PASSWORD SECURITY

AGENDA

* big leaks
* password strength
* weak & strong passwords
* passphrases
* guidelines

BIG LEAKS

BIG LEAKS: ROCKYOU

* RockYou (2009)
  32 mln, plain text

* game changer in password cracking

BIG LEAKS: LEAKEDIN

* LinkedIn (2012)
  8 mln, unsalted SHA1

* SHA1 is very fast,
  50-60% hashes cracked within hours

BIG LEAKS: ADOBE

* Adobe (2013)
  152 mln, encrypted 3DES/ECB

* hints in plain text

* the greatest crossword puzzle in
  the history of the world (XKCD)

';-- HAVE I BEEN PWNED?

* so have I been pwned?
  probably yes ;)

* check haveibeenpwned.com
  made by Troy Hunt

ROCKYOU ANALYSIS

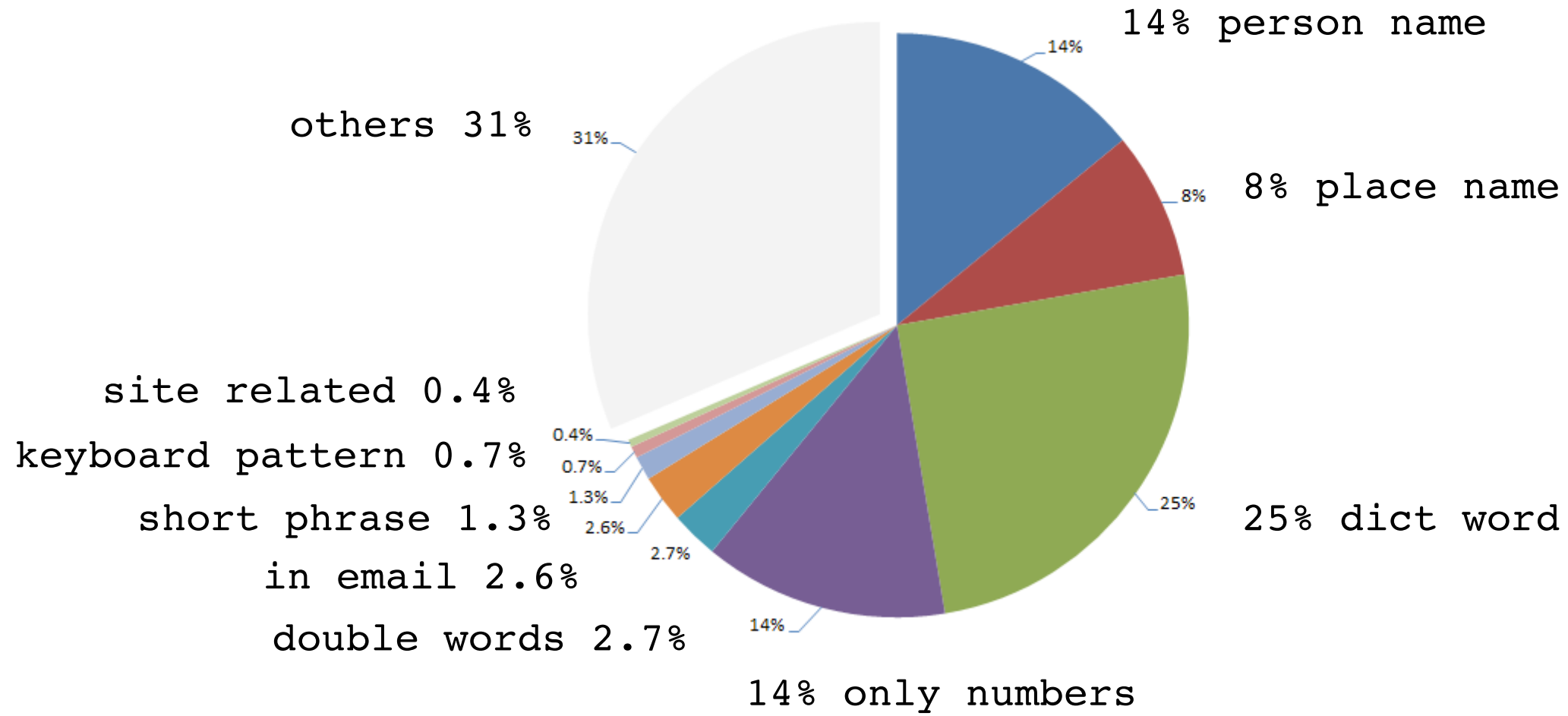
* most passwords are short,
  6-10 characters

* capital letters
  mostly come at the beginning

* numbers and punctuation
  mostly show up at the end

* strong tendency to use
  first names followed by years

LULZSEC RELEASES 2011



TOP 25 PASSWORDS 2013

123456
password
12345678
qwerty
abc123
123456789
111111
1234567
iloveyou
adobe123
123123
Admin
1234567890
letmein
photoshop
1234
monkey
shadow
sunshine
12345
password1
princess
azerty
trustno1
000000

PASSWORD STRENGTH

HOW TO MEASURE

* entropy, measured in bits

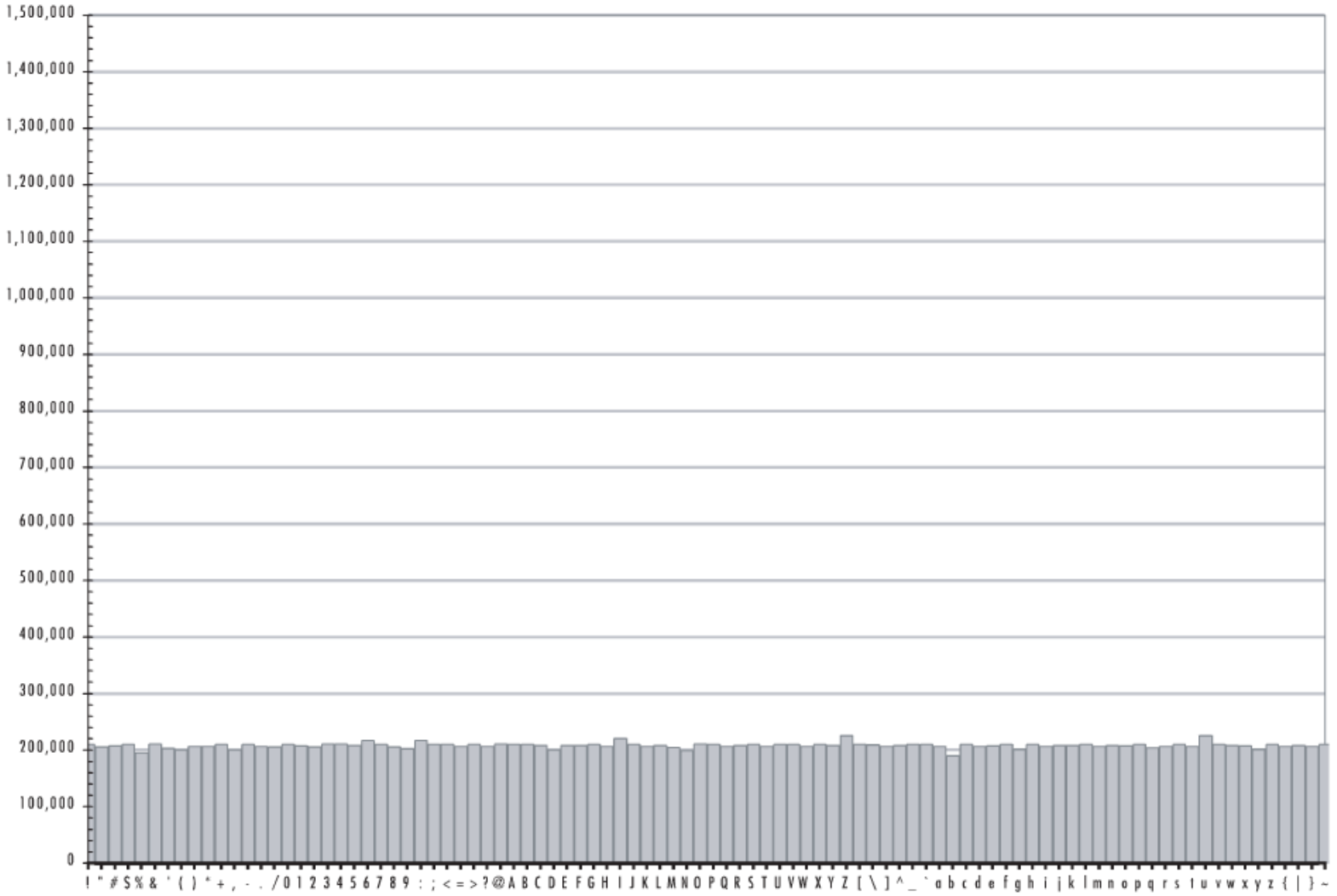
* strength of random passwords can be estimated

* passwords generated by people are difficult to estimate

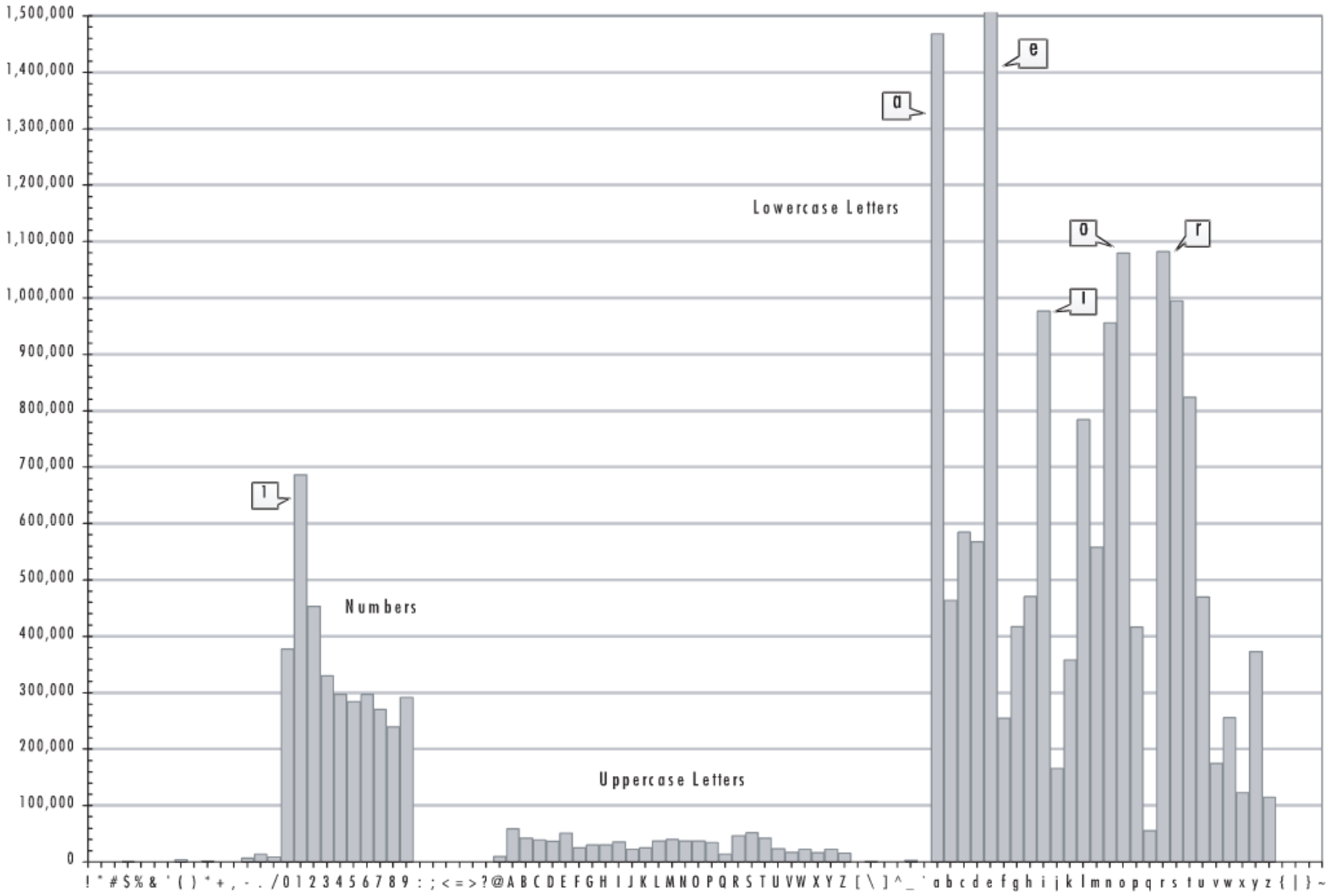
RANDOMNESS

* humans tend to follow patterns
* are unable to achieve sufficient entropy
* rarely make full use of key space

RANDOM DISTRIBUTION



HUMAN RANDOMNESS



DEPENDS ON USER

* key space:
  length and complexity

* can be controlled up to certain
  level by password policy

* reusing passwords is dangerous

DEPENDS ON DEVELOPER

* password storage:
  type of hash function
  key stretching

* other system vulnerabilities

DEPENDS ON ATTACKER

* hardware involved
* identified password limitations
* knowledge and quality of tools
* identified other system vulnerabilities

WEAK PASSWORDS

WEAK PASSWORDS

* single or doubled dictionary words
* words with appended numbers or symbols
* obfuscated words, leet speak
* common keyboard sequences

WEAK PASSWORDS

* any purely numeric passwords

* anything related:
  identifiers, usernames, emails,
  license plate, phone numbers,
  addresses, dates, birthdays,
  names, nicknames, initials,
  content of WHOIS db!

EXAMPLES

kitty	1Kitty	1Ki77y
susan	Susan53	.Susan53.
jellyfish	jelly22fish	J3lly22Fish
smellycat	sm3llycat	$m3llycat.
allblacks	AllBlacks!	A11B1ack$!
jackbauer	jAckBauer	jA(kBauer
doctorhouse	Doct0rH0use	.Doct0rH0use.
adamsandler	adamSandler	#adamS@ndler
ilovemypiano	ILoveMyPiano	ILov3MyPi@no

MORE EXAMPLES

k1araj0hns0n
Sh1a-labe0uf
Apr!l221973
Qbesancon321
DG091101%
@Yourmom69
ilovetofunot
windermere2313
tmdmmj17

BandGeek2014
all of the lights
i hate hackers
allineedislove
ilovemySister31
iloveyousomuch
Philippians4:13
Philippians4:6-7
qeadzcwrsfxv1331

STRONG PASSWORDS

STRONG PASSWORDS

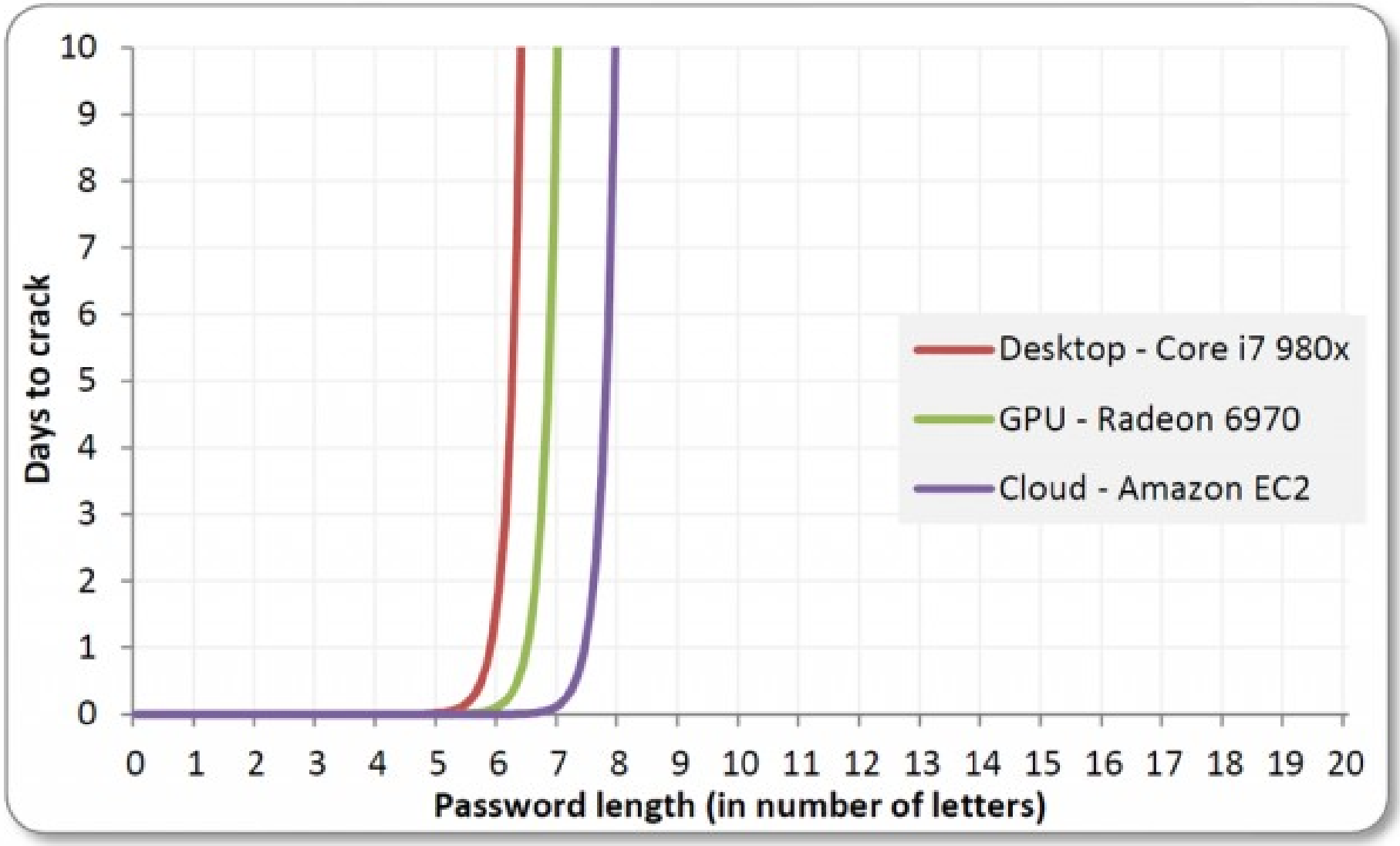
$pwgen -n 15 -sy

```
*?/#C"*:8lq1:jV
.n'rUXJ+jcZ\%D9
7qvmh*O.q$:P$\M
oO8seLzCUbN}h#p
#-5L=UBd6!%vH4G
```

$pwgen -n 15 -s

```
cn9KgidMrOD0zjh
Xc4dXxuZpImQFOp
NvC0xBPt60VRMmk
FgUwSOsJl5Prw8V
VE2zQMO2gQaoiQL
```

EXPOTENTIAL WALL OF BF



PASSPHRASES

PASSPHRASES

* strong and memorable secrets

* short phrases will be cracked

* avoid popular phrases, quotes, lyrics, things from Wikipedia

* introduce some variation: mixed case, digits, specials

* diceware method

EXAMPLES

* correct horse battery staple
* sensible shark rubs own belly
* never_seats_ghost_main_97
* slam,rust,armor,gg,spire

PASSWORD MANAGERS

* people can not remember so many good passwords, too many accounts

* the only way to securely store secrets and password managers

* LastPass, Passpack, KeePassX

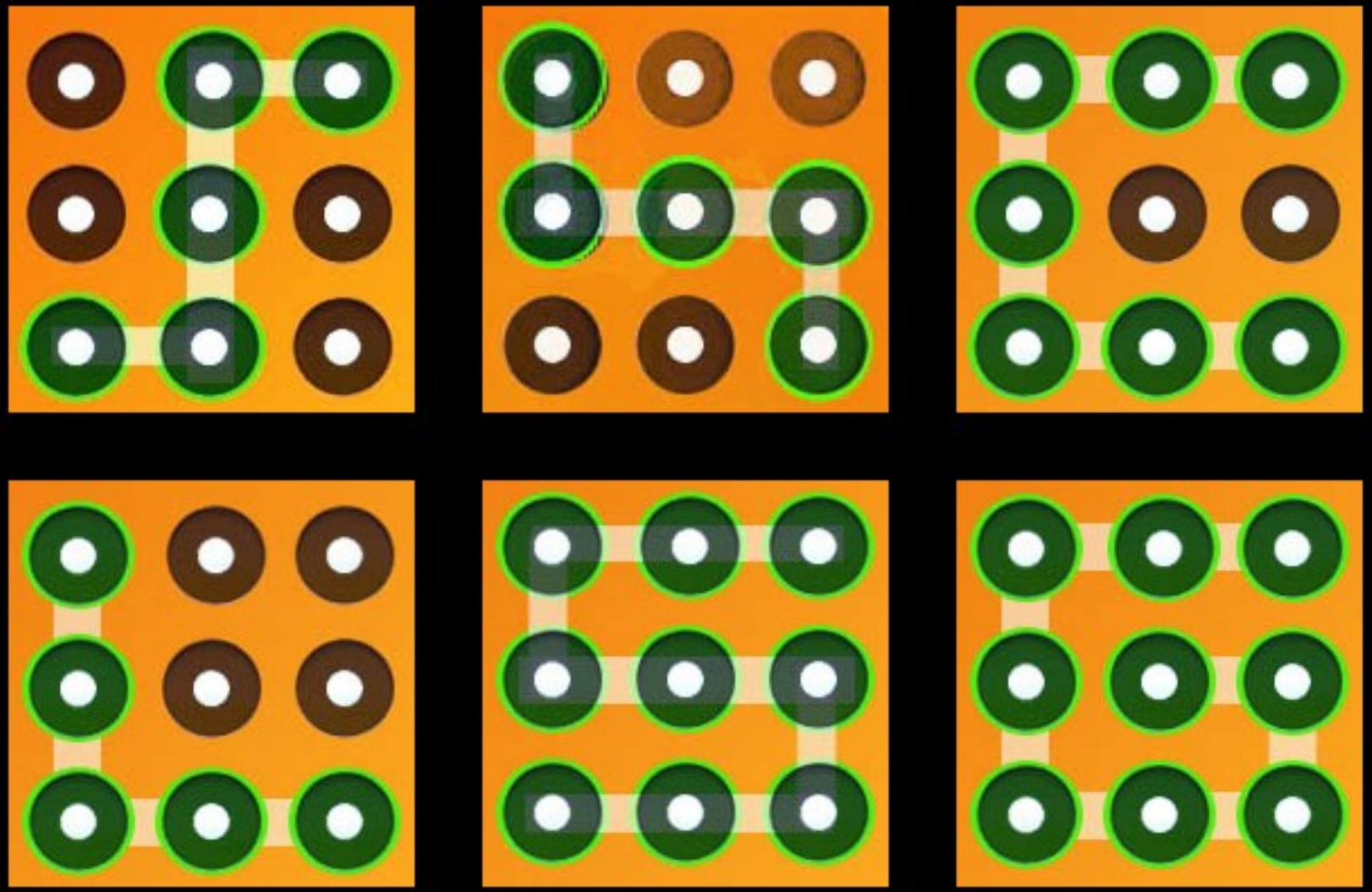
2 FACTOR AUTH

* use second factor is possible

* secure recovery codes

* lock your phone:
  clean screen, hide pattern

COMMON PATTERNS



GUIDELINES

GUIDELINES 4 USERS

* generate random passwords or
  use memorable and long passphrases

* do not reuse

* store in password manager

* backup your passwords
  (offline/offsite)

GUIDELINES 4 USERS

* avoid known patterns
* change default passwords
* change password if compromised
* turn on 2-factor authentication

GUIDELINES 4 DEVS

* use BCRYPT, SCRYPT or PBKDF2 with dynamic salts

* require sufficient password complexity, but do not enforce very strict patterns

* do not relay on secret hash permutations

GUIDELINES 4 QA

* check hashes, passwords can not be stored encrypted or in plain text

* check if hash function is still safe

* check if hashes are salted with dynamic salt

* check if work factor is still sufficient

GUIDELINES 4 QA

* check if required password complexity is sufficient

* check if system allows obvious passwords: empty, same as login, name or email

* check if API is rate limitted

REFERENCES: WEB

* sekurak.pl
* arstechica.com
* troyhunt.com
* haveibeenpwned.com
* splashdata.blogspot.com
* mytrickytricks.blogspot.com
* entima.net/diceware/

REFERENCES: BOOKS

* Take Control of Your Passwords

* Perfect Password