

# Ethical Student Hackers

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Linux Fundamentals



# Welcome!

## Who are SESH and what to expect this year...

- Weekly sessions, Mondays 19:00-20:30
- Teach ethical hacking techniques and tools - mix of theory and practical
- Guest talks from industry experts
- Host and compete in Capture the Flag competitions
- Access to fundamental skills tutorials and cheat sheets
- Fun socials - pub trips, escape rooms...
- Opportunities to join committee (see end of presentation)



# The Legal Bit

- The skills taught in these sessions allow identification and exploitation of security vulnerabilities in systems. We strive to give you a place to practice legally, and can point you to other places to practice. These skills should not be used on systems where you do not have explicit permission from the owner of the system. It is VERY easy to end up in breach of relevant laws, and we can accept no responsibility for anything you do with the skills learnt here.
- If we have reason to believe that you are utilising these skills against systems where you are not authorised you will be banned from our events, and if necessary the relevant authorities will be alerted.
- Remember, if you have any doubts as to if something is legal or authorised, just don't do it until you are able to confirm you are allowed to.



# Code of Conduct

- Before proceeding past this point you must read and agree to our Code of Conduct - this is a requirement from the University for us to operate as a society.
- If you have any doubts or need anything clarified, please ask a member of the committee.
- Breaching the Code of Conduct = immediate ejection and further consequences.
- Code of Conduct can be found at  
<https://shefesh.com/downloads/SESH%20Code%20of%20Conduct.pdf>



# What is Linux?

- Linux is an operating system similar to Windows and Mac OS
  - Linux is everywhere, because of its ability to be very small, very customisable and the ability to run on many devices
- It is Open Source!
  - This means that anyone can read/modify the code that makes Linux
  - Anyone can contribute to the Linux project



# Distributions

As Linux is open source and anyone can edit it, there are multiple distributions by different maintainers that you can download.

There are many different distributions to choose from, you just need to have a look around to see what suits your needs

- **Mint**
  - Very beginner friendly, has many similarities between Windows
- **Ubuntu**
  - Very beginner friendly if transitioning from mac/windows, can be used on servers
- **Debian / Kali**
  - The predecessor to Ubuntu and Mint, Very stable, highly worked on and maintained
- **Arch Linux**
  - Rolling release, intermediate/expert user base, very customizable



# Navigation - Folder structure

```
^ 🔒 /  
> ls /  
bin boot dev etc home lib lib64 lost+found mnt opt proc root run sbin srv sys timeshift tmp usr var swapfile
```

- /bin**
  - Used for essential binaries (applications)
- /etc**
  - 'Etcetera', contains the configuration of Linux and its applications
- /home**
  - Contains the home directories of users
- /root**
  - Contains the home directory of the root user
- /opt**
  - Optional software, software that generally isn't maintained by a package manager
- /usr**
  - User binaries and program data
- /sbin**
  - Binaries to be run as a root/sudo user
- /var**
  - Variable information, generally where running applications store necessary data



# Standard Navigation commands

There are a lot of commands for navigating the file structure in the terminal

- `cd` - Change directory
  - `ls` - List files in the directory
  - `find` - Find files on the system
  - `grep` - Search for strings within files
  - `locate` - Find files on the system (find)
  - `mv` - Move files
  - `cp` - Copy files
  - `rm` - Remove file
  - `nano` - Edit a text file (vim and vi)
  - `cat` - Output contents of a file
  - `touch` - Create a file
  - `sudo / su` - Execute code as another user
- `cd /home/user`
  - `ls /home/user`
  - `find / -name user.txt -type f`
  - `grep "NAME" /etc/os-release`
  - `locate hosts`
  - `mv /home/user/old /home/user/new`
  - `cp /etc/passwd /home/user/passwd`
  - `rm /home/user/old_file`
  - `nano /etc/hosts`
  - `cat /etc/hosts`
  - `touch /home/user/abc`
  - `sudo ls /root / su - user`



So we know we can run commands in the terminal, but how do we run multiple commands and get the output we want from them? In the terminal there are 3 different 'outputs'

stdin: 0 - Standard input

stdout: 1 - Standard output

stderr: 2 - Standard error

## Piping

```
^ [lock] /
> cat /etc/os-release | grep NAME
NAME="Arch Linux"
PRETTY_NAME="Arch Linux"

^ [lock] /
> [ ]
```

## Redirecting errors

```
^ [lock] /
> find / -name flag.txt
find: '/lost+found': Permission denied
find: '/etc/audit/plugins.d': Permission denied
find: '/etc/pacman.d/gnupg/private-keys-v1.d': Permission denied
find: '/etc/pacman.d/gnupg/openpgp-revocs.d': Permission denied
find: '/etc/pacman.d/gnupg/crls.d': Permission denied
find: '/etc/iptables': Permission denied
find: '/etc/openssh/client': Permission denied
find: '/etc/openssh/server': Permission denied
```

```
^ [lock] /
> find / -name flag.txt 2>/dev/null
/home/mole/flag.txt
[ ]
```



# Permissions

Like every other operating system, Linux has file permissions that can be set. This stops data from being misused by members of the OS (if they're set correctly...)

Each file has 3 different type of permissions, Read, Write and Execute. These permissions can be individually assigned to the user who owns the file, the group who owns the file, and then everyone else.

You can also set the permissions and user/groups of files with the `chmod` and `chown` commands respectively. Read = 4, write = 2, execute = 1

```
^ ~
> ls -la flag.txt
.rwxrwxrwx 0 mole mole 29 Sep 17:53 flag.txt

^ ~
> chmod 764 flag.txt && sudo chown root:mole flag.txt

^ ~
> ls -la flag.txt
.rwxrw-r-- 0 root mole 29 Sep 17:53 flag.txt

^ ~
> 
```

```
^ ~
> ls -la flag.txt
.rwxrwxrwx 0 root mole 29 Sep 17:53 flag.txt
```

User Group Other



# Installing software

Different distros have different ways of installing software, for example Ubuntu uses the apt package manager.

## Package managers

- Make it incredibly easy to install and maintain software packages - A lot easier than Windows
- They use repositories to store the packages, you can add your own repositories to query from too
- Generally updating all packages can be done in one or two commands
- You don't need to manually update software packages

`sudo apt update` - Ubuntu update package repositories

`sudo apt upgrade` - Ubuntu upgrade packages

`sudo apt install coreutils` - Install a package

<https://command-not-found.com/>

Debian	<code>apt-get install coreutils</code>
Ubuntu	<code>apt-get install coreutils</code>
Alpine	<code>apk add coreutils</code>
Arch Linux	<code>pacman -S coreutils</code>
Kali Linux	<code>apt-get install coreutils</code>
CentOS	<code>yum install coreutils</code>
Fedora	<code>dnf install coreutils</code>
OS X	<code>brew install coreutils</code>
Raspbian	<code>apt-get install coreutils</code>
Docker	<code>docker run cmd.cat/ls ls</code> powered by <a href="#">Commando</a>

# The practical

```
ssh user[number]@giag.shefesh.com -p 2222
```

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Password: S3sh\_GIAG\_[number]

If [number] is 3, then password is S3sh\_GIAG\_3



# Join the Society

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£7 for 2 Years

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# Join the Committee

EGM **11th October 2021**

Please contact [ethicalhackers@sheffield.ac.uk](mailto:ethicalhackers@sheffield.ac.uk) if  
you are interested!

## Positions available...

### Publicity Officer

Manage social media accounts for the society  
and create advertising materials.

### General Member

Focus on helping other committee members  
and contributing to creating content to  
educate our members.



# Upcoming Sessions

What's up next?

[www.shefesh.com/sessions](http://www.shefesh.com/sessions)

First Session! Introduction to Web Hacking:

**04/10/21** 19:00 - 20:30 Arts Tower LT01

Automation in Cybersecurity + EGM: **11/10/21**

19:00 - 20:30 Arts Tower LT01

Yorkshire & Humber Regional Organised Crime Unit (Guest Talk) **18/10/21** 19:00 - 20:30

Location TBC

# Any Questions?



[www.shefesh.com](http://www.shefesh.com)  
Thanks for coming!

