

Practical Password Cracking

Hardware, Tools, Methods... and AI

Sean T Smith

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whoami



Name	Sean T Smith
Hacker Handle	smidiculous
Occupation	Smart Factory IIoT Consultant
Another Occupation	Cyber Team Lead
Yet Another Occupation	Adjunct Professor of Cybersecurity
Family	Wife, 2 Kiddos
Education	Undergrad, Grad, Google, ChatGPT
Hobbies	Tech, Hardware, Building Stuff, 3D Printing, Pretending to Code
My Social Media Links	www.seantsmith.me

Agenda

- Introduction
- Password Cracking Factors & Considerations
- Overview of Password Attack Types
- Recommended Cracking Rigs
- The Methodology & Experiment
- Tools & Resources for Password Attacks
- Walkthrough & Results
- ☠ **Demo**
- Final Thoughts

What are we learning today?

Password cracking is an exercise in maximizing guesses per unit of time.

- This presentation will focus on learning a **methodology and mindset** which can be applied using many different tools across all password types.
- Expensive GPU(s) and Cloud Infrastructure is not required (although it helps); **most passwords can be cracked with a laptop.**
- Bottom line, password cracking is not difficult if you understand the process, I have spent the last 5 years refining my approach during **real-world assessments.**
- Time to **share what I've learned!**

ChatGPT Hardware

Number of Characters	Numbers Only	Lowercase Letters	Upper and Lowercase Letters	Numbers, Upper and Lowercase Letters	Numbers, Upper and Lowercase Letters, Symbols
4	Instantly	Instantly	Instantly	Instantly	Instantly
5	Instantly	Instantly	Instantly	Instantly	Instantly
6	Instantly	Instantly	Instantly	Instantly	Instantly
7	Instantly	Instantly	Instantly	Instantly	Instantly
8	Instantly	Instantly	Instantly	Instantly	1 secs
9	Instantly	Instantly	4 secs	21 secs	1 mins
10	Instantly	Instantly	4 mins	22 mins	1 hours
11	Instantly	6 secs	3 hours	22 hours	4 days
12	Instantly	2 mins	7 days	2 months	8 months
13	Instantly	1 hours	12 months	10 years	47 years
14	Instantly	1 days	52 years	608 years	3k years
15	2 secs	4 weeks	2k years	37k years	232k years
16	15 secs	2 years	140k years	2m years	16m years
17	3 mins	56 years	7m years	144m years	1bn years
18	26 mins	1k years	378m years	8bn years	79bn years



2023

› Learn how we made this table at hivesystems.io/password-speed-charts

<https://www.hivesystems.com/blog/are-your-passwords-in-the-green>

Key Hive Systems 2023 Chart Assumptions

1. Offline Cracking of MD5 Hash
2. Randomly Generated: a-z, A-Z, 0-9, ^%\$!&@#
3. Black Box, Password Not Previously Breached

How is this useful?

Nothing makes a bigger impact during a cyber assessment than SHOWING the results of poor security practices; password cracking is an easy and useful tool for this.

- Penetration testing requires **initial access and privilege escalation**; frequently this is enabled by cracking captured password hashes.
- Successfully **cracking password hashes can make the difference** between a successful or failed assessment.
- Auditing an organization's NTDS.dit file passwords can **confirm technical controls** of the password policy, or lack thereof!
- The skill of password cracking in a time/resource constrained setting is **critical for any cyber operator**.



How does this help the good guys?

A compelling readout can successfully advocate on behalf of struggling corporate cybersecurity.

- **Presenting compelling engagement results** to the customer's leadership is intensely effective.
- This often leads to swift organizational changes that **improve cybersecurity focus and resourcing**.
- **Non-technical leaders can easily relate** to exploiting passwords and understand the real-world impact.
- It is for this reason that honing your password cracking craft is a **critical skill** for any Cyber Operator.



The Password Cracking Mindset

A pragmatic approach to maximize your cracking probability.

Password Cracking is a Planned Mission

➤ Embrace Complexity

Password cracking involves understanding and navigating complex systems. Recognize that each password and security system presents a unique challenge, requiring a thoughtful tailored approach.

➤ Start by Analyzing the Variables

These include the type of hash, password strength, available hardware, time constraints, etc. Successful solvers methodically assess these factors before starting.

➤ Develop a Plan

After understanding the variables, develop a plan based on the data. Decide the types of attacks and their order ahead of time so that you quickly “pick the lowest hanging fruit” first.

Work Smarter, Not Harder

➤ Leverage Tools & Techniques

Familiarize yourself with the plethora of tools and techniques to understand which are best suited for your scenario. Efficiency comes more from using the right tools for the job, not just the most powerful cracking rig.

➤ Understand the Target

Understand the target system or password's nature. For example, knowing that a password follows a certain format or that the system has rate limiting can significantly influence your approach and increase efficiency.

➤ Prioritize Targets

Prioritize your efforts based on the potential gain and the likelihood of success. This may mean focusing on weaker passwords first or targeting those that grant access to more valuable data.

Patience & Persistence

➤ Trust Your Planning

Follow the plan, even if you don't see success immediately; knowing the time to pivot comes with experience.

➤ Learn Continuously

Successful crackers make a habit of learning from each attempt, whether successful or not, and incorporating that information into the future attempts.



“If I had a nickel for every password guess made by my cracking rigs during this research, I would have 18,222,411,116,041,000 nickels... and if that was converted into a stack of \$100 bills, it would stretch from the Earth to the Moon and back!”

-Sean Smith

...assisted by ChatGPT

Password Cracking Difficulty Factors

Sean's Equation for 'Crackability'



$$\text{Crackability} = \frac{\text{Amplifiers} \times \text{Attack Levers}}{\text{Password Composition} \div \text{Human Factors}}$$

Amplifiers

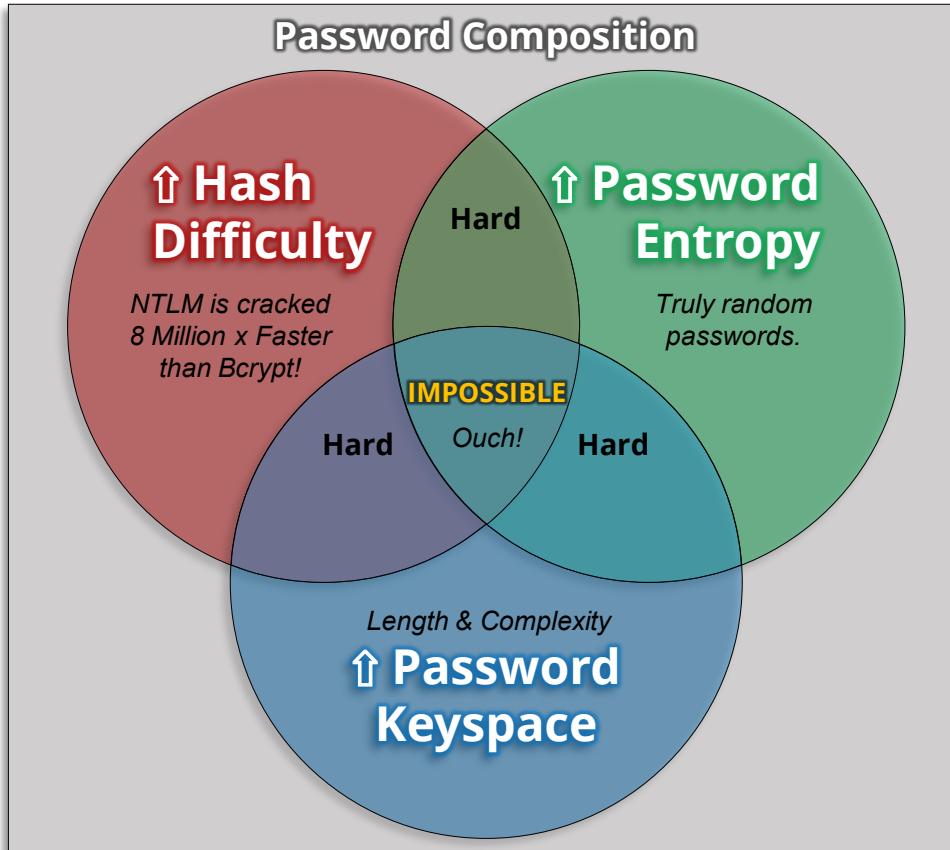
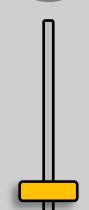
- Tools & Process
- Tailored Wordlists
- Masks & Rules
- AI Models

Attack Levers

Cracking Power



Time

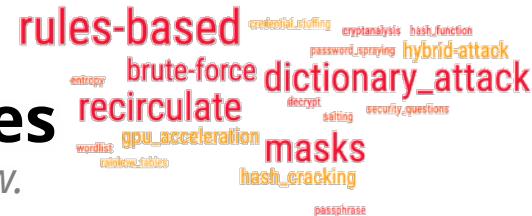


Human Factors

- Default Password
- Previously Breached
- Password Reuse
- Common Password
- Personal Information
- Pattern Following
- Dictionary Words
- Cultural References
- Keyboard Walks
- Simple Substitutions

Overview of Our Password Attack Types

The Hashcat attacks which underpin the research are listed below.



Base Hashcat Command

```
{BaseCommand} = hashcat.exe -d 1 -m 1000 -w 4 --username --backend-ignore-hip --bitmap-max 28 --session MySession -o "C:\Users\Sean\Output\output.txt"
```



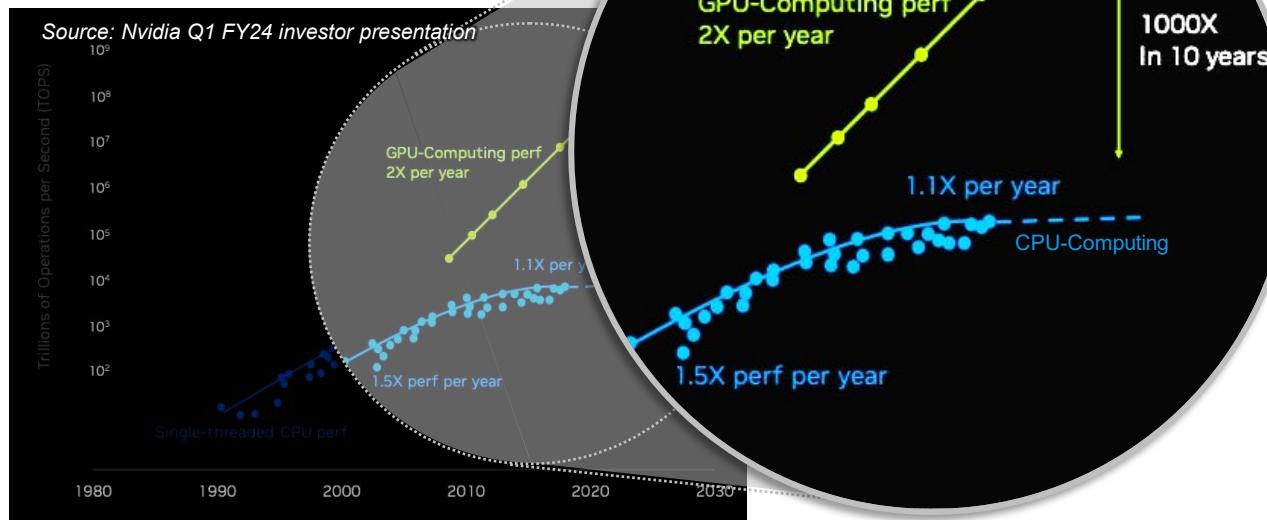
Attack	Description	Example
Dictionary	Read from a text file (aka 'dictionary' or 'wordlist') and try each line as a password candidate.	{BaseCommand} -a 0 "C:\Users\Sean\Hashes\password_hashes.txt" "C:\Users\Sean\Dictionary\dictionary.txt"
Brute-Force	Tries all combinations from a given keyspace (1-8 characters).	{BaseCommand} -a 3 --increment --increment-min=1 "C:\Users\Sean\Hashes\password_hashes.txt" ?a?a?a?a?a?a?a?a
Masks	Try all combinations from a given keyspace, similar to a Brute-Force attack, but more specific.	{BaseCommand} -a 3 "C:\Users\Sean\Hashes\password_hashes.txt" "C:\Users\Sean\Masks\masks.hcmask"
Rules	The rule-based attack is a scripting language which has functions to modify, cut or extend words to generate additional password candidates.	{BaseCommand} -a 0 "C:\Users\Sean\Hashes\password_hashes.txt" "C:\Users\Sean\Dictionary\dictionary.txt" -r "C:\Users\Sean\Rules\rules.rule"
Recirculate	Apply rules to previously cracked passwords to generate new password candidates.	{BaseCommand} -a 0 "C:\Users\Sean\Hashes\password_hashes.txt" "C:\Users\Sean\Cracked\cracked.txt" -r "C:\Users\Sean\Rules\rules.rule"
LLM-Dictionary	Generate a dictionary of password candidates using a trained LLM model.	{BaseCommand} -a 0 "C:\Users\Sean\Hashes\password_hashes.txt" "C:\Users\Sean\LLM_Model\llm_dictionary.txt"

Note: Do not use the [-O / --optimized-kernel-enable] switch if you need maximum coverage, instead use the default Pure Kernel.

Sourcing GPUs: Which to buy?

Buying a single new latest generation graphics card is far better than gambling on used-and-abused older generation cards; > Moore's Law.

- GPU Performance has **doubled each year!**
- That means **1,000x** growth in 10 years!
- **1x RTX4090 = 9x GTX1080TI**



"But how do I get one for retail, they are all overpriced or sold out?"

-Everyone

www.nowinstock.net

+

Patience

www.seantsmith.me

My Pick

Choosing a Cracking Rig

This is my favorite part, but it is actually the least important aspect.

Potential Cracking Rigs	Pros	Cons
 External Graphics Cards (eGPUs)	<ul style="list-style-type: none">+ Multi-Purpose+ Dead Simple to Setup+ I Had Them Already	<ul style="list-style-type: none">- Supports fewer total GPUs- eGPU enclosures are \$- Thunderbolt can be unstable
 Repurposed Mining Rig	<ul style="list-style-type: none">+ Compact Form Factor+ Supports Many GPUs+ Built for Stress	<ul style="list-style-type: none">- Not Intended for Cracking- Weak Compute- Minimal RAM & Storage
 Use a Gaming Desktop	<ul style="list-style-type: none">+ Built for Graphics Stability+ Solid Storage & Compute+ Cool RGB Colors	<ul style="list-style-type: none">- I don't have one!- My friend wouldn't stop gaming on his so I could use it.
 Cloud Infrastructure	<ul style="list-style-type: none">+ Highly Scalable+ Easy to Provision Resources	<ul style="list-style-type: none">- Expensive for my use case. (more on that later)
 Online Password Cracking Service	<ul style="list-style-type: none">+ Zero Setup	<ul style="list-style-type: none">- Expensive and does not support my use case.

External Graphics Cards (eGPU)

I've had a lot of success with eGPUs and I value their balance between simplicity, power, flexibility, and portability; connect it to your laptop when you need it! It's even (barely) compatible with the RTX4090 ... after some slight modifications!



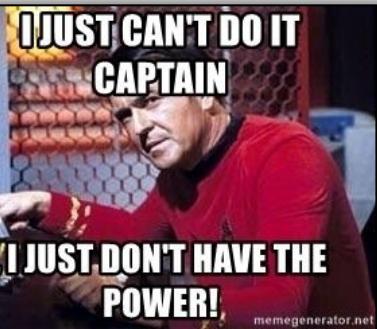
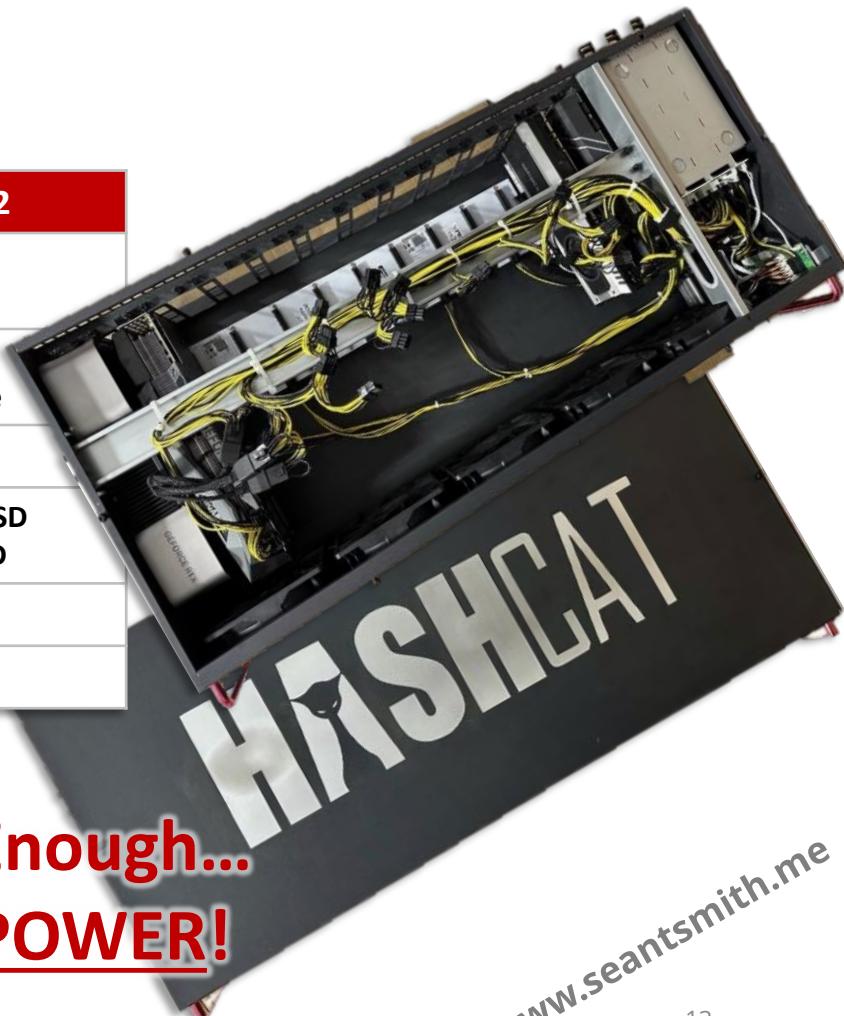
Razer Core X Chroma



Upgraded Mining Rig

MinerDude X12 XTREME = Octominer X12 ULTRA

Specs	Default X12	Upgraded X12
Motherboard	Default w/ PCIe Riser Extension	
Processor	Intel G1840 Celeron 2.8Ghz 2-Core	Intel i7-7700T 2.9Ghz, 4-Core
Memory	8GB DDR3	32GB DDR3
Storage	60GB SATA SSD	250GB MSATA SSD + 4TB SATA SSD
Power Supply	3600W@120v 4200W@240v	
Cooling	5x 140x38mm Fans	



Still Not Good Enough...
NEEDS MORE POWER!

Read this, and don't ignore it like me... <https://hashcat.net/forum/thread-11041.html>

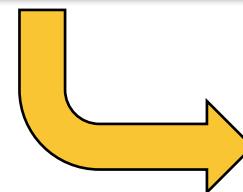
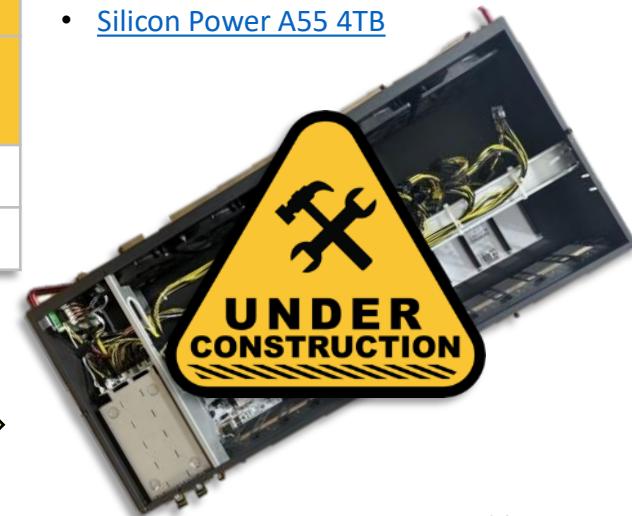
FUTURE UPGRADE: Transformed Mining Rig

Replace X12 Motherboard with Biostar TZ590-BTC DUO

Specs	Default X12	Upgraded X12	X12 → TZ590-BTC
Motherboard	Default w/ PCIe Riser Extension		Biostar TZ590-BTC DUO w/ External PCIe Risers
Processor	Intel G1840 Celeron 2.8Ghz 2-Core	Intel i7-7700T 2.9Ghz, 4-Core	Intel i9-11900T 4.8Ghz, 8-Core, 16-Thread
Memory	8GB DDR3	32GB DDR3	128GB DDR4
Storage	60GB SATA SSD	250GB SATA SSD + 4TB SATA SSD	512GB NVME + 4TB NVME
Power Supply	3600W@120v 4200W@240v		
Cooling	5x 140x38mm Fans		

== Key Parts List ==

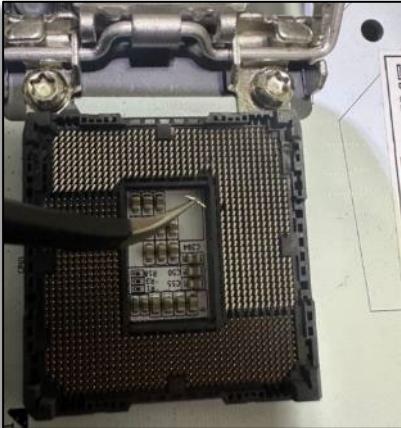
- [Biostar TZ590-BTC DUO](#)
- [12x External PCIe Risers](#)
- [Intel i9-11900T](#)
- [Noctua NH-L9i Processor Fan](#)
- [4x G.SKILL TridentZ DDR4-3600 32GB](#)
- [Samsung 990 Pro 4TB](#)
- [Silicon Power A55 4TB](#)



Embrace the Hard(ware)ship.

Mistakes were made, things go wrong, the home office gets hot. You can learn from every experience, especially bad ones... and wish you just did this in the Cloud.

www.seantsmith.me



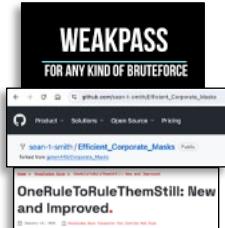
Dropped Power Supply on Exposed Socket: **Busted Pin**

Purchased shady used GPUs on eBay/Facebook: **Dirty, Abused & Glitchy**

Cracking in the Home Office 24/7: **Sweaty Zoom Meetings**

The Experiment

Setting the stage to conduct the research.

Goal	To improve upon previous methods to crack unknown ‘hard’ passwords.				
Hypothesis	If a Large Language Model (LLM) is trained on an existing set of breached plain text passwords, it will then generate a wordlist of novel but highly probable passwords capable of cracking the difficult and uncracked 9-16 character passwords.				
High-Level Approach	<ol style="list-style-type: none"> 1. Identify a test hash dataset. 2. Select and gather tools. 3. Use traditional approach for cracking ‘easy’ passwords. 4. Leverage LLM to crack ‘hard’ passwords. 5. Analyze results and present findings. 				
	<ul style="list-style-type: none"> • Have I Been Pwned Downloader <div style="background-color: #0078D4; color: white; padding: 10px; border-radius: 10px; text-align: center;">';-have i been pwned?</div>	<ul style="list-style-type: none"> • Hashcat • Cracking Rigs 	<ul style="list-style-type: none"> • Brute-Force • Wordlists • Masks • Rules 	<ul style="list-style-type: none"> • LLM Dictionary 	<ul style="list-style-type: none"> • Python • MS Excel • PowerPoint 

Identify a test hash dataset.

HavelBeenPwned.com provides the ideal test dataset because it is clean, contains real passwords as NTLM hashes, and is extremely quick and reliable to download.

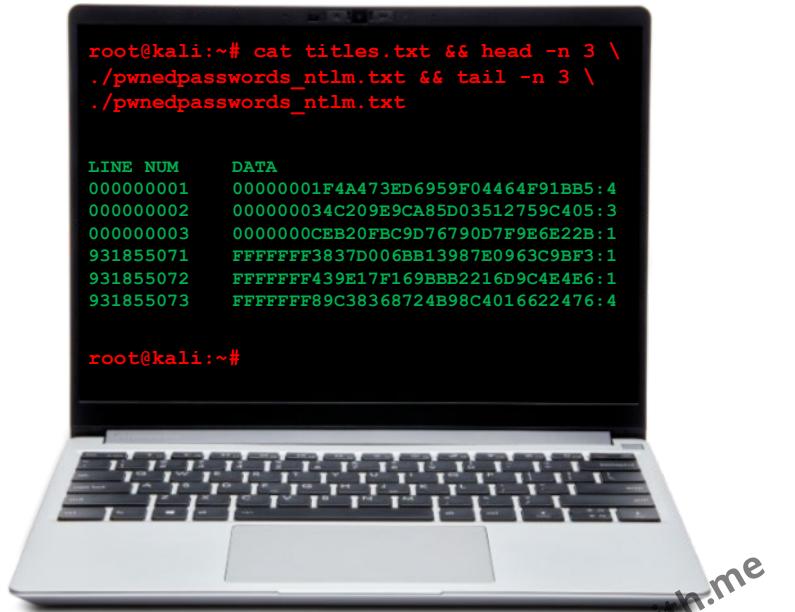
	Description
Name	Have I Been Pwned (HIBP)
Source	HIBP dataset rolling dataset of breached password hashes. This dataset is the most comprehensive list of public / non-public data breaches from various sources including the FBI. Included along with the hashes are the associated occurrences across breaches which can be used to create interesting outputs.
Data Location	https://haveibeenpwned.com/Passwords
Date D/L	1/21/2024
File Size	31.3GB (uncompressed)
Total Hashes	931,855,073
Hash Type	NTLM
Format	<NTLM_HASH>:<#_OCCURRANCE>

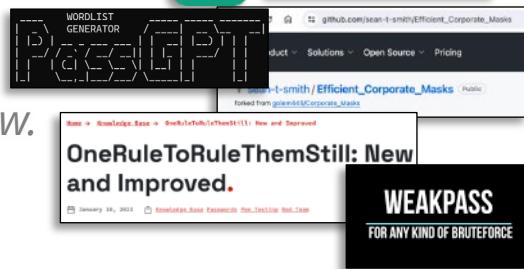
HIBP Sample Data

```
root@kali:~# cat titles.txt && head -n 3 \
./pwnedpasswords_ntlm.txt && tail -n 3 \
./pwnedpasswords_ntlm.txt

LINE NUM      DATA
000000001    00000001F4A473ED6959F04464E91BB5:4
000000002    000000034C209E9CA85D03512759C405:3
000000003    0000000CEB20FBC9D76790D7F9E6E22B:1
931855071    FFFFFFF3837D006BB13987E0963C9BF3:1
931855072    FFFFFFF439E17F169BBB2216D9C4E4E6:1
931855073    FFFFFFF89C38368724B98C4016622476:4

root@kali:~#
```





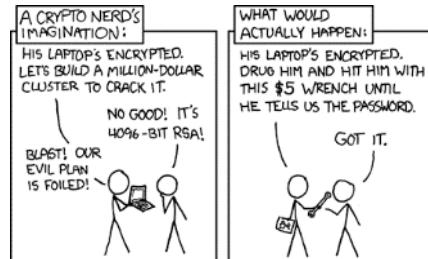
Select and gather [software] tools.

The tools & resources which underpin the research are listed below.

Tool / Resources	Link	Description
Hashcat	<ul style="list-style-type: none"> https://hashcat.net/hashcat https://hashcat.net/wiki https://hashcat.net/wiki/doku.php?id=frequently_asked_questions 	The best resource for Hashcat related information is the Hashcat Wiki and FAQ. I recommend reading the both from beginning to end. Hashcat also has verbose errors, if you see an error don't ignore it, resolve it!
Rules	<ul style="list-style-type: none"> https://in.security/2023/01/10/oneruletorulethemstill-new-and-improved https://github.com/stealthsploit/OneRuleToRuleThemStill 	An improved version of the very popular “OneRuleToRuleThemAll” with improved performance and without any reduction in efficiency.
Masks	https://github.com/sean-t-smith/Efficient_Corporate_Masks/raw/master/hcmask_Generator_9000.xlsx	A personal project which contains a sortable filterable list of prioritized Hashcat masks. Use this to generate .hcmask files to perform targeted mask attacks.
Wordlists	<ul style="list-style-type: none"> https://weakpass.com https://weakpass.com/all-in-one 	This site is the best repository for high-quality wordlists. The wordlists used in my research are: Top304, brockyou, hk_hlm_founds, hashkiller-dict, HashesOrg, weakpass_3, All-in-One
LLM Model	<ul style="list-style-type: none"> https://arxiv.org/abs/2306.01545 https://huggingface.co/javirandor/passgpt-10characters https://huggingface.co/javirandor/passgpt-16characters 	PassGPT is a causal language model trained on password leaks. It was first introduced in this paper (https://arxiv.org/abs/2306.01545). This version of the model was trained on passwords from the RockYou leak, after filtering those that were at most 16 characters long.
ChatGPT	<ul style="list-style-type: none"> https://chat.openai.com 	Manipulating large datasets requires specialized knowledge of specific tools: PowerShell, Python, sed/awk... but as you know ChatGPT can help with pretty much anything.

Select and gather [hardware] tools.

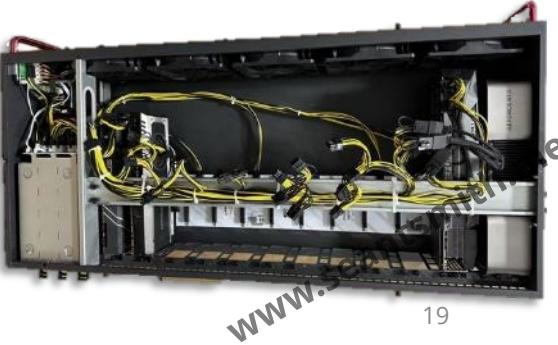
The tools & resources which underpin the research are listed below.



Framework 13 (AMD)	
Laptop	Description
Model	Framework Laptop 13
Processor	Ryzen 7840U, 8-Core
RAM	64GB DDR5
SSD	4TB NVME
eGPU Case	Razer Core X Chroma
GPU 1	RTX 4090

NUC Hades Canyon	
Laptop	Description
Model	NUC8i7HVK
Processor	Intel i7-8809G 4-Core
RAM	64GB DDR4
SSD	512GB NVME
eGPU Case	Razer Core X
GPU 1	RTX 3080TI

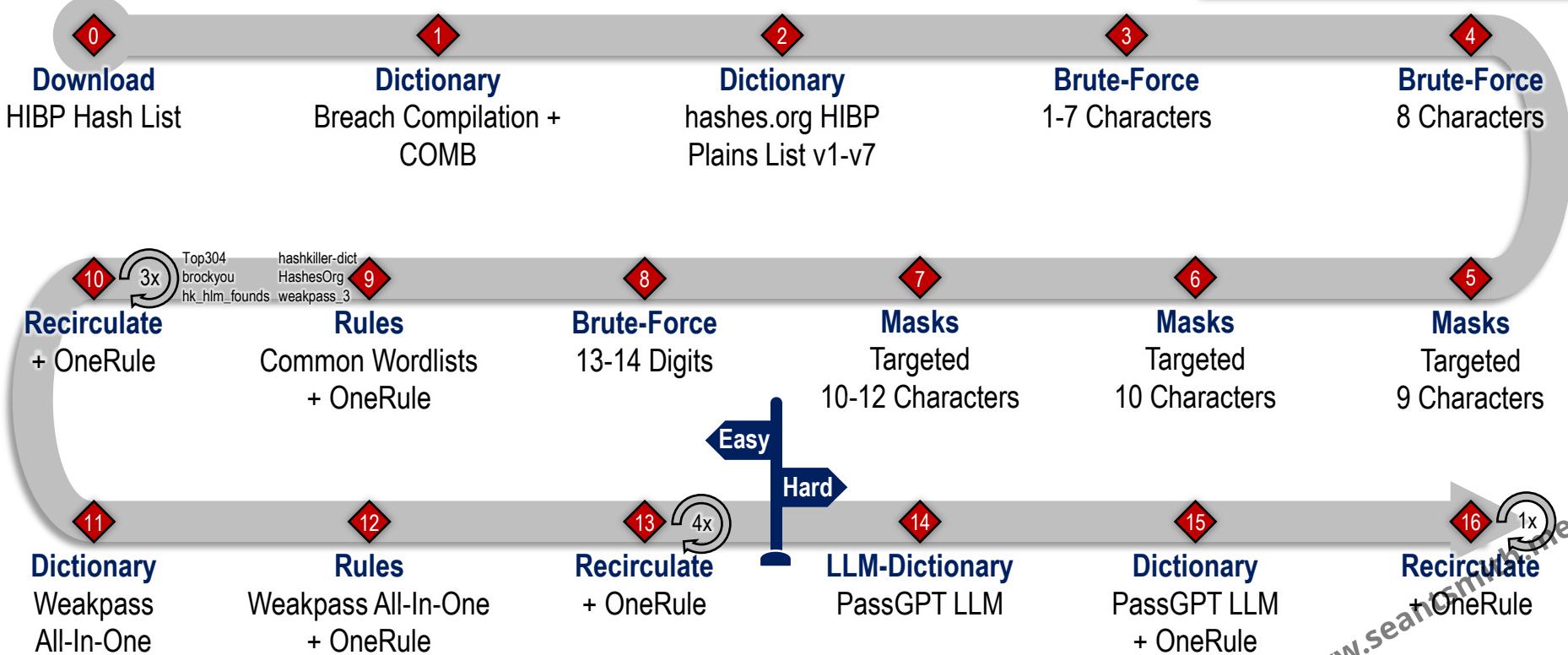
Octominer x12 Ultra	
Laptop	Description
Model	MinerDude X12 XTREME
Processor	Intel i7-7700T, 4-Core
RAM	32GB DDR3
SSD	4TB SATA
GPU 1	RTX 3080
GPU 2,3,4	3x GTX 1080



Password Cracking Walkthrough

Sweating in the office sauna for 52 days!

Sean's Power Bill		
Comparisons Average Daily Use (KWH)	Last Year 18	This Year 30
Rate: Standard Residential ME-REF	952 KWH	x 0.113050
Price to Compute Default Service	10.25	107.63
Customer Charge	2.64	
Distribution System Improvement Charge		56.55
Distribution Charge	952 KWH	x 0.059401
Solar Requirements Charge	952 KWH	x 0.000060
Default Service Support Charge	952 KWH	x 0.004050
TGIA Voluntary Surcharge		3.86
State Tax Surcharge		.223
Current Consumption Bill Charges		0.04
		178.80



Password Cracking Timeline

The rigs were used for 130 total compute days which would have cost this much with AWS!



AWS Cloud EC2 Equivalency

As of 3/20/24

EC2 Type	\$/Day	Days	Total Cost
g5.4xlarge	\$38.98	56	\$2,182.66
g5.4xlarge	\$38.98	37	\$1,442.11
g5.2xlarge	\$29.09	37	\$1,076.26

<https://aws.amazon.com/ec2/instance-types/g5> **\$4,701.02**

<https://aws.amazon.com/ec2/instance-types/g5>

\$4,701.02

A large, semi-transparent red rectangle watermark is positioned diagonally across the page. It contains the URL "www.seantsmith.me" in white, lowercase, sans-serif font. In the bottom right corner of the red box, there is a smaller, dark red square containing the number "1". The top right corner of the red box contains the number "4". The top center of the red box contains the letter "Z".

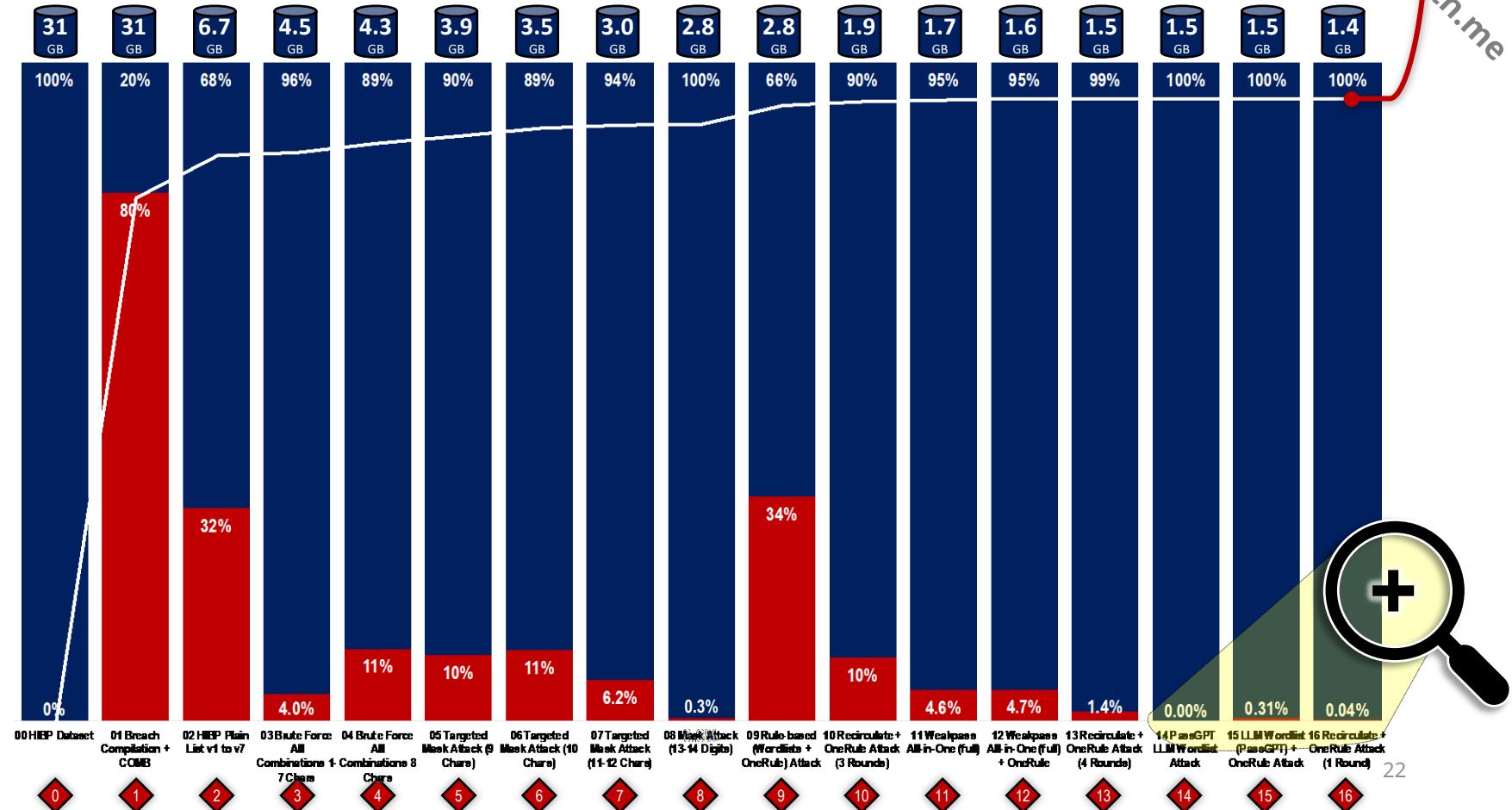
Summarized Results

The methodology cracked over 95% of the Have I Been Pwned hash dataset!

888,921,267 Cracked Hashes

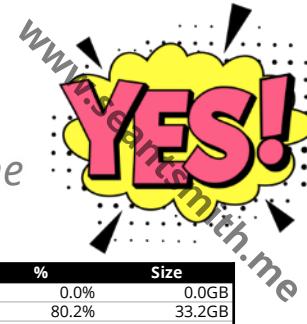
931,855,073 Total Hashes

95.39%



Was the LLM-Dictionary attack successful?

The LLM-Dictionary attack cracked more passwords per total guesses than the Weakpass All-in-One attack, even being last in the attack order!



#	Phase	Attack Keyspace	Uncracked	%	Size	Cracked	%	Size
0	HIBP Dataset		931,855,073	100.0%	31.3GB	-	0.0%	0.0GB
1	Breach Compilation + COMB (102GB)	8,775,988,939	184,698,787	19.8%	6.7GB	747,156,286	80.2%	33.2GB
2	HIBP Plain List v1 to v7 (8GB)	624,156,006	124,991,382	13.4%	4.5GB	59,707,405	6.4%	36.2GB
3	Brute Force All Combinations 1-7 Chars	70,576,641,626,495	120,052,757	12.9%	4.3GB	4,938,625	0.5%	36.4GB
4	Brute Force All Combinations 8 Chars	6,634,204,312,890,620	107,004,666	11.5%	3.9GB	13,048,091	1.4%	37.0GB
5	Targeted Mask Attack (9 chars)	2,663,175,327,420,910	96,407,321	10.3%	3.5GB	10,597,345	1.1%	37.6GB
6	Targeted Mask Attack (10 chars)	3,047,124,553,245,060	86,112,207	9.2%	3.0GB	10,295,114	1.1%	38.3GB
7	Targeted Mask Attack (11-12 chars)	4,039,055,493,990,400	80,776,718	8.7%	2.8GB	5,335,489	0.6%	38.5GB
8	Mask Attack (13-14 digits)	110,000,000,000,000	80,531,094	8.6%	2.8GB	245,624	0.0%	38.5GB
9	Rule-based (Wordlists + OneRule) Attack	161,864,881,597,555	53,178,940	5.7%	1.9GB	27,352,154	2.9%	39.7GB
10	Recirculate + OneRule Attack (3 Rounds)	85,267,558,724,478	48,080,063	5.2%	1.7GB	5,098,877	0.5%	40.0GB
11	Weakpass All-in-One (full)	28,330,556,550	45,877,005	4.9%	1.6GB	2,203,058	0.2%	40.1GB
12	Weakpass All-in-One (full) + OneRule	1,371,595,564,811,700	43,718,518	4.7%	1.5GB	2,158,487	0.2%	40.3GB
13	Recirculate + OneRule Attack (4 Rounds)	238,916,699,352	43,087,510	4.6%	1.5GB	631,008	0.1%	40.3GB
14	PassGPT LLM Wordlist Attack (8.64GB)	810,980,079	43,087,251	4.6%	1.5GB	259	0.0%	40.3GB
15	LLM Wordlist (PassGPT) + OneRule Attack	39,262,789,544,706	42,952,553	4.6%	1.4GB	134,698	0.0%	40.4GB
16	Recirculate + OneRule Attack (1 Round)	6,533,808,198	42,933,806	4.6%	1.4GB	18,747	0.0%	40.4GB

OVERALL RESULTS: 18,222,411,116,041,000 | 42,933,806 4.61% 1.44GB | 888,921,267 95.39% 40.41GB

Weakpass All-in-One	
Steps 11 + 12 + 13	
Dictionary Size	329GB
Cracked	4,992,553
Keyspace	1,371,862,812,067,600
Guess Efficiency (Cracked/Keyspace)	3.64E-09 -7%



PassGPT LLM	
Steps 14 + 15 + 16	
Dictionary Size	8.64GB
Cracked	153,704
Keyspace	39,270,134,332,983
Guess Efficiency (Cracked/Keyspace)	3.91E-09 +8%

A small peak into some cracked hashes.

Here is the proof -- the model successfully cracked never-before-cracked hashes!

Most Popular | Passwords

Top 15

1. 42542807:123456	6. 5070941:111111	11. 4034851:abc123
2. 18313580:123456789	7. 4880569:gwerty123	12. 3897129:123123
3. 10713794:qwerty	8. 4486025:1q2w3e	13. 3663338:NULL
4. 10382543:password	9. 4351342:1234567	14. 3561705:DEFAULT
5. 6901438:123456789	10. 4130502:1234567890	15. 3508324:12345

Most Popular | Mask Patterns

Top 10

1. 481526598:?1?1?1?1?1?1?1?1	6. 205251980:?1?1?1?1?1?1?d?d
2. 321100471:?1?1?1?1?1?1	7. 144530489:?1?1?1?1?1?1?1?1
3. 319361204:?d?d?d?d?d?d	8. 126303027:?1?1?1?1?1?1?1?d
4. 225430345:?1?1?1?1?1?1?1	9. 123240391:?1?1?1?1?1?1?1?1?1
5. 215320674:?d?d?d?d?d?d?d	10. 122936007:?1?1?1?1?1?1?1?d

1. PassGPT Wordlist

259 Cracked

e95fbbaa8fafac04d0141a42c717fc541:burgosfresa
f5244f78c0757fb2babcc95b4436d8e98:MorbidDiana
e17f17609ab95ef91231b2c4b85bac49:LASVEGAS&ME
577dc1e13f042740d84b47ac7c48180:ABCabc123ert
55ad51225157a4af52205b24487bdb:eulogiamenteo
44e949e8e4d7c6633e38b6c5843b183f:12_sept_1987
11edda3c45bb636df4a5e43e779f37f8:amoremipaolo
357d8f9c5d0f96653b7e7cf3ec0ff26:1968ScoobyDoo
69f938370abfc0090a5162f0fa32dce8:hidalgoferrer
0e62a5b96e4831f302912e192d372651:blazeandlottie
45c710982905da7305fae54dicb86582:camiloesunobo
b3db9b4c4ef945e047f345c321746dc09:milagrostedio
7f58bfeb7bed4ec6bd8b0c3b936a7653:figueroaventura
76153fc02710dbb8508e2dd5f580478e:iliketosucktoes
45fb0807997:acf2b4fafd10f19ddaa3:medanotrequiero
c5f6ae53328705d7elab1f2ee72cdeb:queenofdangerous
1e88268ad6af32bbb979a31338e626f:zacefronxsiempre
a5claca5783404f8ddfd14e3eaad0b23:12369874!@#\$%^&

2. PassGPT Wordlist + OneRule

134,698 Cracked

82e3aeb7bc2565e9e0317cbc465563c8:muliba23re
058fbc9de5c6ab6439934545c6e35b:sunnySK11
9c1c51026d3608e475bb0fb38a47b2f7:killerLSA23
214fd681c216f84cb7758c0ffbb3b01cf:leandroMSB9
1333553437499be7fd327c0564ec76:facebookLoL15
bc31fle63c9be69ff5fc950809a658:computeritb747
7cdc17db713fbfa645ff95308a5ced6e:alexandre09tuna
515fe044b00ba04fdffdaea5431e6038e:alma*****
d8080ebac59563235090ffeb4292dcb:taylor swift jcw12
9097daf5de29e2adfbbe461130d9c796:yoso yunkkkkkkk
545d46c4c30cc1613fe6ad23e3c346f:imortal kombat s192903
f920d33ba4efcd7a80332c5d34b4be6a0:lamborghini700spyder
4c7eae92597f53c0fdaf6424ea19c8e:123456789saramagnante
5568d1983f5d9aa88f7d915bte074a5:ssaaajaal1223344566**
dde008e3d32f205ce705905cad4e56:paradise loser 1234567890
88a231361ba96e0310b73c257807a1d0:undertaker30/wrestlemania
6fef3cal479df7d4f938195ce83ed73c:policeisawesome1234567890
e44943afe2dbc7361a2b29e63921d56b:i love you 1234567890
500d718e9513dd1b862cd82eb46969df:014578163014578163014578163
3c636198145c5d25bf179d66352ac1:4nn2nn34nn2nn34nn2nn34nn2nn3
f6a36bdb507192dfe0a14efcd9b98:arielminiairielminiairielminiairiel
be490ad4021821bbde2445ec432e5809:001210191100121019110012101911

3. Recirculate + OneRule

18,747 Cracked

19890blab584f482338bc7cd5f4efd38:Ss@123+12
991bd98334f6821fca92538e8949a2ad8:Lisa*emma2
ebf6cdde011b455f1fb13048e5d9ad63:Kimshgood1!
b347a9e099a0b80de4b259a9edcffaaaa:kikisskutyal
b8cd92a9fb7325ab4f5b5ebc669fc10443:Patchiepeach
c6e74525c172fa5c98d4ecdff17af1e62:258258546852sm
cdb0fcdf1877db57bdc653f2edceldf2:12341234VIDA123
2aedc5cc31efec54ab690b99656df93e:1707199521212301
9918ee06af86f6e221191dca5ff6159:IkerTorrescabello
37f453b9f2343425bf24cc22d09d67a:Eveny199419941994
1f8bc7b5572ecb61c901ff2514fe029a:Dragonballgodo102!
3450d5450844c5c20a1469e256fb1b6d:Alejo2007patrick2007
9eb89ed416bf9f22019b9ff2f516bf8:Fatimavaleriadaniel1
5300fb27045762d4a04d74c147e88751:endtsilandendtsiland
18eea04b17e19fb6c631718ba56406a:Argentina2020porsiempre
14d3375fc0083d2e030f0a260641aef7425e8:eletnameopadreteamo719
4dd6d3634c756a6f9d0c29c0eb1dc8c:Policeisawesome1234567890
dee2d7ef83d802be253f66e8bee8c17:VALENTINA123456789LISETTEEE
b10d1a02987113cc6cd9729642afee09:yamahafr940228yamahafr940228
bda5ffd3bab2fd1a84551bd79f032f:poopyhead15414poopyhead15414

Now let's take the model for a spin...

System Prep & Dependencies

First things first, let's get our system ready to run the LLM model.

1. Use Windows 10 or 11 for Best Experience

GPU drivers cause trouble in Linux

2. Install the Latest Version of Python

<https://www.python.org/downloads>

3. Install Python Package Manager (pip)

<https://www.youtube.com/watch?v=fjKdlf11Gcl>

4a. For CPU & CUDA GPU Support

Reboot Computer in Safe Mode

<https://www.youtube.com/watch?v=Rf3u7PAiWpE>

Uninstall Current GPU Driver with DDU

<https://www.youtube.com/watch?v=v7KfnZ2wSog>

Install CUDA Toolkit & PyTorch GPU

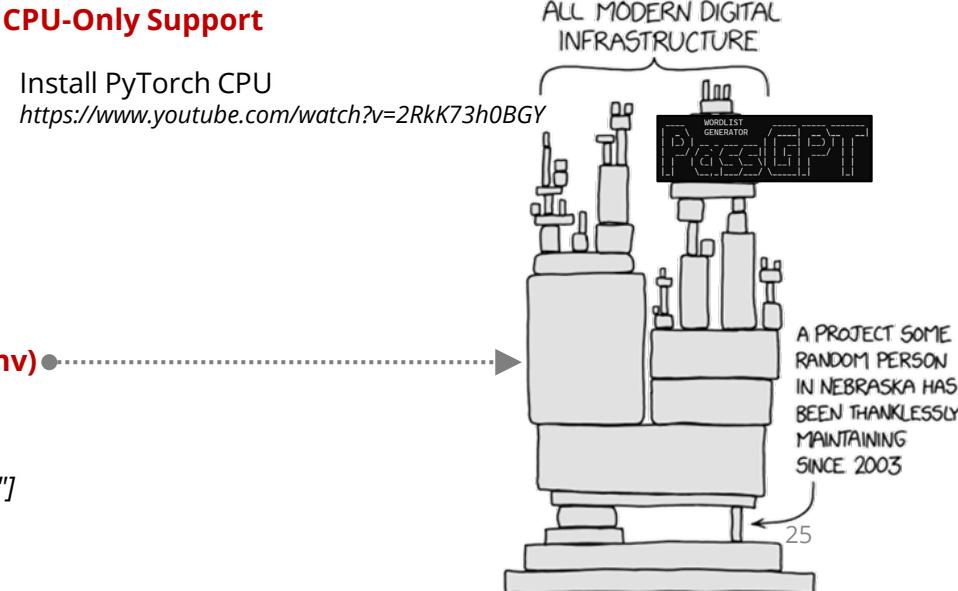
<https://www.youtube.com/watch?v=r7Am-ZGMef8>

5. [Recommended] Create a Virtual Environment (venv)

<https://www.youtube.com/watch?v=APOPm01BVrk>

6. Install Dependencies (ideally via venv)

`python.exe -m pip install transformers huggingface_hub["cli"]`





<https://youtu.be/NUQsfHW1Nek>

☠ Demo Time ☠

When things go terribly wrong...



Final Thoughts & Surprises

Thanks for coming, I will make this presentation, some data, and tools public on my GitHub page, happy hacking!

- ✓ **AWS is Expensive** - Why rent when you can own?
- ✓ **PII in Passwords** - Email addresses, full names, birthdays.
- ✓ **External Thunderbolt NVME** - Makes transporting large files easy.
- ✓ **Leave No Hash Behind** - Data integrity after processing is tricky.
- ✓ **Read Hashcat's Documentation** - There are a lot of awesome tools.
- ✓ **ChatGPT** - Makes writing scripts extremely accessible for all.
- ✓ **Huge Thank You to PassGPT Team** - They provided access to their non-public 16-character model for educational use.

[PassGPT Password Modeling and \(Guided\) Generation with Large Language Models](#): Javier Rando, Fernando Perez-Cruz, Briland Hitaj

Thank you!



Sean T Smith

www.seantsmith.me



linkedin.com/in/seantsmith



twitter.com/sts5017



github.com/sean-t-smith