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Subject Code: 24CAP-607

Q. Title of Project. Password Generator Using Shell-script

Aim/Overview of the practical: Password security is a critical aspect of digital security practices. Using complex, unpredictable passwords helps to protect sensitive data from unauthorized access. This project demonstrates a simple method to generate secure passwords using shell scripting in Linux, which relies on the randomness provided by /dev/urandom, a pseudo-random number generator. The script filters characters to include only alphanumeric characters for readability and versatility.

1. **Task to be done:** The main objective of this project is to create a shell script that generates a secure, random password of a specified length. This script will prompt the user to enter the desired password length and generate a random alphanumeric password based on the user's input. It serves as a simple but effective way to create strong passwords for secure systems.

2. **Script's Explanation:** The script is written in Bash and includes the following key components:

A) **Function Definition (**generate_password**)**:

1. This function accepts one argument: length, which determines the number of characters in the generated password.
2. It uses the `tr` command with /dev/urandom to generate a random alphanumeric string:

   * /dev/urandom produces a stream of random bytes.
   * tr -dc 'A-Za-z0-9' filters these bytes to include only uppercase and lowercase letters (A-Za-z) and numbers (0-9).
   * head -c "$length" restricts the output to the specified number of characters.

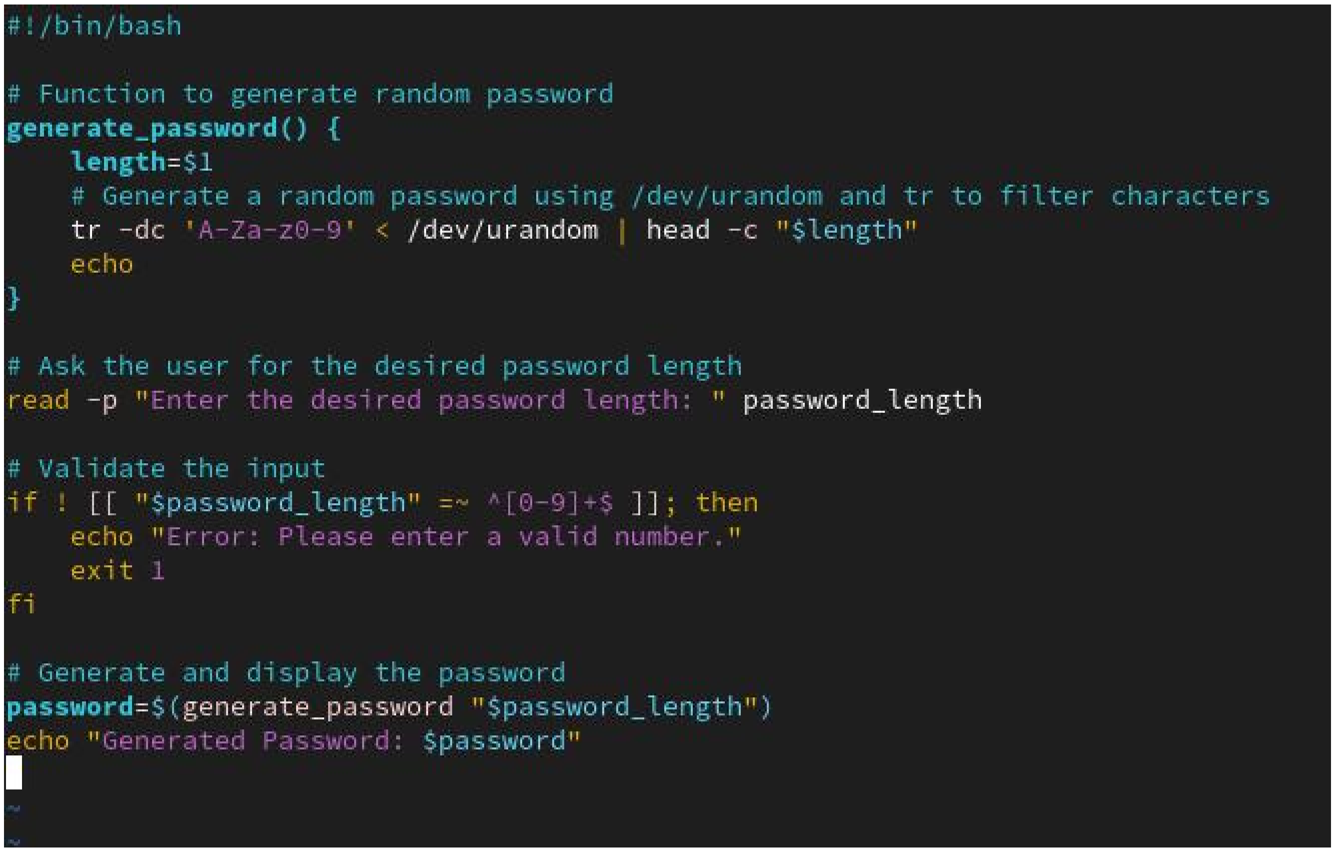
B) **User Input**:
* The script prompts the user to input their desired password length using the read command.
* It then validates the input to ensure it is a positive integer using a regular expression.

C) **Input Validation**:
If the input does not match the pattern for a positive integer (^[0-9]+$), the script outputs an error message and exits with a status of 1 (indicating an error).

D) **Password Generation and Display**:

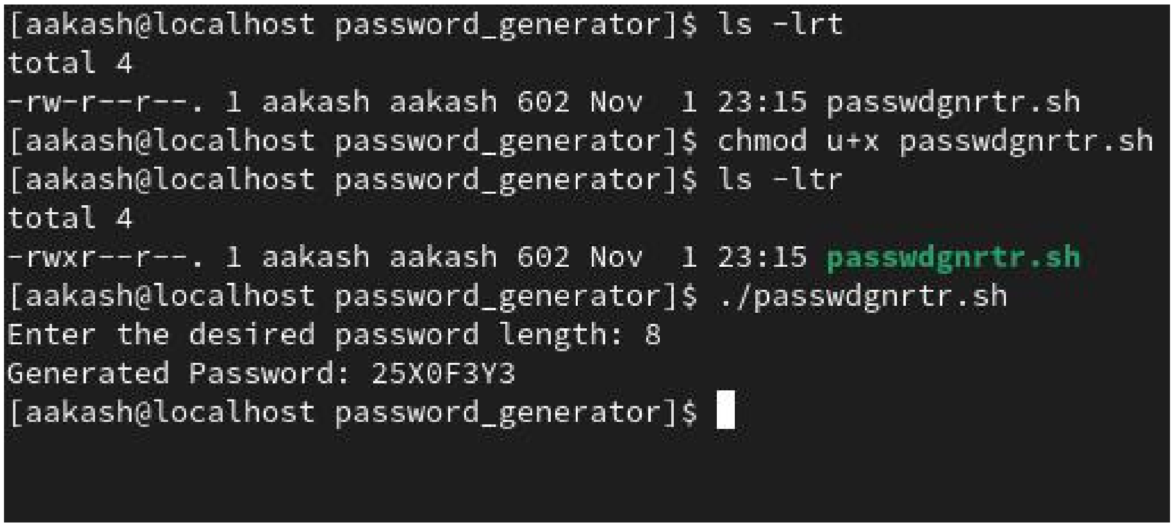
* After validating the input, the script calls generate_password with the specified length and stores the generated password in the password variable.
* The password is then displayed to the user.

3. Code for experiment/practical:



```bash
#!/bin/bash

# Function to generate random password
generate_password() {
    length=$1
    # Generate a random password using /dev/urandom and tr to filter characters
    tr -dc 'A-Za-z0-9' < /dev/urandom | head -c "$length"
    echo
}

# Ask the user for the desired password length
read -p "Enter the desired password length: " password_length

# Validate the input
if ! [[ "$password_length" =~ ^[0-9]+$ ]]; then
    echo "Error: Please enter a valid number."
    exit 1
fi

# Generate and display the password
password=$(generate_password "$password_length")
echo "Generated Password: $password"

~
~
```

4. Result/Output/Writing Summary:



```
[aakash@localhost password_generator]$ ls -lrt
total 4
-rw-r--r--. 1 aakash aakash 602 Nov  1 23:15 passwdgnrtr.sh
[aakash@localhost password_generator]$ chmod u+x passwdgnrtr.sh
[aakash@localhost password_generator]$ ls -ltr
total 4
-rwxr--r--. 1 aakash aakash 602 Nov  1 23:15 passwdgnrtr.sh
[aakash@localhost password_generator]$ ./passwdgnrtr.sh
Enter the desired password length: 8
Generated Password: 25X0F3Y3
[aakash@localhost password_generator]$
```

5. Future Scope:

To further improve the script, additional options could be added to include special characters, enforce minimum length, and check for repeated characters or character classes (e.g., uppercase, lowercase, digits).

6. Modules Used:

The script ensures secure password generation by:
1.Using /dev/urandom for randomness, which is non-blocking and suitable for most non-cryptographic uses.
1. Restricting the password characters to alphanumeric symbols for compatibility across various systems.

7. Conclusion:

This project demonstrates a basic shell scripting technique for generating random passwords in a secure and user-friendly way. The script allows users to quickly create strong passwords of customizable lengths, enhancing overall system security.

8. Learning outcomes (What I have learnt):

- **Understanding of Shell Scripting Basics**: Knowledge of fundamental shell scripting concepts, including functions, user input handling, and input validation.
- **Secure Password Generation:** Understanding how to utilize /dev/urandom to generate secure, random passwords using a shell script.
- **Practical Application of Linux Commands:** Using commands like tr, head, and read to manipulate data, handle user input, and control output formatting.