

# Homework 2

## One Liner Script & System Info

hslin, cwang, xizhen

國立陽明交通大學資工系資訊中心

Computer Center of Department of Computer Science, NYCU

# HW 2-1: One liner script (40%)

國立陽明交通大學資工系資訊中心

Computer Center of Department of Computer Science, NYCU

# HW 2-1: One liner script (40%)

- Use shell script to analyze the content of **auth.log (secure)** and output three files:
  - **audit\_ip.txt**: List the source IPs that ssh login failed and count the number of login failed times.
  - **audit\_sudo.txt**: List the commands and users who used `sudo`.
  - **audit\_user.txt**: List the users who ssh login failed and count the number of login failed times. (Users who in the system)

# HW 2-1: One liner script (40%)

- **audit\_ip.txt**: List the source IPs that ssh login failed and count the number of login failed times. (10%)

```
10.2.11.4 failed to log in 2 times
10.2.11.6 failed to log in 1 times
10.2.11.22 failed to log in 2 times
140.113.168.125 failed to log in 1 times
175.198.80.24 failed to log in 1 times
10.2.11.25 failed to log in 5 times
10.2.11.17 failed to log in 1 times
```

# HW 2-1: One liner script (40%)

- **audit\_sudo.txt:** List the commands and users who used `sudo`.  
(20%)

```
xizhen used sudo to do `/bin/nmcli connection modify ens192 IPv4.address 10.2.4.7/32` on Sep 23 16:16:32
xizhen used sudo to do `/bin/systemctl restart network.service` on Sep 23 16:22:26
xizhen used sudo to do `/bin/systemctl restart NetworkManage` on Sep 23 16:22:47
xizhen used sudo to do `/bin/nmtui edit ens192` on Sep 23 16:29:59
xizhen used sudo to do `/bin/vim /etc/sysconfig/network-scripts/ifcfg-ens192` on Sep 23 16:59:19
xizhen used sudo to do `/bin/nmcli connection down ens192` on Sep 23 17:00:21
xizhen used sudo to do `/bin/nmtui` on Sep 23 17:10:32
vagrant used sudo to do `/bin/cat /var/log/secure` on Sep 23 17:12:46
vagrant used sudo to do `/bin/cp /var/log/secure /vagrant/hw2` on Sep 23 17:14:15
```

# HW 2-1: One liner script (40%)

- **audit\_user.txt**: List the users who ssh login failed and count the number of login failed times. (Users who in the system) (10%)

```
vagrant2 failed to log in 1 times  
stchang failed to log in 2 times  
vagrant failed to log in 2 times  
xizhen failed to log in 5 times  
hslin failed to log in 1 times
```

# HW 2-1: One liner script (40%)

- Your script is limited to one line and outputs 3 files.
- **Must not** use the following commands:
  - Subshell for grouping: `( ... )`
  - Command substitution: `$(...)` also spelled ``...``
  - Process substitution: `<(...)` or `>(...)`
  - *tee, sh, bash, csh, base64, eval*
  - *;, &&, ||*
- Temporary files are not allowed.
- Only use `>` to redirect output to file once.

# HW 2-1: One liner script (40%)

- Must not use shell variables.
- Must not call network tools (such as curl, wget...)
- Must not call interpreters or compiler (such as Python, Ruby...).
- Only one shell, **sh**, are allowed.
- If you are not sure whether a tool is allowed, please ask TA on Google group.
- Your script must start with
  - FreeBSD:* `cat /var/log/auth.log |`
  - CentOS:* `cat /var/log/secure |`



# HW 2-1: One liner script (40%)

- Bonus (10%):
  - Convert the date format of audit\_sudo.txt. (5%)
    - Example: **Sep 23 16:16:32** → **2021-09-23 16:16:32**

```
xizhen used sudo to do `/bin/nmcli connection modify ens192 IPv4.address 10.2.4.7/32` on 2021-09-23 16:16:32
xizhen used sudo to do `/bin/systemctl restart network.service` on 2021-09-23 16:22:26
xizhen used sudo to do `/bin/systemctl restart NetworkManager` on 2021-09-23 16:22:47
xizhen used sudo to do `/bin/nmtui edit ens192` on 2021-09-23 16:29:59
xizhen used sudo to do `/bin/vim /etc/sysconfig/network-scripts/ifcfg-ens192` on 2021-09-23 16:59:19
xizhen used sudo to do `/bin/nmcli connection down ens192` on 2021-09-23 17:00:21
xizhen used sudo to do `/bin/nmtui` on 2021-09-23 17:10:32
vagrant used sudo to do `/bin/cat /var/log/secure` on 2021-09-23 17:12:46
vagrant used sudo to do `/bin/cp /var/log/secure /vagrant/hw2` on 2021-09-23 17:14:15
```

- If you can finish homework 2-1 without awk, please email [ta@nasa.cs.nctu.edu.tw](mailto:ta@nasa.cs.nctu.edu.tw) (5%)

# HW 2-1: Sample log

- FreeBSD: <https://reurl.cc/vgmnak>
- CentOS: <https://reurl.cc/0x6zvK>

# HW 2-2: System Info Panel (60%)

# Freebsd: Dialog (1)

DIALOG(1)

General Commands Manual

DIALOG(1)

## NAME

dialog - display dialog boxes from shell scripts

## DESCRIPTION

Dialog is a program that will let you to present a variety of questions or display messages using dialog boxes from a shell script.

# Freebsd: Dialog (1) - Example 1



# Freebsd: Dialog (1) - Example 2



# System Info Panel

- You are a System Admin
- You decided to develop a text-based user interface (TUI) program to help you manage the system
- It comes with several functions
  - After selecting one, use [dialog\(1\)](#) to show system information
  - It has to be beautiful. It has to be formatted output but raw output

# Ref.

- Use flow: <https://bit.ly/39HB6zu>
- Video: <https://bit.ly/3zUwJf9>



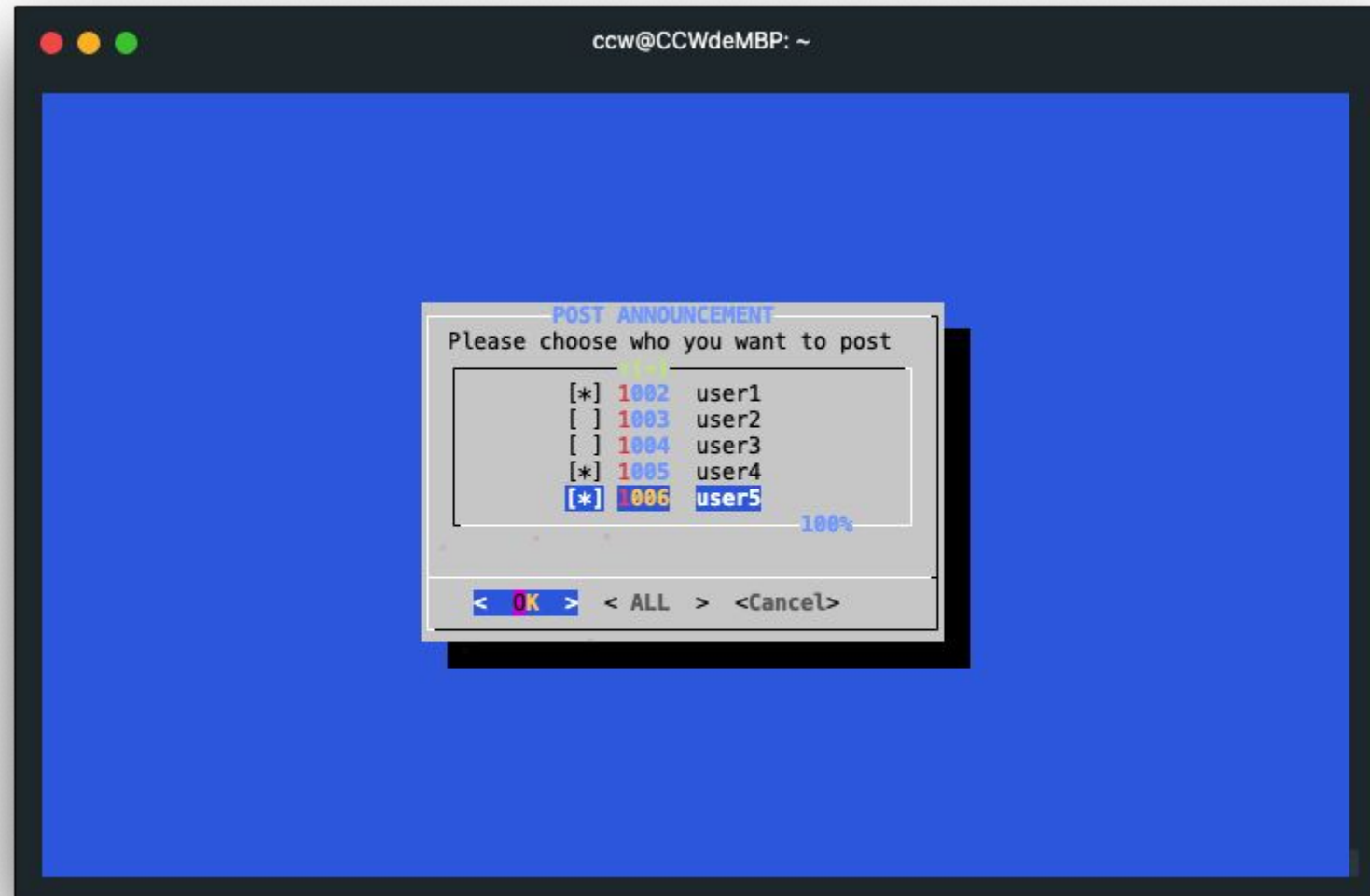
# Announcement

- Page - 5%
  - Entrance: show “Announcement” and “Users” two options.
  - User list: list all loginable user, and multi select.
  - Input message
  - You need make use flow here. (follow P.16)
- You can send broadcast message to specify users - 5%

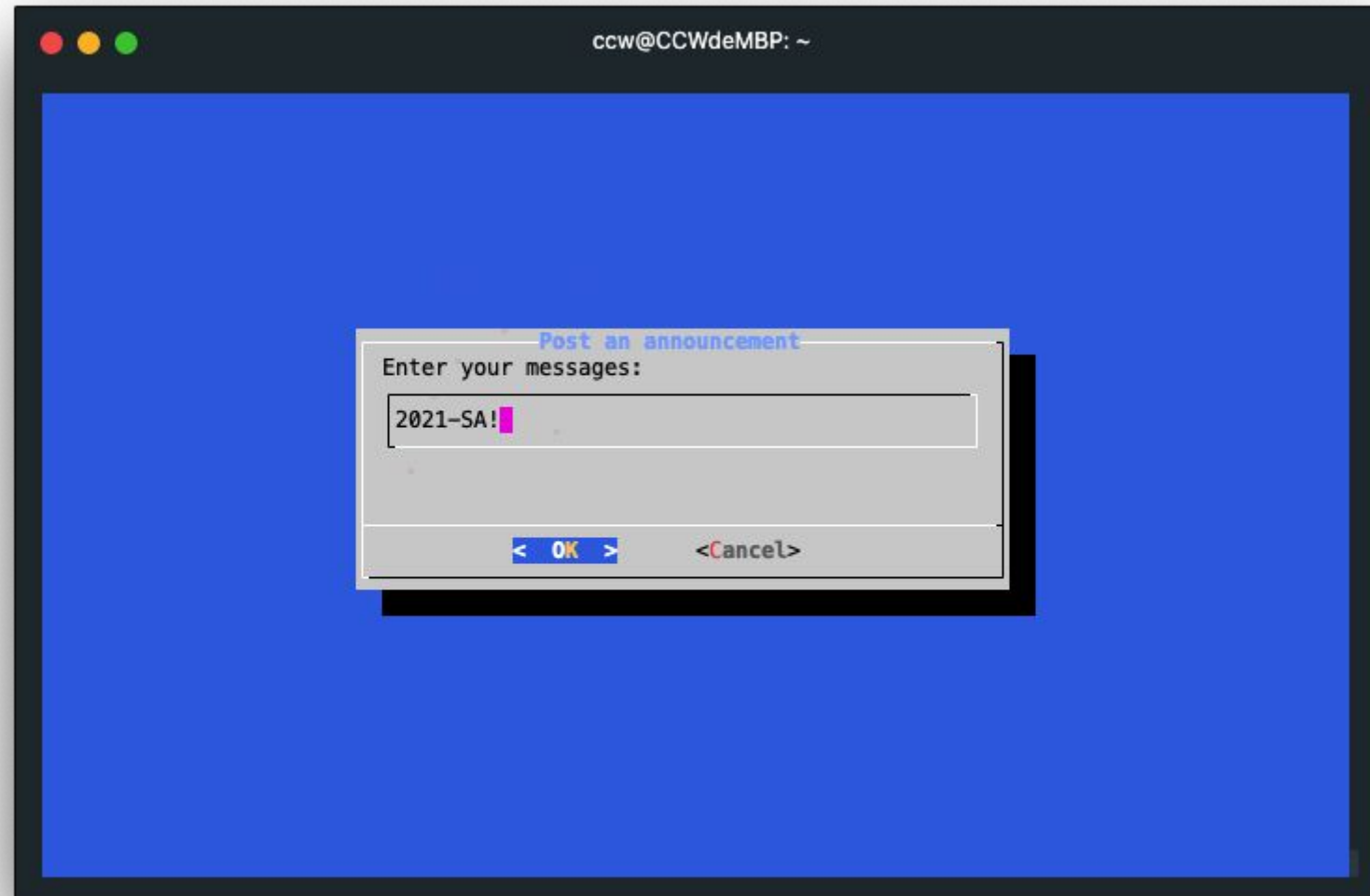
Hint:

- `/etc/passwd`

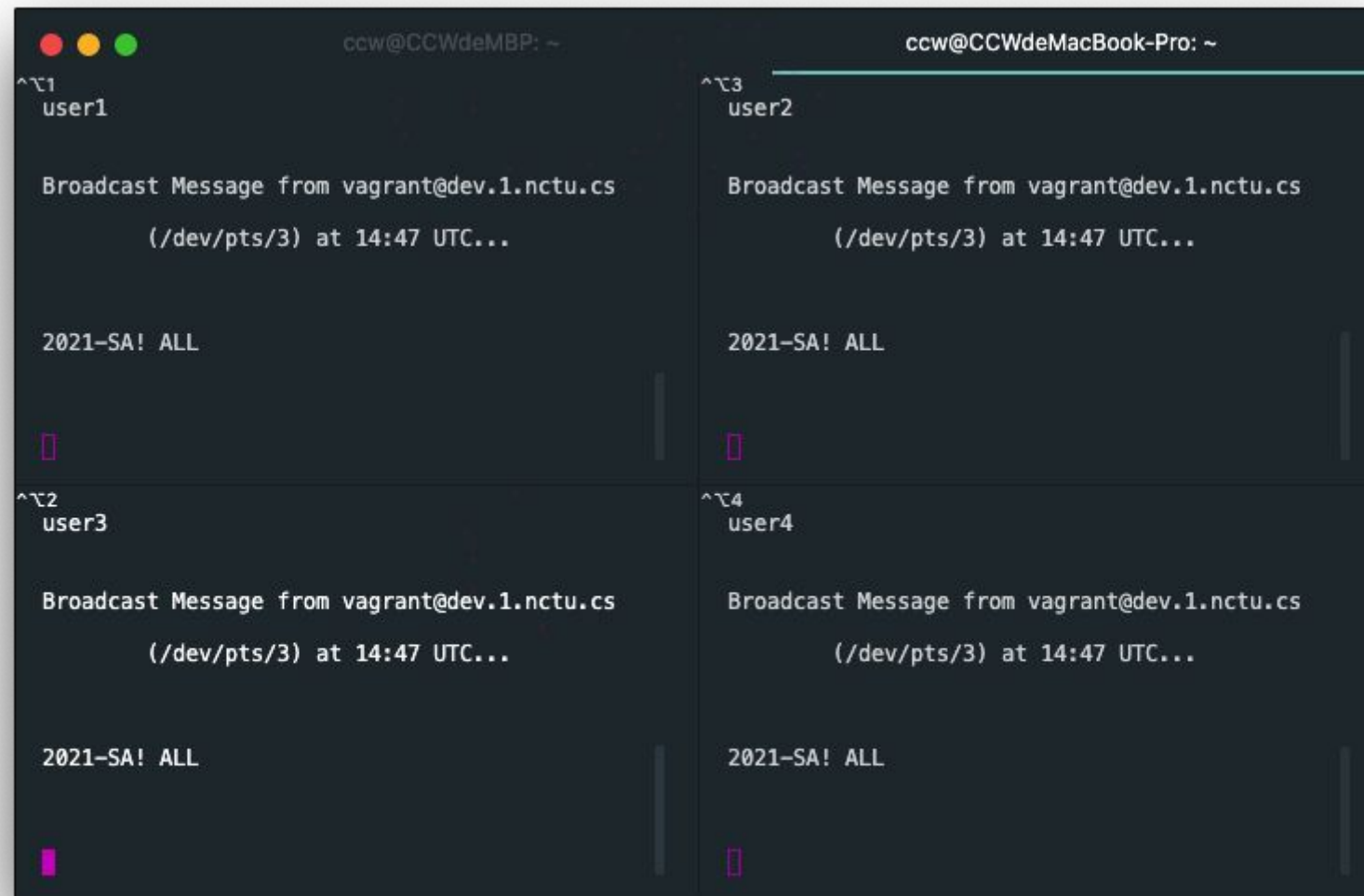
# Announcement



# Announcement



# Announcement - Type Msg (Cont.)



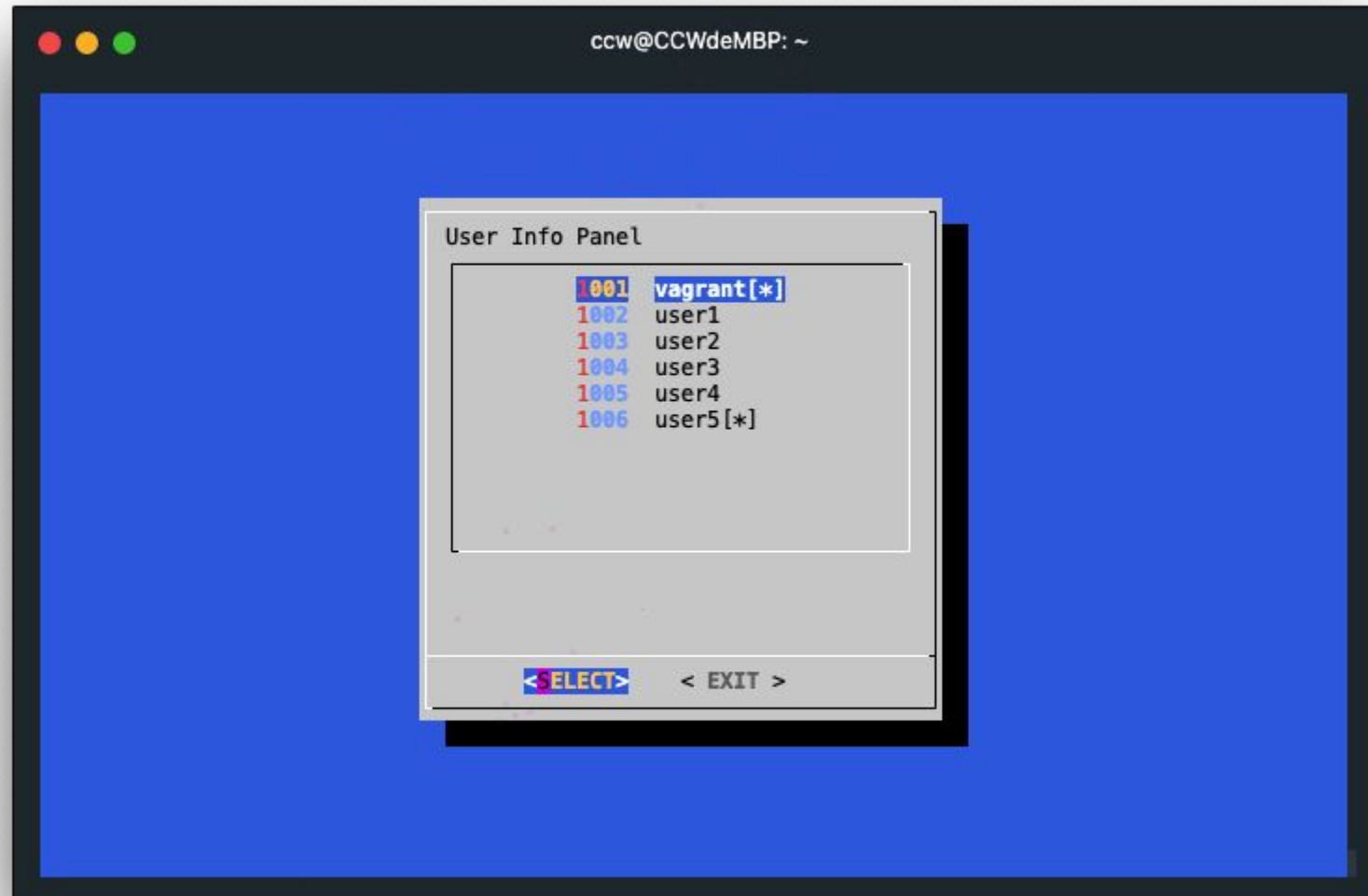
The image shows four terminal windows arranged in a 2x2 grid, each displaying a broadcast message. The top-left window is titled 'ccw@CCWdeMBP: ~' and shows a message to 'user1'. The top-right window is titled 'ccw@CCWdeMacBook-Pro: ~' and shows a message to 'user2'. The bottom-left window shows a message to 'user3' and the bottom-right window shows a message to 'user4'. All messages are from 'vagrant@dev.1.nctu.cs' at '14:47 UTC...' and contain the text '2021-SA! ALL'. Each window has a vertical scrollbar on the right side.

```
ccw@CCWdeMBP: ~  
^1  
user1  
  
Broadcast Message from vagrant@dev.1.nctu.cs  
(/dev/pts/3) at 14:47 UTC...  
  
2021-SA! ALL  
  
[]  
  
ccw@CCWdeMacBook-Pro: ~  
^3  
user2  
  
Broadcast Message from vagrant@dev.1.nctu.cs  
(/dev/pts/3) at 14:47 UTC...  
  
2021-SA! ALL  
  
[]  
  
ccw@CCWdeMBP: ~  
^2  
user3  
  
Broadcast Message from vagrant@dev.1.nctu.cs  
(/dev/pts/3) at 14:47 UTC...  
  
2021-SA! ALL  
  
[]  
  
ccw@CCWdeMacBook-Pro: ~  
^4  
user4  
  
Broadcast Message from vagrant@dev.1.nctu.cs  
(/dev/pts/3) at 14:47 UTC...  
  
2021-SA! ALL  
  
[]
```

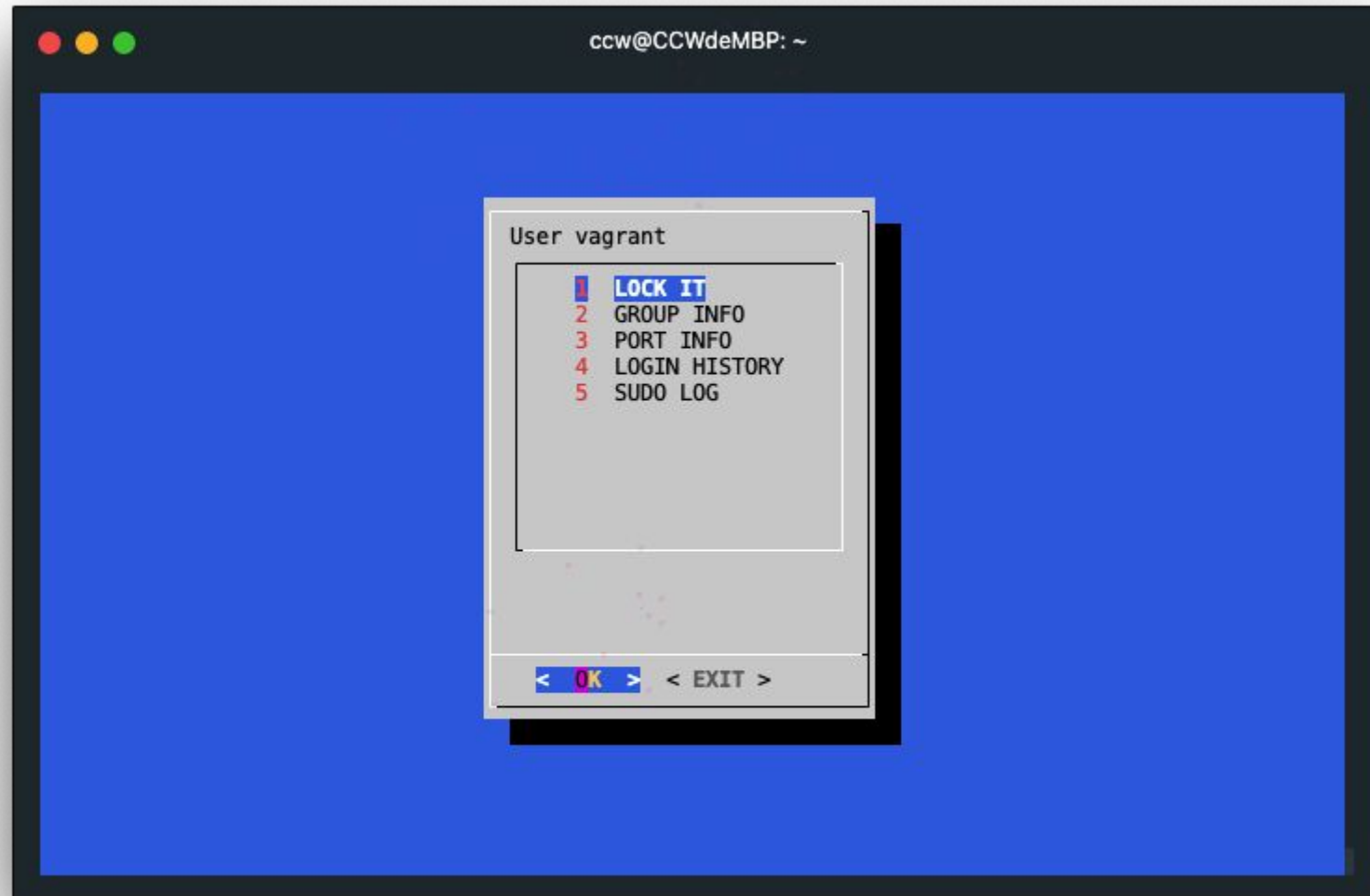
# Users

- Page - 6%
  - User List: list all loginable user, and mark online user with star.
    - Hint: who
  - User Action: display groups, ports, login history, sudo log, block user, total 5 options.

# User List



# User Action



# Groups (5%)

- List groups that specify user belongs to.
- Need group id and group name column.

Hint: groups



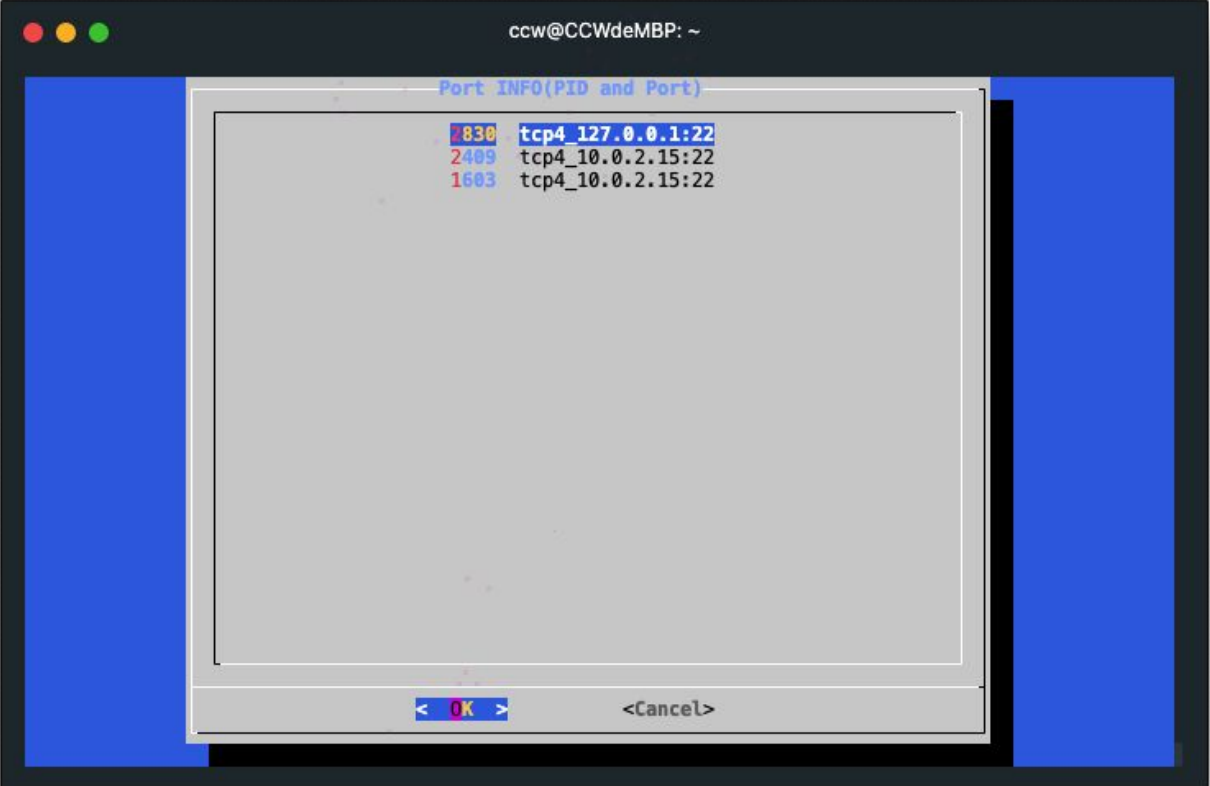
A terminal window titled "ccw@CCWdeMBP: ~" showing the output of the "groups" command. The output is a table with two columns: "GROUP\_ID" and "GROUP\_NAME". The first row shows "0 wheel" and the second row shows "1001 vagrant". The terminal window has a title bar with red, yellow, and green window control buttons. At the bottom of the terminal window, there are two buttons: "< OK >" and "<EXPORT>".

```
GROUP_ID GROUP_NAME
0 wheel
1001 vagrant
```



# Ports (5%)

- List specify user used port listening on tcp and udp
  - List only ipv4
- Can get port detail info in next page
- If the list is too long, make it scrollable




```
ccw@CCWdeMBP: ~  
Port INFO(PID and Port)  
838 tcp4_127.0.0.1:22  
2409 tcp4_10.0.2.15:22  
1603 tcp4_10.0.2.15:22  
^ OK > <Cancel>
```

Hint: [sockstat \(1\)](#)

# Ports

- Each port is used by one process.
- Get process detail that specify port used.

Hint: ps



A terminal window titled 'ccw@CCWdeMBP: ~' showing the output of the 'ps' command for a specific process. The output is as follows:

```
PROCESS STATE: 2409
USER vagrant
PID 2409
PPID 2407
STAT I
%CPU 0.0
%MEM 0.9
COMMAND sshd:
```

The terminal window has a dark background and a light gray text area. At the bottom, there are navigation buttons: '< OK >' and '<EXPORT>'. The window title bar shows standard macOS window controls (red, yellow, green buttons).

# Lock / Unlock (10%)


- Lock (or unlock) user login.
- When specify user already lock, then options in User Action page show “unlock” text.

Hint: pw

# Login History (5%)

- Show specify user login history
- Recently 10 times login history
  - datetime, login ip

Hint: [last\(1\)](#)



A terminal window titled 'ccw@CCWdeMBP: ~' displaying a table of login history. The table has two columns: 'DATE' and 'IP'. The data rows are as follows:

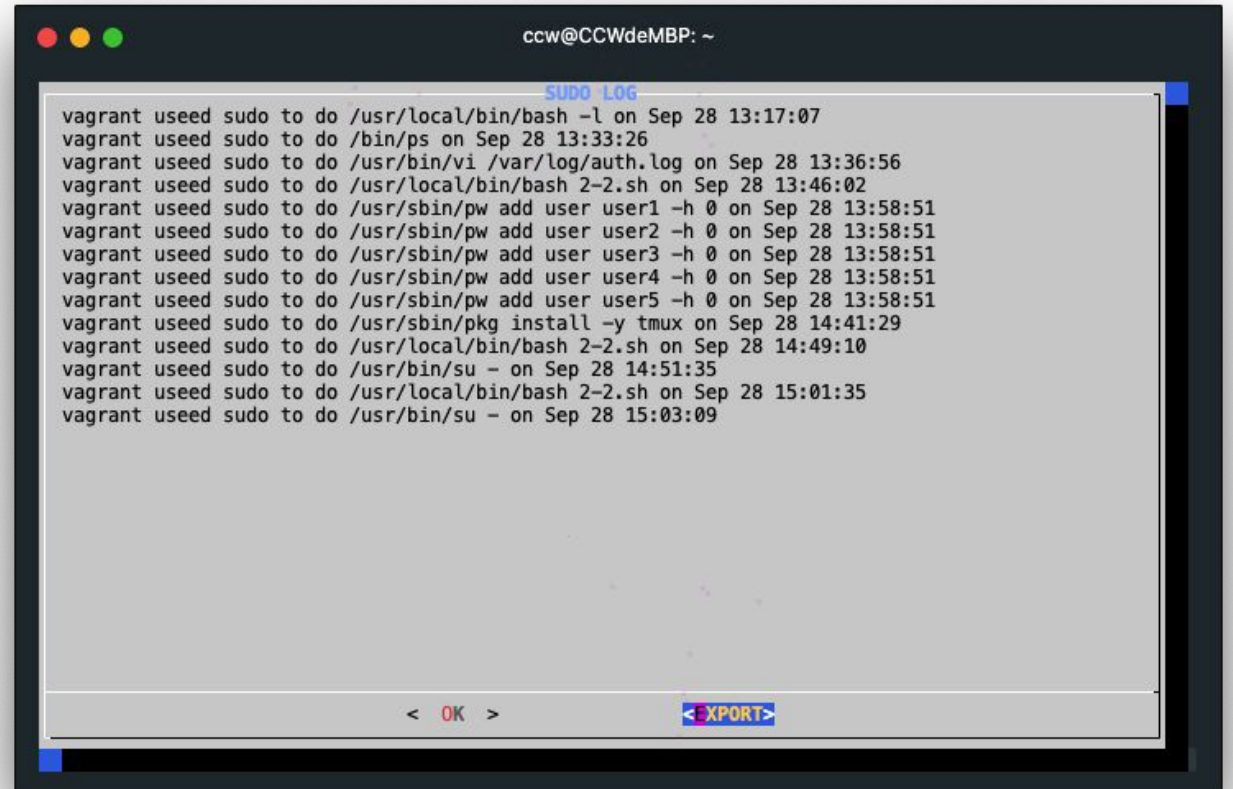
DATE	IP
Tue Sep 28 14:42	127.0.0.1
Tue Sep 28 14:23	10.0.2.2
Tue Sep 28 14:02	127.0.0.1
Tue Sep 28 13:28	10.0.2.2
Tue Sep 28 13:17	10.0.2.2
Tue Sep 28 13:17	10.0.2.2

The terminal window also shows a blue title bar 'LOGIN HISTORY' and a footer with '< OK >' and '< EXPORT >' buttons.

# Sudo Log (5%)

- Show specify user sudo command usage log.
- Show recent 30 days log.

Hint: auth.log

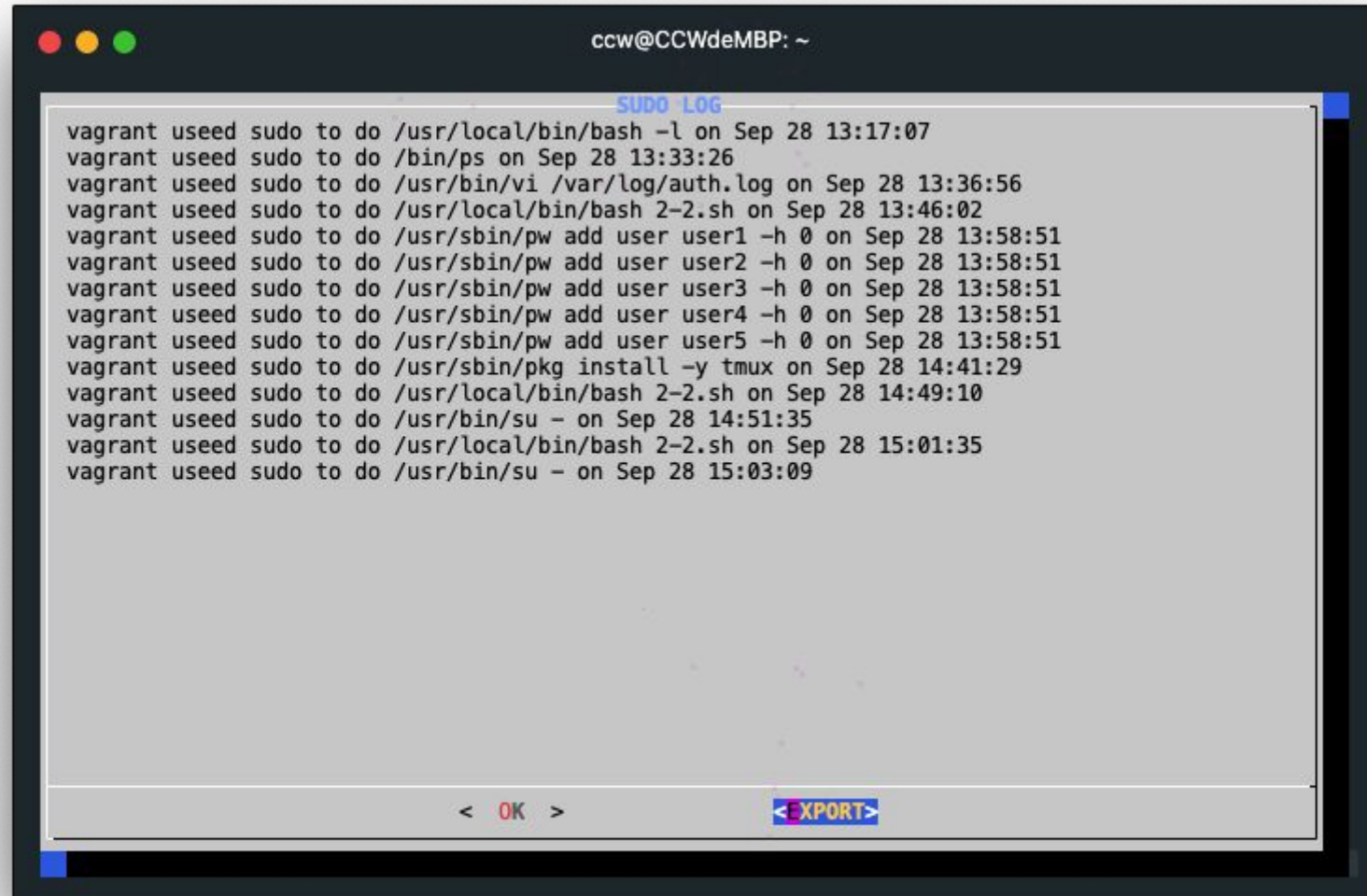


```
ccw@CCWdeMBP: ~  
  
SUDO LOG  
vagrant useed sudo to do /usr/local/bin/bash -l on Sep 28 13:17:07  
vagrant useed sudo to do /bin/ps on Sep 28 13:33:26  
vagrant useed sudo to do /usr/bin/vi /var/log/auth.log on Sep 28 13:36:56  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 13:46:02  
vagrant useed sudo to do /usr/sbin/pw add user user1 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user2 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user3 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user4 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user5 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pkg install -y tmux on Sep 28 14:41:29  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 14:49:10  
vagrant useed sudo to do /usr/bin/su - on Sep 28 14:51:35  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 15:01:35  
vagrant useed sudo to do /usr/bin/su - on Sep 28 15:03:09  
  
< OK >  EXPORT
```

# Export (10%)

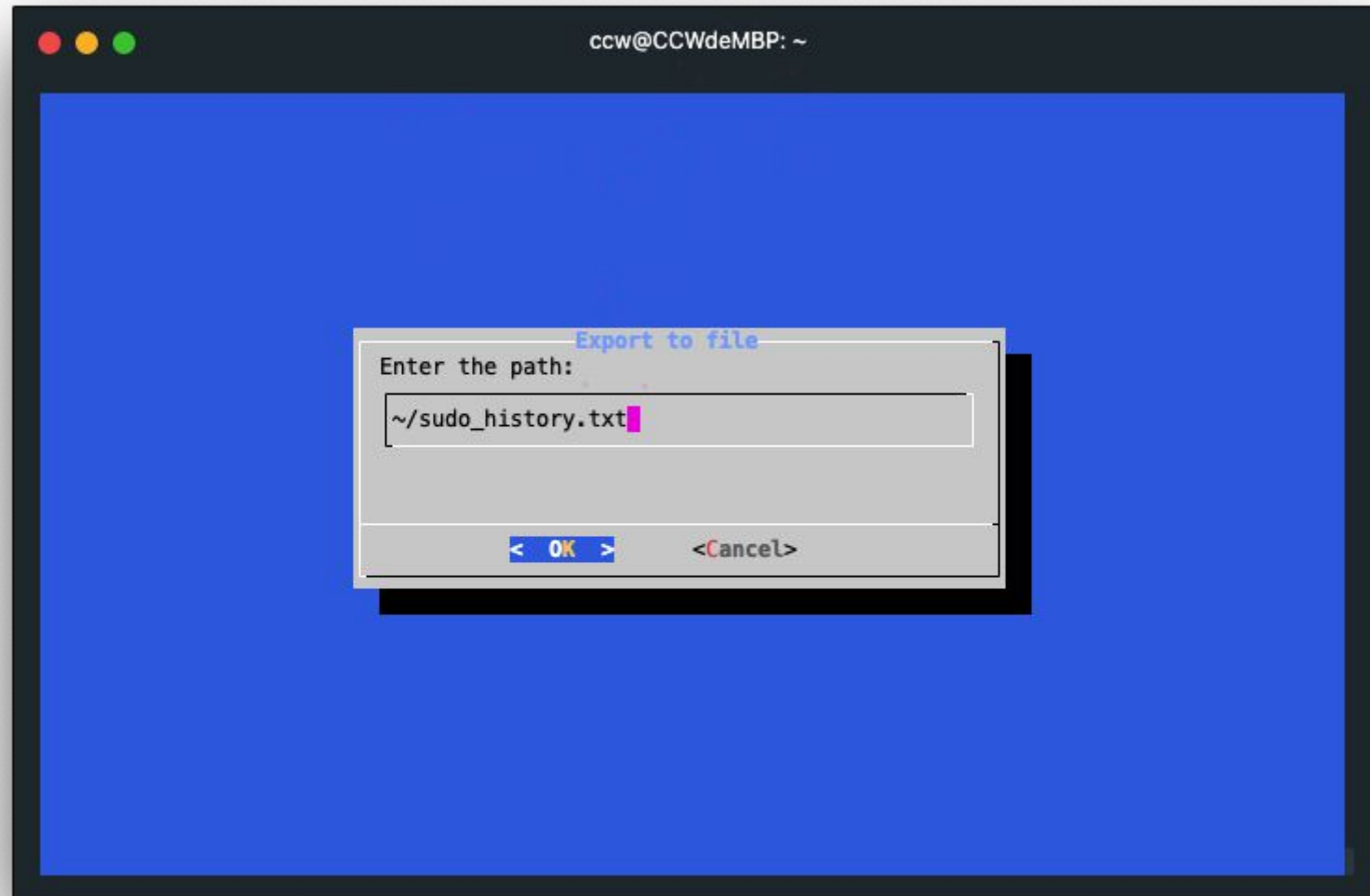
- Export dialog text into file
- Use dialog to ask user on where to save and save the output to file
  - User could input absolute path or relative path based on user's home directory
    - e.g. res -> /u/gcs/109/309551019/res
- Export button in each info page (group, port, sudo log, login history)

# Export



```
ccw@CCWdeMBP: ~  
  
SUDO LOG  
vagrant useed sudo to do /usr/local/bin/bash -l on Sep 28 13:17:07  
vagrant useed sudo to do /bin/ps on Sep 28 13:33:26  
vagrant useed sudo to do /usr/bin/vi /var/log/auth.log on Sep 28 13:36:56  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 13:46:02  
vagrant useed sudo to do /usr/sbin/pw add user user1 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user2 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user3 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user4 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user5 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pkg install -y tmux on Sep 28 14:41:29  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 14:49:10  
vagrant useed sudo to do /usr/bin/su - on Sep 28 14:51:35  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 15:01:35  
vagrant useed sudo to do /usr/bin/su - on Sep 28 15:03:09  
  
< OK > < EXPORT >
```

# Export





# Export

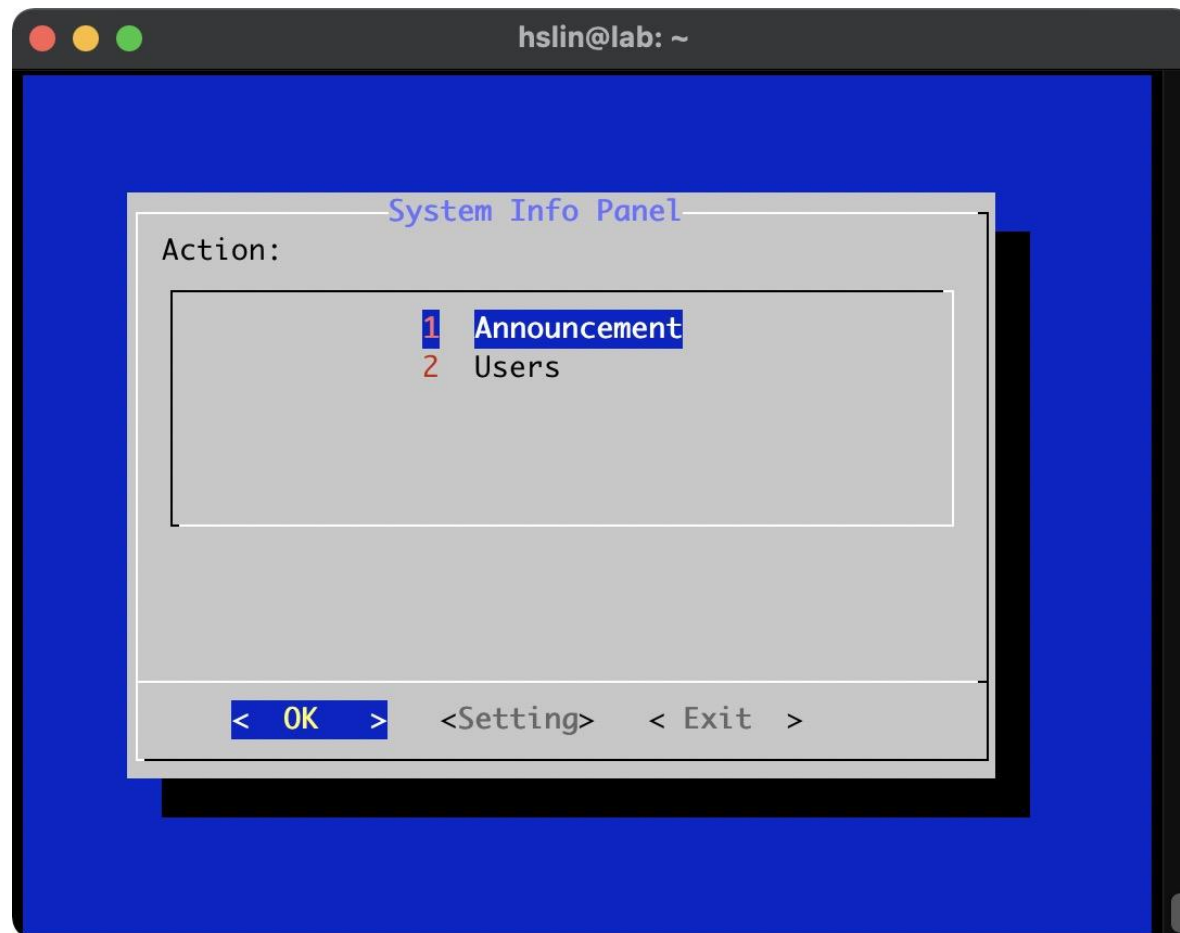
```
ccw@CCWdeMBP: ~  
  
root@dev:/vagrant/ccw # cat ~/sudo_history.txt  
vagrant useed sudo to do /usr/local/bin/bash -l on Sep 28 13:17:07  
vagrant useed sudo to do /bin/ps on Sep 28 13:33:26  
vagrant useed sudo to do /usr/bin/vi /var/log/auth.log on Sep 28 13:36:56  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 13:46:02  
vagrant useed sudo to do /usr/sbin/pw add user user1 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user2 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user3 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user4 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pw add user user5 -h 0 on Sep 28 13:58:51  
vagrant useed sudo to do /usr/sbin/pkg install -y tmux on Sep 28 14:41:29  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 14:49:10  
vagrant useed sudo to do /usr/bin/su - on Sep 28 14:51:35  
vagrant useed sudo to do /usr/local/bin/bash 2-2.sh on Sep 28 15:01:35  
vagrant useed sudo to do /usr/bin/su - on Sep 28 15:03:09  
root@dev:/vagrant/ccw #
```

# Return Code (4%)

- Program **Return codes** and stdout:
  - **0** for cancel (program successfully finished)
    - echo **Exit.** to stdout
  - **1** for Esc
    - echo **Esc pressed.** to **stderr**
  - **2** for Ctrl + C
    - echo **Ctrl + C pressed.** to stdout

# System Info Panel - Bonus (5%)

- If user login fail  $\geq 3$ , auto lock this user
  - Enable / Disable this feature in “system info panel” setting



# System Info Panel - Grading

- Each page & control flow (11%) - This is required.
- Post an announcement to online users (5%)
- User
  - Get this user's group (5%)
  - Query the port used by this user (5%)
    - And get process (used port) detail
  - User login history (5%)
  - Sudo usage log (5%)
  - BLOCK / UNBLOCK this user (10%)
- Return Code (4%)
- EXPORT the information of each page (10%)

# Attention!

- You are restricted to use only `sh` to complete your work
  - That is, no other shell and no other programming language.
  - If you're not sure what's allowed, contact TAs.
  - TAs reserve the right of final explanations. Specs are subject to change without notice.
- Your output does not have to be exactly the same as mine.
  - You could design your own ways the information is presented in as you please.

# How to use git.cs

國立陽明交通大學資工系資訊中心

Computer Center of Department of Computer Science, NYCU

# git.cs

- You should have a **cc account** and use this account to sign in git.cs.  
<https://git.cs.nctu.edu.tw/>
- Note: You must sign in before 10/01 23:59 (Fri.)

Please accept the Terms of Service before continuing.



## 國立交通大學資訊工程學系 GitLab 服務條款

為推廣Git之使用，國立交通大學資訊工程學系資訊中心(以下簡稱「本中心」)建置一Git管理平台GitLab (<https://git.cs.nctu.edu.tw>，以下簡稱「本平台」)，並提供每位教職員生1GB的空間，以支援資訊學院之教職員生教學或研究使用。

只要您使用本平台，即表示您已閱讀並同意本使用規範，故請詳閱本使用規範內容。一、個人資料保護本中心在中華民國「個人資料保護法」與相關法令之規範下，蒐集、處理及利用您的個人資料。

1. 請於申請時提供您本人正確、最新及完整的個人資料。
2. 本中心因執行業務所蒐集您的個人資料包括帳號名稱、中英文姓名、學號、學籍、E-mail 信箱等，您可依中華民國「個人資料保護法」，就您的個人資料行使以下權利：(1) 請求查詢或閱覽。(2) 製給複製本。(3) 請求補充或更正。(4) 請求停止蒐集、處理及利用。(5) 請求刪除。若因本中心執行職務或業務所必須者，本中心得拒絕之。若因您行使上述權利，而導致權益受損時，本中心將不負相關賠償責任。
3. 當您的個人資料使用方式與當初本中心蒐集的目的不同時，我們會在使用前先徵求您的書面同意，您可以拒絕向本中心提供個人資料，但可能因此喪失您的權益。
4. 您的個人資料受到「個人資料保護法」之保護及規範。本中心如有違反「個人資料保護法」規定或因天災、事變或其他不可抗力所致者，致您的個人資料被竊取、洩漏、竄改、遭其他侵害者，本中心將於查明後以電話、信函、電子郵件或網站公告等方法，擇適當方式通知您。二、尊重智慧財產權
5. 使用者得自行決定其資料之著作權歸屬與授權規則。任何使用此資料之使用者，應遵守之，並了解本平台對此資料不負任何法律責任。
6. 使用者應尊重智慧財產權，不得為下列行為：(1) 違法複製受著作權法保護之著作。(2) 未經著作權人之同意，將受保護之著作上傳於公開之網

# git.cs: application

- Update your email on the Profile page.
- Remember to confirm an email address in your mailbox.

The screenshot shows the GitLab user settings interface. On the left is a sidebar with navigation options: User Settings, Profile (selected), Account, Applications, Chat, Access Tokens, Emails, Notifications, SSH Keys, GPG Keys, Preferences, Active Sessions, and Authentication log. The main content area is titled 'Main settings' and includes a note: 'This information will appear on your profile. Some options are unavailable for LDAP accounts.' The settings are organized into sections: 'Full name' (input field: 'Xi-Zhen Wang', User ID: '281'), 'Pronouns' (empty input field), 'Email' (input field: 'xizhen@cs.nctu.edu.tw', highlighted with a red box, with a note: 'We also use email for avatar detection if no avatar is uploaded'), and 'Public email' (dropdown menu: 'Do not show on profile', with a note: 'This email will be displayed on your public profile').



# git.cs: CS-NASA Group

- Find your the group in “CS-NASA”

## Groups

Search by name Last created

Your groups Explore public groups

CS-NASA	4	0	10
SA	2	0	1
2021	2	1	1
219	0	0	2

- The name of your group is your ID in Online Judge:

Attribute List	
Key	Value
ID	219

# git.cs: New Project

- Create a new project

CS-NASA > ... > 219



**219**

Group ID: 791 [Leave group](#)



New subgroup

New project

**Subgroups and projects**

[Shared projects](#)

[Archived projects](#)

Search by name

Name



# git.cs: New Project (Cont.)

New project › Create blank project

Project name

**It must be exactly the same**


Project URL

Project slug

Project description (optional)

**Check your URL again**

Visibility Level 

 Private

Project access must be granted explicitly to each user. If this project is part of a group, access will be granted to members of the group.

**Initialize repository with a README**


Allows you to immediately clone this project's repository. Skip this if you plan to push up an existing repository.



# ans.sh

- Make sure your directory structure is like this:

```
xizhen@ ~/hw2/sahw2 (master*?) $ tree
├── hw2-1
│   └── ans.sh
├── hw2-2
│   └── ans.sh
└── os_env
    os="freebsd" / "centos" ...

2 directories, 3 files
```

 Update .env  
Xi-Zhen Wang authored just now

 .env  13 Bytes

1 os="freebsd"

- Check your permission:

```
xizhen@ ~/hw2/sahw2 (master) $ ll hw2-1/ans.sh
-rwxr-xr-x. 1 xizhen xizhen 741 Sep 29 20:09 hw2-1/ans.sh
```

x: execute

# Debug HW2-1: Student answer not found

```
Please make sure you have the correct access rights  
and the repository exists.
```

```
Command: /bin/sh -c GIT_SSH_COMMAND="ssh -o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no" git clone
```

```
==== Start Judging ====
```

```
Making answer...
```

```
./judge-2.sh: line 22: stu_repo/hw2-1/ans.sh: No such file or directory
```

```
Student answer not found.
```

```
0;0;0;
```

# Debug HW2-1: 0;0;0; Wrong Answer

```
-----  
Your ID: 144  
Your IP: 10.113.0.144  
[debug] ID: 144  
[debug] CMD1: GIT_SSH_COMMAND="ssh -o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no" git clone --quiet git@git.cs.nctu.edu.tw:~/hw2  
[debug] CMD2: cd sa-judge-hw2 && ./judge-2.sh  
==== Preparing Judge Environment ====  
Warning: Permanently added 'git.cs.nctu.edu.tw' (ECDSA) to the list of known hosts.  
Cloning student repo...  
Warning: Permanently added 'git.cs.nctu.edu.tw' (ECDSA) to the list of known hosts.  
[OK].  
Cloning answer repo...  
Warning: Permanently added 'git.cs.nctu.edu.tw' (ECDSA) to the list of known hosts.  
[OK].  
==== Start Judging ====  
Making answer...  
[OK].  
Judging...  
Section 1 error. (In case 1)  
Finished Section 1.  
Section 2 error. (In case 1)  
Finished Section 2.  
Section 3 error. (In case 1)  
Finished Section 3.  
0;0;0;
```

**0 = Wrong answer, 1 = accepted**

# Attention!

- You will get **zero** points if you just **copy code** from other students
- You will get **zero** points if you **tamper with TA's system / file**
- You can use our workstations to complete your homework
- **HW 2-1 → Online Judge & Check Manually**
  - We will check whether your script meets one-liner manually.
  - Online Judge only support FreeBSD currently.
- **HW 2-2 → Submit Code & Offline Judge**
  - TA Judging Time: 10/22 (Fri.) and 10/29 (Fri.)
  - TA will clone your project from gitlab and release scores on next monday.
- Due date: **10/29 23:59 (Fri.)**

# Attention!

- TA will use these operating systems to judge your homework
  - FreeBSD 12
  - CentOS Stream 8
- Online Judge only supports **built-in commands**.



# Help me! TA!

- Questions about this homework
  - Ask questions on <https://groups.google.com/g/nctunasa>
  - We MIGHT give out hints on google group
    - Be sure to join the group :D
  - Do not email us directly
  - Do not use E3 to email us
- TA time : Wed. 15:00 - 17:00 at EC 324 (PC Lab)
  - You must use email to make an appointment first.
    - [ta@nasa.cs.nctu.edu.tw](mailto:ta@nasa.cs.nctu.edu.tw)
  - You must ask questions on google group first.
  - You can bring your laptop or use PC lab.
  - If there are too many people, we will announce another time slot.

# Good Luck!

國立陽明交通大學資工系資訊中心

Computer Center of Department of Computer Science, NYCU