords using john.

Elevate privileges with sudo and su.

Create and manage users and groups.

Inspect and set file permissions for sensitive files on the system.

A Brief Introduction to Hashes and Password Cracking

Password Hashes

A hash is a cryptographic function that takes data as input and translates it to a string of different, seemingly random data.

My Plain Text Password

```
ApPles2Orang3s93
```

My Password Hash

```
579de3a38386c62a1eca4600e3882b8b
```

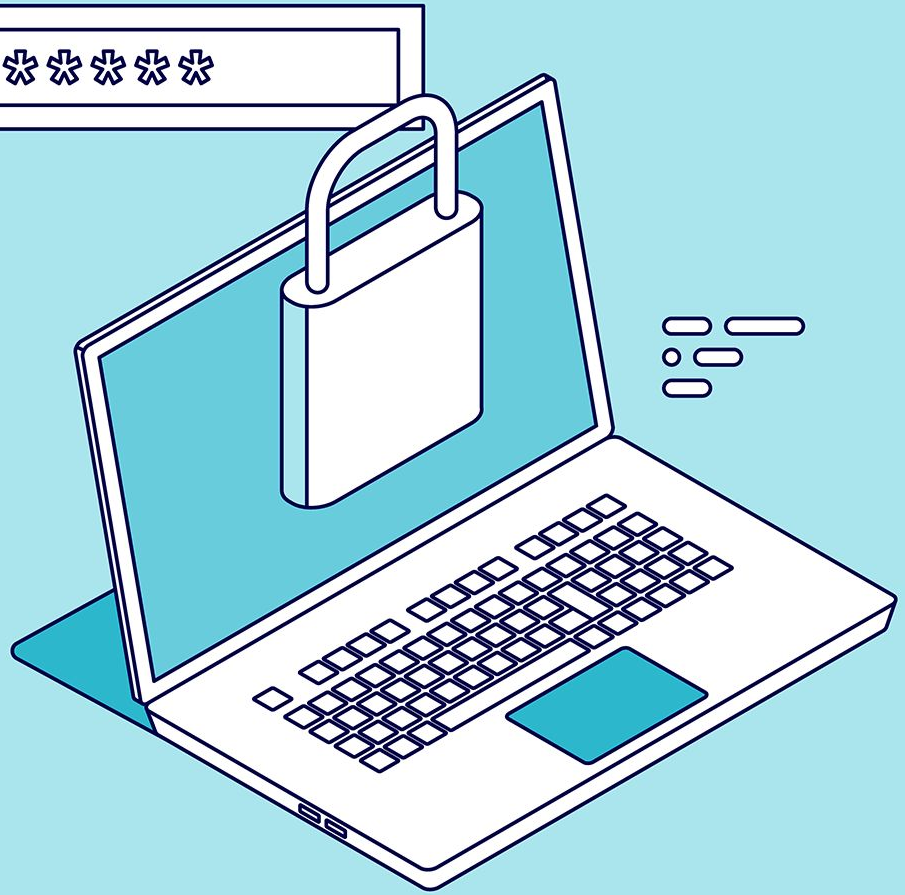
A hash will always output the same string for the same input data.

Password Hashes

The hash is stored in the shadow file.

When a user logs in, the hash of the submitted password is compared to the hash stored in `etc/shadow`.

If the hashes match, the user's logged in.



Password Cracking

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Password Hashes

Password cracking tools **cannot** reverse a password hash.

Instead, they use a wordlist of potential passwords and create hashes for each one.

This form of password hacking is called a **brute force attack**.

The more random and lengthy the password, the longer it will take to crack.

How Secure is my Password?

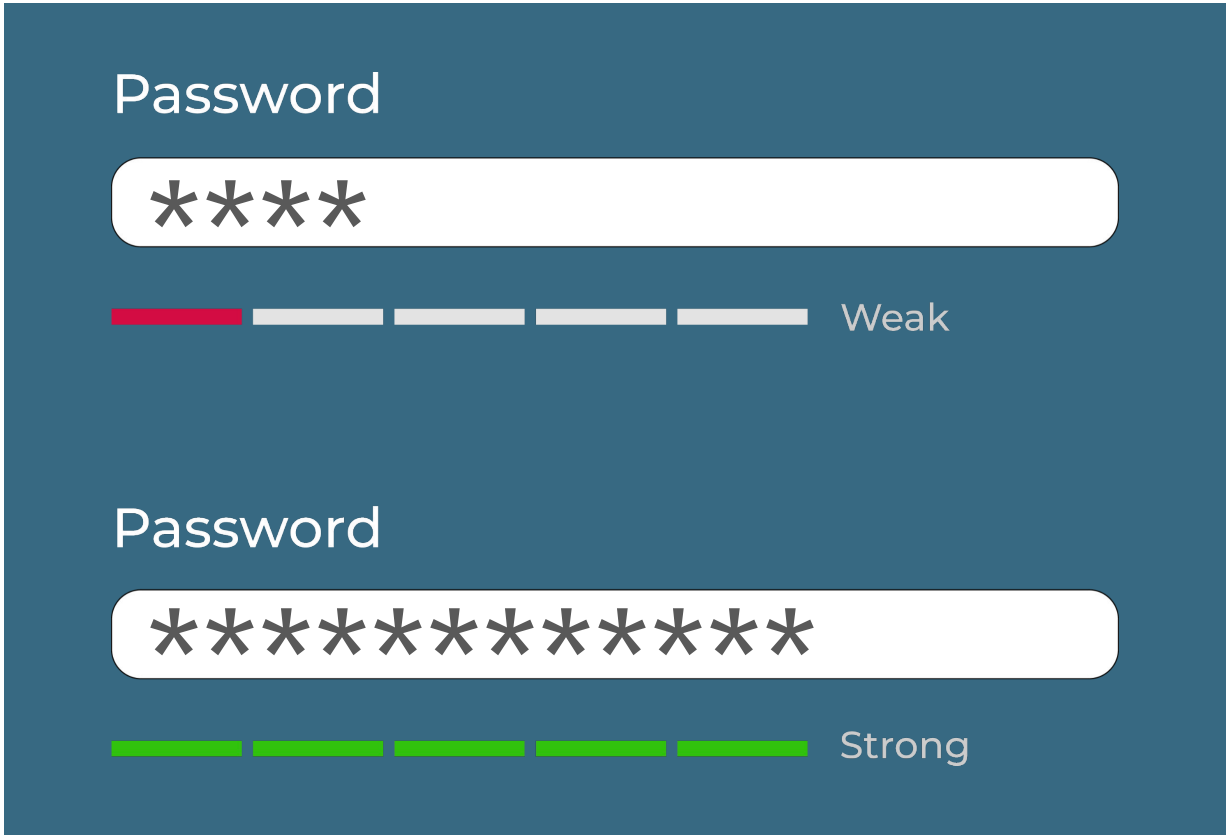
Go to howsecureismypassword.net.

Secure Password Takeaways

If a system requires passwords of only sixteen characters, the password will be relatively strong, even if it contains words.

Add a few extra characters and it will become exponentially more secure.

In contrast, if using all random characters, a password still must be at least 10 characters to be very effective.



Cracking Passwords

Modern password cracking software works using the following steps:

01 Takes a list of hashes as input.

02 Hashes passwords from a given password list and compares each hash to the list of hashes it was given.

03 If it matches a hash, it gives outputs of what password was used to create the hash.

Password Cracking and John the Ripper

Modern password cracking software works uses the following steps:

01 Takes a list of hashes as input.

02 Hashes passwords from a given password list and compares each hash to the list of hashes it was given.

03 If it matches a hash, it gives outputs of what password was used to create the hash.

John the Ripper is a popular modern software that uses this technique to crack a wide variety of hashes.

Instructor Demonstration

John the Ripper

Activity: Let's Talk to John

In this activity, you will continue your role as a junior administrator auditing a system. Now, the focus is on passwords.

You will use `john` to crack the password hashes for all of the users on our system.

Suggested Time:

20 Minutes

Time’s Up! Let’s Review.

Questions?

Privileges, root, sudo, and su

We've used `sudo` for several commands in this unit.

Why do you think some commands require `sudo` and others don't?

Privileges and Users

Why do we need to use sudo for some commands and not others?

Users

Every file and program on a Linux system has permissions.

These permissions tell the system which users can access a file or run a program.

Groups

Users can be placed in groups, which can have their own permissions.

Root

File and program permissions apply to all users *except* the root.

The root user (or super user) has complete access to the system and can perform any task.

Root Access

When attackers try to gain access to a system, they often try to gain **root access.**

Secure Linux systems do not allow just anyone to log in as the root user on the system.

`sudo` (`superuser do`) can grant a user root privileges for one command.

When the one `sudo` command is done, users are reverted to their usual access.

`sudo` can also control which commands the user can run as root.

Su Demo

In the following demo, we will attempt to update all of our existing software packages:

Instructor Demonstration

su vs. sudo

Sudo Demo Summary

In the previous demonstration, we covered the following commands:

`whoami`	Determines the current user.
`su`	Switches to another user, in this case the root user.
`sudo`	Invokes the root user for one command only.
`sudo -l`	Lists the `sudo` privileges for a user.
`visudo`	Edits the `sudoers` file.

Activity: Sudo Wrestling

In this activity, you will continue your role as a junior administrator auditing the system:

- The senior administrator has asked you to audit the system for sudo and root access, making sure no users other than the admin user have access to any sudo use.
- You must log in as each user, check their privileges, edit the sudoers file, and look for anything else suspicious.

Suggested Time:

25 Minutes

Time’s Up! Let’s Review.

Questions?


Break

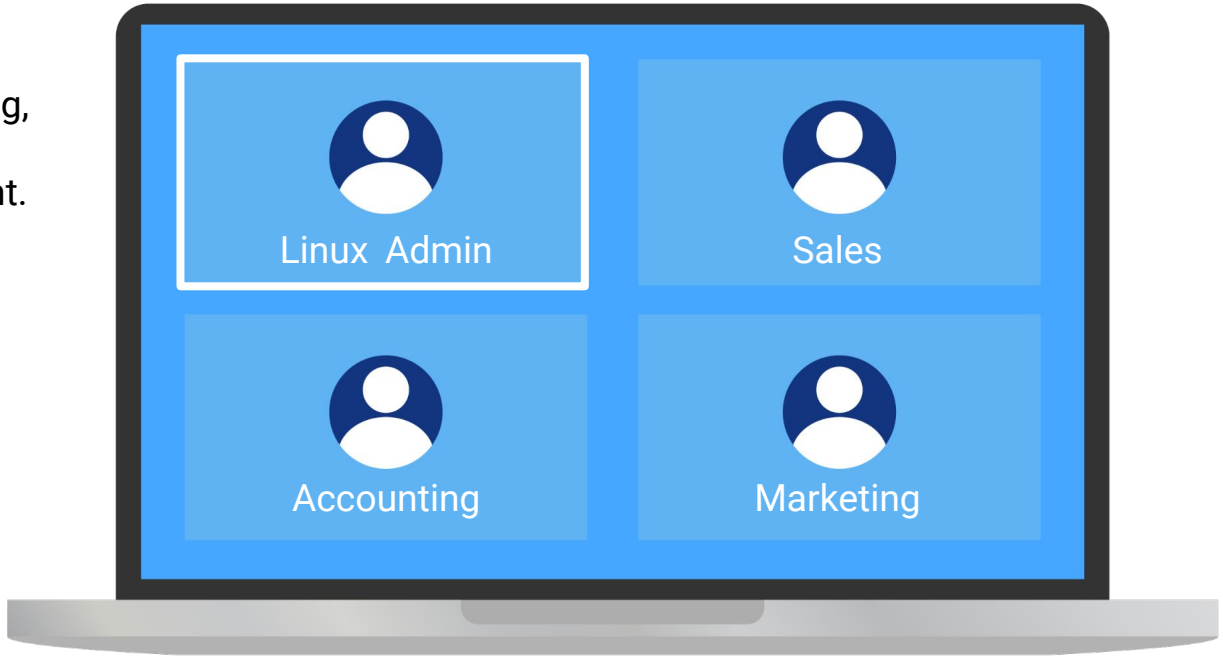
Users and Groups

Users and Groups

Users on a Linux system can be added to groups. Linux has the ability to create groups of users for functions like file and service sharing.

If a company has different departments, like Sales, Accounting, and Marketing, a Linux admin can create a group for each department.

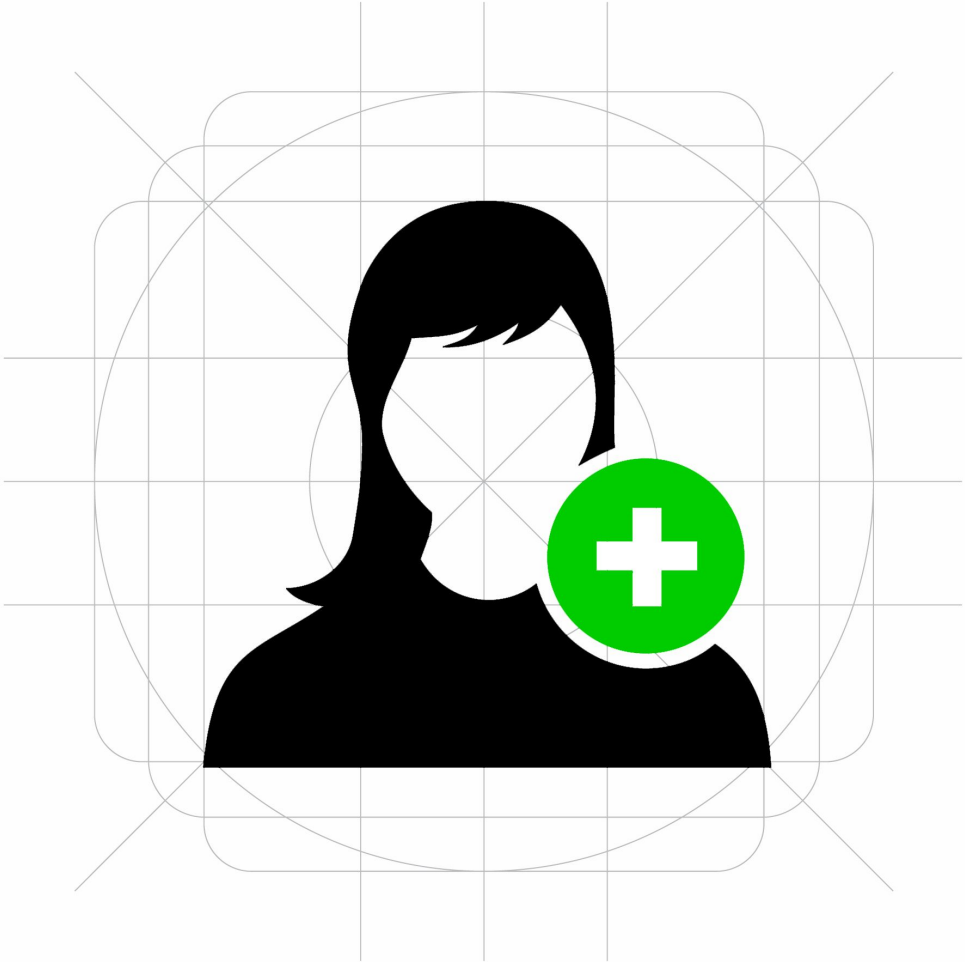
Only users in each group can access files owned by the group.



Users and Groups

A system admin must know how to to add and remove users to a system, add and remove groups, and add or remove users from groups.

Soon we'll discuss commands specifically used for user and group management.



First, let’s see how Linux identifies users and groups in the system.

`id` command

Linux identifies users and groups in the system using the **`id`** command:

Linux associates a specific number with each user, known as the **user ID (UID)**.

When Linux needs to identify a user, it uses the UID, not the username.

System users have a UID that is **less than 1000**.

Standard users have a UID that is **greater than 1000**.

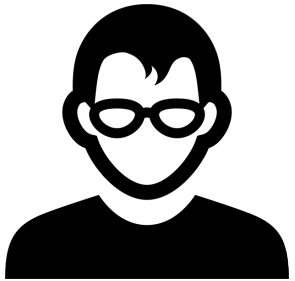
The root user always has the UID of **0.**

Users and Groups Demo Scenario

In the upcoming demo, we'll dive into more actions for user and group management using the following scenario:

Your company recently made changes to the developer team.

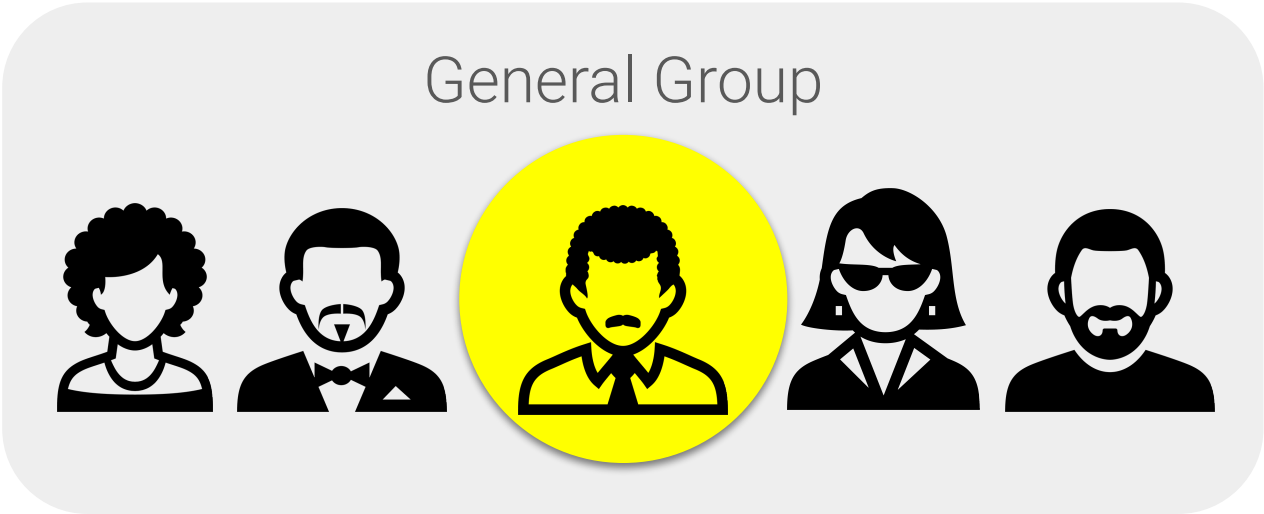
Mike, a lead developer, has left the company.



Joseph has joined as a new junior developer.

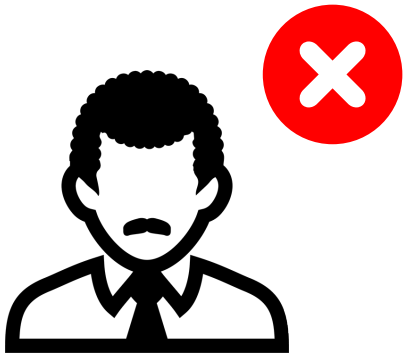
Users and Groups Demo Scenario

The company's Linux system has never been set up properly with a `developers` group. Instead, **Mike was part of the `general` group**.



Users and Groups Demo Scenario

As the sysadmin for this system, you need to remove Mike from the general group, remove the general group, and delete Mike from the system.



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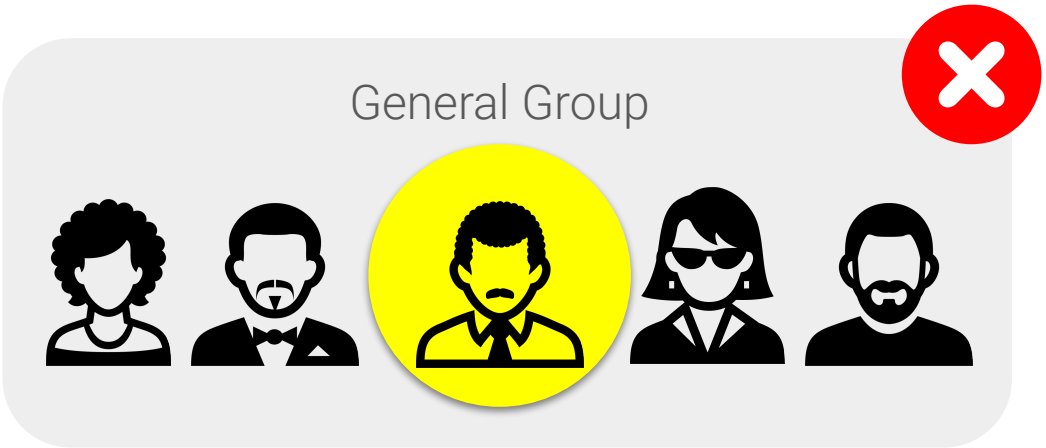
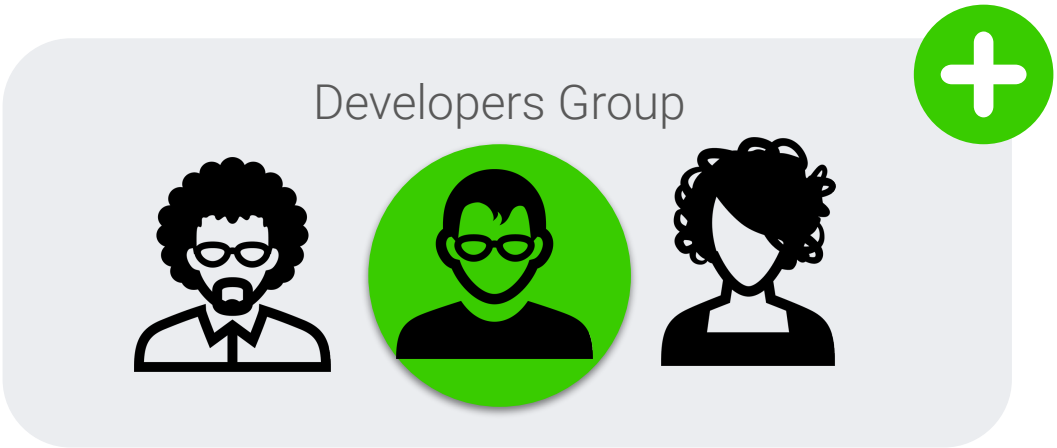


Users and Groups Demo Scenario

Then, you need to add Joseph to the system, create a developers group, and add Joseph to this group.

Joseph has joined as a new junior developer.



Users and Groups Scenario

To accomplish these tasks, we will use the following commands:

`groups`	Get group info for the user `mike`.
`usermod`	Lock Mike's account to prevent him from logging in.
`usermod`	Remove the user `mike` from the `general` group.
`deluser --remove-home`	Delete the user `mike`. 
`delgroup`	Delete the `general` group.
`adduser`	Create the user `joseph`. 
`addgroup`	Create a `developer` group.
`usermod`	Add the user `joseph` to the `developer` group.

Instructor Demonstration

Users and Groups

Activity: Users and Groups

Your senior administrator has asked you to audit all the users and groups on the system.

- You must create a new group for the standard users and remove users from the sudo group.
- In the previous activity, you found some malicious users. Now, you will remove them from the system entirely.

Suggested Time:

20 Minutes

Time’s Up! Let’s Review.

Questions?


The End