

Auntie Tuna

Personalized
Content-based
Phishing Detection

Calvin Ardi, John Heidemann



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User ID:
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Password:

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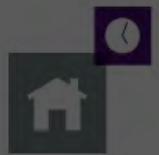
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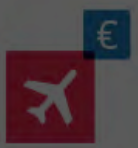
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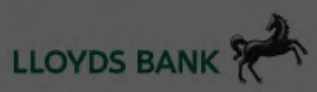
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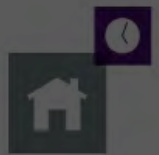
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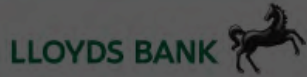
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missing lock

Mobile Cookie policy



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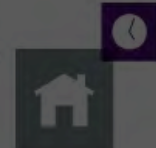
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sayyed-alakwan.com/wp-content/3618349200/lloyds

Please enter your password and User ID (if you have forgotten your User ID simply click on the link '[Forgotten your User ID](#)' and follow the instructions).

User ID:

Password:

Remember my User ID [?]

Warning: Don't tick this box if you're using a public or shared computer

missing lock

wrong URL

- > [Forgotten your password?](#)
- > [Forgotten your User ID?](#)
- > [Having problems logging in?](#)

Continue

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! Please enter a value.

Password:

Remember my User ID [\[?\]](#)

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[> Forgotten your User ID?](#)

[> Having problems logging in?](#)



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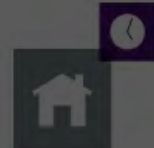
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lost time and \$\$\$

PAYMENTS

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Protecting your money

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we need something
effective
and
usable



url blacklists

effective?

usable?



url blacklists

effective?



slow updates

usable?



url blacklists

effective?



slow updates

usable?



when updated



url whitelists

effective?



usable?





url whitelists

effective?



yes

usable?





url whitelists

effective?



yes

usable?



too restrictive

what targets do we track?

what targets do we track?

how to deal with our targets?

what targets do we track?

how to deal with our targets?

how to make it usable?

AuntieTuna

user personalization

precise content matching

usable design

AuntieTuna

user personalization

precise content matching

usable design

AuntieTuna

user personalization (discovery)

precise content matching

usable design



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Not applicable to deposits in the Channel Islands, Isle of Man and Gibraltar.



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EasyChair uses cookies for user authentication. To use EasyChair you should **allow your browser to save cookies from easychair.org**.

User name:

Password:

Log in

If you have no EasyChair account, [create an account](#)
 Forgot your password? [click here](#)
 Problems to log in? [click here](#)



Welcome. Please sign in to continue.

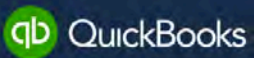
USC NetID (username)

Password

Sign in

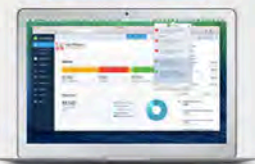
[Activate new account](#) | [Forgot NetID](#) | [Forgot password](#)

To sign out, quit/close your web browser. When using a



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Sign in

User ID

Password



Remember my user ID

Sign In

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Schedule Master

for partnerships, clubs and schools



fast & easy scheduling from wherever you are

User name/number	Password
<input type="text"/>	<input type="password"/>
<input type="checkbox"/> Remember my ID & Password (Not recommended for shared computers.)	

Login

Questions? Check our Knowledge Base.
 New Feature

Don't remember your login details? Enter your email address below. Your information will be emailed to you if you previously entered your email address in the Schedule Master database, you must contact your manager for more information.

Email Address:

[Email my account info](#)



Email

Password

Log In

[Forgot your email or password?](#)

Sign Up



Summary

Activity

Send & Request

Wallet

Shop



Hi again, Calvin!

Your profile is at 100%



Pay or send money



Donate to your cause

Take more time to pay

Do you want Google Chrome to save your password for this site?

user@example.com

Send money to a friend, even if they're not on PayPal yet.

PayPal balance >

\$0.00

Available

[Add money](#)

[Transfer to your bank](#)

Banks and cards >

You can update them in your [Wallet](#).

Selling tools >

[Manage invoices](#)

[MultiOrder shipping](#)

[Seller preferences](#)

More about your account

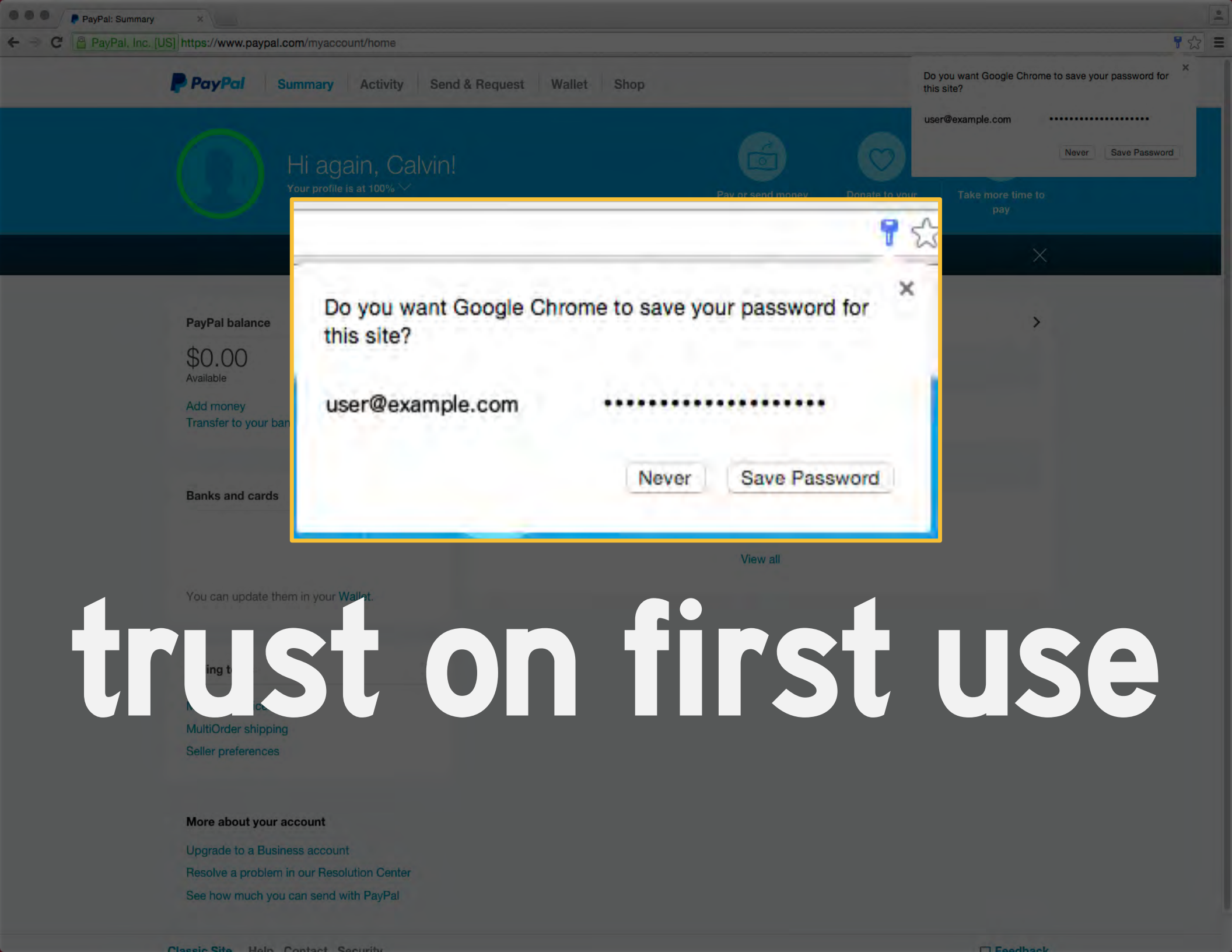
[Upgrade to a Business account](#)

[Resolve a problem in our Resolution Center](#)

[See how much you can send with PayPal](#)

Completed >

[View all](#)



Do you want Google Chrome to save your password for this site?

user@example.com

.....

Never

Save Password

trust on first use

add to good list

messages

all systems go.



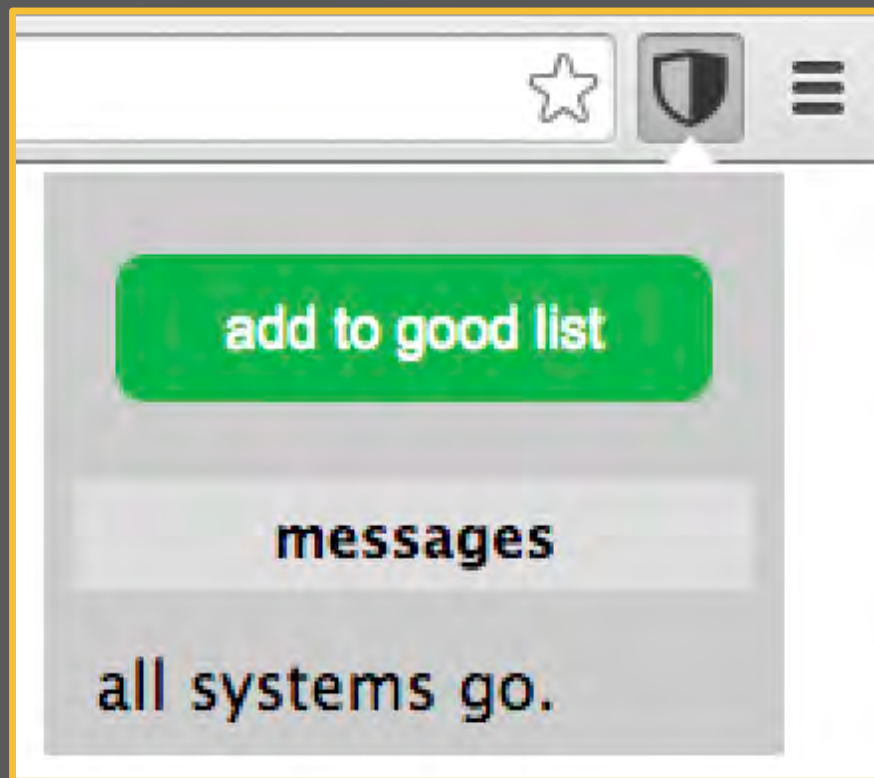
Email

Password

Log In

[Forgot your email or password?](#)

Sign Up



add to good list

messages

all systems go.

manual add



⇒ **defense++**

AuntieTuna

user personalization (discovery)

precise content matching (detection)

usable design

```
<p>
```

```
Lorem ipsum  
dolor sit amet,  
consectetur  
adipiscing  
elit.
```

```
</p>
```

```
<p>
```

```
  Lorem ipsum  
  dolor sit amet,  
  consectetur  
  adipiscing  
  elit.
```

```
</p>
```



581d51aba4e

```
dolor sit amet,  
consectetur  
adipiscing  
elit.  
</p>
```



581d51aba4e

```
<script>  
window.alert("hello world")  
</script>
```



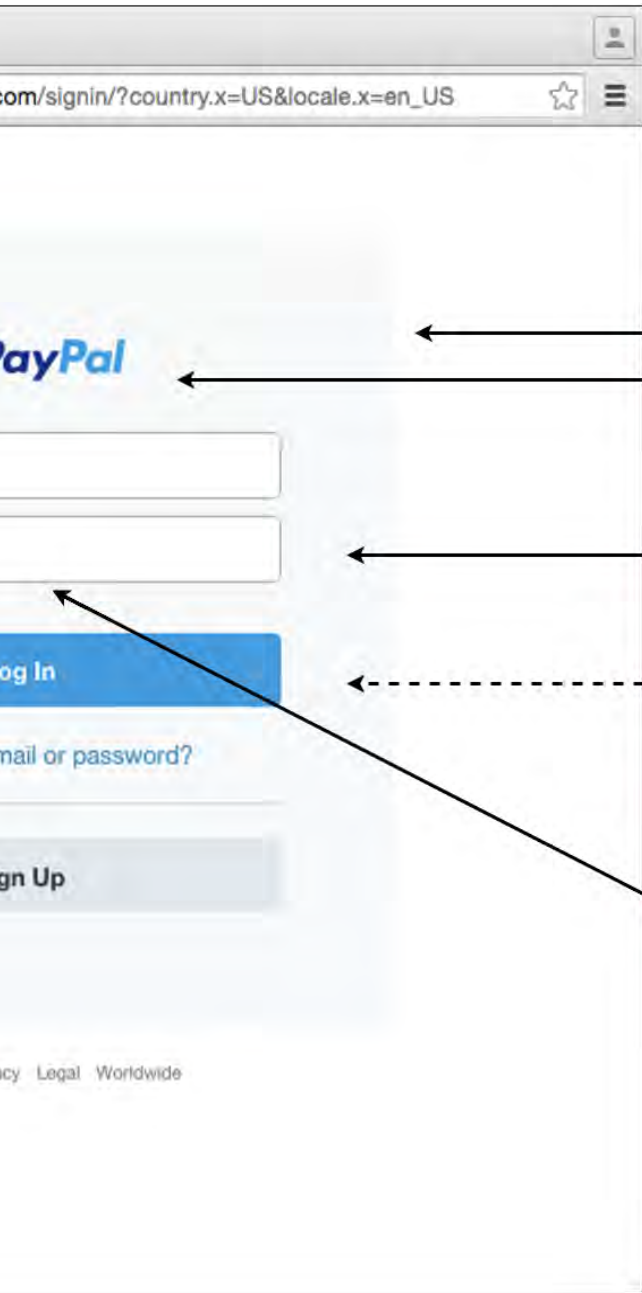
1bcf3508dea



[Forgot your email or password?](#)

7667cd7
b3a4ac5
b2c2bf6
a32706c

84ef5a6
917457f
f16f56b
00ac15d
41918d0
cf33340
24ff03e
133eed6
42bae26
...



7667cd7
b3a4ac5
b2c2bf6
 a32706c

doctype, header
 div: container
 div: PayPal logo
attack payload

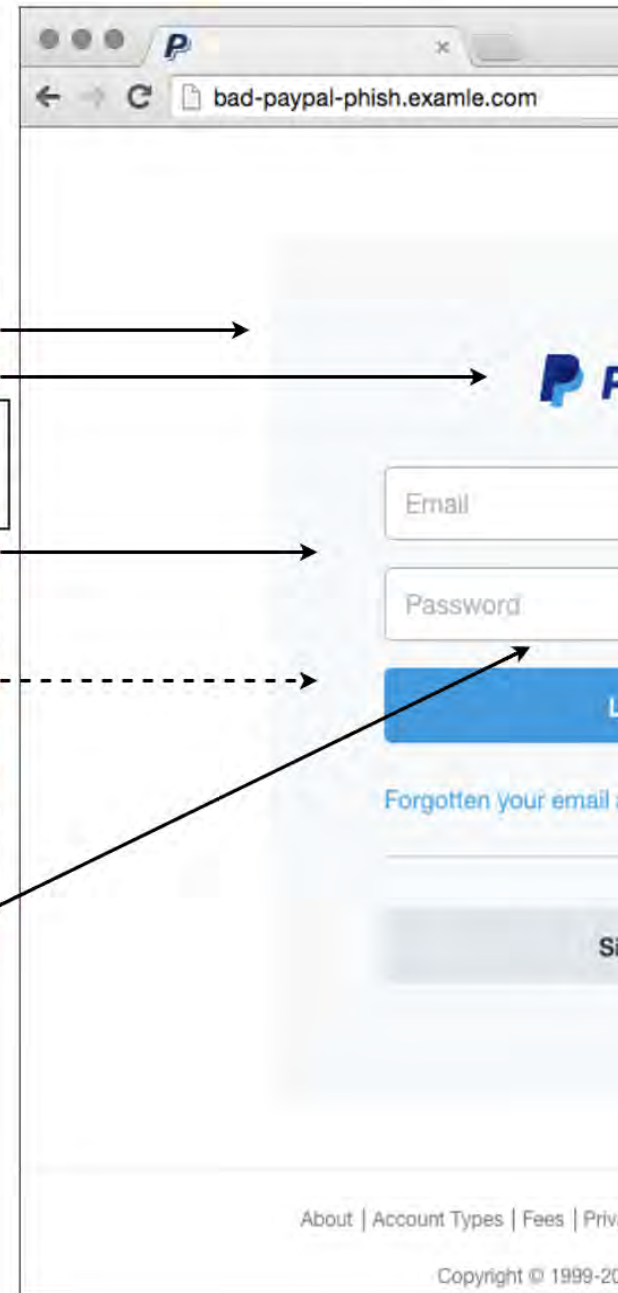
84ef5a6
 917457f
 f16f56b
00ac15d
 41918d0
cf33340
 24ff03e
 133eed6
42bae26
 ...

div: password container
 div: email input
 div: error message

div: password input

6ae14bb
b3a4ac5
b2c2bf6
a41e9a6
78ef329
b94cdbc

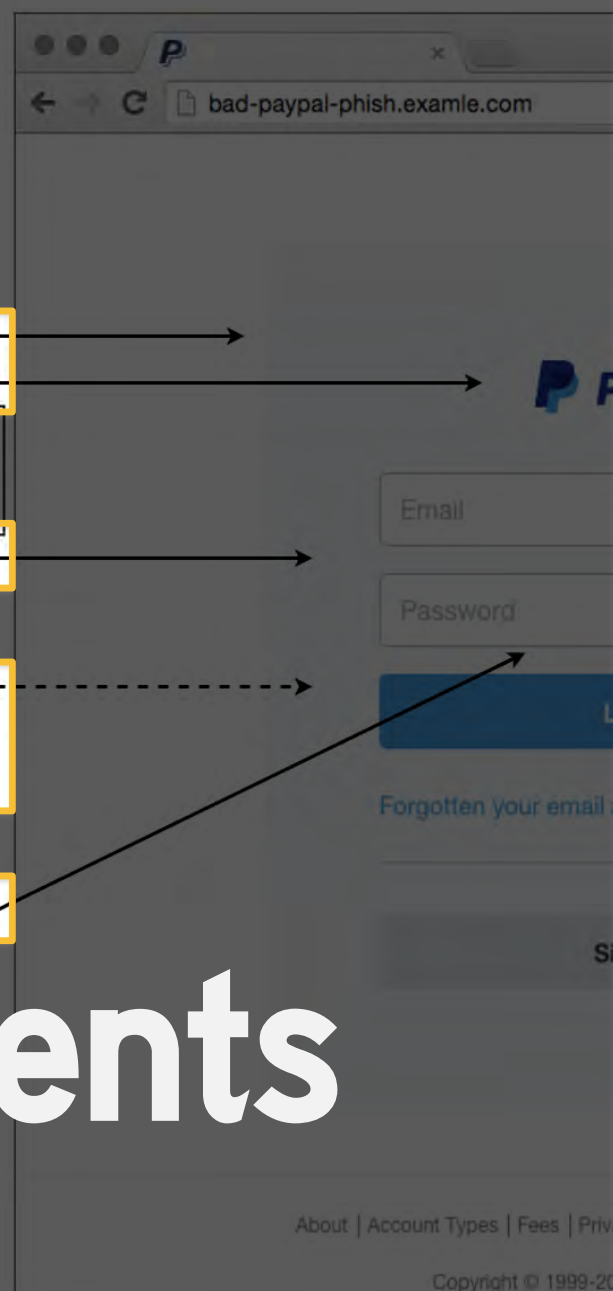
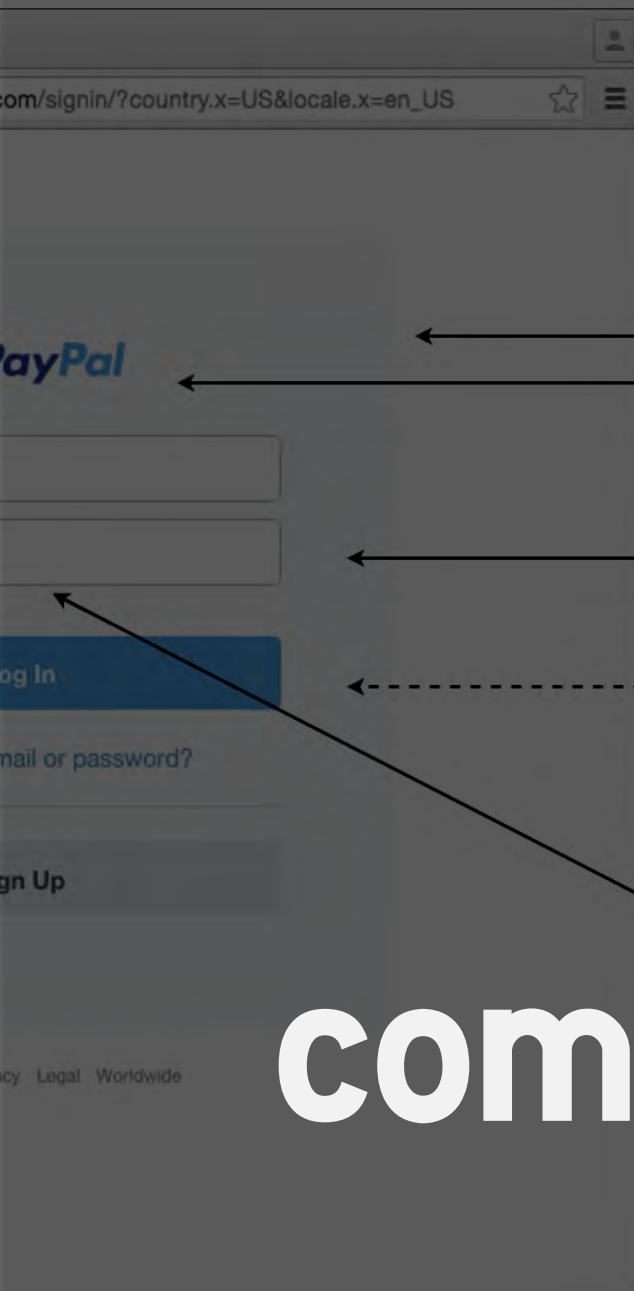
84ef5a6
 3a55a8f
 552bc8b
00ac15d
 dd5de67
cf33340
 7019d6f
 02de0a8
42bae26
 ...





7667cd7	doctype, header	6ae14bb
b3a4ac5	div: container	b3a4ac5
b2c2bf6	div: PayPal logo	b2c2bf6
a32706c	attack payload	a41e9a6 78ef329 b94cddb
84ef5a6	div: password container	84ef5a6
917457f	div: email input	3a55a8f
f16f56b		552bc8b
00ac15d	div: error message	00ac15d
41918d0		dd5de67
cf33340		cf33340
24ff03e		7019d6f
133eed6		2de0a8
27e1e5	div: password input	27e1e5

attack payload

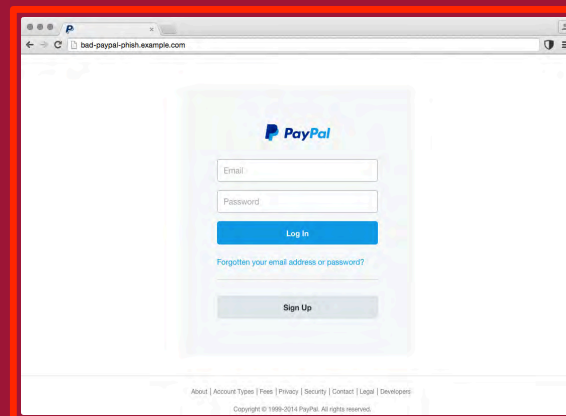
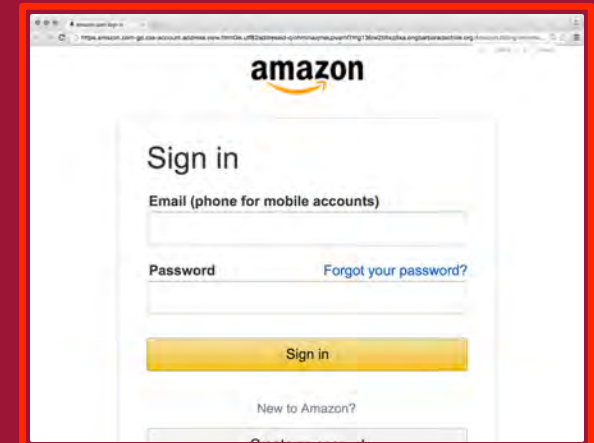
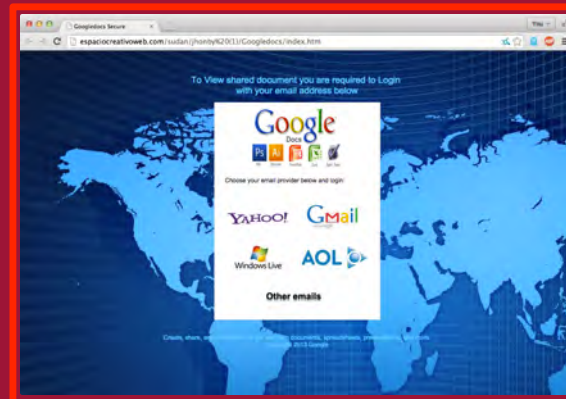
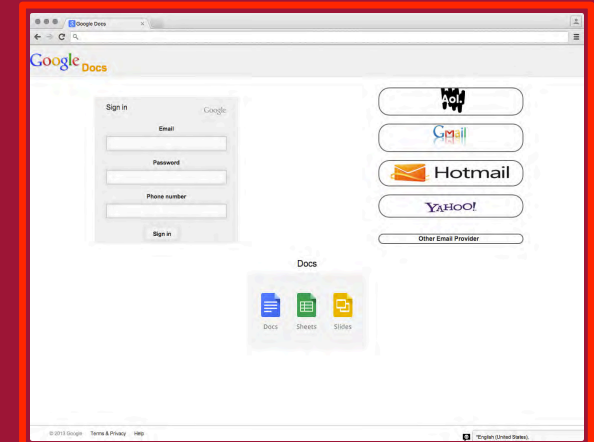
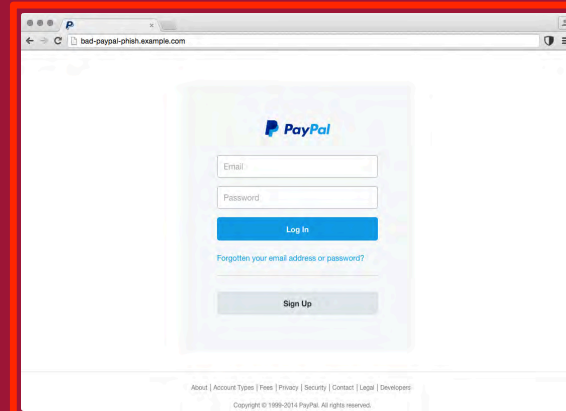
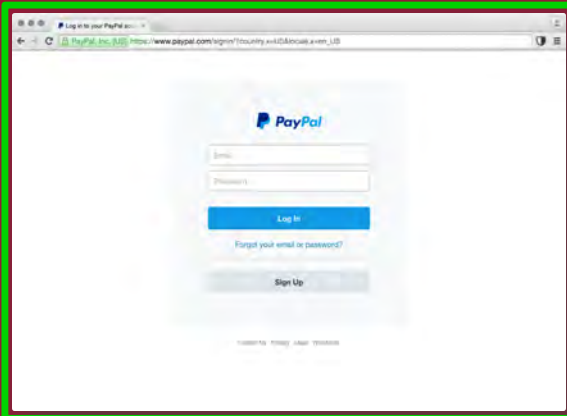


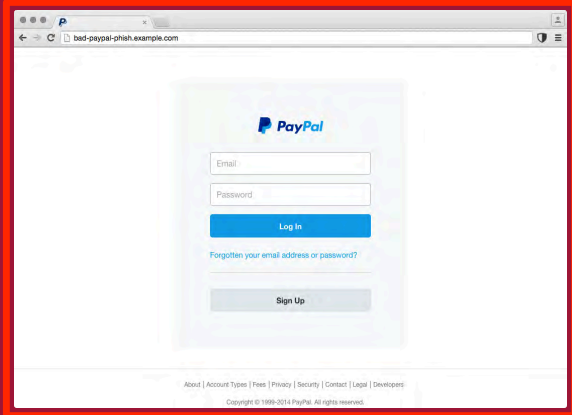
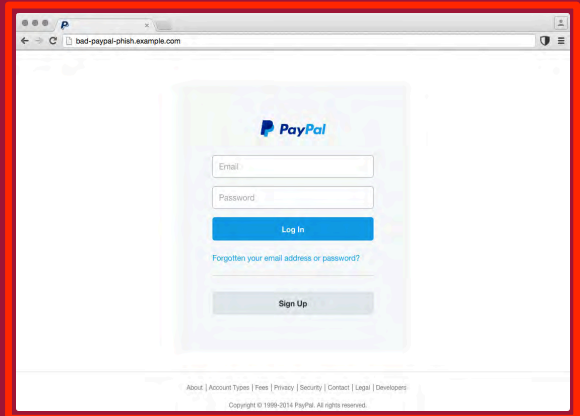
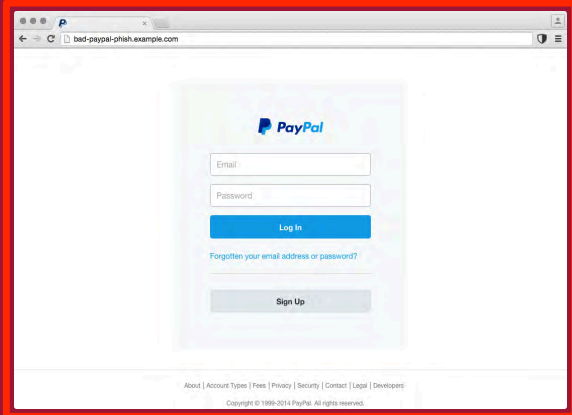
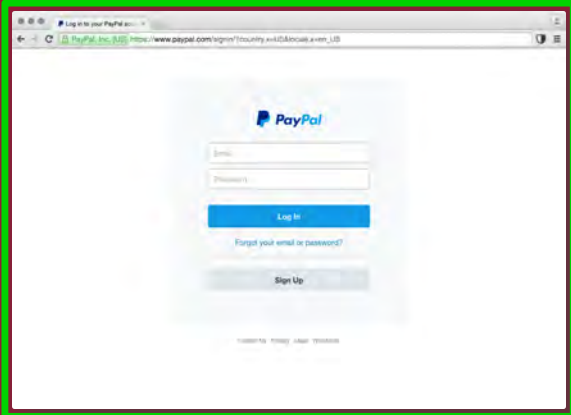
7667cd7	doctype, header	6ae14bb
b3a4ac5	div: container	b3a4ac5
b2c2bf6	div: PayPal logo	b2c2bf6
a32706c	attack payload	a41e9a6 78ef329 b94cdbc
84ef5a6	div: password container	84ef5a6
917457f	div: email input	3a55a8f
f16f56b		552bc8b
00ac15d	div: error message	00ac15d
41918d0		dd5de67
cf33340		cf33340
24ff03e		7019d6f
133eed6		02de0a8
42bae26	div: password input	42bae26
...		...

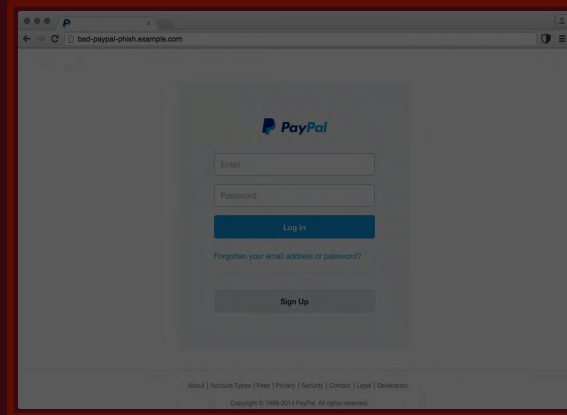
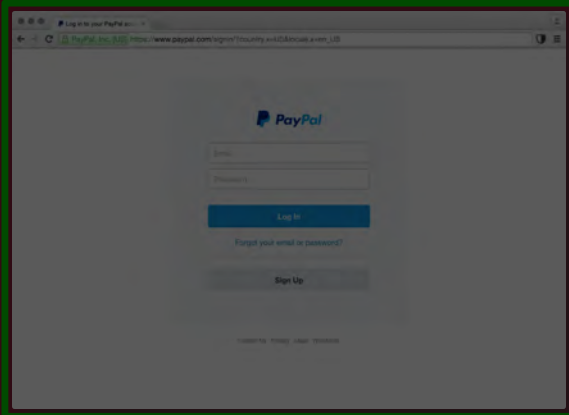
common elements

⇒ phish

effective?







do we find the phish?

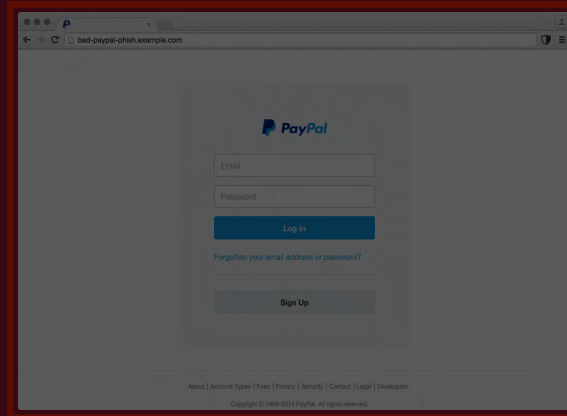
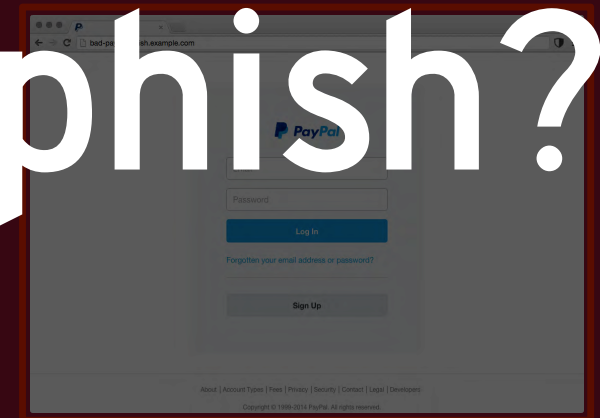


TABLE I. CLASSIFICATION OF PHISH IN TWO DAYS OF PHISH TANK REPORTS, BASED ON DETECTION AGAINST PAYPAL. SENSITIVITY = 58.8%, SPECIFICITY = 100%.

Description	Num. Pages	%	
Candidates	2374		
Unavailable	486		
Ripped	1888		
Other	1764		TN = 1764
PayPal (image-based, <i>removed</i>)	39		
PayPal	85	100.0	FP = 0
Successfully detected	50	58.8	TP = 50
Direct rips	35		
Whitespace norm.	8		
JavaScript obfuscation	7		
Custom-styled with minor PayPal content	35	41.2	FN = 35

TABLE I. CLASSIFICATION OF PHISH IN TWO DAYS OF PHISH TANK REPORTS, BASED ON DETECTION AGAINST PAYPAL. SENSITIVITY = 58.8%, SPECIFICITY = 100%.

Description	Num. Pages	%	
Unavailable	2374		
Ripped	436		
Other	1888		
PayPal (image-based, <i>removed</i>)	1764		TN = 1764
PayPal	39		
Successfully detected	85	100.0	FP = 0
Direct rips	50	58.8	TP = 50
Whitespace norm.	35		
JavaScript obfuscation	8		
Custom-styled with minor PayPal content	7		
	35	41.2	FN = 35

pretty good! (58.8%)

usable?

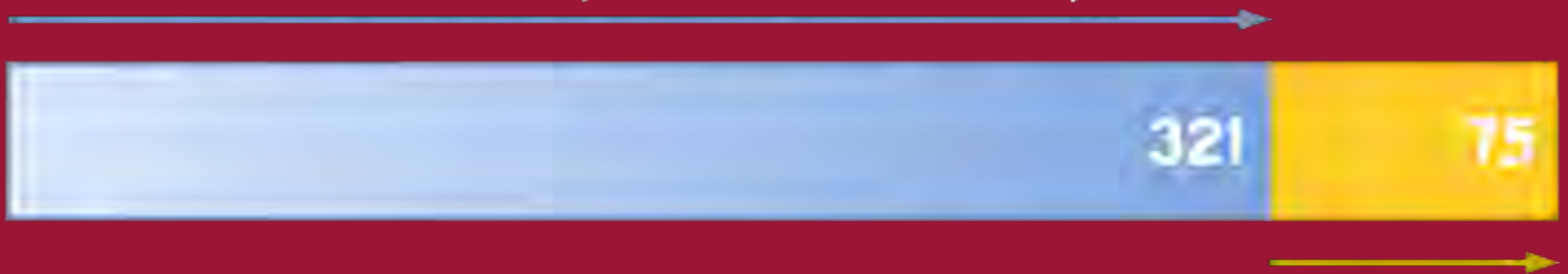
TABLE II. PAGE RENDER AND AUNTIE TUNA EXECUTION TIMES

Website	Page Render ms (σ ms)	AuntieTuna ms (σ ms)
google.com	327 (15)	144 (6)
paypal.com	349 (5)	20 (2)
nytimes.com	5316 (1632)	167 (6)
en.wikipedia.org	321 (7)	75 (3)

en.wikipedia.org



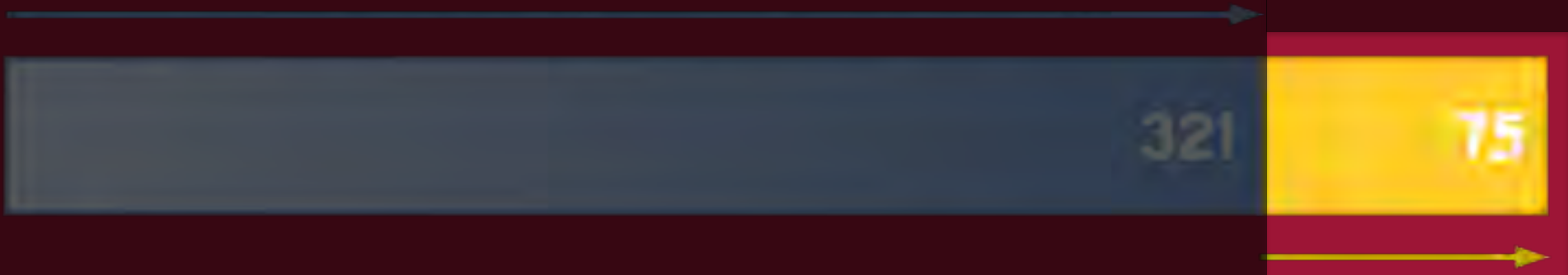
en.wikipedia.org



AuntieTuna

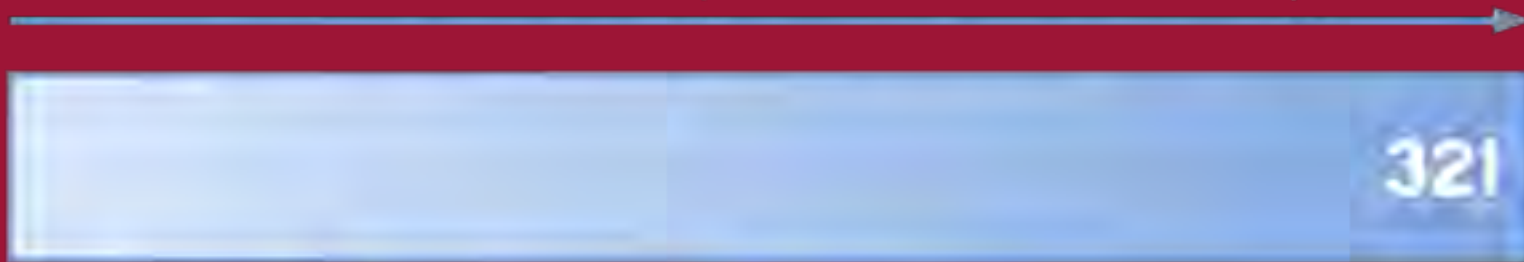
post-render

en.wikipedia.org



AuntieTuna

en.wikipedia.org



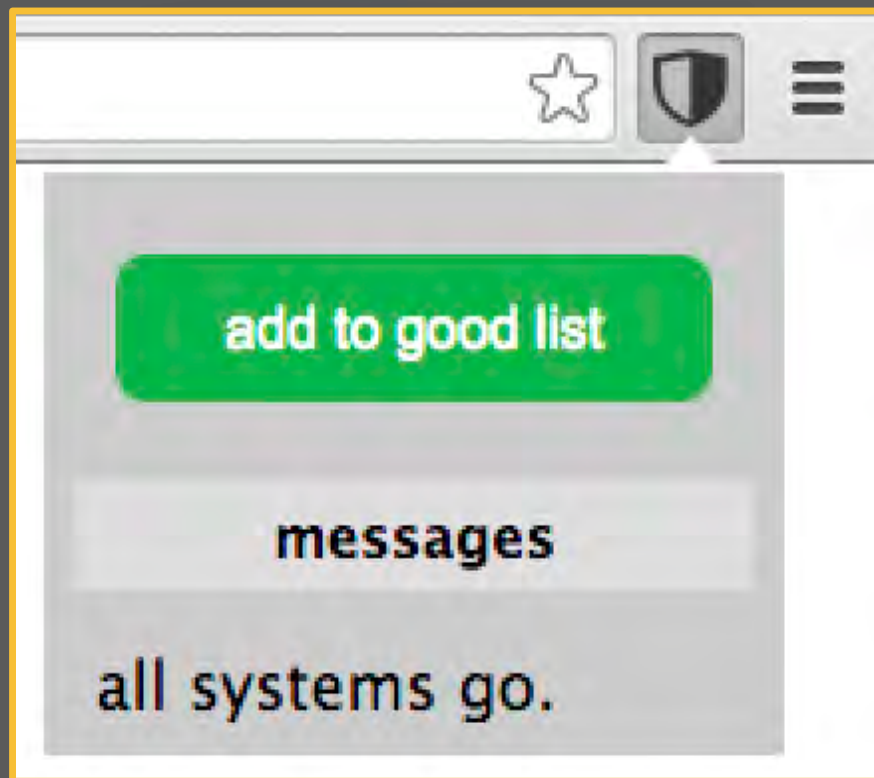
AuntieTuna

AuntieTuna

user personalization (discovery)

precise content matching (detection)

usable design

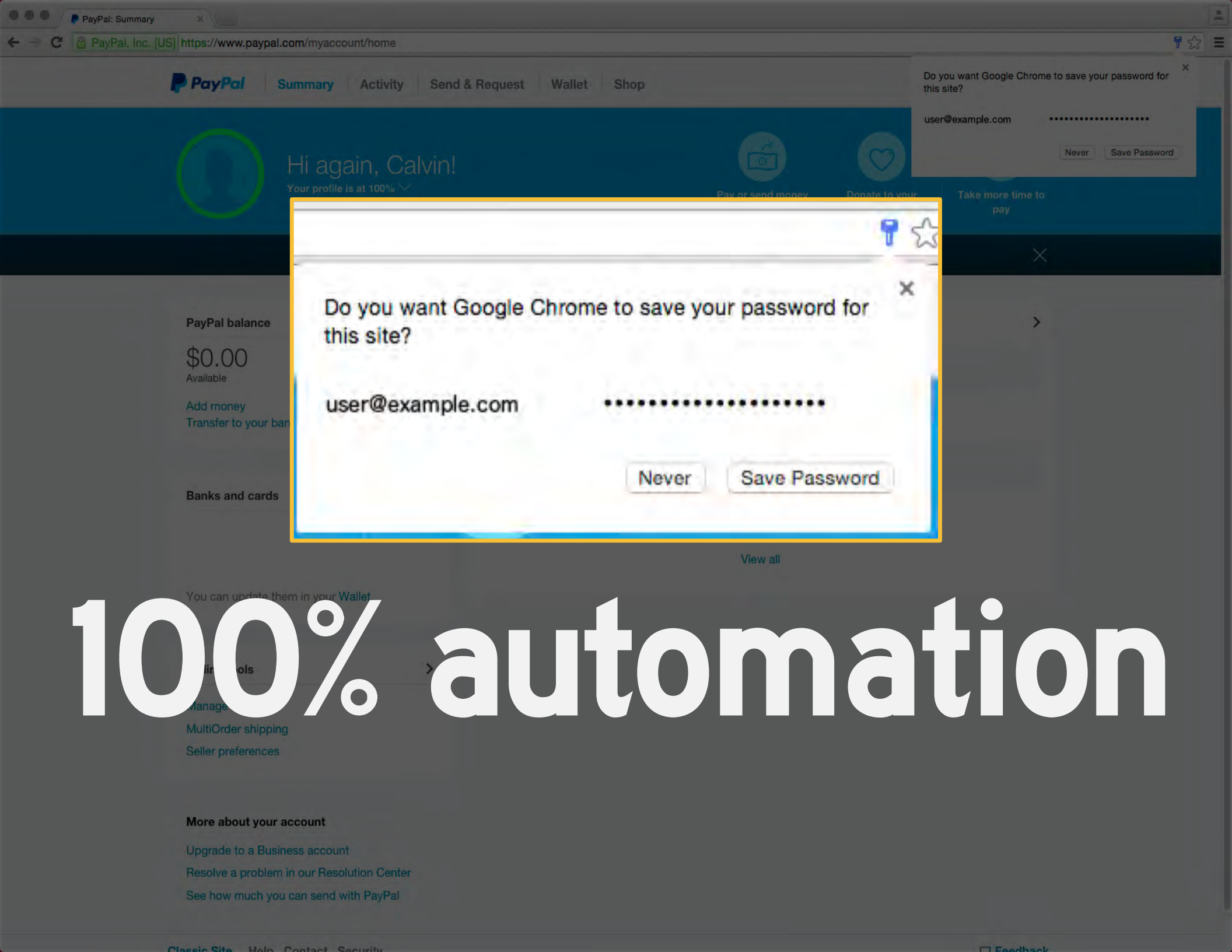


add to good list

messages

all systems go.

one button



100% automation



Log In

[Forgotten your email address or password?](#)

Sign Up

Warning—Suspected phishing page!

This page may be a forgery designed to trick you into sharing sensitive information. Entering any information here may result in identity theft or other abuse.

→ What is phishing and how do I protect myself?

Click to learn more: antiphishing.org

→ We think you meant to go to: [PayPal \(paypal.com\)](https://paypal.com)

[Back to Safety](#)

Warning—Suspected phishing page!

This page may be a forgery designed to trick you into sharing sensitive information. Entering any information here may result in identity theft or other abuse.

→ What is phishing and how do I protect myself?

Click to learn more: antiphishing.org

→ We think you meant to go to: [PayPal \(paypal.com\)](https://paypal.com)

Back to Safety

▶ Advanced

clear warning

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Back to Safety

Advanced

escape #1

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[Back to Safety](#)

▶ Advanced

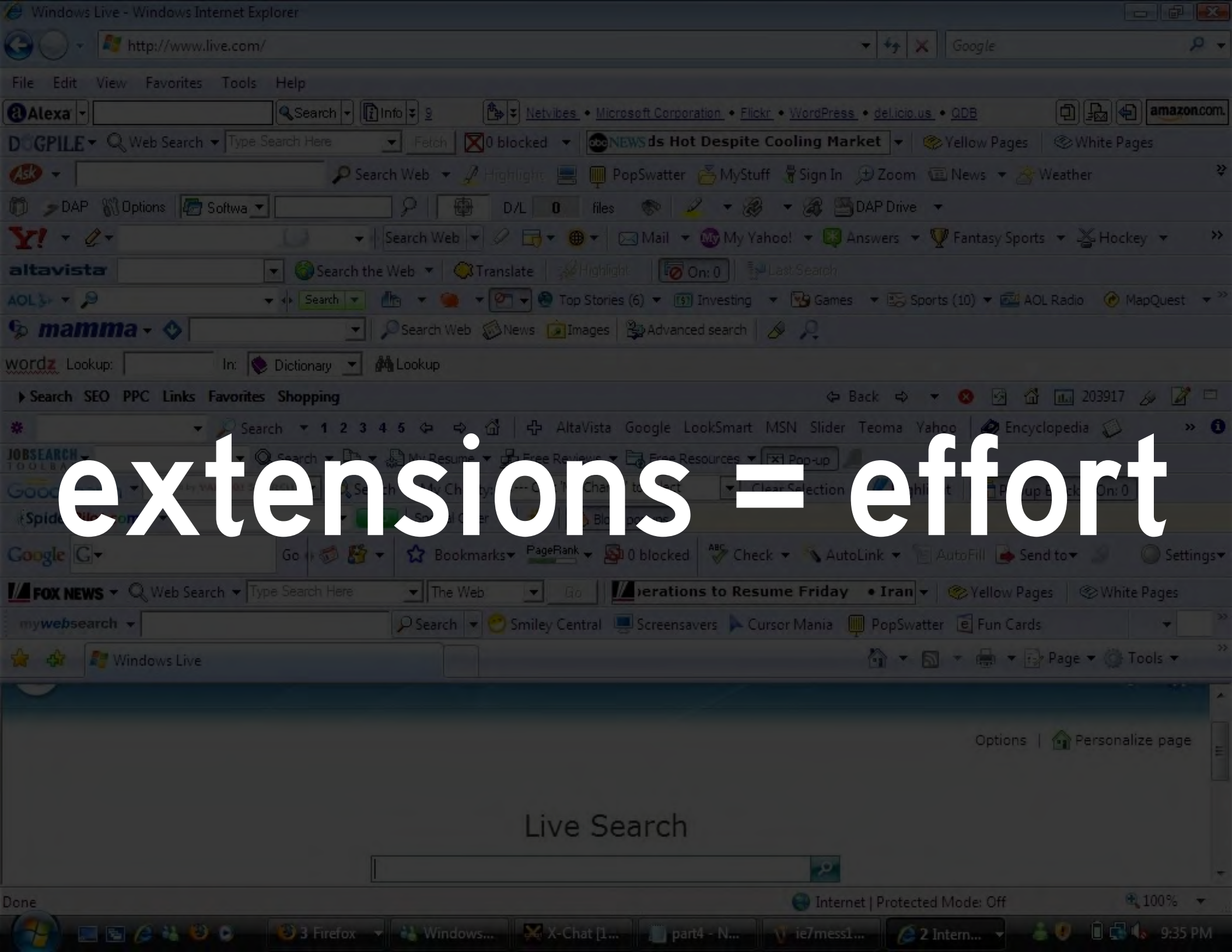
escape #2

A classical painting depicting a muscular man wrestling a lion. The man is shown from the waist up, his body tensed with effort. He is wearing a white loincloth and has a thick, dark rope or chain around his waist. His right arm is raised, gripping the lion's mane. The lion is positioned above him, its head and front paws visible. The background is dark and textured, suggesting a rocky or cave-like environment. The overall style is dramatic and emphasizes physical strength and struggle.

challenges

Options | Personalize page

Live Search



extensions = effort

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Password

Phone number


Sign in




Docs



Docs



Sheets



Slides



Sign in

Google

Email

Password

Phone number

Sign in



Hotmail

YAHOO!

Other Email Provider

this works

Docs



Docs



Sheets



Slides



A silhouette of a person walking a tightrope against a cloudy sky. The person is in a crouched position, balancing on a thin wire. The background is a dark, overcast sky with some light clouds. The text is overlaid in white, bold, sans-serif font.

**stopped class of
attacks**

Auntie Tuna

effective and usable

use it, hack it

<https://ant.isi.edu/software/antiphish>