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Certified Ethical Hacker (CEH) Exam Cheat Sheet 2023

January 11, 2023 / By Nathan House

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If you're in need of a quick reference for the EC-Council Certified Ethical Hacker exam, we've got you covered.

With nine knowledge domains covering the "latest commercial-grade hacking tools, techniques, and methodologies used by hackers and information security professionals to lawfully hack an organization," there is no shortage of things you have to remember for this exam.

Use this CEH cheat sheet to supplement **our hacking and CEH exam courses**, and as a quick reference for terminology, definitions, port numbers, methodology, and various important commands.

We hope this helps you boost your career by becoming a Certified Ethical Hacker. You can download the PDF version of this cheat sheet **here**.

Search cheats here

Basics

ATTACK TYPES
OS: Attacks targeting default OS settings
App level: Application code attacks
Shrink Wrap: off-the-shelf scripts and code
Misconfiguration: not configured well

5 PHASES TO A PENETRATION
Reconnaissance
Scanning & Enumeration
Gaining Access
Maintaining Access
Covering Tracks

Legal

18 U.S.C 1029 & 1030	
RFC 1918 – Private IP Standard	**SOX** – Corporate Finance Processes
RFC 3227 – Collecting and storing data	**GLBA** – Personal Finance Data
ISO 27002 – InfoSec Guideline	**FERPA** – Education Records
CAN-SPAM – email marketing	**FISMA** – Gov Networks Security Std
SPY-Act – License Enforcement	**CVSS** – Common Vuln Scoring System
DMCA – Intellectual Property	**CVE** – Common Vulns and Exposure

Regional Registry Coverage Map

Cryptography

SYMMETRIC ENCRYPTION

Only one key used to encrypt and decrypt

ASYMMETRIC ENCRYPTION

Public key = Encrypt, Private Key = Decrypt

SYMMETRIC ALGORITHMS

DES: 56bit key (8bit parity); fixed block

3DES: 168bit key; keys ≤ 3

AES: 128, 192, or 256; replaced DES

IDEA: 128bit key

Twofish: Block cipher key size ≤ 256bit

Blowfish: Rep. by AES; 64bit block

RC: incl. RC2 —› RC6. 2,040key, RC6 (128bit block)

ASYMMETRIC ALGORITHMS

Diffie-Hellman: key Exchange, used in SSL/IPSec

ECC: Elliptical Curve. Low process power/Mobile

El Gamal: !=Primes, log problem to encrypt/sign

RSA: 2 x Prime 4,096bit. Modern std.

HASH ALGORITHMS

MD5: 128bit hash, expres as 32bit hex

SHA1: 160bit hash,rq 4 use in US apps

SHA2: 4 sep hash 224,256,384,512

TRUST MODELS

Web of trust: Entities sign certs for each other

Single Authority: CA at top. Trust based on CA itself

Hierarchical: CA at top. RA's Under to manage certs

XMKS – XML PKI System

CRYPTOGRAPHY ATTACKS

Known Plain-text: Search plaintext for repeatable sequences. Compare to t versions.

Ciphertext-only: Obtain several messages with same algorithm. Analyze to reveal repeating code.

Replay: Performed in MITM. Repeat exchange to fool system in setting up a comms channel.

DIGITAL CERTIFICATE

Used to verify user identity = nonrepudiation

Version: Identifies format. Common = V1

Serial: Uniquely identify the certificate

Subject: Whoever/whatever being identified by cert

Algorithm ID: Algorithm used

Issuer: Entity that verifies authenticity of certificate

Valid from/to: Certificate good through dates

Key usage: Shows for what purpose cert was made

Subject's public key: self-explanatory

Optional fields: e.g., Issuer ID, Subject Alt Name...

Reconnaissance

DEFINITION

Gathering information on targets, whereas foot-printing is mapping out at a high level. These are interchangeable in C|EH.

GOOGLE HACKING

Operator: keyword additional search items

site: Search only within domain

ext: File Extension

loc: Maps Location

intitle: keywords in title tag of page

allintitle: any keywords can be in title

inurl: keywords anywhere in url

allinurl: any of the keywords can be in url

DNS RECORD TYPES

Service (SRV): hostname & port # of servers

Start of Authority (SOA): Primary name server

Pointer (PTR): IP to Hostname; for reverse DNS

Name Server (NS): NameServers with namespace

Mail Exchange (MX): E-mail servers

CNAME: Aliases in zone. list multi services in DNS

Address (A): IP to Hostname; for DNS lookup

DNS footprinting: whois, nslookup, dig

GOOGLE HACKING

incache: search Google cache only

DNS RECORD TYPES

TCP HEADER FLAGS

URG: Indicates data being sent out of band

ACK: Ack to, and after SYN

PSH: Forces delivery without concern for buffering

RST: Forces comms termination in both directions

SYN: Initial comms. Parameters and sequence #'s

FIN: ordered close to communications

DNS

port 53 nslokup (UDP), Zone xfer (TCP)

DHCP

Client — Discover-> Server

Client<—Offers—- Server

Client —Request—> Server

Client<—-ACK—- Server

IP is removed from pool

Scanning & Enumeration

ICMP MESSAGE TYPES

0: Echo Reply: Answer to type 8 Echo Request

3: Destination Unreachable: No host/ network Codes

0 — Destination network unreachable

1 — Destination host unreachable

6 — Network unknown

7 — Host unknown

9 — Network administratively prohibited

10 — Host administratively prohibited

4: Source Quench: Congestion control message

5: Redirect: 2+ gateways for sender to use or the best route not the configured default gateway Codes

0 — redirect datagram for the network

1 — redirect datagram for the host

8: Echo Request: Ping message requesting echo

11: Time Exceeded: Packet too long be routed

ICMP MESSAGE TYPES
13 — Communication administratively prohibited

CIDR

Method of the representing IP Addresses.

IPV4 NOTATION	
/30=4	.255.252
/28=16	.255.240
/26=64	.255.192
/24=256	. 255.0
/22=1024	.248.0
/20=4096	.240.0

PORT NUMBERS
0 — 1023: Well-known
1024 — 49151: Registered

HTTP ERROR CODES
200 Series – OK
400 Series – Could not provide req

PORT NUMBERS

49152 — 65535: Dynamic

HTTP ERROR CODES

500 Series – Could not process req

IMPORTANT PORT NUMBERS

FTP:	20/21	**NetBIOS/SMB:**	137-139
SSH:	22	**IMAP:**	143
Telnet:	23	**SNMP:**	161/162
SMTP:	25	**LDAP:**	389
WINS:	42	**HTTPS:**	443
TACACS:	49	**CIFS:**	445
DNS:	53	**RADIUS:**	1812
HTTP:	80 / 8080	**RDP:**	3389
Kerbers:	88	**IRC:**	6667
POP3:	110	**Printer:**	515,631,9100
Portmapper (Linux):	111	**Tini:**	7777
NNTP:	119	**NetBus:**	12345
NTP:	123	**Back Orifice:**	27374
RPC-DCOM:	135	**Sub7:**	31337

NMAP

Nmap is the de-facto tool for this pen-test phase

NMAP <SCAN OPTIONS> <TARGET>

-sA: ACK scan -sF: FIN scan

-sS:SYN -sT: TCP scan

NMAP SCAN TYPES

TCP: 3 way handshake on all ports.

Open = SYN/ACK, Closed = RST/ACK

SYN: SYN packets to ports (incomplete handshake).

Open = SYN/ ACK, Closed = RST/ ACK

NMAP <SCAN OPTIONS> <TARGET>

-sI: IDLS scan -sn: PING sweep

-sN: NULL -sS: Stealth Scan

-sR: RPC scan -Po: No ping

-sW: Window -sX: XMAS tree scan

-PI: ICMP ping – PS: SYN ping

-PT: TCP ping -oN: Normal output

-oX: XML output -A OS/Vers/Script

-T<0-4>: Slow – Fast

NMAP SCAN TYPES

FIN: Packet with FIN flag set

Open = no response, Closed = RST

XMAS: Multiple flags set (fin, URG, and PSH) **Binary Header: 00101001**

Open = no response, Closed = RST

ACK: Used for Linux/Unix systems

Open = RST, Closed = no response

IDLE: Spoofed IP, SYN flag, designed for stealth.

Open = SYN/ACK, Closed= RST/ACK

NULL: No flags set. Responses vary by OS. NULL scans are designed for Linux/ Unix machines.

SNMP

Uses a community string for PW

SNMPv3 encrypts the community strings

NETBIOS

nbstat

nbtstat -a COMPUTER 190	nbtstat -S 10 -display ses stats every 10 sec
nbtstat -A 192.168.10.12 remote table	**1B** ==master browser for the subnet
nbtstat -n local name table	**1C** == domain controller
nbtstat -c local name cache	**1D** == domain master browser
nbtstat -r -purge name cache	

Sniffing and Evasion

IPV4 AND IPV6

IPv4 == unicast, multicast, and broadcast

IPv6 == unicast, multicast, and anycast.

IPv6 unicast and multicast scope includes link local, site local and global.

MAC ADDRESS

First half = 3 bytes (24bits) = Org UID

Second half = unique number

NAT (NETWORK ADDRESS TRANSLATION)

Basic NAT is a one-to-one mapping where each internal IP== a unique public IP.

Nat overload (PAT) == port address translation. Typically used as is the cheaper option.

STATEFUL INSPECTION

Concerned with the connections. Doesn't sniff ever packet, it just verifies if it's a known connection, then passes along.

HTTP TUNNELLING

Crafting of wrapped segments through a port rarely filtered by the Firewall (e.g., 80) to carry payloads that may otherwise be blocked.

IDS EVASION TACTICS

Slow down OR flood the network (and sneak through in the mix) OR fragmentation

TCPDUMP SYNTAX

#~tcpdump flag(s) interface

SNORT IDS

It has 3 modes:	Sniffer/Packet logger/ Network IDS.
Config file: /etc/snort, or c:snortetc #~alert tcp!HOME_NET any ->$HOME_NET 31337 (msg : “BACKDOOR ATTEMPT-Back-orifice.”)	Any packet from any address !=home network. Using any source port, intended for an address in home network on port 31337, send msg.
Span port: port mirroring	**False Negative:** IDS incorrectly reports stream clean

LM HASHING

7 spaces hashed: AAD3B435B51404EE

SAM FILE

C:Windowssystem32config

Attacking a System

C|EH RULES FOR PASSWORDS

Must not contain user’s name. Min 8 chars.

3 of 4 complexity components. E.g., Special, Number, Uppercase, Lowercase

ATTACK TYPES

Passive Online: Sniffing wire, intercept clean text password / replay / MITM

Active Online: Password guessing.

Offline: Steal copy of password i.e., SAM file. Cracking efforts on a separate system

Non-electronic: Social Engineering

SIDEJACKING

Steal cookies exchanged between systems and use tp perform a replay-style attack.

AUTHENTICATION TYPES

Type 2: Something you have

Type 3: Something you are

SESSION HIJACKING

Refers to the active attempt to steal an entire established session from a target

1. Sniff traffic between client and server

4. Predict session token and take over session

5. Inject packets to the target server

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KERBEROS

Kerberos makes use of symmetric and asymmetric encryption technologies and involves:

KDC: Key Distribution Centre

KERBEROS

AS: Authentication Service

TGS: Ticket Granting Service

TGT: Ticket Granting Ticket

Process

1. Client asks KDC (who has AS and TGS) for ticket to authenticate throughout the network. this request is in clear text.

2. Server responds with secret key. hashed by the password copy kept on AD server (TGT).

3. TGT sent back to server requesting TGS if user decrypts.

4. Server responds with ticket, and client can log on and access network resources.

REGISTRY

2 elements make a registry setting: a key (location pointer), and value (define the key setting).

Rot level keys are as follows:

HKEY_LOCAL_MACHINE_Info on Hard/software

HKEY_CLASSES_ROOT — Info on file associations and Object Linking and Embedding (OLE) classes

HKEY_CURRENT_USER — Profile info on current user

HEKY_CURRENT-CONFIG—pointer tohardware Profiles.

HEKY_LOCAL-MACHINESoftwareMicrosoftWindowsCurrentVersion

RunServicesOnce

RunServices

Run Once

Run

Social Engineering

HUMAN BASED ATTACKS

- Dumpster diving
- Impersonation
- Technical Support
- Should Surfing
- Tailgating/ Piggybacking

COMPUTER BASED ATTACKS

- Phishing – Email SCAM
- Whaling – Targeting CEO’s
- Pharming – Evil Twin Website

TYPES OF SOCIAL ENGINEERS

Insider Associates: Limited Authorized Access

Insider Affiliates: Insiders by virtue of Affiliation that spoof the identity of the Insider

Outsider Affiliates: Non-trusted outsider that use an access point that was left open

Physical Security

3 MAJOR CATEGORIES OF PHYSICAL SECURITY MEASURES

Physical measures: Things you taste, touch, smell

Technical measures: smart cards, biometrics

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Web-Based Hacking

CSRF – CROSS SITE REQUEST FORGERY

DOT-DOT-SLASH ATTACK

Variant of Unicode or un-validated input attack

SQL INJECTION ATTACK TYPES

Union Query: Use the UNION command to return the union of target Db with a crafted Db

Tautology: Term used to describe behavior of a Db when deciding if a statement is true.

Blind SQL Injection: Trial and Error with no responses or prompts.

Error based SQL Injection: Enumeration technique. Inject poorly constructed commands to have Db respond with table names and other information

BUFFER OVERFLOW

A condition that occurs when more data is written to a buffer than it has space to store and results in data corruption. Caused by insufficient bounds checking, a bug, or poor configuration in the program code.

Stack: Premise is all program calls are kept in a stack and performed in order. Try to change a function pointer or variable to allow code exe

Heap: Takes advantage of memory “on top of” the application (dynamically allocated). Use program to overwrite function pointers

NOP Sled: Takes advantage of instruction called “no-op”. Sends a large # of NOP instructions into buffer. Most IDS protect from this attack.

Dangerous SQL functions

The following do not check size of destination buffers: gets() strcpy() stract() printf()

Wireless Network Hacking

Compatible wireless adapter with promiscuous mode is required, but otherwise pretty much the same as sniffing wired.

802.11 SPECIFICATIONS

WEP: RC4 with 24bit vector. Kers are 40 or 104bit

WAP: RC4 supports longer keys; 48bit IV

802.11 SPECIFICATIONS

WPA/TKIP: Changes IV each frame and key mixing

WPA2: AES + TKIP features; 48bit IV

Spec	Dist	Speed	Freq
802.11a	30m	54 Mbps	5GHz
802.11b	100m	11 Mbps	2.4 GHz
802.11g	100m	54 Mbps	2.4 GHz
802.11n	125m	100 Mbps+	2.4/5GHz

BLUETOOTH ATTACKS

Bluesmacking: DoS against a device

Bluejacking: Sending messages to/from devices

Bluesniffing: Sniffs for Bluetooth

Bluesnarfing: actual theft of data from a device

Trojans and Other Attacks

VIRUS TYPES

Boot: Moves boot sector to another location. Almost impossible to remove.

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Cavity: Hides in empty areas in exe.

Marco: Written in MS Office Macro Language

Multipartite: Attempts to infect files and boot sector at same time.

Metamorphic virus: Rewrites itself when it infects a new file.

Network: Spreads via network shares.

VIRUS TYPES

Polymorphic virus: Constantly changing signature makes it hard to detect.

Shell virus: Like boot sector but wrapped around application code, and run on application start.

Stealth: Hides in files, copies itself to deliver payload.

DOS TYPES

SYN Attack:	Send thousands of SYN packets with a false IP address. Target will attempt SYN/ACK response. All machine resources will be engaged.
SYN Flood:	Send thousands of SYN Packets but never respond to any of the returned SYN/ACK packets. Target will run out of available connections.
ICMP Flood:	Send ICMP Echo packets with a fake source address. Target attempts to respond but reaches a limit of packets sent per second.
Application level:	Send “legitimate” traffic to a web application than it can handle.
Smurf:	Send large number of pings to the broadcast address of the subnet with source IP spoofed to target. Subnet will send ping responses to target.
Fraggle Attack:	Similar to Smurf but uses UDP.
	Attacker fragments ICMP message to send to target. When the fragments are

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LINUX FILE SYSTEM

/	-Root
/var	-Variable Data / Log Files
/bin	-Biniaries / User Commands

IDENTIFYING USERS AND PROCESSES

INIT process ID 1

Root UID, GID 0

Accounts of Services 1-999

All other users Above 1000

LINUX FILE SYSTEM	
/sbin	-Sys Binaries / Admin Commands
/root	-Home dir for root user
/boot	-Store kernel
/proc	-Direct access to kernel
/dev	-Hardware storage devices
/mnt	-Mount devices

PERMISSIONS
4 – Read
2 – Write
1 – Execute
User/Group/Others
764 – User>RWX, Grp>RW, Other>R

SNORT
action protocol address port -> address port (option:value;option:value)
alert tcp 10.0.0.1 25 -> 10.0.0.2 25
(msg:"Sample Alert"; sid:1000;)

Command Line Tools

NMAP	NMAP -ST -T5 -N -P 1-100 10.0.0.1
Netcat	nc -v -z -w 2 10.0.0.1

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hping	hping3 -I -eth0 -c 10 -a 2.2.2.2 -t 100 10.0.0.1
iptables	iptables -A FORWARD -j ACCEPT -p tcp —dport 80

CEH Tools

VULNERABILITY RESEARCH

- National Vuln Db
- Eccouncil.org
- Exploit Database

FOOT-PRINTING

Website Research Tools

- Netcraft
- Webmaster
- Archive

DNS and Whois Tools

- Nslookup
- Sam Spacde
- ARIN
- WhereisIP
- DNSstuff
- DNS-Digger

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- Wget
- Archive
- GoogleCache

SYSTEM HACKING TOOLS

Password Hacking

SCANNING AND ENUMERATION

Ping Sweep

- Angry IP Scanner
- MegaPing

Scanning Tools

- SuperScan
- NMap (Zenmap)
- NetScan Tools Pro
- Hping
- Netcat

War Dialing

- THC-Scan
- TeleSweep
- ToneLoc
- WarVox

Banner Grabbing

- ID Serve
- Netcraft
- Xprobe

Vulnerability Scanning

- Nessus
- SAINT

SYSTEM HACKING TOOLS
Cain
John the Ripper
LCP
THC-Hydra
ElcomSoft
Aircrack
Rainbow Crack
Brutus
KerbCrack
Sniffing
Wireshark
Ace
KerbSniff
Ettercap
Keyloggers and Screen Capture
Ultimate Keylogger
All in one Keylogger
Actual Spy
Ghost
Hiddern Recorder
Desktop Spy

SCANNING AND ENUMERATION
Retina
Core Impact
Nikto
Network Mapping
NetMapper
LANState
IPSonar
Proxy, Anonymizer, and Tunneling
Tor
ProxySwitcher
ProxyChains
SoftCab
HTTP Tunnel
Anonymouse
Enumeration
User2Sid/Sid2User
LDAP Admin
Xprobe
Hyena
SNMP Enumeration
SolarWinds

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SYSTEM HACKING TOOLS

USB Grabber

Privilege Escalation

Password Recovery Boot Disk

Password Reset

Password Recovery

System Recovery

Executing Applications

PDQ Deploy

RemoteExec

Dameware

Spyware

Remote Desktop Spy

Activity Monitor

OSMomitor

SSPro

Covering Tracks

ELsave

Cleaner

EraserPro

Evidence Eliminator

Packet Craftin/Spoofing

SCANNING AND ENUMERATION

SNMPUtil

SNMPScanner

CRYPTOGRAPHY AND ENCRYPTION

Encryption

TureCrypt

BitLocker

DriveCrpyt

Hash Tools

MD5 Hash

Hash Calc

Steganography

XPTools

ImageHide

Merge Streams

StegParty

QuickStego

InvisibleSecrets

EZStego

OmniHidePro

Cryptanalysis

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SYSTEM HACKING TOOLS

Komodia

Hping2

PackEth

Packet Generator

Netscan

Scapy

Nemesis

Session Hijacking

Paros Proxy

Burp Suite

Firesheep

Hamster/Ferret

Ettecap

Hunt

SNIFFING

Wireshark

CACE

tcpdump

Capsa

OmniPeek

CRYPTOGRAPHY AND ENCRYPTION

Cryptobench

WIRELESS

Discovery

Kismet

NetStumbler

insider

NetSurveyor

Packet Sniffing

Cascade Pilot

Omnipeek

Comm View

Capsa

WEP/WPA Cracking

Aircrack

KisMac

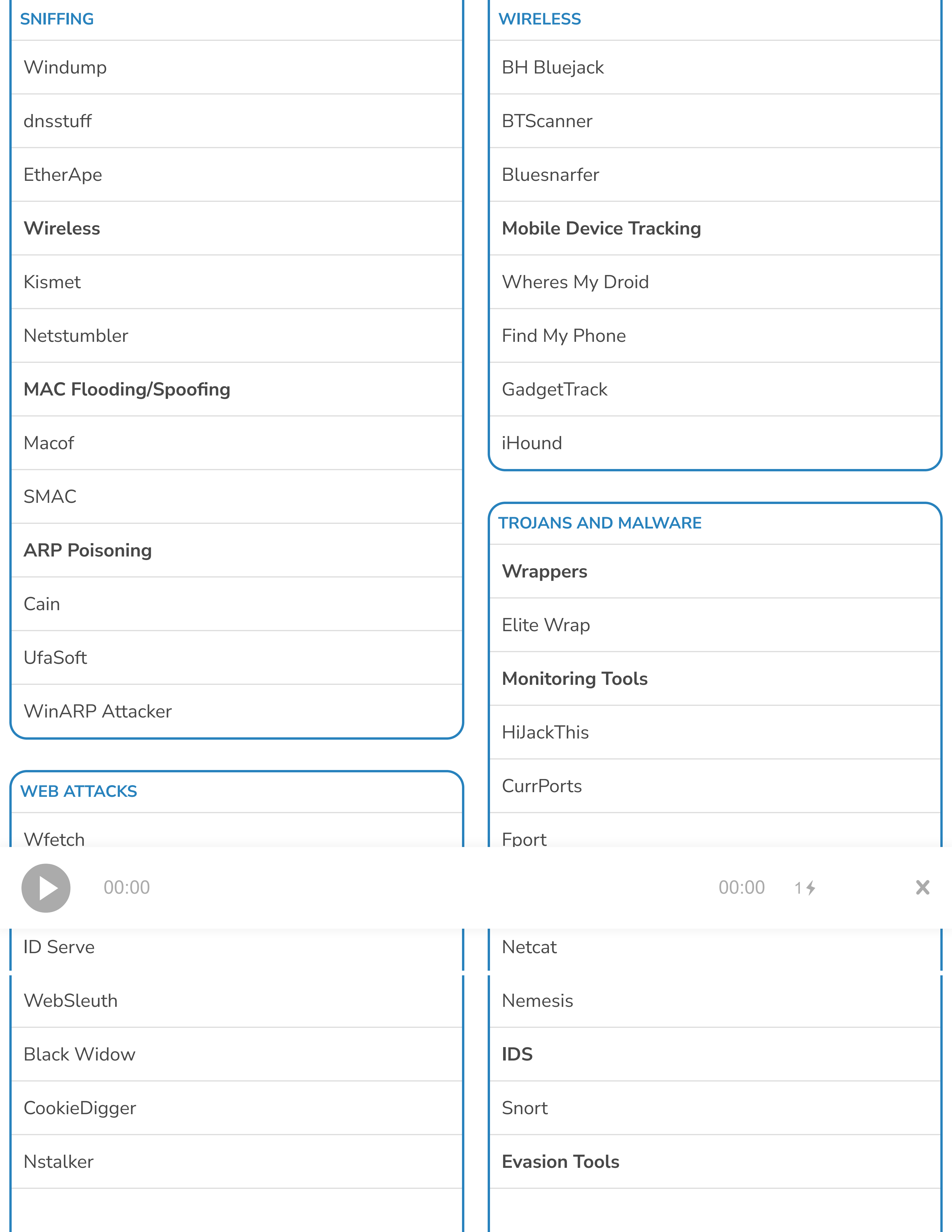
WepAttack

WepCrack

coWPatty

Bluetooth

BTBrowser



SNIFFING

- Windump
- dnsstuff
- EtherApe
- **Wireless**
- Kismet
- Netstumbler
- **MAC Flooding/Spoofing**
- Macof
- SMAC
- **ARP Poisoning**
- Cain
- UfaSoft
- WinARP Attacker

WEB ATTACKS

- Wfetch
- ID Serve
- WebSleuth
- Black Widow
- CookieDigger
- Nstalker

WIRELESS

- BH Bluejack
- BTScanner
- Bluesnarfer
- **Mobile Device Tracking**
- Wheres My Droid
- Find My Phone
- GadgetTrack
- iHound

TROJANS AND MALWARE

- **Wrappers**
- Elite Wrap
- **Monitoring Tools**
- HiJackThis
- CurrPorts
- Fport
- Netcat
- Nemesis
- **IDS**
- Snort
- **Evasion Tools**

WEB ATTACKS
NetBrute
SQL Injection
BSQL Hacker
Marathon
SQL Injection Brute
SQL Brute
SQLNinja
SQLGET

TROJANS AND MALWARE
ADMutate
NIDSBench
IDSInformer
Inundator

The information in this cheat sheet is not only useful for passing the Certified Ethical Hacker Exam, but can act as a useful reference for penetration testers and those pursuing other security certifications.

However you choose to use it, we hope you've found it a helpful resource to keep around.

Frequently Asked Questions

⊖ Is the CEH exam hard to pass?

When compared to a similar certification, such as the Pentest+, CEH is widely considered the easier exam to pass due to the strict multiple-choice format, narrower scope, and longer sit time.

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⊕ Can I self study for CEH?

⊕ How easy is the CEH?

⊕ How long does it take to learn CEH?

⊕ How many questions do you need to pass CEH?

⊕ How many times can I take the CEH exam?

⊕ **Does CEH have any value?**

⊕ **How much does a CEH make a year?**

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CATEGORIES CHEAT SHEETS HACKING

Nathan House

Nathan House is the founder and CEO of StationX. He has over 25 years of experience in cyber security, where he has advised some of the largest companies in the world. Nathan is the author of the popular "The Complete Cyber Security Course", which has been taken by over half a million students in 195 countries. He is the winner of the AI "Cyber Security Educator of the Year 2020" award and finalist for Influencer of the year 2022.

Related Articles

Nmap Cheat Sheet 2023: All the Commands, Flags & Switches

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Linux Command Line Cheat Sheet: All the Commands You Need

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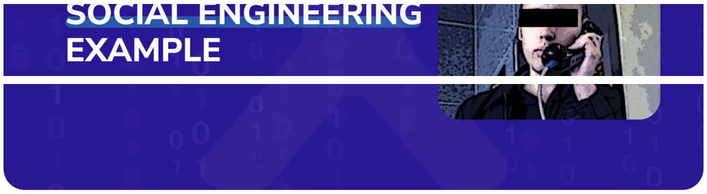

Social Engineering Example

Read More »

Movies for Hackers to Watch

Read More »

INFO

- Affiliates
- Legal Notices
- Privacy Policy
- Site Map

SECURITY ASSESSMENT

- Penetration Testing
- Vulnerability Scanning
- Build Reviews
- Source Code Review
- Social Engineering

CONSULTING

- Audit & Compliance
- Incident Response
- Security Architecture
- Risk Assessment
- Security Training

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