Cybersecurity

Passwords Lab

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THE ACADEMIC INITIATIVE OF THE CYBER INNOVATION CENTER

Passwords Materials

- Description of the lab
- Materials needed
  - Kali Linux Machine
- Software Tools used
  - Leafpad

Objectives Covered

- Security+ Objectives (SY0-701)
  - Objective 2.4 - Given a scenario, analyze indicators of malicious activity.
    - Password attacks

Password Lab Overview

1. Set up Environment
2. Navigate to Shadow
3. Exploring the Kali Password
4. Creating a User
5. Creating a Password
6. Moving the Password
7. Testing the Password
8. On Your Own Activity

Set up Environment

- Log into the cyber range
- Open the Kali Linux Environment
  - You should be on your Kali Linux Desktop
  - Open the Terminal

Navigate to Shadow

- Make yourself the root user:

  `sudo su -`

- Change directory to the etc folder:

  `cd /etc/`

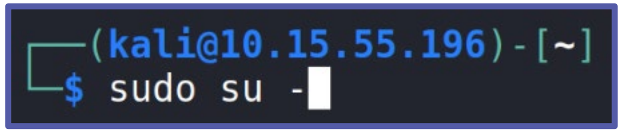
- Display all the directories within /etc:

  `ls`

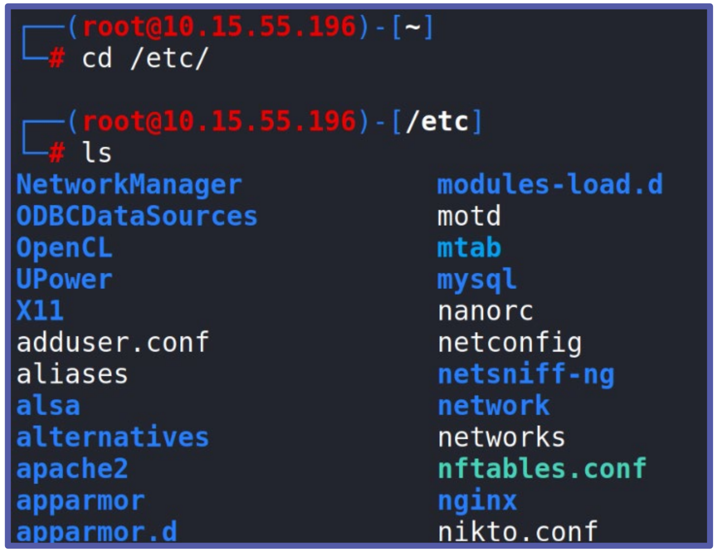
  - You should be able to see the shadow file

- Read the Shadow file where the passwords are stored:

  `cat shadow`

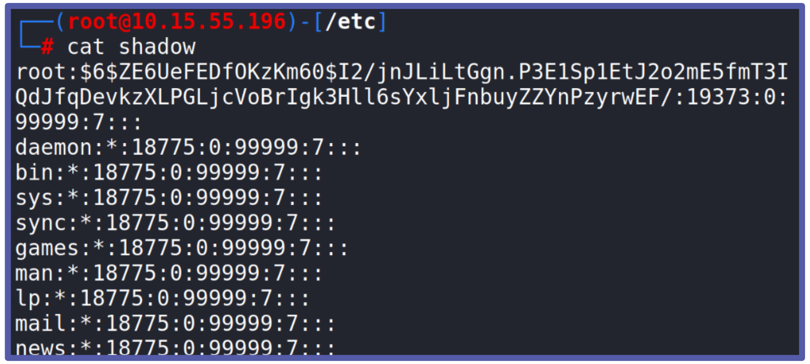


```
┌──(kali@10.15.55.196)-[~]
└─$ sudo su -
```



```
┌──(root@10.15.55.196)-[~]
└─# cd /etc/

┌──(root@10.15.55.196)-[/etc]
└─# ls
NetworkManager                modules-load.d
ODBCDataSources               motd
OpenCL                        mtab
UPower                        mysql
X11                           nanorc
adduser.conf                  netconfig
aliases                       netsniff-ng
alsa                          network
alternatives                  networks
apache2                       nftables.conf
apparmor                      nginx
apparmor.d                    nikto.conf
```



```
┌──(root@10.15.55.196)-[/etc]
└─# cat shadow
root:$6$ZE6UeFEDfOKzKm60$I2/jnJLiLtGgn.P3E1Sp1EtJ2o2mE5fmT3I
QdJfqDevkzXLPGLjcVoBrIgk3Hll6sYxljFnbuyZZYnPzyrwEF/:19373:0:
99999:7:::
daemon:*:18775:0:99999:7:::
bin:*:18775:0:99999:7:::
sys:*:18775:0:99999:7:::
sync:*:18775:0:99999:7:::
games:*:18775:0:99999:7:::
man:*:18775:0:99999:7:::
lp:*:18775:0:99999:7:::
mail:*:18775:0:99999:7:::
news:*:18775:0:99999:7:::
```

Notice that the users root and kali have passwords stored

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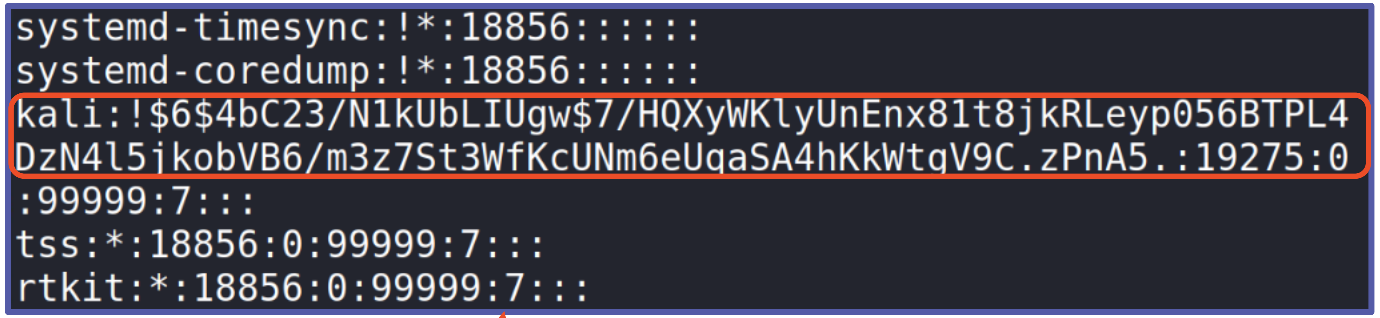
Exploring the Kali Password

- Take a look at the kali password*
  - Remember, “password” is the password*



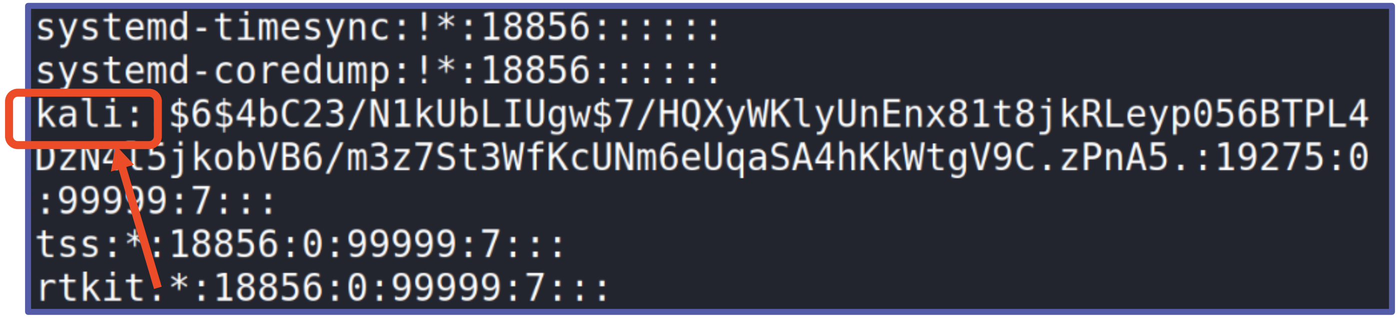
```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:!$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

What does all this mean?

*Please Note: The username/password combination can differ depending on the range/environment you are using

Exploring the Kali Password

- Take a look at the kali password
  - Remember, “password” is the password

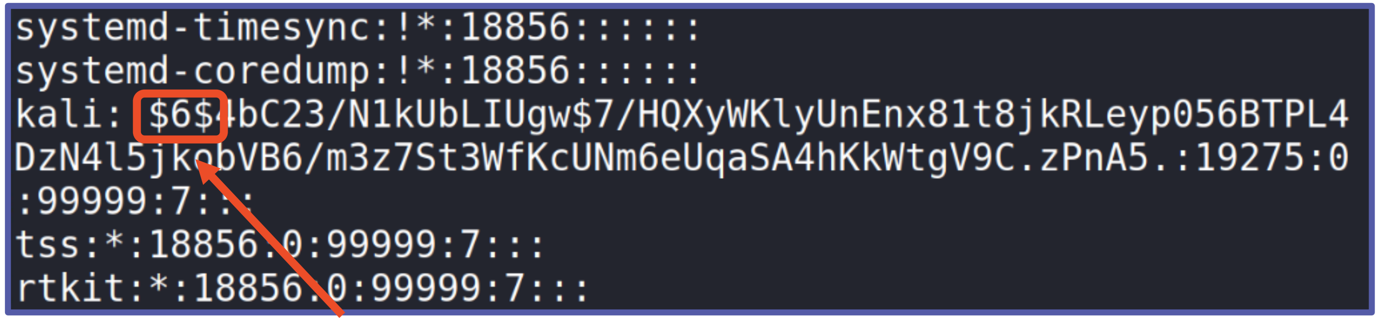


```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

The user’s name

Exploring the Kali Password

- Take a look at the kali password
  - Remember, “password” is the password



```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

The Hash Algorithm
(Here it is 6, thus using SHA-512 Algorithm)

$1$ → MD5

$2$ → Blowfish

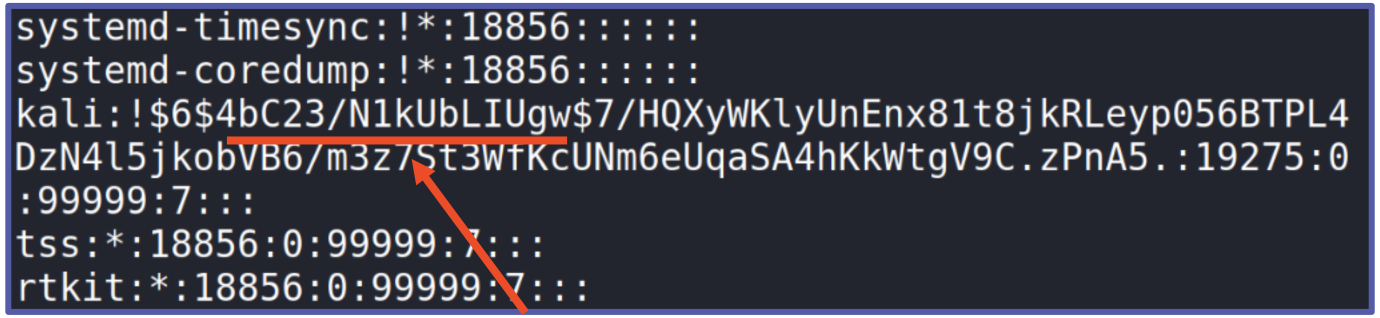
$2a$ → ekaBlowfish

$5$ → SHA-256

$6$ → SHA-512

Exploring the Kali Password

- Take a look at the kali password
  - Remember, “password” is the password



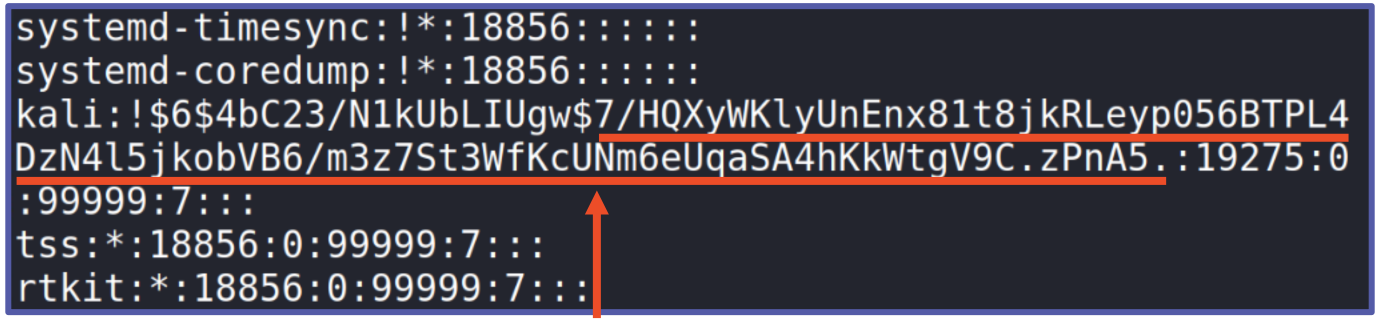
```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:!$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

The Salt

What is the purpose of a salt? Why is this important for security?

Exploring the Kali Password

- Take a look at the kali password
  - Remember, “password” is the password

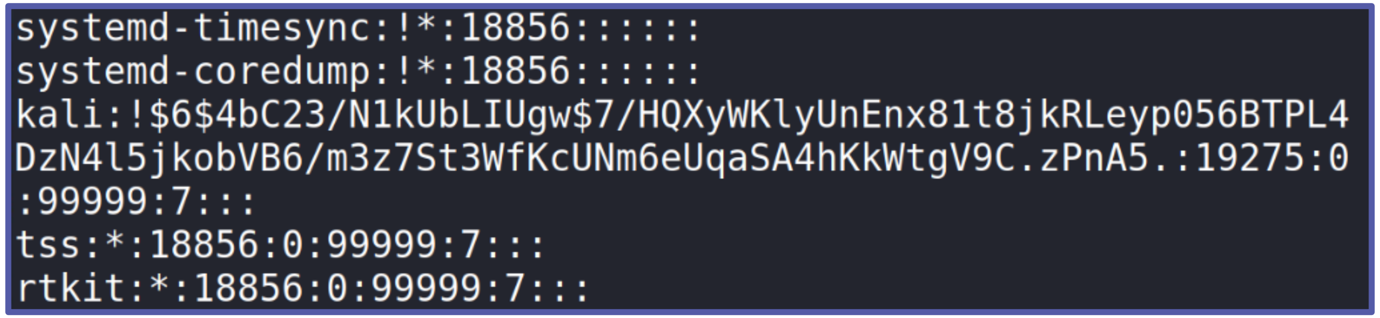


```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:!$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

The Hashed Password

What is a hashed password and why are passwords stored like this?

Exploring the Kali Password



```
systemd-timesync:!*:18856::::::
systemd-coredump:!*:18856::::::
kali:!$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4
DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.:19275:0
:99999:7:::
tss:*:18856:0:99999:7:::
rtkit:*:18856:0:99999:7:::
```

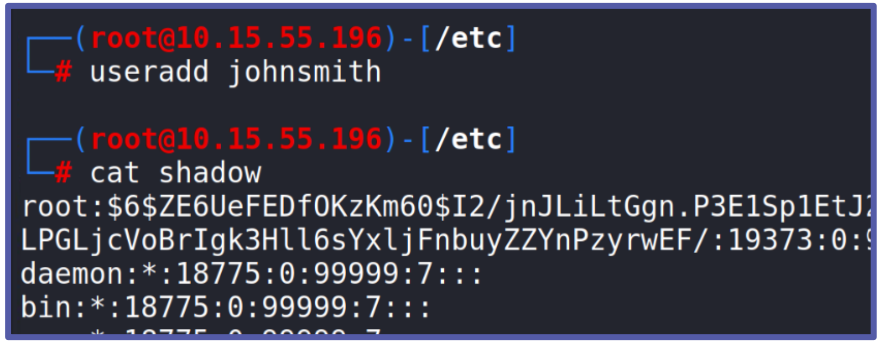
- Thus, passwords are stored in the following format:

username: $hash number$salt$hashed password:

- Kali has the following data:
  - username = kali
  - Hash Algorithm = 6 or SHA-512
  - Salt is ‘4bC23/N1kUbLIUgw’
  - Hash is ‘7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4DzN4l5jkobVB6/m3z7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.’
  - Plaintext password is ‘password’

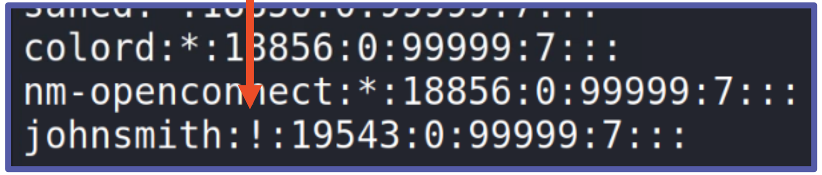
Creating a User

- Create a new user with the same hash and password as ‘kali’
- Create a new user:
  - **`useradd johnsmith`**
- Now, check out johnsmith’s data:
  - **`cat shadow`**
- Notice, that johnsmith has a “!” where the password should be stored



```
┌──(root@10.15.55.196)-[/etc]
└─# useradd johnsmith

┌──(root@10.15.55.196)-[/etc]
└─# cat shadow
root:$6$ZE6UeFEDfOKzKm60$I2/jnJLiLtGgn.P3E1Sp1EtJ
LPGLjcVoBrIgk3Hll6sYxljFnbuyZZYnPzyrwEF/:19373:0:
daemon:*:18775:0:99999:7:::
bin:*:18775:0:99999:7:::
```

No stored password

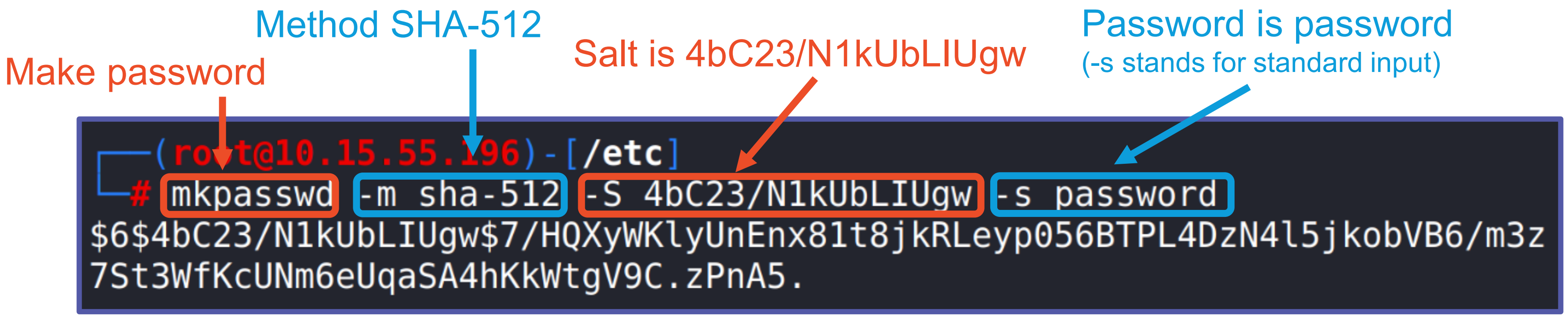


```
saned:*:18856:0:99999:7:::
colord:*:18856:0:99999:7:::
nm-openconnect:*:18856:0:99999:7:::
johnsmith:!:19543:0:99999:7:::
```

Creating a Password

- Use the following command to make the same password as the kali account:

```
mkpasswd -m sha-512 -S <YOUR SALT> -s password
```



Method SHA-512

Make password

Salt is 4bC23/N1kUbLIUgw

Password is password
(-s stands for standard input)

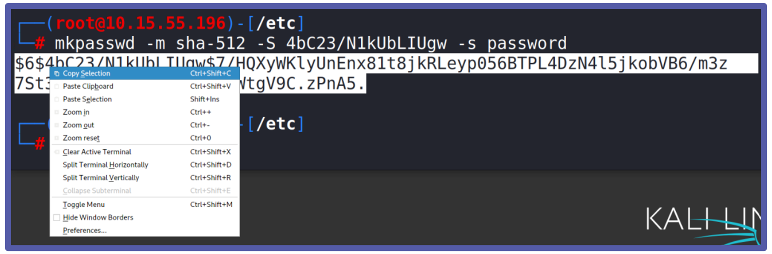
```
┌──(root@10.15.55.196)-[/etc]
└─# mkpasswd -m sha-512 -S 4bC23/N1kUbLIUgw -s password
$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4DzN4l5jkobVB6/m3z
7St3WfKcUNm6eUqaSA4hKkWtgV9C.zPnA5.
```

Notice, the password created is the same as the original user

Moving the Password

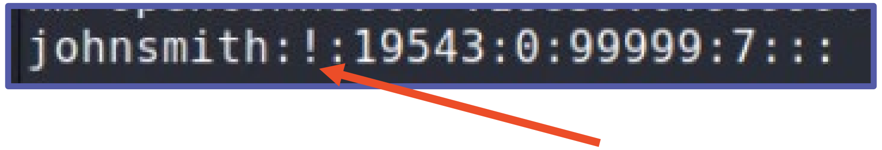
- Highlight the entire password
- Right-click, and select “copy selection”
- Open shadow in Leafpad:

  `leafpad shadow`
- Navigate to user johnsmith
- Delete the exclamation mark
- Paste in the password
- Save and exit Leafpad!



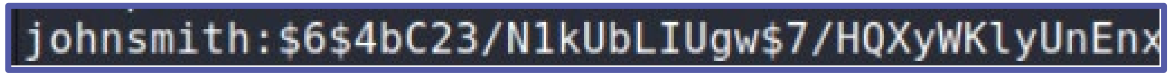
```
┌──(root@10.15.55.196)-[/etc]
└─# mkpasswd -m sha-512 -S 4bC23/N1kUbLIUgw -s password
$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx81t8jkRLeyp056BTPL4DzN4l5jkobVB6/m3z
7St3                  VtgV9C.zPnA5.

┌─                    -[/etc]
└─#
```

Copy Selection Ctrl+Shift+C
Paste Clipboard Ctrl+Shift+V
Paste Selection Shift+Ins
Zoom in Ctrl++
Zoom out Ctrl+-
Zoom reset Ctrl+0
Clear Active Terminal Ctrl+Shift+X
Split Terminal Horizontally Ctrl+Shift+D
Split Terminal Vertically Ctrl+Shift+R
Collapse Subterminal Ctrl+Shift+E
Toggle Menu Ctrl+Shift+M
Hide Window Borders
Preferences...
KALI LIN



```
johnsmith:!:19543:0:99999:7:::
```

Only replace the ‘!’

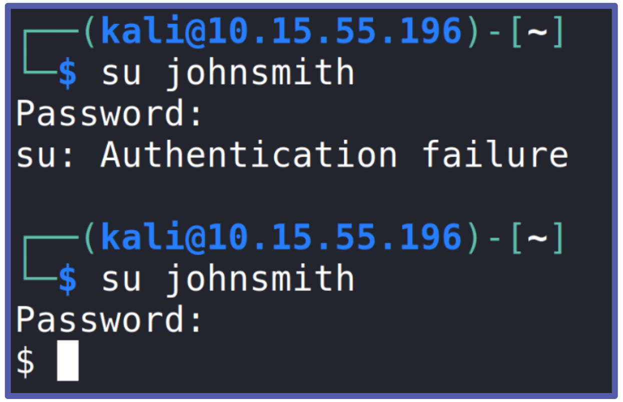


```
johnsmith:$6$4bC23/N1kUbLIUgw$7/HQXyWKlyUnEnx
```

Please Note: If Leafpad is not able to open the display while logged in as the root user, use the following command to open the text in the nano editor:
`nano shadow`

Test the password

- Open a new Terminal (should not be root access)
- Switch user to johnsmith:
  - **`su johnsmith`**
- When prompted, enter the wrong password
  - Do not type in 'password'
- You should see "Authentication failure"
- Switch user to johnsmith:
  - **`su johnsmith`**
- Now type in 'password' as the password
  - You should notice that it gave you access to johnsmith account!



```
┌──(kali@10.15.55.196)-[~]
└─$ su johnsmith
Password:
su: Authentication failure

┌──(kali@10.15.55.196)-[~]
└─$ su johnsmith
Password:
$ █
```

On Your Own Activity

- Try and make passwords for the following:
  1. Create your own SHA-512 password with a different salt
  2. A different password using MD5 Algorithm (-m md5)
  3. Another password using SHA-256 Algorithm (-m SHA-256)
- Here was the command we used to create the kali password:

```
mkpasswd -m sha-512 -S 4bC23/N1kUbLIUgw -s password
```

- Remember to check to make sure the password works!