Linux and Shell Scripting

7.Administering Linux: Introduction to Users and Groups

Managing users and groups is a fundamental aspect of Linux administration. Proper user and group management ensures system security, resource allocation, and efficient user collaboration. This chapter will guide you through the basics of user and group management in Linux, covering essential commands and best practices.

Understanding Users and Groups

In Linux, users and groups are used to control access to the system and its resources. Each user has a unique user ID (UID), and each group has a unique group ID (GID). Users can belong to one or more groups, which helps to manage permissions and access control.

Users:

- **Root User**: The root user (UID 0) has unrestricted access to the system. This user is used for system administration tasks.
- **Regular Users**: Regular users have limited permissions and are assigned UIDs starting from 1000 (or 500 in some older distributions).

Groups:

- **Primary Group**: Each user is assigned a primary group, typically a private group with the same name as the user.
- **Secondary Groups**: Users can be members of multiple secondary groups, which are used to grant additional permissions.

User Management Commands

1. **Adding Users**
    - To add a new user, use the **useradd** command:

bash

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sudo useradd username

    - To set a password for the new user:

bash

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sudo passwd username

2. **Modifying Users**
    - To change a user's information, such as their home directory or shell, use the **usermod** command:

bash

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sudo usermod -d /new/home/dir username sudo usermod -s /bin/bash username

- To add a user to a secondary group:

bash

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sudo usermod -aG groupname username

3. **Deleting Users**
    - To delete a user, use the **userdel** command:

bash

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sudo userdel username

- To delete a user and their home directory:

bash

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sudo userdel -r username

Group Management Commands

1. **Adding Groups**
    - To create a new group, use the **groupadd** command:

bash

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sudo groupadd groupname

2. **Modifying Groups**
    - To change a group's information, such as its GID, use the **groupmod** command:

bash

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sudo groupmod -g 1001 groupname

3. **Deleting Groups**
    - To delete a group, use the **groupdel** command:

bash

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sudo groupdel groupname

Viewing User and Group Information

- To list all users on the system:

bash

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cut -d: -f1 /etc/passwd

- To list all groups on the system:

bash

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cut -d: -f1 /etc/group

- To view detailed information about a user:

bash

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id username

Managing User Permissions

File permissions in Linux are controlled using read (r), write (w), and execute (x) permissions for the file owner, group, and others. To view the permissions of a file, use the **ls -l** command:

bash

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ls -l filename

- Example output:

csharp

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-rwxr-xr-- 1 user group 1024 May 28 12:00 filename

In this example:

- **-rwxr-xr--** represents the file permissions.
- **user** is the owner of the file.
- **group** is the group associated with the file.

Changing File Permissions

1. **Using chmod**
    - To change file permissions, use the **chmod** command. Permissions can be specified using symbolic or numeric modes.

- Symbolic mode:

bash

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```
chmod u+rwx,go-rwx filename
```

- Numeric mode:

bash

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```
chmod 700 filename
```

2. **Changing Ownership**
    - To change the owner of a file, use the **chown** command:

bash

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sudo chown newowner filename
```

- To change the group associated with a file:

bash

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sudo chown :newgroup filename
```

Best Practices for User and Group Management

1. **Least Privilege Principle**: Grant users only the permissions they need to perform their tasks.
2. **Regular Audits**: Periodically review user accounts and groups to ensure they are still necessary and correctly configured.
3. **Strong Password Policies**: Enforce strong password policies to enhance security.
4. **Use Groups for Permissions**: Assign permissions to groups rather than individual users to simplify management.

Conclusion

Proper user and group management is crucial for maintaining a secure and efficient Linux system. By understanding and using the commands and best practices outlined in this chapter, you can effectively manage user accounts and groups, ensuring that your system remains organized and secure.