Cracking your AD P@sSw0rd$ is a GOOD THING!

Presented by Robert Reif

Grassr00tz 2022

Audit your passwords

Who am I?

Soc Analyst
Enthusiast Password Cracker
Avid Homelabber
General Tinker of things

Twitter @winxp5421

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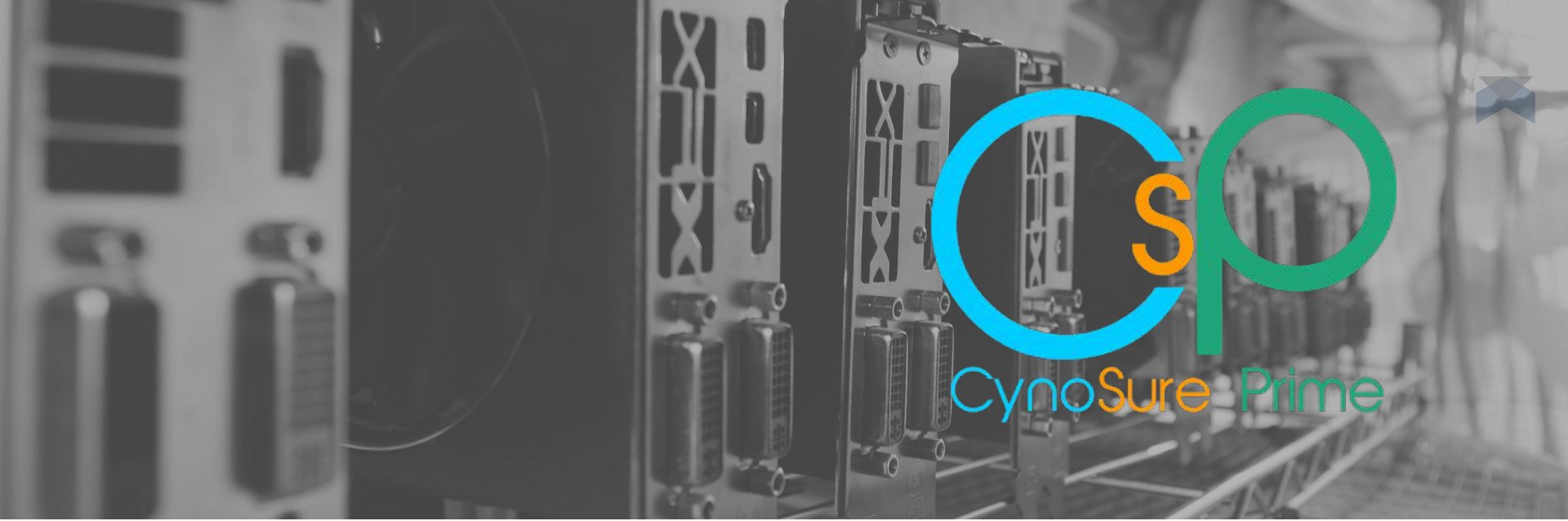
Winxp5421

Audit your passwords



Password Research

We compete in all major hash cracking contests.

Release statistical analysis on data leaks that are made publicly available.

Twitter @cynoprime

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Audit your passwords

Overview

- Real world weekly password audit against a real world company!
  - With Pretty Graphs (Oooo, Ahhhh)
- Effectiveness of AD Policy changes
- Effectiveness of company policy changes
- Does policy change how people create passwords?
- End User Benefits how exactly?
- NIST to meet you…
  - NIST knowing you
- Audit your password environment.
  - No, really you should be doing this!

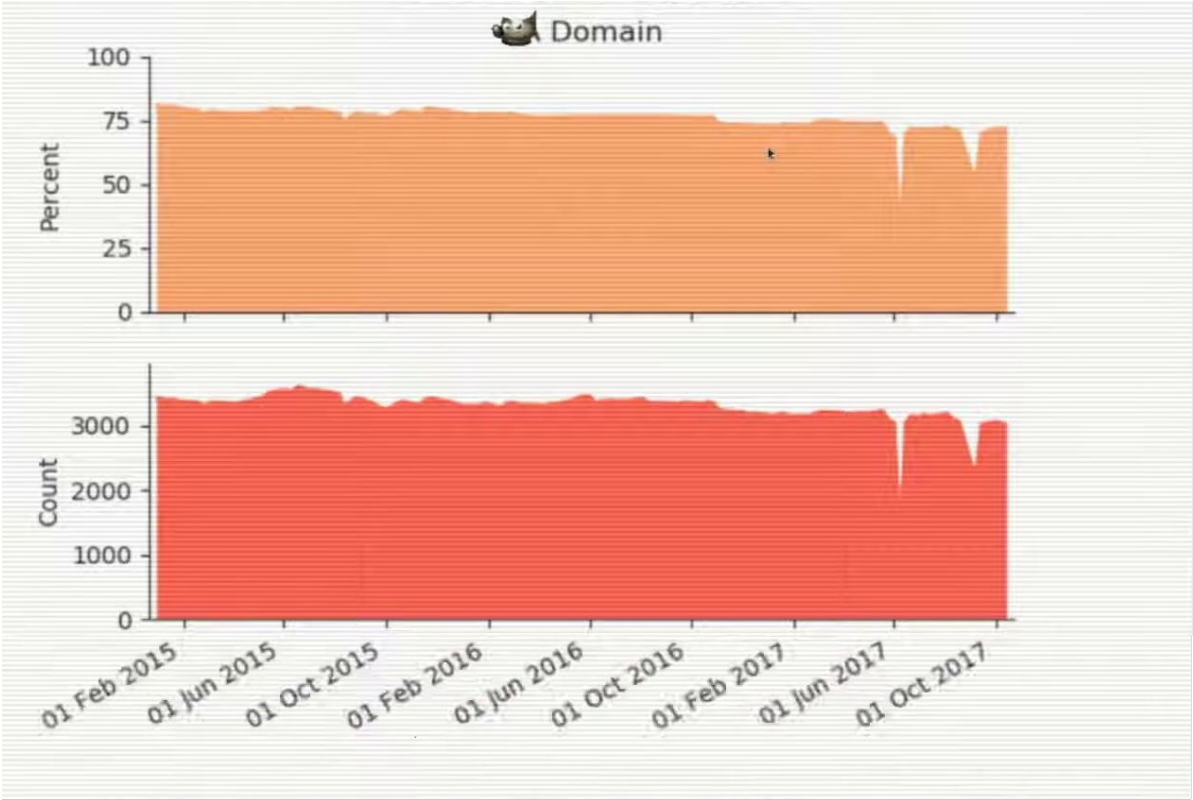
Audit your passwords

Password Audit?

- Dump NTDS.dit, SYSTEM, SECURITY Files from a Domain Controller
  - Yes, all the things! Plan your opsec accordingly
- Extract with DSInternals
  - First, Last, UPN, Privileged, Password hashes, Password history, Last Password Change
- Actually crack your AD User’s passwords!
- Quantify success and failure.
- Adapt and overcome.

Let’s we have a look at what information we can gather from this!

Passwords Recovered Domain Wide



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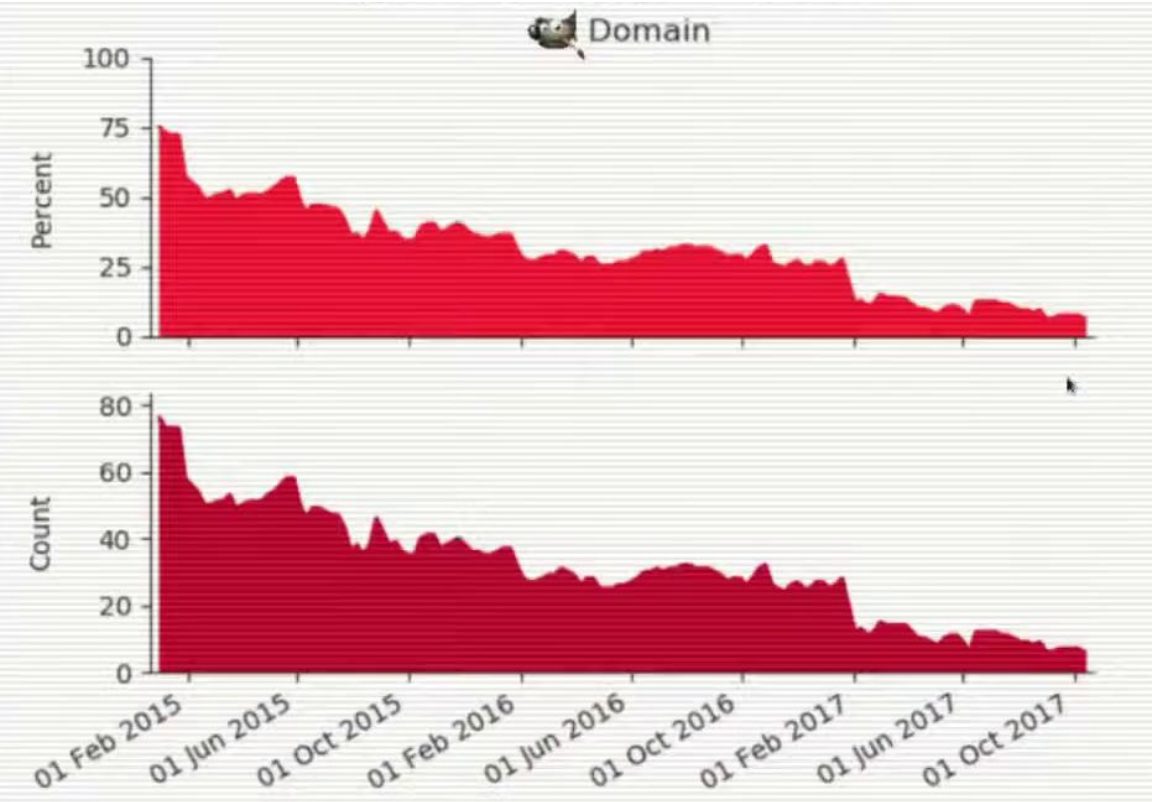
Recovered Admin Accounts



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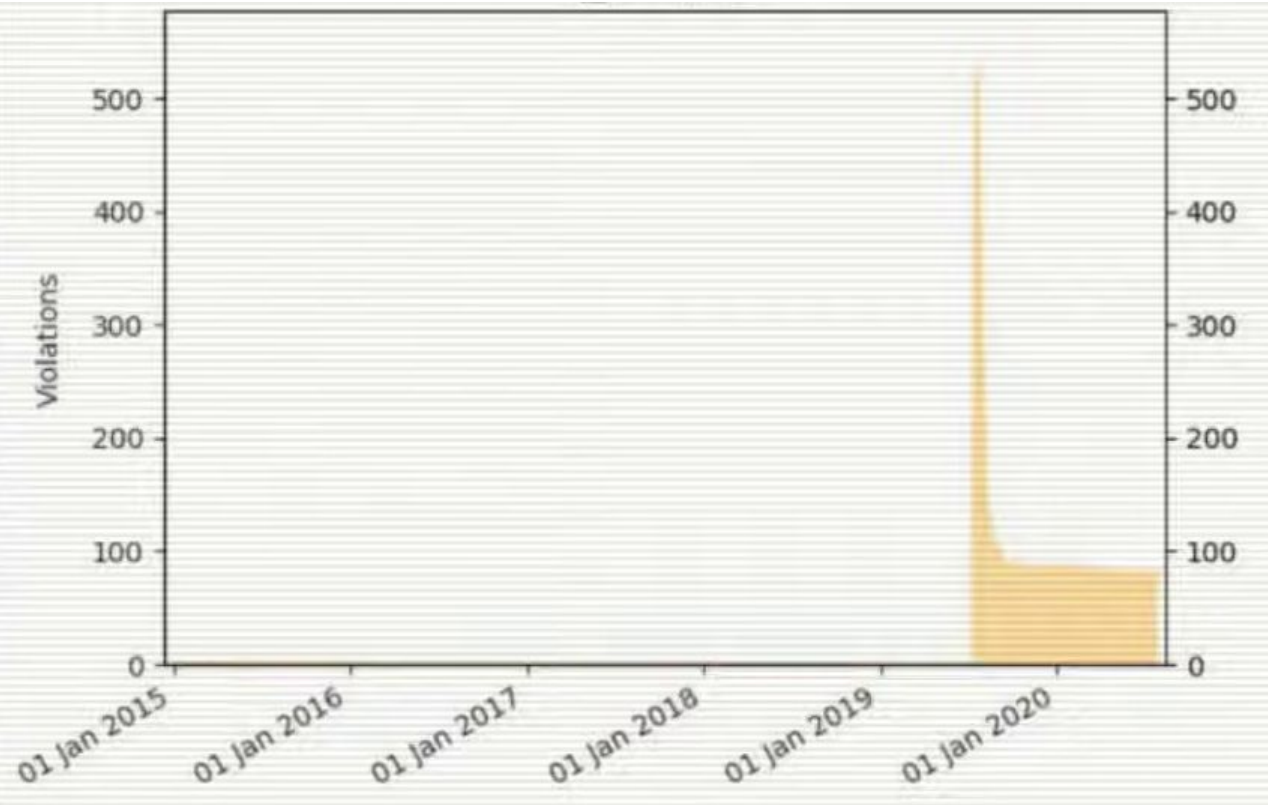
Policy Violations



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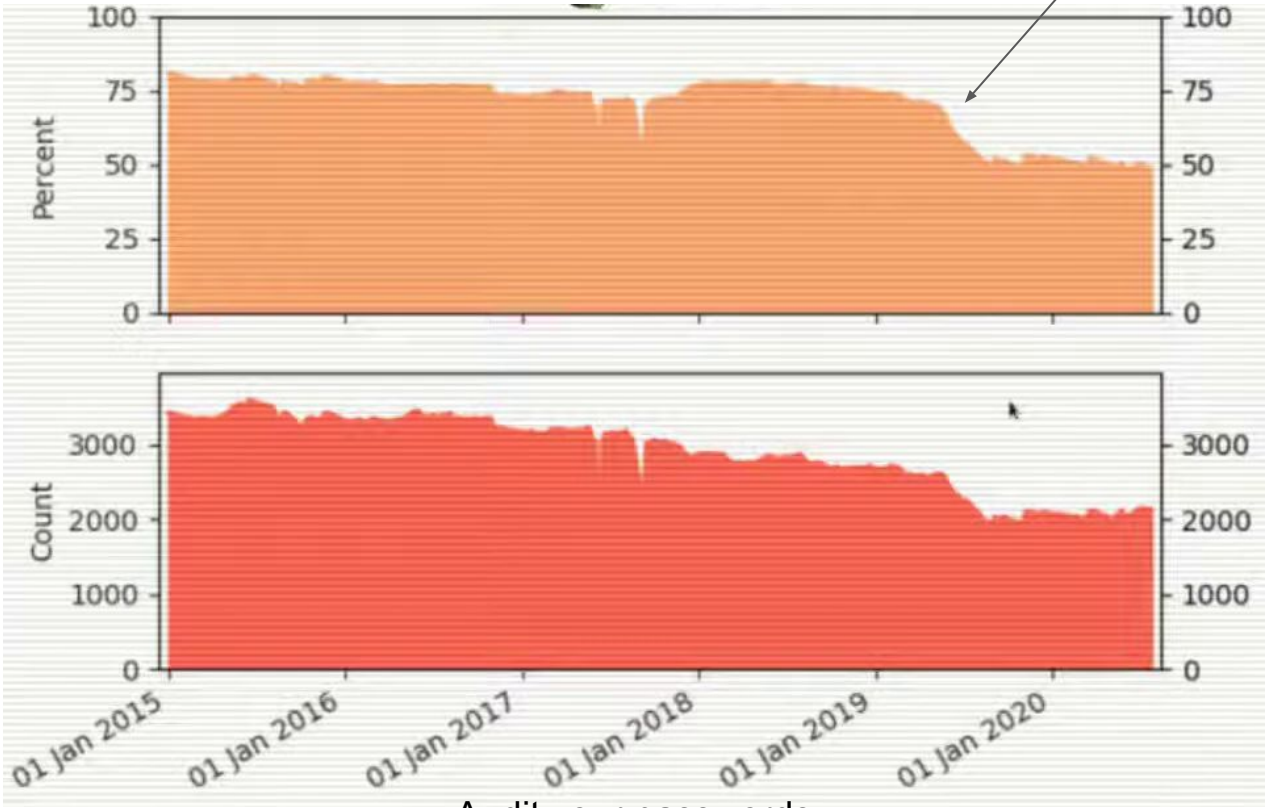
Passwords Recovered Domain Wide



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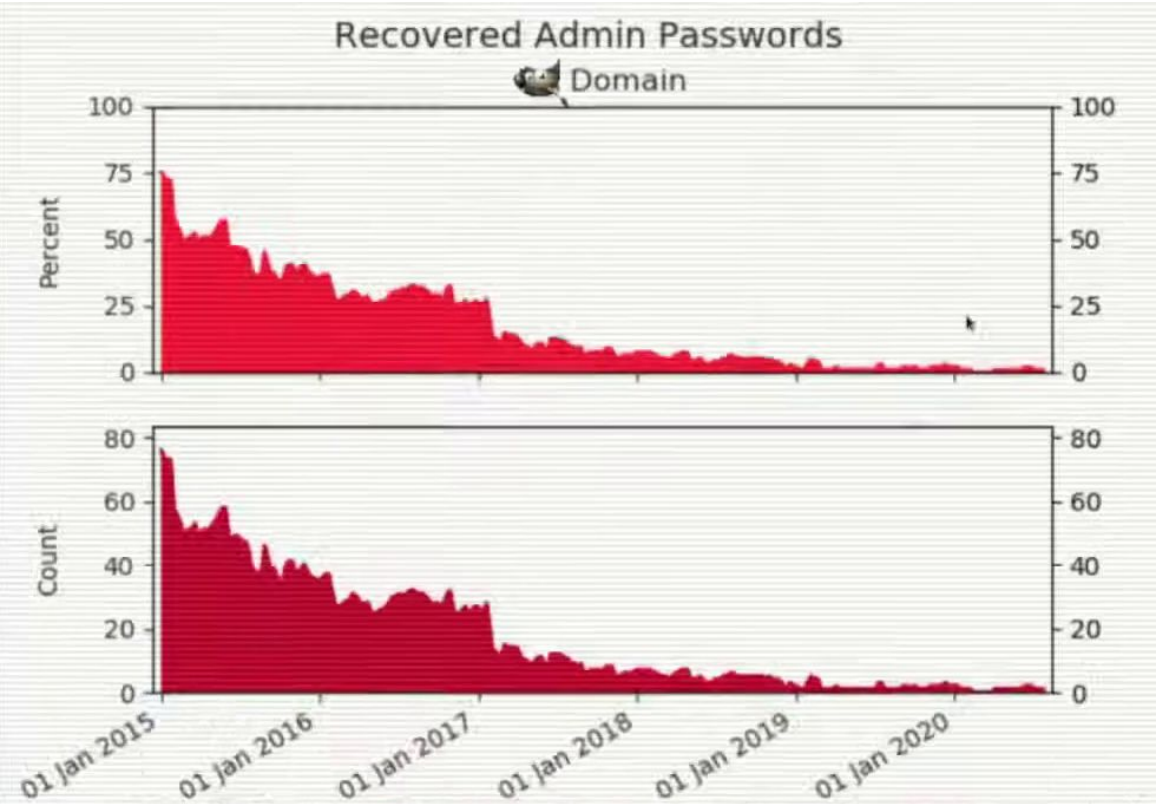
Recovered Admin Passwords



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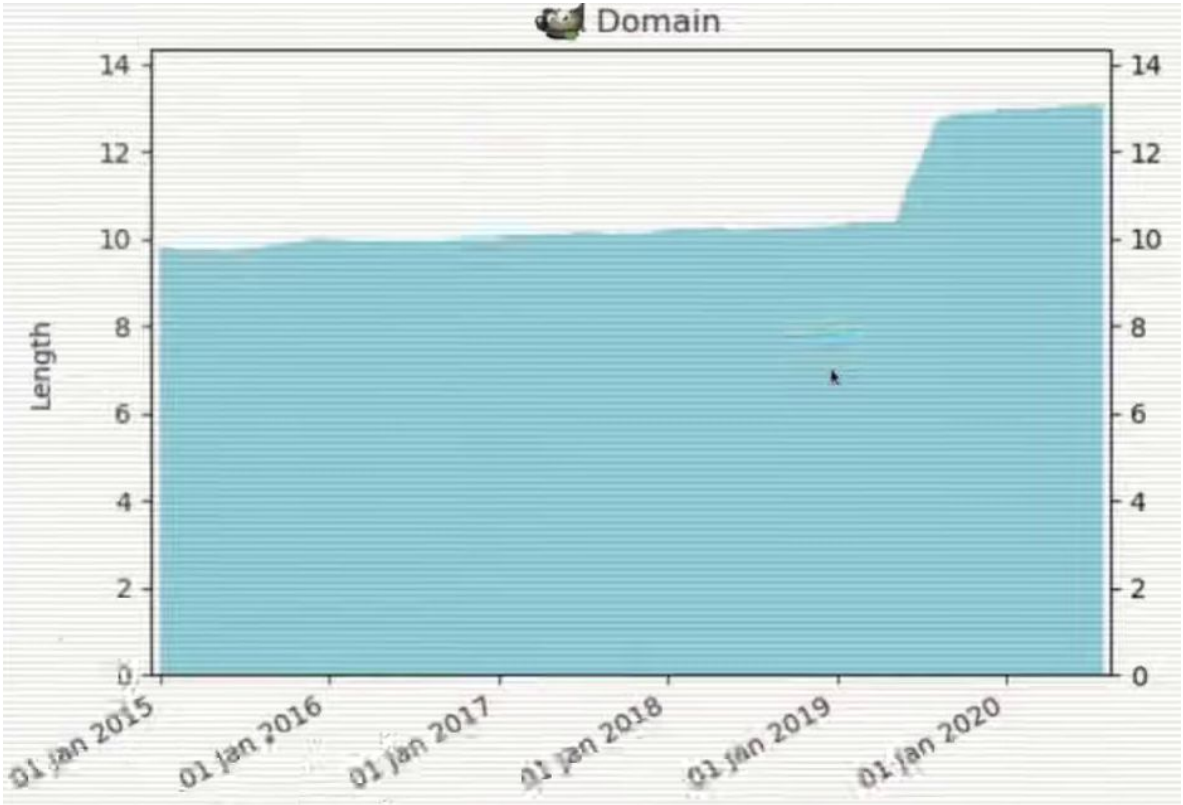
Average Password Length Over Time



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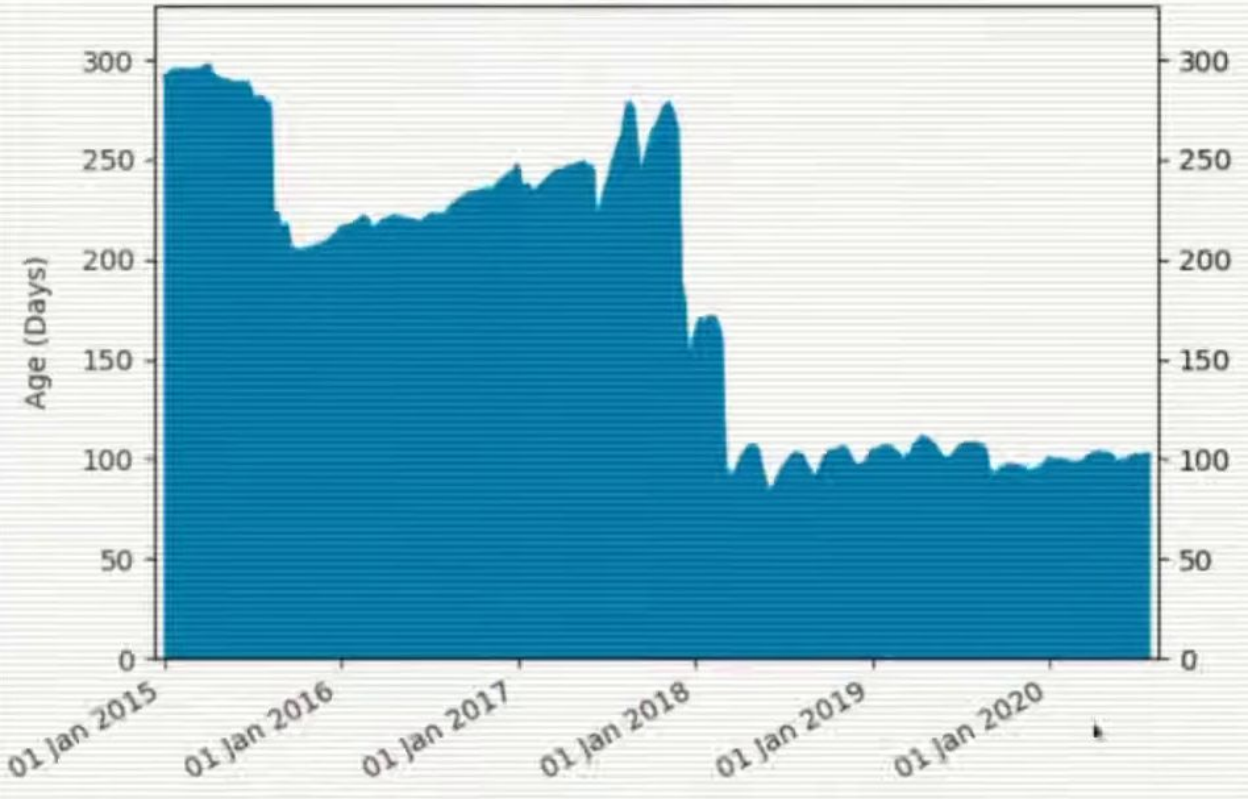
Password Age Over Time



Audit your passwords

Pwd Patterns and Changes

From 2017: Most common topologies:

?u?l?l?l?l?l?d?d	Austin20	1.36% of cracks (CAP Append 2 Digits)
?u?l?l?l?l?l?l?d?d	Arizona20	1.26% of cracks (CAP Append 2 Digits)
?u?l?l?l?l?l?l?l?d?d	Carolina20	1.17% of cracks (CAP Append 2 Digits)
?u?l?l?l?l?l?l?d	Arizona2	1.14% of cracks (CAP Append 1 Digit)
?u?l?l?l?l?l?d?d?s	Austin20!	0.98% of cracks (CAP Append 2 Digits + Spec)

From 2020 After 12+ password policy went into place:

?u?l?l?l?l?l?l?d?d?d?d?s	Arizona2020!	2.10% of cracks (CAP Append 4 Digits + 1 Spec)
?u?l?l?l?l?l?l?l?l?l?d?s	California2!	1.04% of cracks (CAP Append 1 Digit + 1 Spec)
?u?l?l?l?l?l?l?l?d?d?d?d?s	Carolina2020!	1.01% of cracks (CAP Append 4 Digits + 1 Spec)
?u?l?l?l?l?l?l?l?l?d?d?s	Wisconsin20!	0.92% of cracks (CAP Append 2 Digits + 1 Spec)
?u?l?l?l?l?l?l?l?l?l?d?d?d?d?s	California2020!	0.78% of cracks (CAP Append 4 Digits + 1 Spec)
?u?l?l?l?l?l?d?d?d?d?s?s	Austin2020!!	0.74% of cracks (CAP Append 4 Digits + 2 Spec)

Notice: Passwords got longer, Users are choosing longer words

Audit your passwords

Pwd Patterns and Changes

Client Name:	Was 2.64%	Now 2.24%	
Seasons:	Was 2.05%	Now 6.66%	Why more? Season are long words
Months:	Was 1.06%	Now 1.46%	Why more? Months are long
Years:	Was 0.51%	Now 8.65%	Why more? Easy way to increase length

The use of common strings by users is still a massive security risk.
Especially with "password spraying" attacks.

Adapt and Overcome

To prevent "password spraying" attacks:

- Black list common passwords - Password1, Password2020 (duh)
- IDS/NIDS to detect attacks (duh)
- Learn what your users are doing with passwords / common strings (NEW)
  - Audit your passwords
- Train your users not to create basic passwords - using REAL data (NEW)
  - Audit your passwords
- Block Months/Years/Season/Client Name (NEW)
- Eradicate that “one” password… You know the one.

Audit your passwords

NIST - A Rant

- Bill Burr
  - Choose alphanumeric passwords sprinkled with capitals and special characters. (2003)
    - Trivial for a computer to do
  - Force user to change password often
    - Forcing a user to iterate
  - “*It just drives people bananas and they don’t pick good passwords no matter what you do.*” -Bill Burr
    - No, we have forced people to “give up”
  - “Unfortunately, we do not have much data on the passwords users choose under particular rules, and much of what we do know is found empirically by “cracking” passwords…” -NIST 800-63 v1.0.2

Audit your passwords

NIST - A Rant

- NIST - 2020
  - Do NOT force users to rotate passwords.
    - Are we really sure about this?
      - Sure, maybe if they are uncrackable
  - Do NOT force users to have complex passwords
    - Yes, to better support Pass-Phrases and Pass-Sentences
      - Currently an extreme minority
  - Blacklist passwords in known public dumps
    - Maybe meant to say audit your passwords? :)
    - HIBP does not cover all the things!

Audit your passwords

Adapt and Overcome

- Direct targeted and specific end-user password training
  - Group individuals doing the same bad password habits
  - Run a specific training on why <XYZ> is bad
  - Show them their own passwords as examples of what not to do.
- How can we make better passwords that are easier to remember!
- Relaxing requirements!

Audit your passwords

Fin

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Bonus Slides

For the Password Crackers

-m 1000 -a 3 ?a?a?a?a?a?a?a?a?a

4x RTX 2080 TI == 380GH/s Keyspace == 95^9

95^9 / 380 x 10^9 == 1,658,551 Seconds

1,658,551 Seconds / 86,400 (Seconds in one day) == 19.2 Days

Summary: Longer than your engagement scope.

Bonus Slides

For the Password Crackers

- Hashcat Utilizes per character Markov Chains in all bruteforce operations
  - Most probable characters based on the characters around other characters first
  - These tables are on the fly tunable
  - Let’s use this to our advantage

Bonus Slides

For the Password Crackers

-m 1000 -a 3 ?a?a?a?a?a?a?a?a?a

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For the Password Crackers

-m 1000 -a 3 ?a?a?a?a?a?a?a?a

Hashrate	X	Seconds	==	Number of Guesses in 8 hours
380 x 10^9	X	29,280	==	11,126,400,000000000

# of Guesses	^	(	1	/	Length	)	==	char
11,126,400,000,000,000	^	(	1	/	9	)	==	60

Uses only the top most probable 60 char for each char position
Instead of all 95 characters

-m 1000 -a 3 ?a?a?a?a?a?a?a?a?a -t 60

Audit your passwords

Bonus Slides

For the Password Crackers

- Chain Rules ‘hashcat -m <ht> ./hl.txt ./dict.txt -r best64.rule -r best64.rule’
  - More GPU Ram = More better!

- Use CeWL scrape the organizations webpage for industry terms, names, etc.

- Purple Rain
  - ‘shuf dict.txt | pp64.bin --pw-min=8 | hashcat -a 0 -m <ht> ./hl.txt -g 300000’
  - PRobability INfinite Chained Elements
  - Infinite Monkeys + Infinite Keyboards = Profit
  - Randomly Generate 300k rules
    - Bonus Points: --debug-mode=4 --debug-file=success_purplerain.rules

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