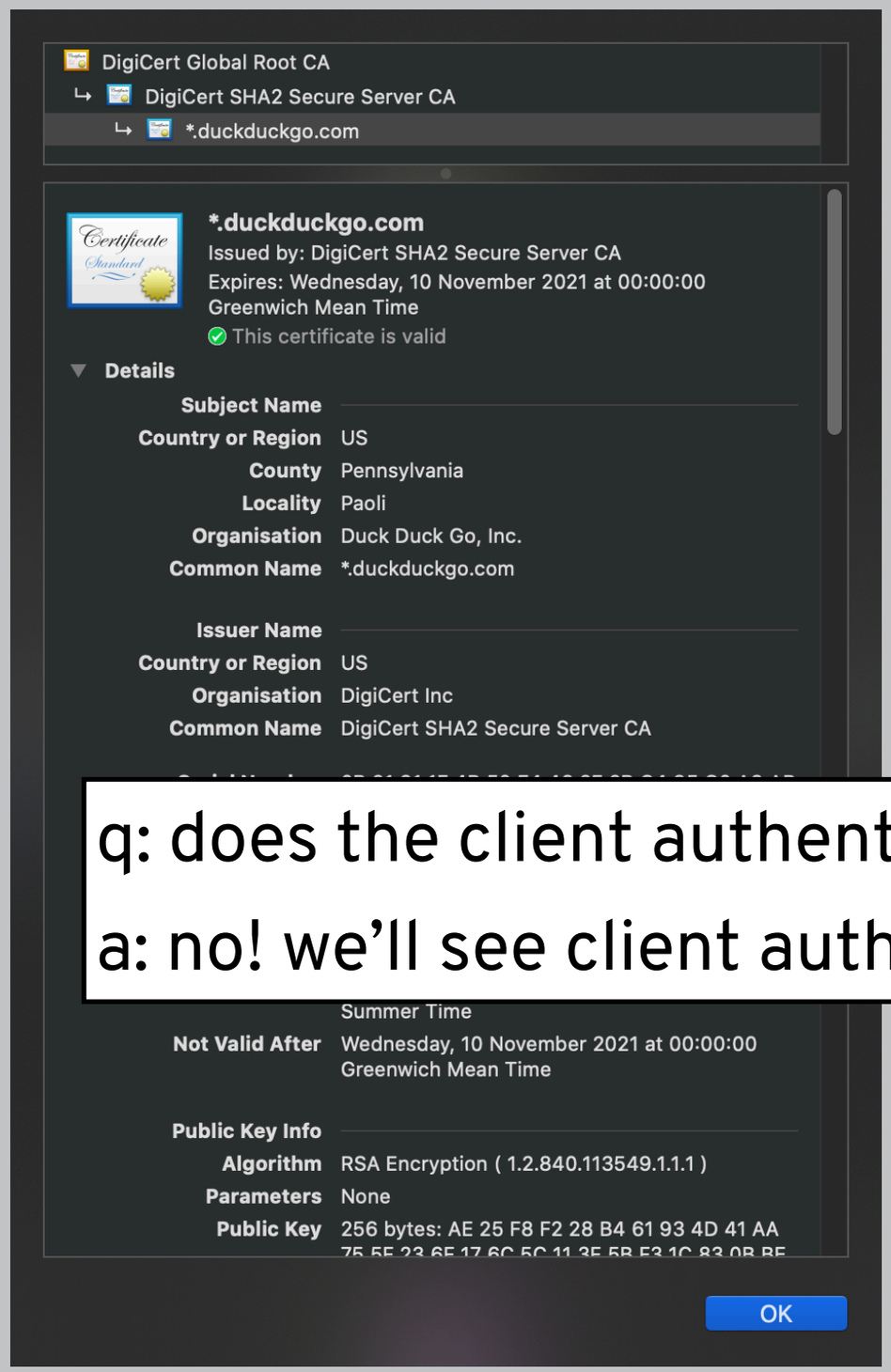
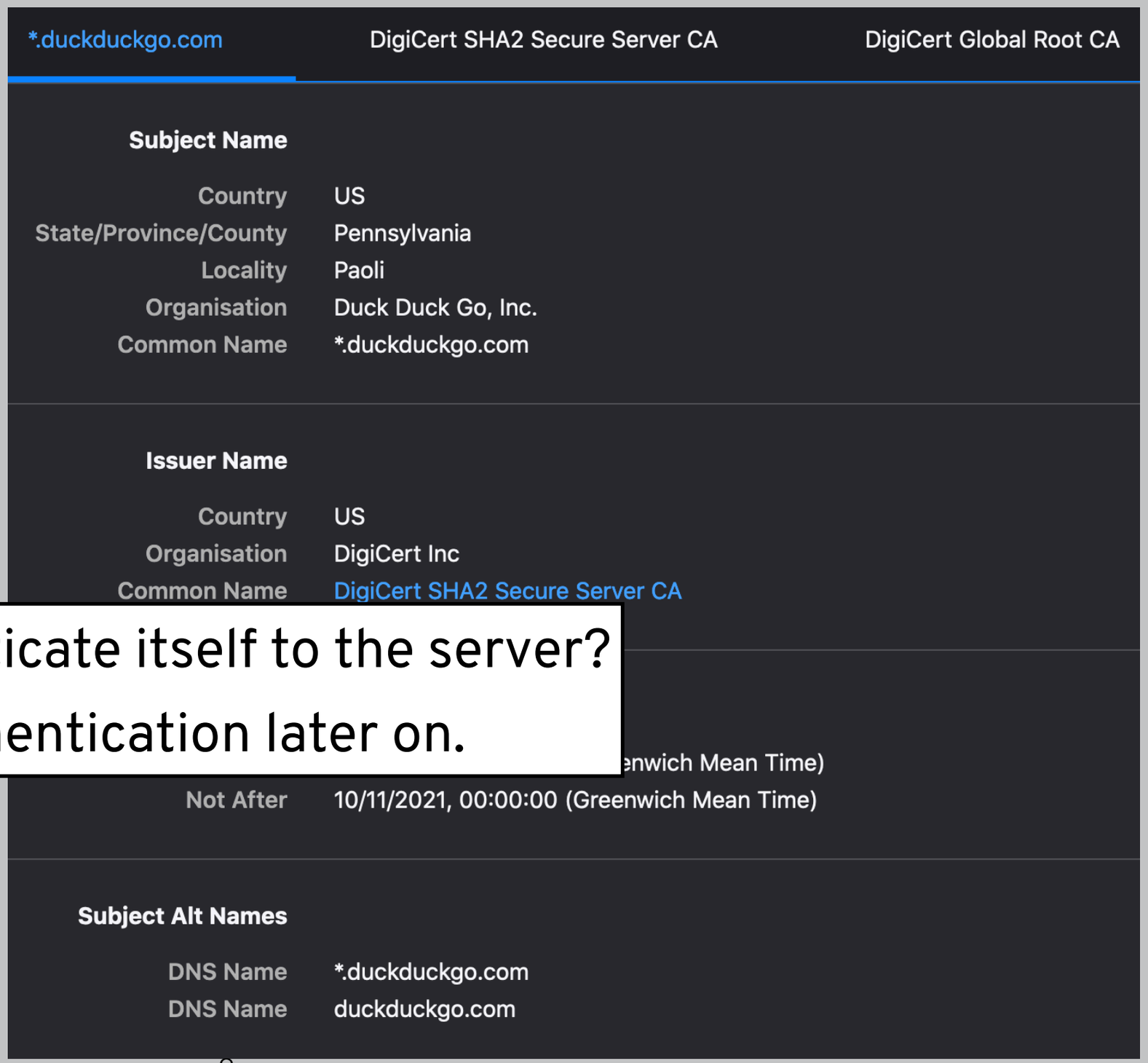
SECURITY (COMP0141): AUTHENTICATION

DIGITAL CERTIFICATES





q: does the client authenticate itself to the server?

a: no! we'll see client authentication later on.

AUTHENTICATION

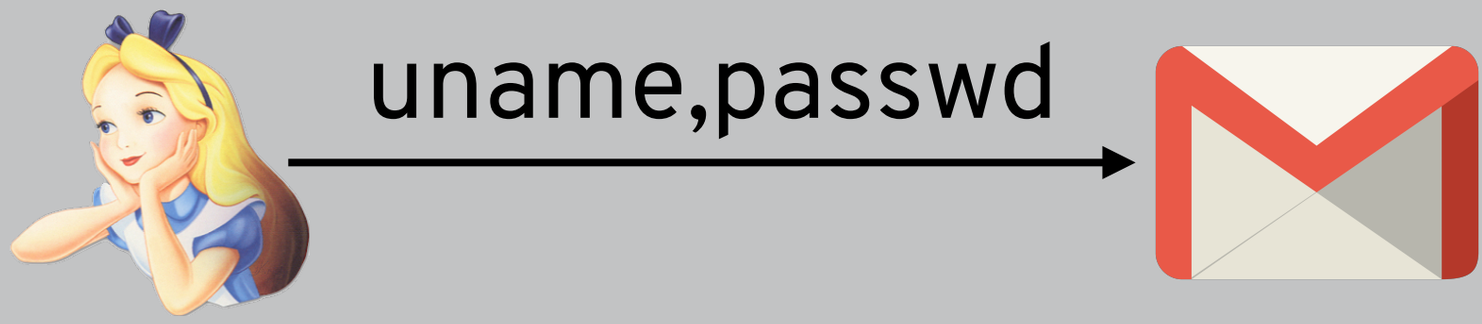
Authentication is:

What you know

What you have

What you are

PASSWORDS



simple? how do you make them:

easy to memorise?

easy to enter?

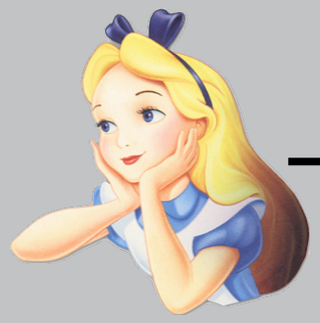
hard to leak/steal?

hard to guess?

resettable?

retrievable?

STORING PASSWORDS



uname,passwd

uname,passwd here?

(RockYou breach leaked 32M passwords)

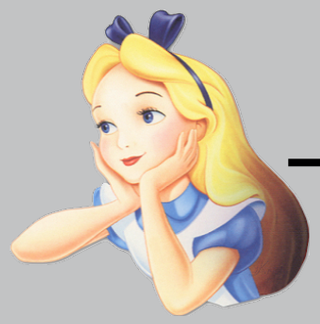
problem: password is revealed

solution: use a hash function

u1	p1
u2	p2
…	…
un	pn

`passwords.csv`

STORING PASSWORDS



uname,passwd

uname,**H(passwd)** here?

problem: common passwords

(H(p1) = H(p2) for p1 = p2)

u1	H(p1)
u2	H(p2)
…	…
un	H(pn)

`passwords.csv`

COMMON PASSWORDS

general purpose

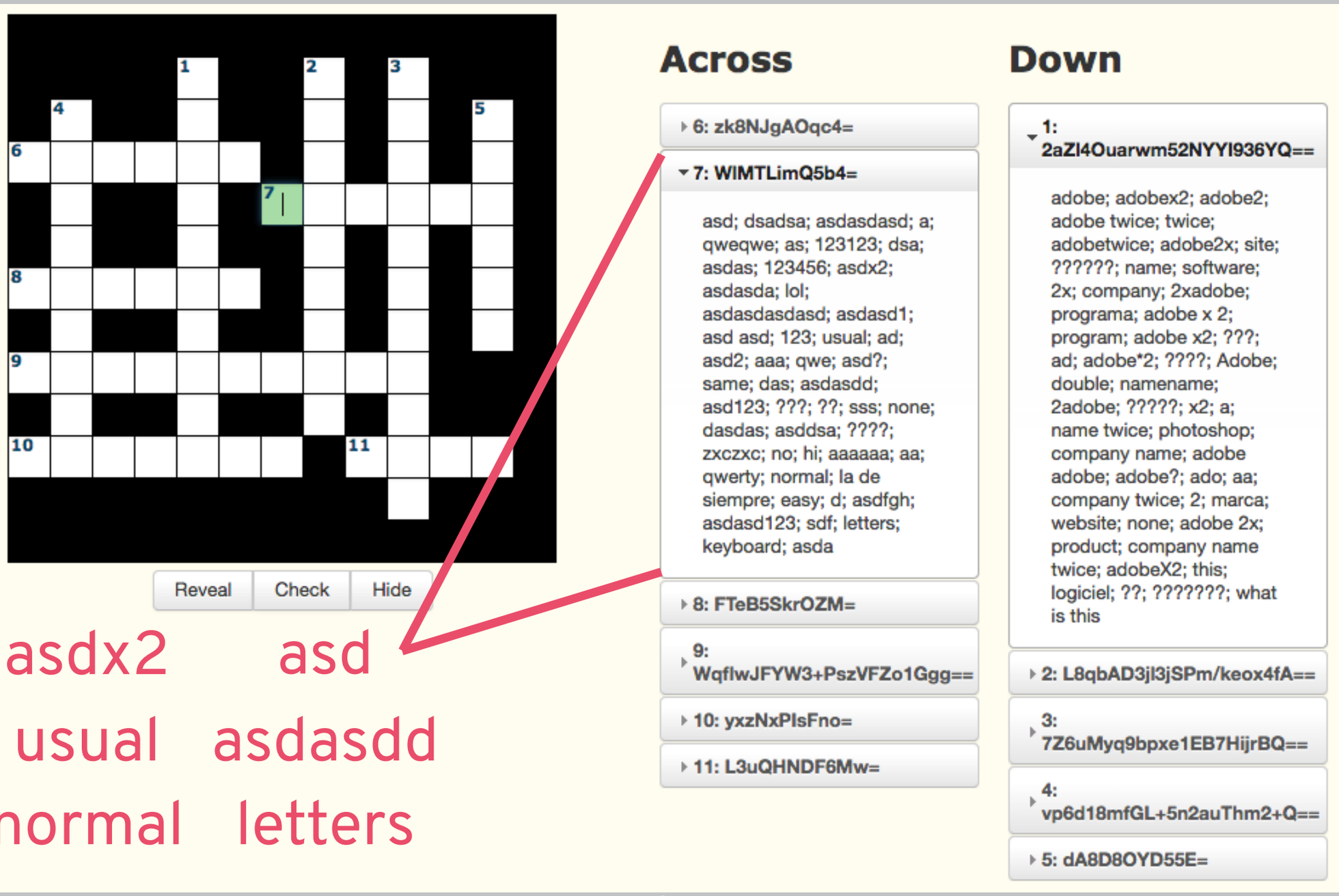
password(1)
123456
asdasd
qwerty(123)
<names>

service specific

hotmail
gmail
dreamweaver
macromedia
linkedin

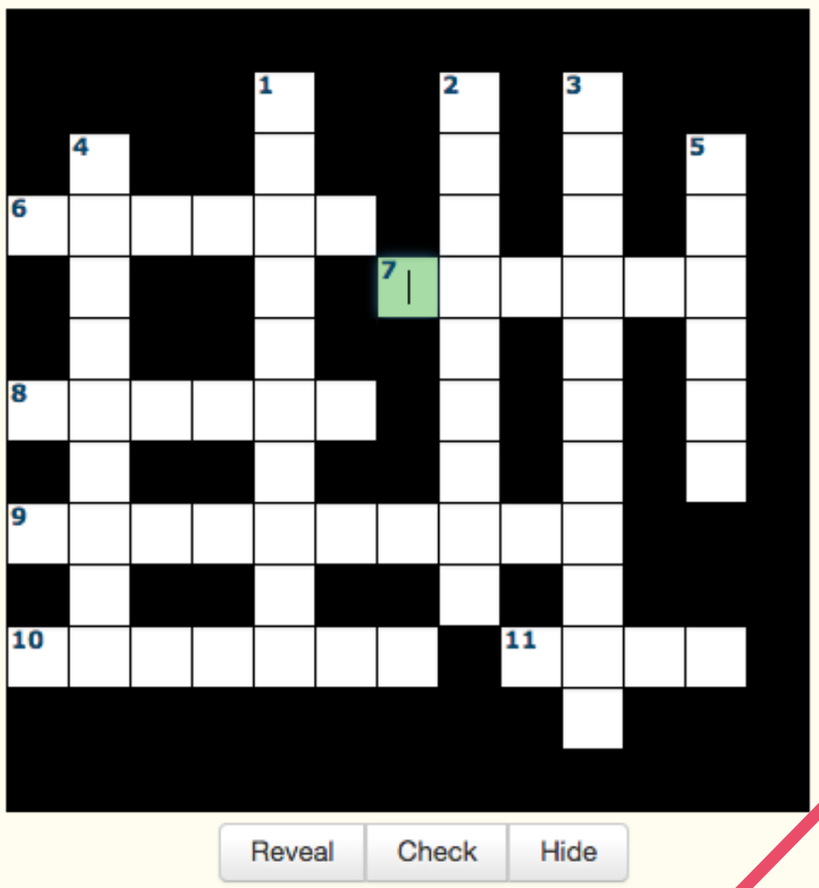
COMMON PASSWORDS

Adobe: 38 million password records stolen



COMMON PASSWORDS

Adobe: 38 million password records stolen



adobex2 adobe
name company
adobe twice

Across

- 6: zk8NJgAOqc4=
- 7: WlMTLimQ5b4=

  asd; dsadsa; asdasdasd; a; qweqwe; as; 123123; dsa; asdas; 123456; adx2; asdasda; lol; asdasdasdasd; asdasd1; asd asd; 123; usual; ad; asd2; aaa; qwe; asd?; same; das; asdasdd; asd123; ???; ??; sss; none; dasdas; asddsa; ????; zxczxc; no; hi; aaaaaa; aa; qwerty; normal; la de siempre; easy; d; asdfgh; asdasd123; sdf; letters; keyboard; asda
- 8: FTeB5SkrOZM=
- 9: WqfIwJFYW3+PszVFZo1Ggg==
- 10: yxzNxPIsFno=
- 11: L3uQHNDF6Mw=

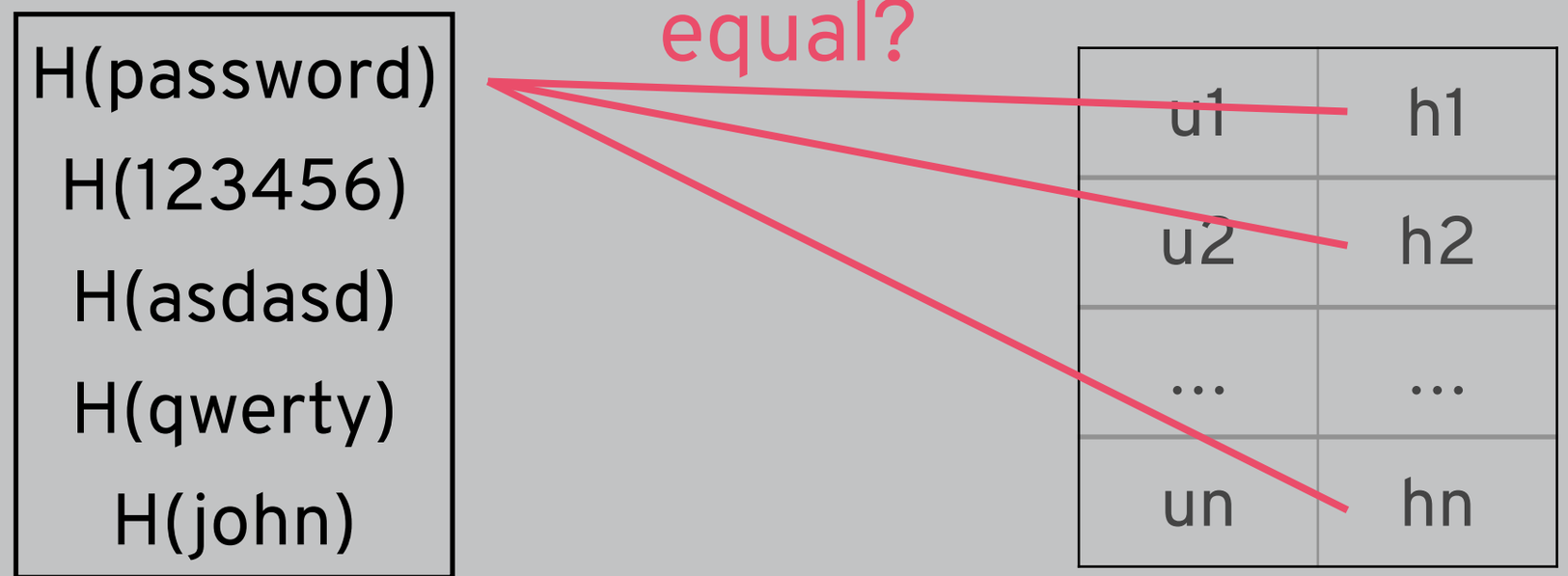
Down

- 1: 2aZl4Ouarwm52NYYl936YQ==

  adobe; adobex2; adobe2; adobe twice; twice; adobetwice; adobe2x; site; ??????; name; software; 2x; company; 2xadobe; programa; adobe x 2; program; adobe x2; ???; ad; adobe*2; ????; Adobe; double; namename; 2adobe; ?????; x2; a; name twice; photoshop; company name; adobe adobe; adobe?; ado; aa; company twice; 2; marca; website; none; adobe 2x; product; company name twice; adobeX2; this; logiciel; ??; ???????; what is this
- 2: L8qbAD3jl3jSPm/keox4fA==
- 3: 7Z6uMyq9bpxe1EB7HijrBQ==
- 4: vp6d18mfGL+5n2auThm2+Q==
- 5: dA8D8OYD55E=

PASSWORD CRACKING

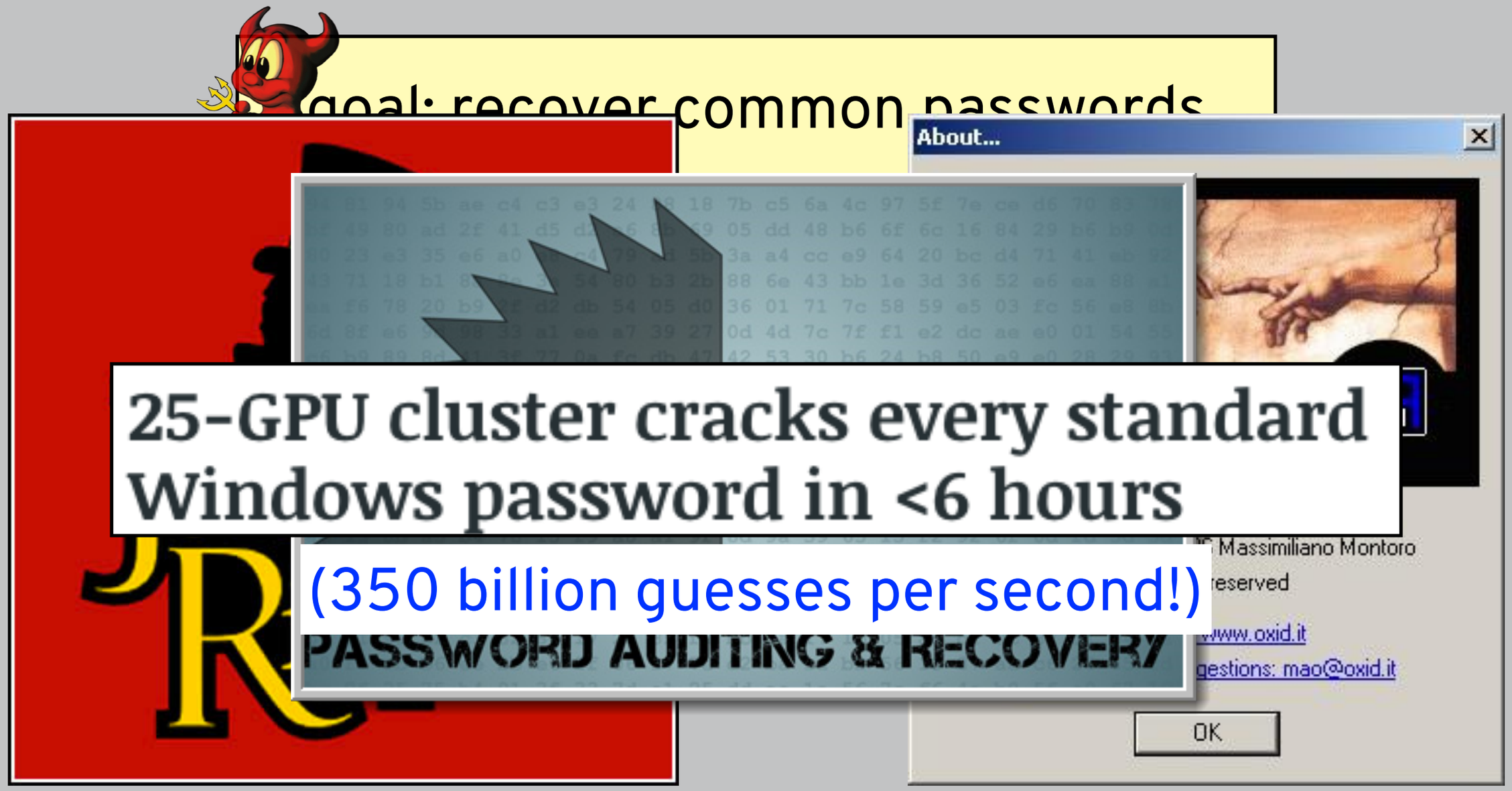
goal: recover common passwords



rainbow table

this is a **dictionary attack**

PASSWORD CRACKING

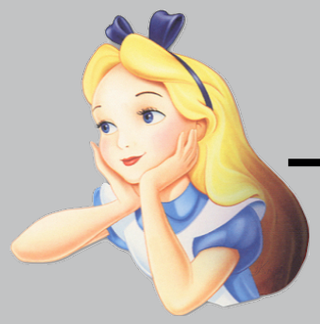


this is a **dictionary attack**

JOHN THE RIPPER DEMO

```
smeiklej@nocciola demos % john --wordlist=rockyou.txt --stdout | head
Using default input encoding: UTF-8
Press 'q' or Ctrl-C to abort, almost any other key for status
123456
12345
123456789
password
iloveyou
princess
1234567
rockyou
12345678
abc123
smeiklej@nocciola demos %
```

STORING PASSWORDS



uname,passwd

uname,**H(passwd)** here?

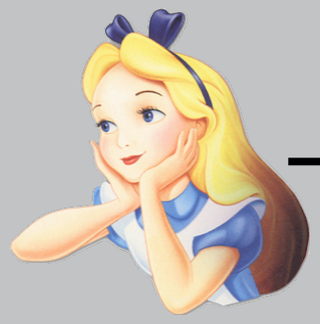
problem: common passwords

solution: use a **salt**

u1	H(p1)
u2	H(p2)
…	…
un	H(pn)

`passwords.csv`

STORING PASSWORDS



uname,passwd

uname,**s**,H(passwd||**s**) here?

u1	**s1**	H(p1||**s1**)
u2	**s2**	H(p2||**s2**)
…	…	…
un	**sn**	H(pn||**sn**)

passwords.csv

PASSWORD CRACKING

goal: recover common passwords

H(password)
H(123456)
H(asdasd)
H(qwerty)
H(john)

equal?

u1	s1	h1
u2	s2	h2
…	…	…
un	sn	hn

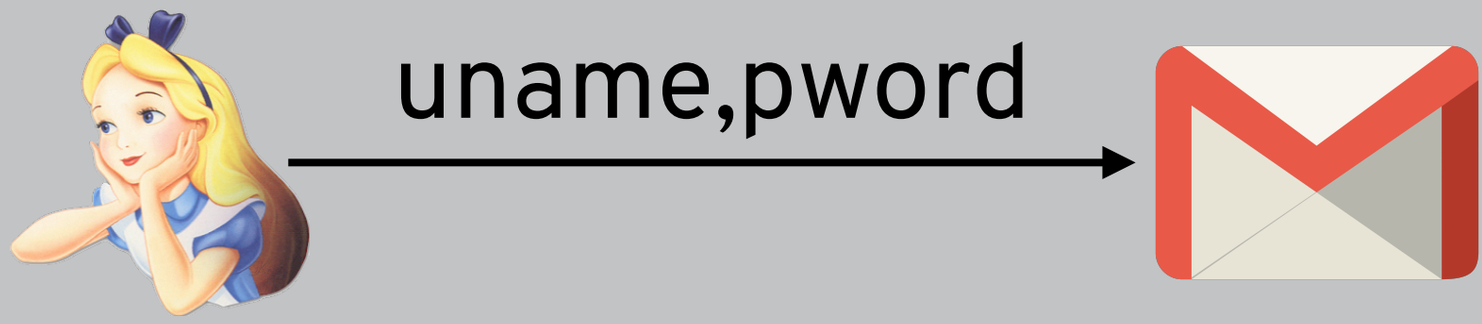
dictionary attack won't work!

(H(password||s1) ≠ H(password||s2) if s1 ≠ s2)

JOHN THE RIPPER DEMO

```
smeiklej@nocciola demos % john --wordlist=rockyou.txt --stdout | head
Using default input encoding: UTF-8
Press 'q' or Ctrl-C to abort, almost any other key for status
123456
12345
123456789
password
iloveyou
princess
1234567
rockyou
12345678
abc123
smeiklej@nocciola demos %
```

PASSWORDS



simple? how do you make them:

easy to memorise?

easy to enter?

hard to leak/steal?

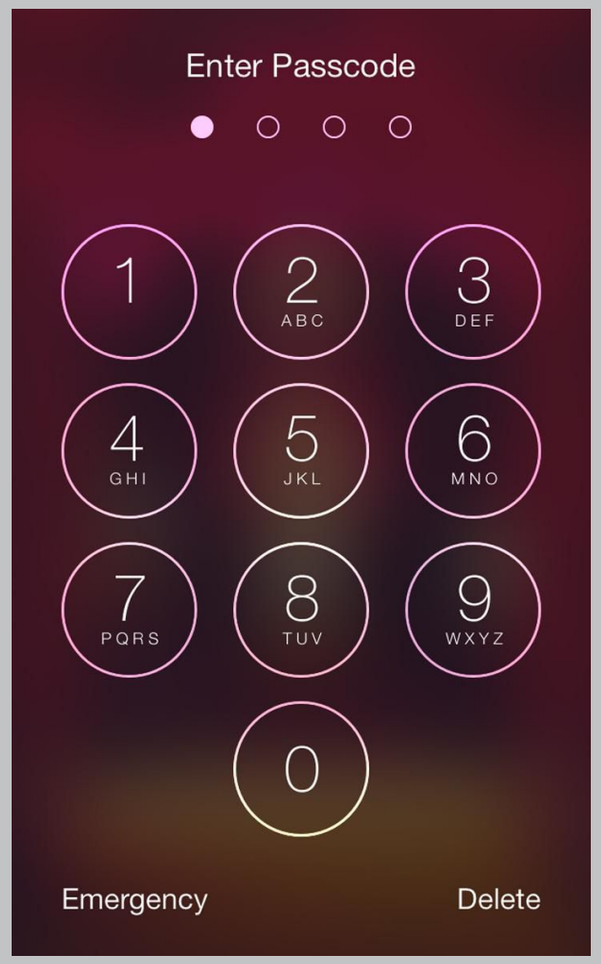
hard to guess?

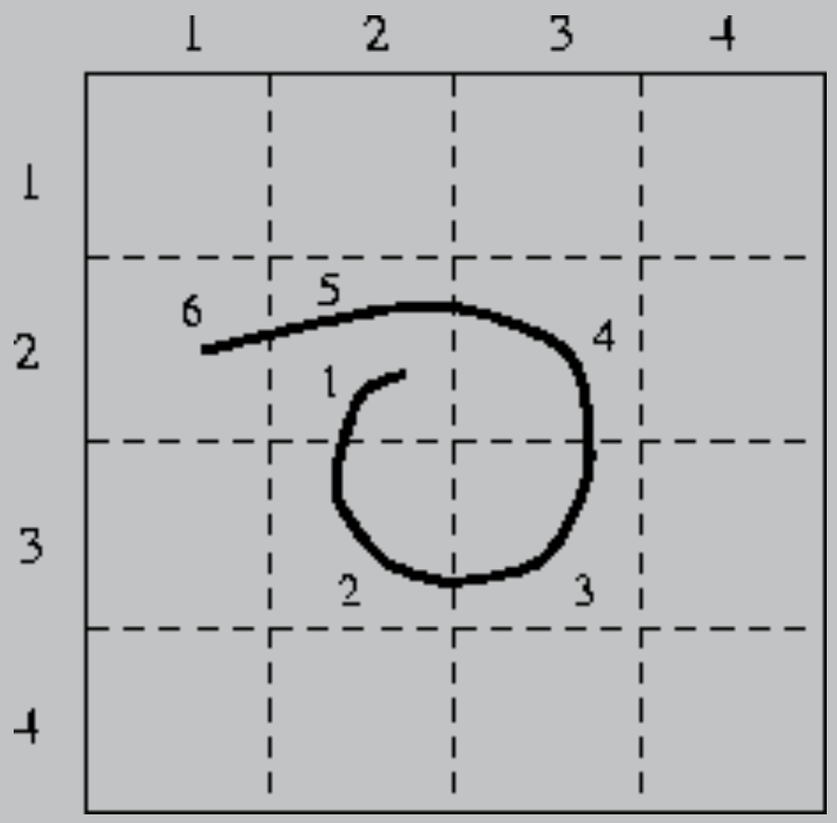
resettable?

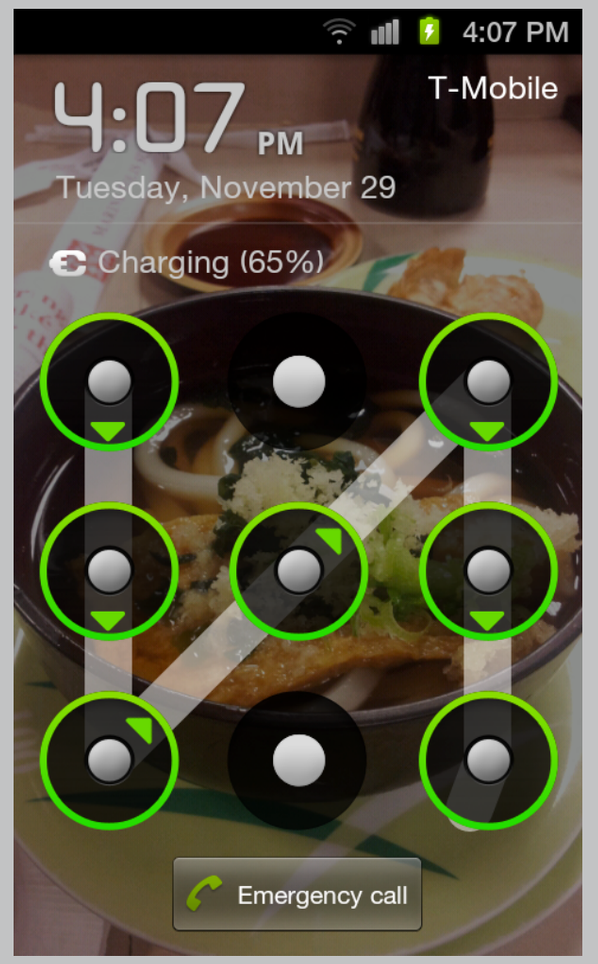
retrievable?

how to retrieve hashed and salted password?

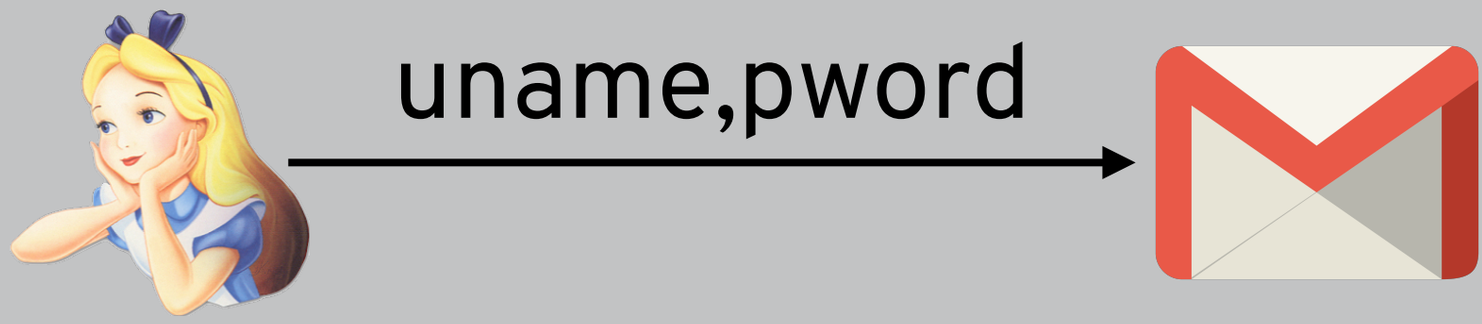
GRAPHICAL PASSWORDS







PASSWORDS



simple? how do you make them:

easy to memorise?

hard to guess?

easy to enter?

resettable?

hard to leak/steal?

retrievable?

SECURITY QUESTIONS

What is your pet's name?

In what year was your father born?

In what county where you born?

What is the color of your eyes?

What is the first name of the person you first kissed?

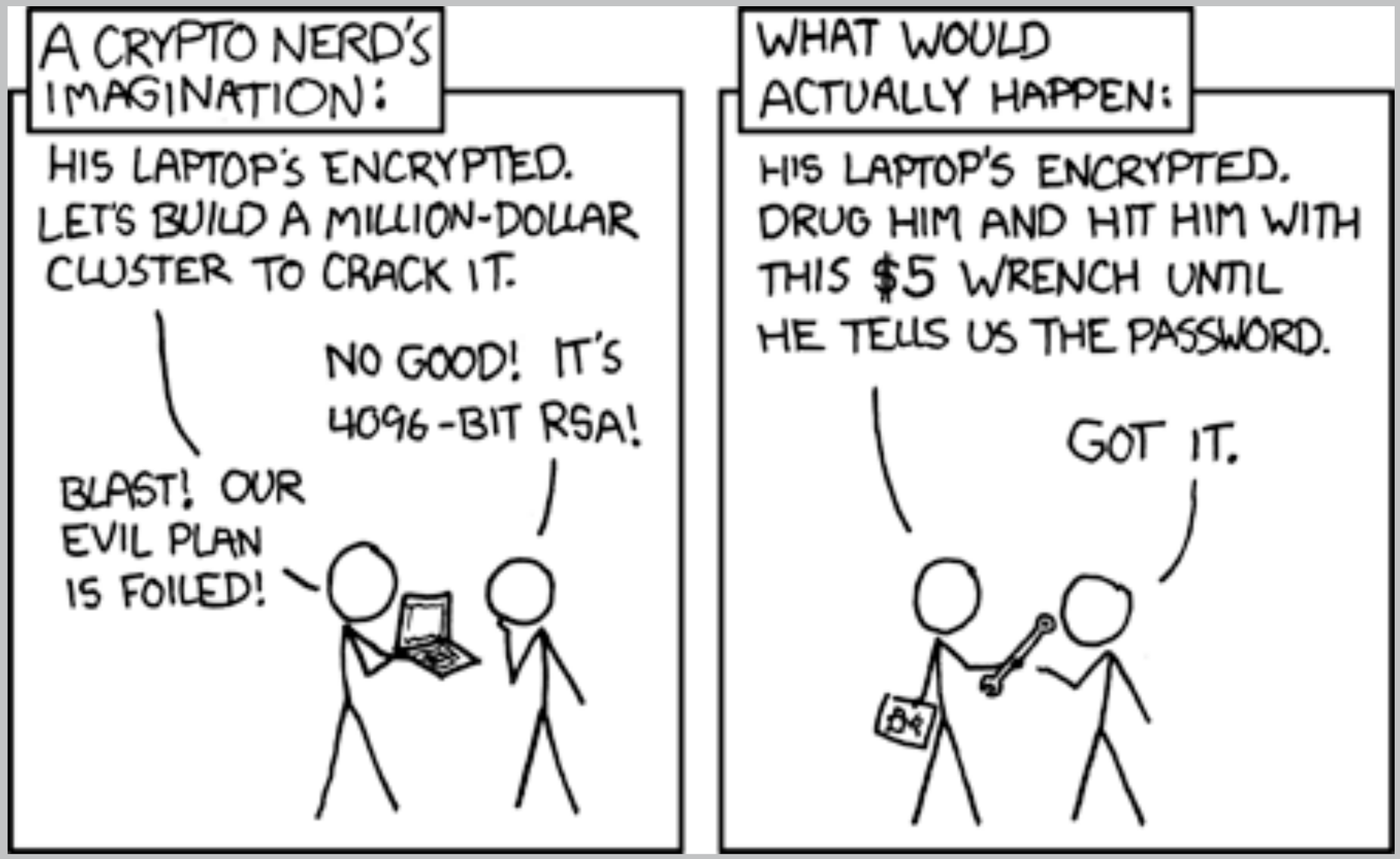
What is the last name of the teacher who gave you your first failing grade?

What is the name of the place your wedding reception was held?

In what city or town did you meet your spouse/partner?

What was the make and model of your first car?

COERCION ("RUBBER-HOSE") ATTACK



COPING STRATEGIES

try to enforce:	**users will:**
different passwords	use same password
long passwords	add ‘123’ (or other padding)
random passwords	write passwords down
letters and numbers	add ‘1’ (or ’123’ or other)
regular passwords changes	add, e.g., ‘spring’ or ‘june’
more complicated stuff	use reset functionality


MilFlip Logon Details
ORMS
ATTENTION ALL ORMS STUDENTS
SCARPA

MilFlip Logon Details

ORMS

ATTENTION ALL ORMS STUDENTS

MilFlip Logon Details

Username: 22/201
Password: Seaking5

ORMS

ATTENTION ALL ORMS STUDENTS

MilFlip Logon Details

Username: 22/201
Password: Seeking5_

RMS

AUTHENTICATION AS A USER TASK

Properties of password-based authentication:

- Unaided recall (violation of “recognition rather than recall”)
- Recall and entry have to be 100% correct
- No corrective feedback on failure

Coping strategies include:

- Re-using the same password (or small set of passwords)
- Writing passwords down
- Relying on password reset

PASSWORDS

uname,pword

security: want long and random passwords

S **usability:** humans can't generate or remember these

easy to memorise?

easy to enter?

hard to leak/steal?

hard to guess?

resettable?

retrievable?

AUTHENTICATION

Authentication is:

What you know

text passwords

graphical passwords

personal details

What you have

What you are