

National Taiwan Normal University
Computer Science and Information Engineering

Information Security: A Hands-on Approach

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Due Date: 09 24, 2023, PM 11:59

Assignment

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Policies:

- Zero tolerance for late submission.
- Please pack all your submissions in one zip file. **RAR is not allowed!!**
- I only accept **PDF**. MS Word is not allowed.
- Hand-writing is not allowed.

1.1 SEED Lab (30 pts)

Environment Variable and Set-UID Lab

https://seedsecuritylabs.org/Labs_20.04/Software/Environment_Variable_and_SetUID/

Please record all your steps with **screen captures** and **answer all questions**.

1.2 Capabilities (15 pts)

Please run the following sequence of commands.

```
1 $ cp /usr/bin/cat mycat
2 $ mycat /etc/shadow
3 $ sudo setcap CAP_DAC_READ_SEARCH=ep mycat
4 $ mycat /etc/shadow
```

1. What are results?
2. Please explain the meaning of the third line.
3. How to check the capability of a file? Please use **/usr/bin/ping** as an example and describe its capabilities.

1.3 Linux PAM (15 pts)

Linux Pluggable Authentication Modules (PAM) is a suite of libraries that allow a Linux system administrator to configure methods to authenticate users. Please show how to use this module to develop a **"hello world"** program in C which the system user has to be authenticated first before printing messages. Otherwise, print "Error."

1.4 Daemon (20 pts)

In this class, I have shown you how to build a daemon. Now you need to develop a linux daemon to **alert you if a new user logs into the system by printing a warning message with time**. The monitoring interval is one second. Do not forget the Makefile. Moreover, you should answer the following question: If the terminal is closed, can you receive the warning message? If no, how can you get the warning message?

1.5 chsh (20 pts)

In this class, I have introduced the command **chsh** and explain how it works. Please read the code and answer the following questions:

<https://github.com/util-linux/util-linux/blob/master/login-utils/chsh.c>

- How does this code change the user's shell setting? Please explain the code in detail and in depth. Simply point out the line number will get nothing.
- Is it possible to add a new user with **chsh** by adding a **newline** in the shell input? Why or why not? You need to explain it in detail.