
OMU
HACKERS

Announcements

- Quiz

Quiz

This Monday!!

OMU HACKERS

Announcements

- Quiz
- Christmas Meal

Christmas Meal

Announcements

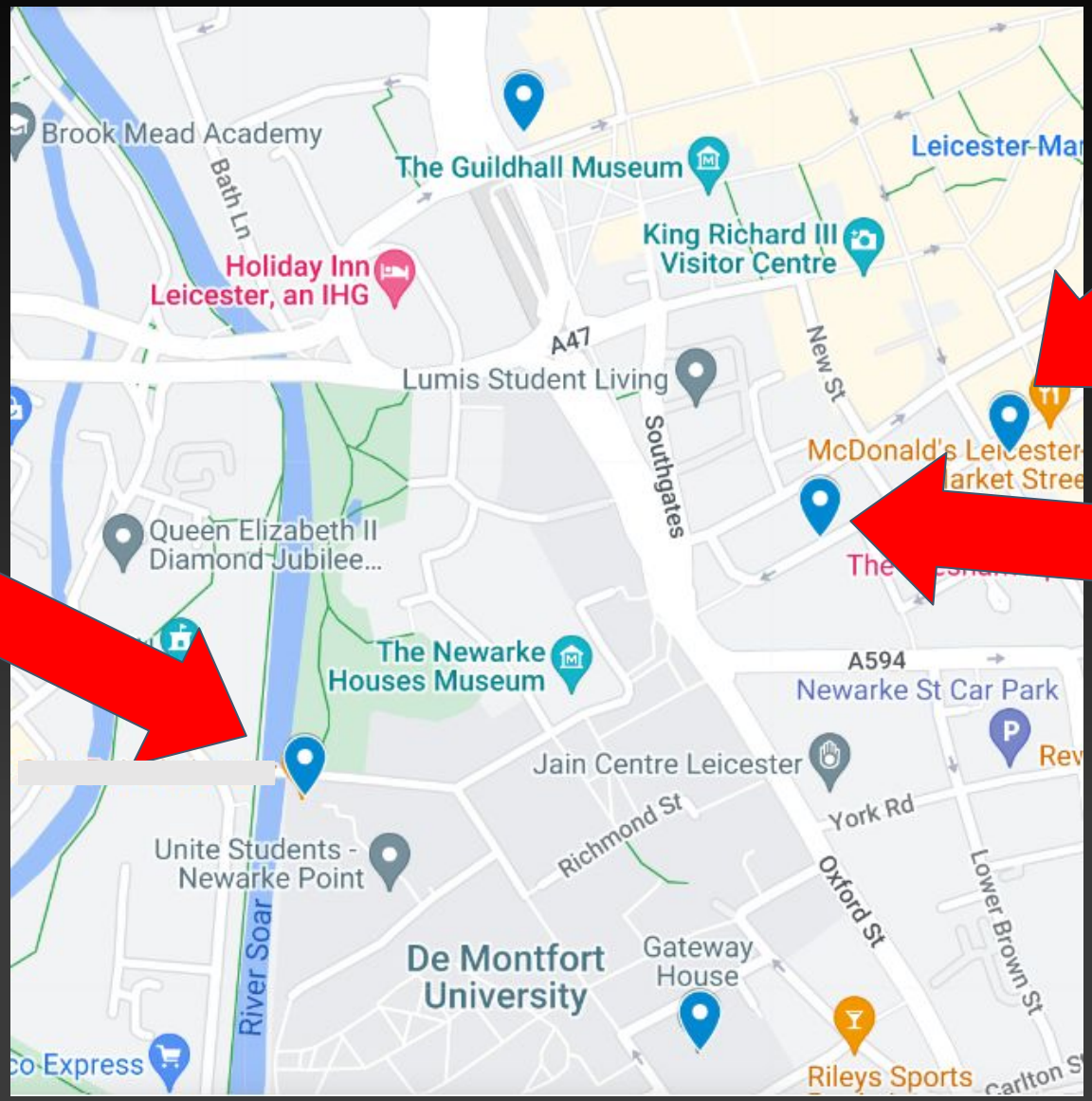
- Quiz
- Christmas Meal
- Lanyards
- And last but not least…

TryHackMe Advent of Cyber 2023

OMU HACKERS

Social

THE SOAR POINT



FIREBUG
BAR . VENUE . FOOD

oddbar

DMU HACKERS

Hash Functions & Cracking

Don't do illegal shit

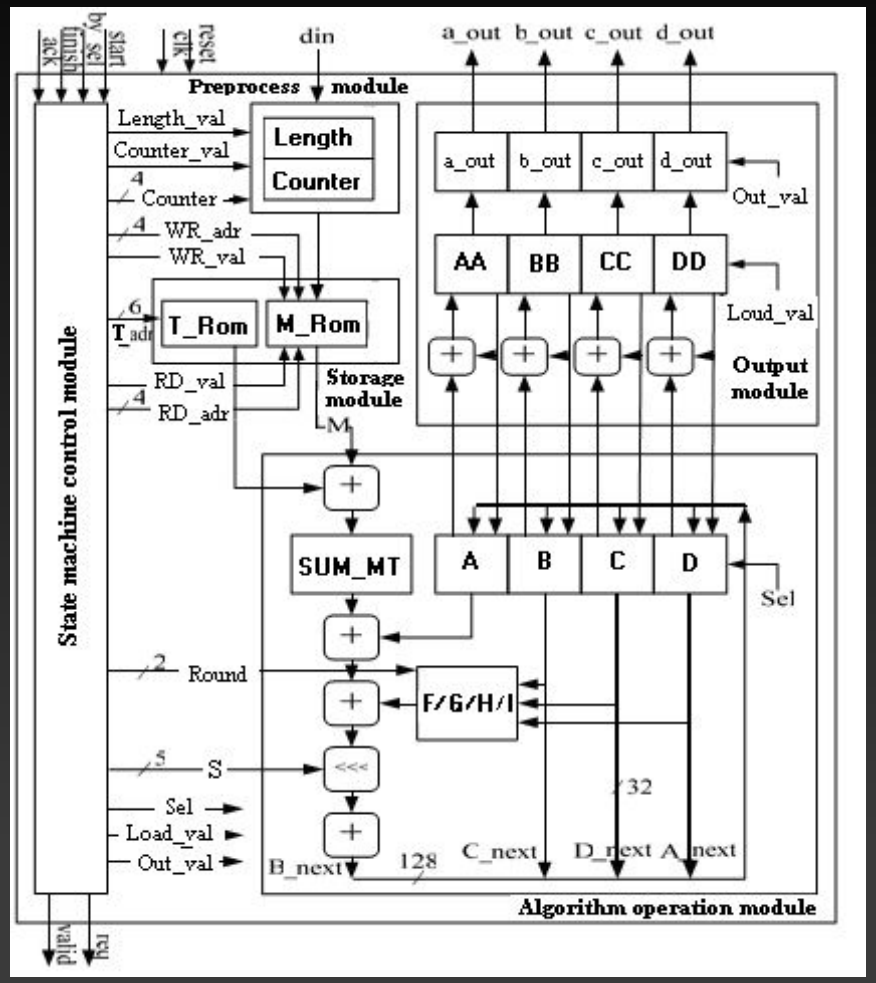
Pretending you are 12

- Capital Letters, Numbers, Symbols, Sentences over just words
- Don't leave passwords laying around
- Update regularly

What is a hash function?

- An irreversible, complex calculation
- Takes an input (plaintext) and produces a fixed-size output (digest aka hash)

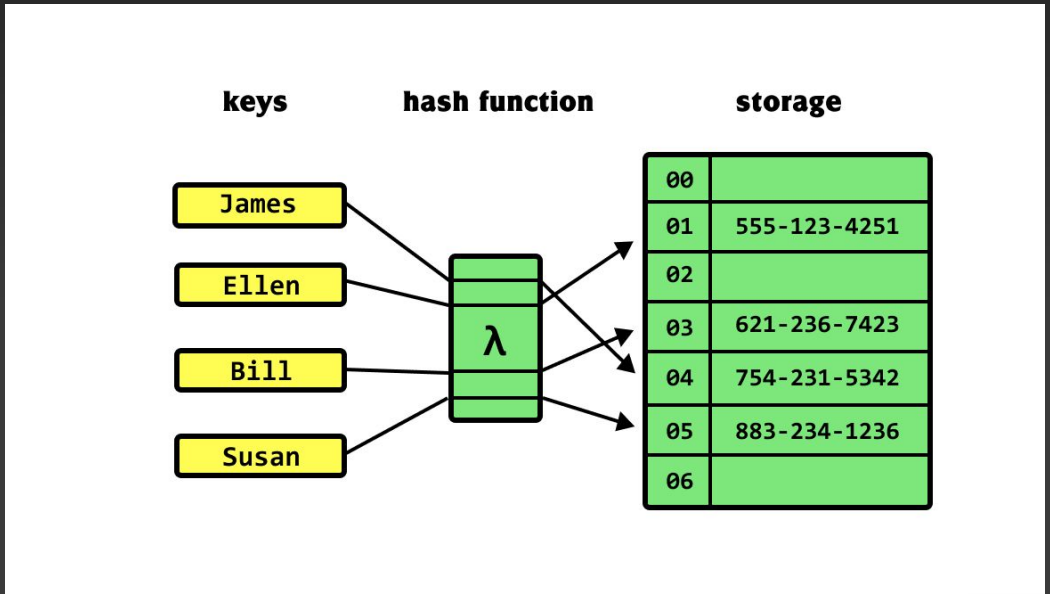
What is a hash function?



MD5 Algorithm

What is a hash function?

- Should be a case of:
- 2 ***same*** plaintexts will always give the ***same*** hash
- 2 ***different*** plaintexts should always have **unique hashes**



What is a hash?

- Changing just 1 part of a plaintext will change the hash drastically

password123	482c811da5d5b4bc6d497ffa98491e38
password1234	bdc87b9c894da5168059e00ebffb9077

- Case-sensitive (as 'A' and 'a' are different binary values)

confusion	c52e29d93f53d6098cc31d7e185008d0
Confusion	54894e44b2caf1104cfb21288a0e449e

Security of Hashes

- Longer hashes provide more security because there are more possible combinations
- For example
  - MD5 creates a message digest of 128-bits
  - SHA1 creates a message digest of 160-bits
- And so SHA1 is more secure than MD5
- SHA256 uses 256-bits, which is much more secure than both SHA1 and MD5.

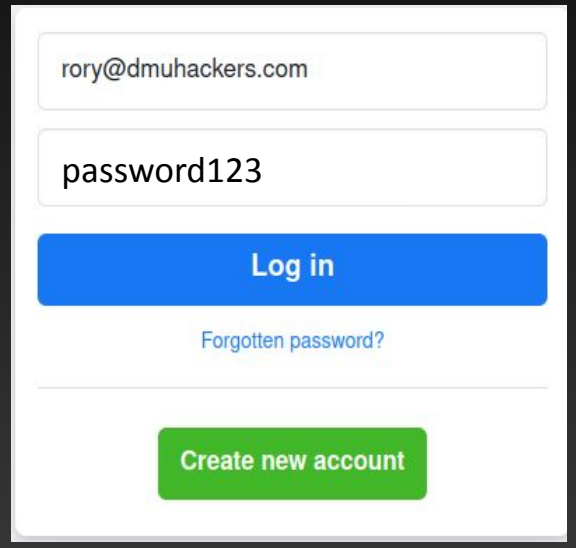
What are hashes actually used for?

Passwords

- Password stored in database as a hash
  - This means if passwords are stolen, makes it harder for attacker to find out what it is
- When you log in, it hashes your input and then compares this to your stored password
  - Server will respond with either 'yes' or 'no'

What are hashes actually used for?

Passwords



Email	Salt	Password
rory@dmuhackers.com	ba	9c1b25a3a226d7747189deda42c12e52

Lookup the 'salt'

- Random value added to password
- Means 2 users who have same plaintext password very unlikely to have same hash

What are hashes actually used for?

Passwords

Email	Salt	Password
rory@dmuhackers.com	ba	6c1b25a3a226d7747189deda42c12e52

password123 482c811da5d5b4bc[illegible]497ffa98491e38

password123ba 6c1b25a3a226[illegible]189deda42c12e52

These are MD5 hashes and would (hopefully) not be used as it's been broken!
(more on this later)

What are hashes actually used for?

Rainbow Tables

- Hashes are irreversible - right?
- Nothing to stop somebody looking up hashes in advance… (we'll pretend salts aren't a thing)

Password	MD5 Hash
123456	e10adc3949ba59abbe56e057f20f883e
12345	827ccb0eea8a706c4c34a16891f84e7b
123456789	25f9e794323b453885f5181f1b624d0b
password	5f4dcc3b5aa765d61d8327deb882cf99
iloveyou	f25a2fc72690b780b2a14e140ef6a9e0

What are hashes actually used for?

Rainbow Tables

- Can create a custom rainbow table - e.g if you think a victim might use their cat's name as a password - nibbles, Nibbles, Nibbles44 …

- Not effective when salting is in use
- Still works against systems where salting is not implemented

What are hashes actually used for?

File Integrity Checking

- Usually measures in place to ensure files download wholly and completely
- Only way to check **for sure** is to compare hashes!
- Software developer will provide 'initial hash', you download file and calculate 'subsequent hash' and compare the two - if the same, the file is a carbon copy!
- Used in forensics too to check files are same as when you first took the evidence


Kali Linux 2023.3 Changelog
64-bit
32-bit
Apple Silicon (ARM64)
Recommended
64
Installer
Complete offline installation
with customization
3.9G
torrent
sum


Kali Linux 2023.3 Changelog
64-bit
32-bit
Apple Silicon (ARM64)
SHA256sum
ffe5aa3932397895
257252a144f9c62f
2b8663f6b3f8bcf1
20b5ae53045d6031
3.9G
torrent
sum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Other Uses of hashing

Digital Signatures

Blockchain and Cryptocurrency

Data Deduplication

Combatting Online Child Abuse

Cracking Hashes

Cracking Hashes

- Although hashes are supposed to be secure, they can be cracked!
- Depending on the algorithm, can take **a lot** of compute power (especially GPU)
- GPU speeds up hash cracking as it's much better than a CPU at completing tasks in parallel (at the same time)

Cracking Hashes

Number of characters	Lowercase letters only	At least one uppercase letter	At least one uppercase letter +number	At least one uppercase letter +number+symbol
1	Instantly	Instantly	-	-
2	Instantly	Instantly	Instantly	-
3	Instantly	Instantly	Instantly	Instantly
4	Instantly	Instantly	Instantly	Instantly
5	Instantly	Instantly	Instantly	Instantly
6	Instantly	Instantly	Instantly	Instantly
7	Instantly	Instantly	1 min	6 min
8	Instantly	22 min	1 hrs	8 hrs
9	2 min	19 hrs	3 days	3 wks
10	1 hrs	1 mths	7 mths	5 yrs
11	1 day	5 yrs	41 yrs	400 yrs
12	3 wks	300 yrs	2,000 yrs	34,000 yrs

Take these with a pinch of salt!

rockyou.txt

- Company RockYou was breached - attackers stole 32 million user records - with passwords stored in PLAIN TEXT!!!!

rockyou.txt

- After the breach, the complete list of passwords was leaked
- In amateur pentesting (ie CTFs), without a doubt the most common 'wordlist'
- Comes as standard with Kali Linux

```
root@kali:~# cd /usr/share/wordlists/
root@kali:/usr/share/wordlists# ls
dirb       dnsmap.txt     fern-wifi   nmap.lst        sqlmap.txt
dirbuster  fasttrack.txt  metasploit  rockyou.txt.gz  wfuzz
root@kali:/usr/share/wordlists# gzip -d rockyou.txt.gz
root@kali:/usr/share/wordlists# ls
dirb       dnsmap.txt     fern-wifi   nmap.lst     sqlmap.txt
dirbuster  fasttrack.txt  metasploit  rockyou.txt  wfuzz
root@kali:/usr/share/wordlists#
```

NameThatHash (nth)

- To crack a hash, you need to know it's type!
- Most commonly MD5 in CTFs/TryHackMe but don't be surprised if it's something else
- Also now comes as standard with Kali Linux

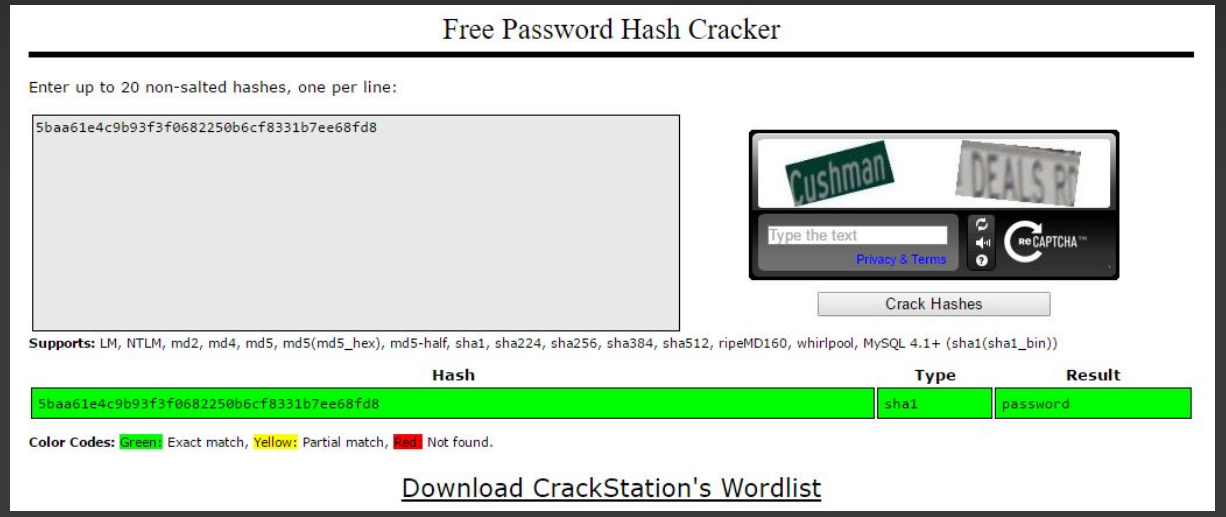
```
871f16813da4f554a8c2dcd8034e1c74d4c58fd246196b1e14b0dc0cbedfadd
5caf651dd8b019afa7414c15c5113eed8d829049b353f63eccdfda8641342e4
09

Most Likely
SHA-512, HC: 1700 JtR: raw-sha512 Summary: Used in Bitcoin
Blockchain and Shadow Files.
Keccak-512, HC: 1800
Blake2, HC: 600 JtR: raw-blake2 Summary: Used in Wireguard,
Zcash, IPFS and more.
Keccak-256, HC: 17800

Least Likely
Whirlpool, HC: 6100 JtR: whirlpool Salsa10, Summary: Not
considered a hash function. Salsa20, Summary: Not considered a
hash function. SHA3-512, HC: 17600 JtR: raw-sha3 Skein-512,
JtR: skein-512 Skein-1024(512),  sha512($pass.$salt), HC: 1710
```

How to crack a hash?

- First port of call - crackstation.net
- A website that supports a wide range of hash algorithms
- Will work especially on common passwords, and saves your own compute power and time



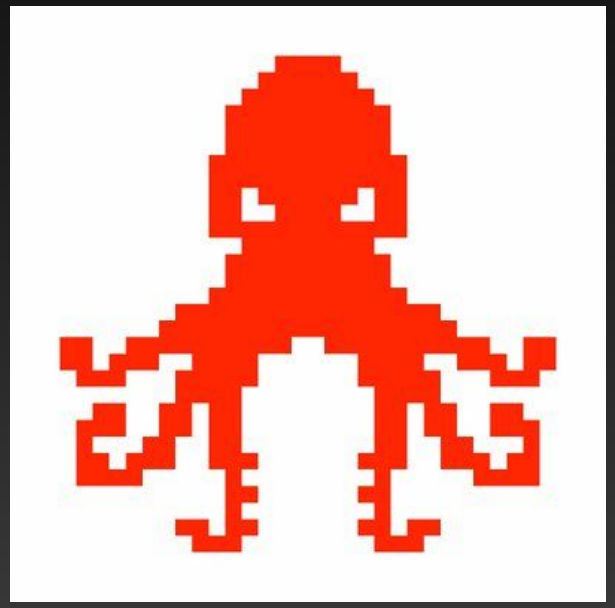
JohnTheRipper

- Password cracking tool
- Purely CPU based - doesn't utilise GPU
- Supports more traditional-types of hash
- BleedingJumbo: Expanded version of john with a wider range of supported hashes

Hashcat

- Another password cracking tool
- Utilises GPU too - can be a lot faster
- Supports a wider range of hashes than John
- Ability to create custom wordlists
- Better documentation available online

Password Cracking



Crack the Hash

https://tryhackme.com/room/crackthehash

Password Cracking

sudo apt install hashcat

Hash Mode Values

Md5 = 0

SHA1 = 100

Decrypt MD5, SHA1, MySQL, NTLM, SHA256, MD5 Email, SHA256 Email, SHA512, Wordpress, Bcrypt hashes for free online

Hash Type Identifier - Identify unknown hashes

CrackStation - Online Password Hash Cracking - MD5, SHA1, Linux, Rainbow Tables, etc.

Crack the Hash
https://tryhackme.com/room/crackthehash

Tips:

- Use a tool like Crackstation/CyberChef for the easier tasks
- Hashcat's wiki pages are really handy
- Tab to autocomplete file paths/commands

EXTENSION: Crack the Hash 2
https://tryhackme.com/room/crackthehashlevel2


Le Beaujolais nouveau
est arrivé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