

# Certified Ethical Hacker (CEH) Exam Cheat Sheet

## CERTIFIED ETHICAL HACKER EXAM CHEAT SHEET



**STATIONX**  
THE CYBER SECURITY COMPANY

## 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

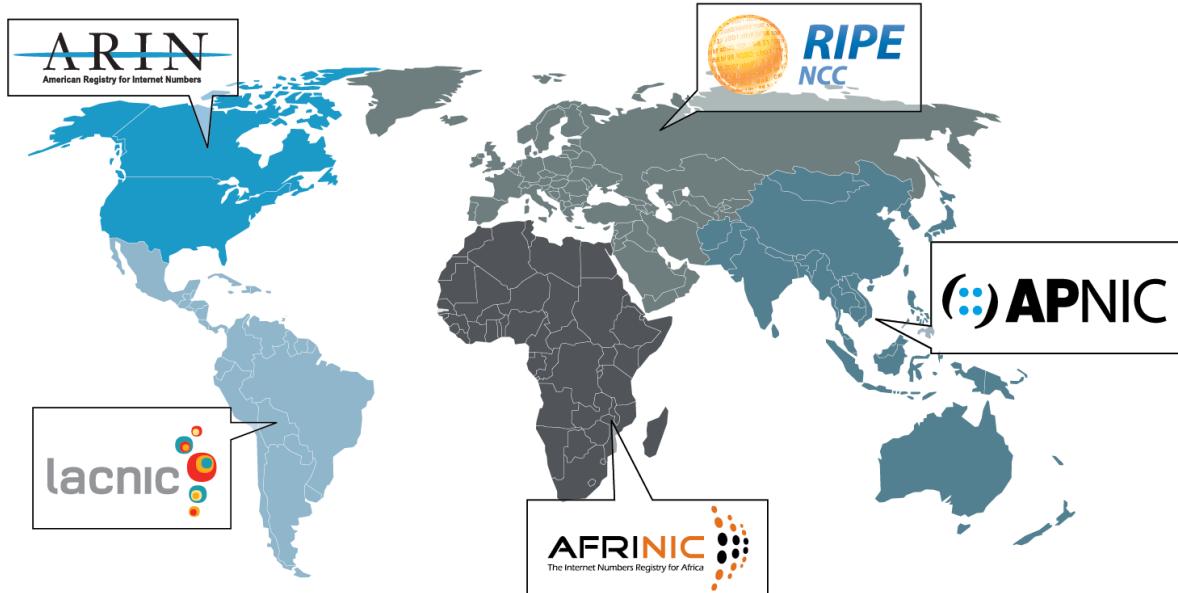
### 5 phases to a penetration

- 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	<b>FERPA</b> - Education Records
CAN-SPAM - email marketing	<b>FISMA</b> - Gov Networks Security Std
SPY-Act - License Enforcement	<b>CVSS</b> - Common Vuln Scoring System
DMCA - Intellectual Property	<b>CVE</b> - 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  $\leq 3$

**AES:** 128, 192, or 256; replaced DES

**IDEA:** 128bit key

**Twofish:** Block cipher key size  $\leq 256$ bit

**Blowfish:** Rep. by AES; 64bit block

**RC:** incl. RC2  $\rightarrow$  RC6. 2,040key, RC6 (128bit block)

### ASYMMETRIC ALGORITHMS

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

**ECC:** Elliptical Curve. Low process power/Mobile

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

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

HASH ALGORITHMS	TRUST MODELS
<b>MD5:</b> 128bit hash, expres as 32bit hex	<b>Web of trust:</b> Entities sign certs for each other
<b>SHA1:</b> 160bit hash, rq 4 use in US apps	<b>Single Authority:</b> CA at top. Trust based on CA itself
<b>SHA2:</b> 4 sep hash 224, 256, 384, 512	<b>Hierarchical:</b> CA at top. RA's Under to manage certs
	<b>XMKs</b> - XML PKI System

CRYPTOGRAPHY ATTACKS
<b>Known Plain-text:</b> Search plaintext for repeatable sequences. Compare to t versions.
<b>Ciphertext-only:</b> Obtain several messages with same algorithm. Analyze to reveal repeating code.
<b>Replay:</b> Performed in MITM. Repeat exchange to fool system in setting up a comms channel.

DIGITAL CERTIFICATE	
Used to verify user identity = nonrepudiation	<b>Valid from/to:</b> Certificate good through dates
<b>Version:</b> Identifies format. Common = V1	<b>Key usage:</b> Shows for what purpose cert was made
<b>Serial:</b> Uniquely identify the certificate	<b>Subject's public key:</b> self-explanatory
<b>Subject:</b> Whoever/whatever being identified by cert	<b>Optional fields:</b> e.g., Issuer ID, Subject Alt Name...
<b>Algorithm ID:</b> Algorithm used	
<b>Issuer:</b> Entity that verifies authenticity of certificate	

## Reconnaissance

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

GOOGLE HACKING	DNS RECORD TYPES
Operator: keyword additional search items	<b>Service (SRV):</b> hostname & port # of servers
site: Search only within domain	<b>Start of Authority (SOA):</b> Primary name server
ext: File Extension	
loc: Maps Location	<b>Pointer (PTR):</b> IP to Hostname; for reverse DNS
intitle: keywords in title tag of page	

allintitle: any keywords can be in title	<b>Name Server (NS)</b> : NameServers with namespace
inurl: keywords anywhere in url	<b>Mail Exchange (MX)</b> : E-mail servers
allinurl: any of the keywords can be in url	<b>CNAME</b> : Aliases in zone. list multi services in DNS
incache: search Google cache only	<b>Address (A)</b> : IP to Hostname; for DNS lookup
	<b>DNS footprinting</b> : whois, nslookup, dig

TCP HEADER FLAGS	DNS
<b>URG</b> : Indicates data being sent out of band	port 53 nslookup (UDP), Zone xfer (TCP)
<b>ACK</b> : Ack to, and after SYN	
<b>PSH</b> : Forces delivery without concern for buffering	
<b>RST</b> : Forces comms termination in both directions	
<b>SYN</b> : Initial comms. Parameters and sequence #'s	
<b>FIN</b> : ordered close to communications	

## Scanning & Enumeration

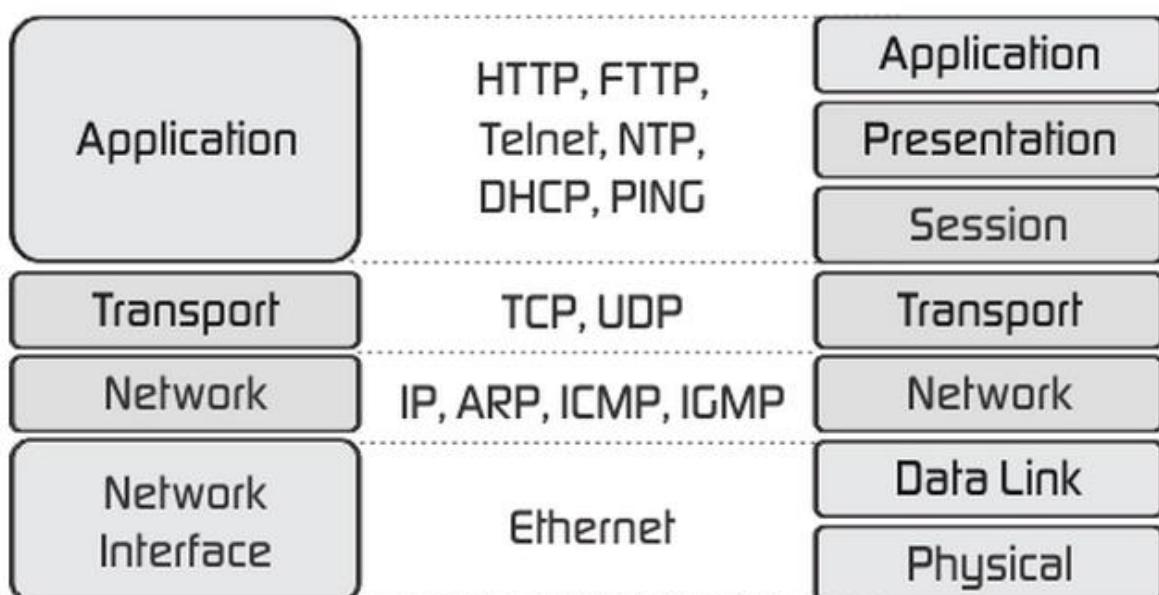
ICMP MESSAGE TYPES	
<b>0</b> : Echo Reply: Answer to type 8 Echo Request	
<b>3</b> : Destination Unreachable: No host/ network Codes	<b>4</b> : Source Quench: Congestion control message
0 – Destination network unreachable	<b>5</b> : Redirect: 2+ gateways for sender to use or the best route not the configured default gateway Codes
1 – Destination host unreachable	0 – redirect datagram for the network
6 – Network unknown	1 – redirect datagram for the host
7 – Host unknown	<b>8</b> : Echo Request: Ping message requesting echo
9 – Network administratively prohibited	<b>11</b> : Time Exceeded: Packet too long be routed
10 – Host administratively prohibited	
13 – Communication administratively prohibited	

## CIDR

Method of representing IP Addresses.

IPV4 NOTATION	
/30=4	.255.252
/28=16	.255.240
/26=64	.255.192
/24=256	.255.0
/22=1024	.252.0
/20=4096	.240.0

TCP/IP model      Protocols and services      OSI model



PORT NUMBERS	HTTP Error Codes
0 – 1023: Well-known	200 Series – OK
1024 – 49151: Registered	400 Series – Could not provide req
49152 – 65535: Dynamic	500 Series – Could not process req

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

NMAP	NMAP SCAN TYPES
Nmap is the de-facto tool for this pen-test phase	TCP: 3 way handshake on all ports. Open = SYN/ACK, Closed = RST/ACK
<b>NMAP &lt;SCAN OPTIONS&gt; &lt;TARGET&gt;</b>	SYN: SYN packets to ports (incomplete handshake). Open = SYN/ ACK, Closed = RST/ ACK
-SA: ACK scan -sF: FIN scan -sS:SYN -sT: TCP scan -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	FIN: Packet with FIN flag set Open = no response, Closed = RST XMAS: Multiple flags set (fin, URG, and PSH) <b>Binary Header: 00101001</b> 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	<b>1B</b> ==master browser for the subnet
nbtstat -n local name table	<b>1C</b> == domain controller
nbtstat -c local name cache	<b>1D</b> == 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 every 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 to perform a replay-style attack.

## AUTHENTICATION TYPES

Type 1: Something you know

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
2. Monitor traffic and predict sequence
3. Desynchronise session with client
4. Predict session token and take over session
5. Inject packets to the target server

## KERBEROS

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

**KDC:** Key Distribution Centre

**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).

Root 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

HKEY\_USERS - User config info for all active users

HKEY\_CURRENT\_CONFIG - pointer to hardware Profiles.

HKEY\_LOCAL\_MACHINE\Software\Microsoft\Windows\CurrentVersion

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

**Operational measures:** policies and procedures

## Web-Based Hacking

CSRF - CROSS SITE REQUEST FORGERY

### CSRF - CROSS SITE REQUEST FORGERY

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 exec

**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() strcat() printf()

## Wireless Network Hacking

### WIRELESS SNIFFING

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. Keys are 40 or 104bit

**WAP:** RC4 supports longer keys; 48bit IV

**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.  
**Camo:** Disguise as legit files.  
**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.  
**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

<b>SYN Attack:</b>	Send thousands of SYN packets with a false IP address. Target will attempt SYN/ACK response. All machine resources will be engaged.
<b>SYN Flood:</b>	Send thousands of SYN Packets but never respond to any of the returned SYN/ACK packets. Target will run out of available connections.
<b>ICMP Flood:</b>	Send ICMP Echo packets with a fake source address. Target attempts to respond but reaches a limit of packets sent per second.
<b>Application level:</b>	Send "legitimate" traffic to a web application than it can handle.
<b>Smurf:</b>	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.
<b>Fraggle Attack:</b>	Similar to Smurf but uses UDP.
<b>Ping of Death:</b>	Attacker fragments ICMP message to send to target. When the fragments are reassembled, the resultant ICMP packet is larger than max size and crashes the system

## Linux Commands

LINUX FILE SYSTEM		IDENTIFYING USERS AND PROCESSES
/	-Root	INIT process ID 1
/var	-Variable Data / Log Files	Root UID, GID 0
/bin	-Binaries / User Commands	Accounts of Services 1-999
/sbin	-Sys Binaries / Admin Commands	All other users Above 1000
PERMISSIONS		
/root	-Home dir for root user	4 - Read
/boot	-Store kernel	2 - Write
/proc	-Direct access to kernel	1 - Execute
/dev	-Hardware storage devices	User/Group/Others
/mnt	-Mount devices	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
TCPdump	tcpdump -i eth0 -v -X ip proto 1
Snort	snort -vde -c my.rules 1
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	SCANNING AND ENUMERATION
National Vuln Db	Ping Sweep
Eccouncil.org	Angry IP Scanner
Exploit Database	MegaPing
FOOT-PRINTING	Scanning Tools
Website Research Tools	SuperScan
Netcraft	NMap (Zenmap)
Webmaster	NetScan Tools Pro
Archive	Hping
DNS and Whois Tools	Netcat
Nslookup	War Dialing
	THC-Scan
	TeleSweep

Sam Spacde	ToneLoc
ARIN	WarVox
WhereisIP	<b>Banner Grabbing</b>
DNSstuff	Telnet
DNS-Digger	ID Serve
<b>Website Mirroring</b>	Netcraft
Wget	Xprobe
Archive	<b>Vulnerability Scanning</b>
GoogleCache	Nessus
<b>SYSTEM HACKING TOOLS</b>	
<b>Password Hacking</b>	
Cain	NetMapper
John the Ripper	LANState
LCP	IPSonar
THC-Hydra	<b>Proxy, Anonymizer, and Tunneling</b>
ElcomSoft	Tor
Aircrack	ProxySwitcher
Rainbow Crack	ProxyChains
Brutus	SoftCab
KerbCrack	HTTP Tunnel
<b>Sniffing</b>	Anonymouse
Wireshark	<b>Enumeration</b>
Ace	SuperScan
KerbSniff	User2Sid/Sid2User
Ettercap	LDAP Admin
<b>Keyloggers and Screen Capture</b>	
KeyProwler	Xprobe
Ultimate Keylogger	Hyena
All in one Keylogger	<b>SNMP Enumeration</b>
Actual Spy	SolarWinds
Ghost	SNMPUtil
Hiddern Recorder	SNMPScanner
Desktop Spy	
USB Grabber	
<b>Privilege Escalation</b>	
Password Recovery Boot Disk	Encryption
Password Reset	TureCrypt
Password Recovery	BitLocker
System Recovery	DriveCryt
<b>Executing Applications</b>	
PDQ Deploy	Hash Tools
RemoteExec	MD5 Hash
Dameware	Hash Calc
<b>Spyware</b>	Steganography
Remote Desktop Spy	XPTools
Activity Monitor	ImageHide
OSMomitor	Merge Streams
SSPro	StegParty
Spector Pro	gifShuffle
<b>Covering Tracks</b>	QuickStego
	InvisibleSecrets
<b>CRYPTOGRAPHY AND ENCRYPTION</b>	

ELsave	EZStego
Cleaner	OmniHidePro
EraserPro	Cryptanalysis
Evidence Eliminator	Cryptobench
<b>Packet Craftin/Spoofing</b>	
Komodia	
Hping2	<b>WIRELESS</b>
PackEth	Discovery
Packet Generator	Kismet
Netscan	NetStumbler
Scapy	insider
Nemesis	NetSurveyor
<b>Session Hijacking</b>	Packet Sniffing
Paros Proxy	Cascade Pilot
Burp Suite	Omnipeek
Firesheep	Comm View
Hamster/Ferret	Capsa
Ettecap	WEP/WPA Cracking
Hunt	Aircrack
	KisMac
	Wireless Security Auditor
<b>SNIFFING</b>	WepAttack
<b>Packet Capture</b>	WepCrack
Wireshark	coWPatty
CACE	Bluetooth
tcpdump	BTBrowser
Capsa	BH Bluejack
OmniPeek	BTScanner
Windump	Bluesnarfer
dnsstuff	Mobile Device Tracking
EtherApe	Wheres My Droid
Wireless	Find My Phone
Kismet	GadgetTrack
Netstumbler	iHound
<b>MAC Flooding/Spoofing</b>	
Macof	<b>TROJANS AND MALWARE</b>
SMAC	Wrappers
<b>ARP Poisoning</b>	Elite Wrap
Cain	Monitoring Tools
UfaSoft	HiJackThis
WinARP Attacker	CurrPorts
	Fport
	Attack Tools
	Netcat
	Nemesis
	IDS
	Snort
	Evasion Tools
<b>WEB ATTACKS</b>	
Wfetch	
Httprecon	
ID Serve	
WebSleuth	
Black Widow	
CookieDigger	
Nstalker	
NetBrute	
<b>SQL Injection</b>	

BSQL Hacker	ADMutate
Marathon	NIDSBenchmark
SQL Injection Brute	IDSInformer
SQL Brute	Inundator
SQLNinja	
SQLGET	

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.