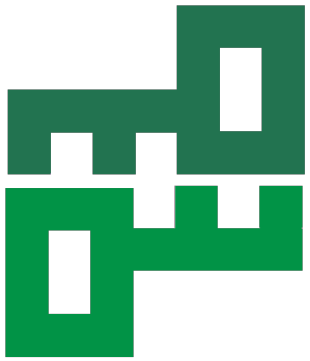
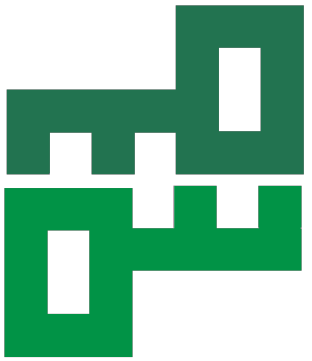
Webtracking and Countermeasures

Anton and Bernhard, Cryptoparty Graz



2015-04-25
Linuxtage Graz, FH Joanneum



Anton
PGP-key and Fingerprint
2048R, 2014-02-27
A727 CC1E 08AD F9F3 9C43
E650 BFE1 E2F8 8AF5 A989

Bernhard Z.
PGP-key and Fingerprint
4096R, 2014-10-23
2015 C9D7 3FD4 355B 0D18
CFBD 3542 8539 ACDC 6F44

Structure

1. Commercial surveillance (= webtracking) and negative consequences

2. Available countermeasures

3. Measurement of effectivenes against surveillance

4. Rating of countermeasures for effectiveness and user comfort

Why commercial surveillance?

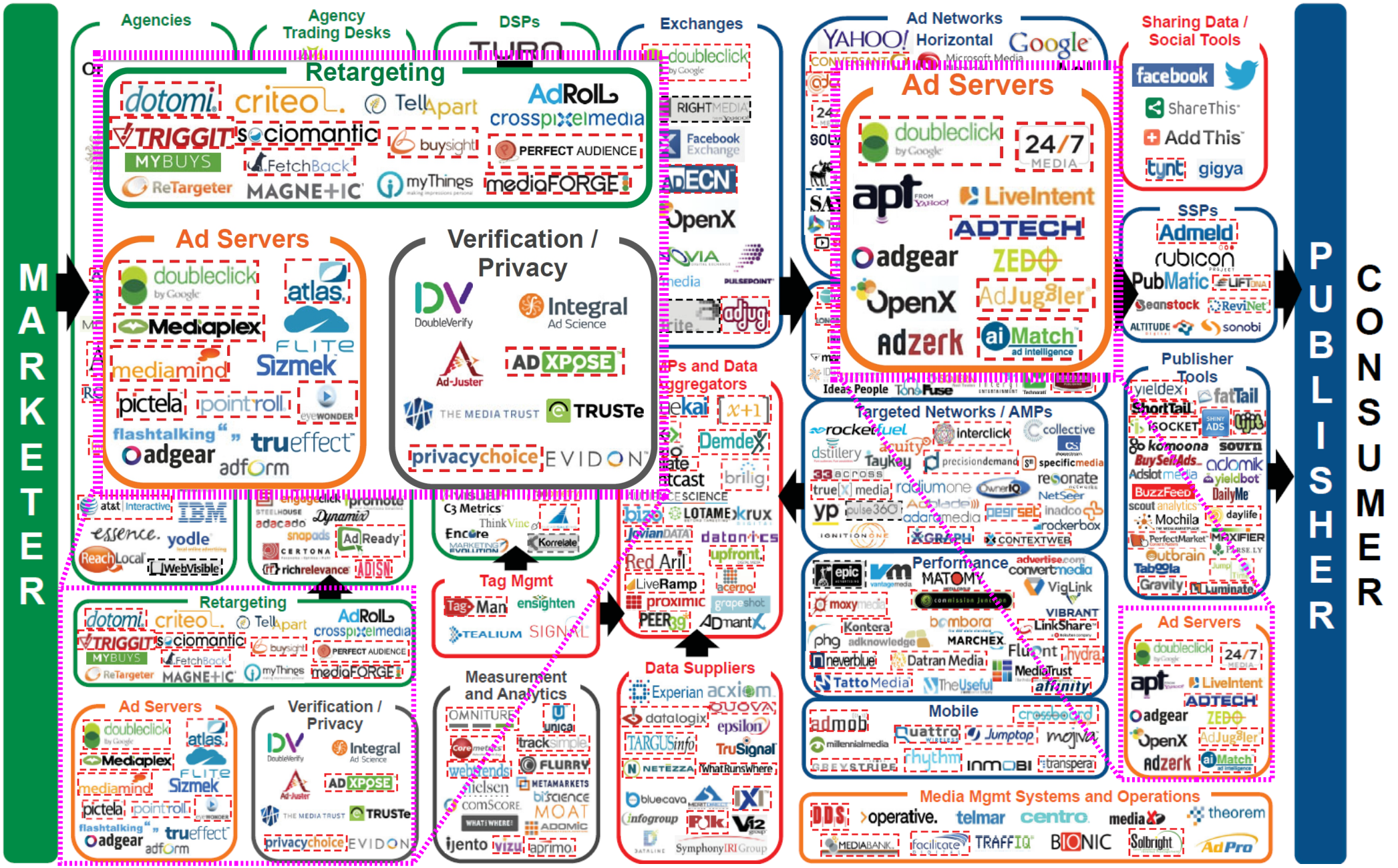
Euphemism of the decade: “Webtracking”

=> For Money!

- Get to know the users
- Create detailed profiles of persons (job, age, ***buying power***, hobbies, politics, pregnancy ...)
- sell profiles to advertisement companies
- higher conversion rate with targeting
- higher prices for targeted ads

=> Conversion tracking

DISPLAY LUMAscape



Kawaja, T., 2010-12-30, DISPLAY LUMAscape

Problems:

- Profiling, Scoring
- Deanonymization
- Trade with profiles of persons (like stocks)
- insurances (tailored premiums)
- banks (tailored credit interests)
- employers (candidate screening)
- differential pricing
- political parties (election campaigns)

Further readings

Study (German): Web-Tracking-Report

Study (German): Kommerzielle digitale Überwachung im Alltag

Congressional Testimony: What Information Do Data Brokers Have on Consumers?

European Comission, Data Protection, Article 29 Working Party

- 2012-06-07, Opinion 04/2012 on Cookie Consent Exemption
- 2014-04-10, Opinion 05/2014 on Anonymisation Techniques
- 2014-11-25, Opinion 9/2014 on the application of Directive 2002/58/EC to device fingerprinting

Cane from JonDo on browser tracking (German)

Web Series do not track (in 4/2015 with 3rd party JS from google-analytics.com :-))

Articles

How Microsoft and Yahoo Are Selling Politicians Access to You

Everything We Know About What Data Brokers Know About You

- So they don't sell information about my health?

Insurers Test Data Profiles to Identify Risky Clients

Has Google Gone Too Far?

- Parental Status Demographic Added to AdWords

Wie Facebook-Einträge einen Kredit verhindern können

EC-Datenfirma wollte zur neuen Schufa werden

Tricksen und täuschen mit System (Differential Pricing)

Auktion wie ein Wimpernschlag (Real Time Bidding, find prices for targeted ads)

Actual state of commercial surveillance

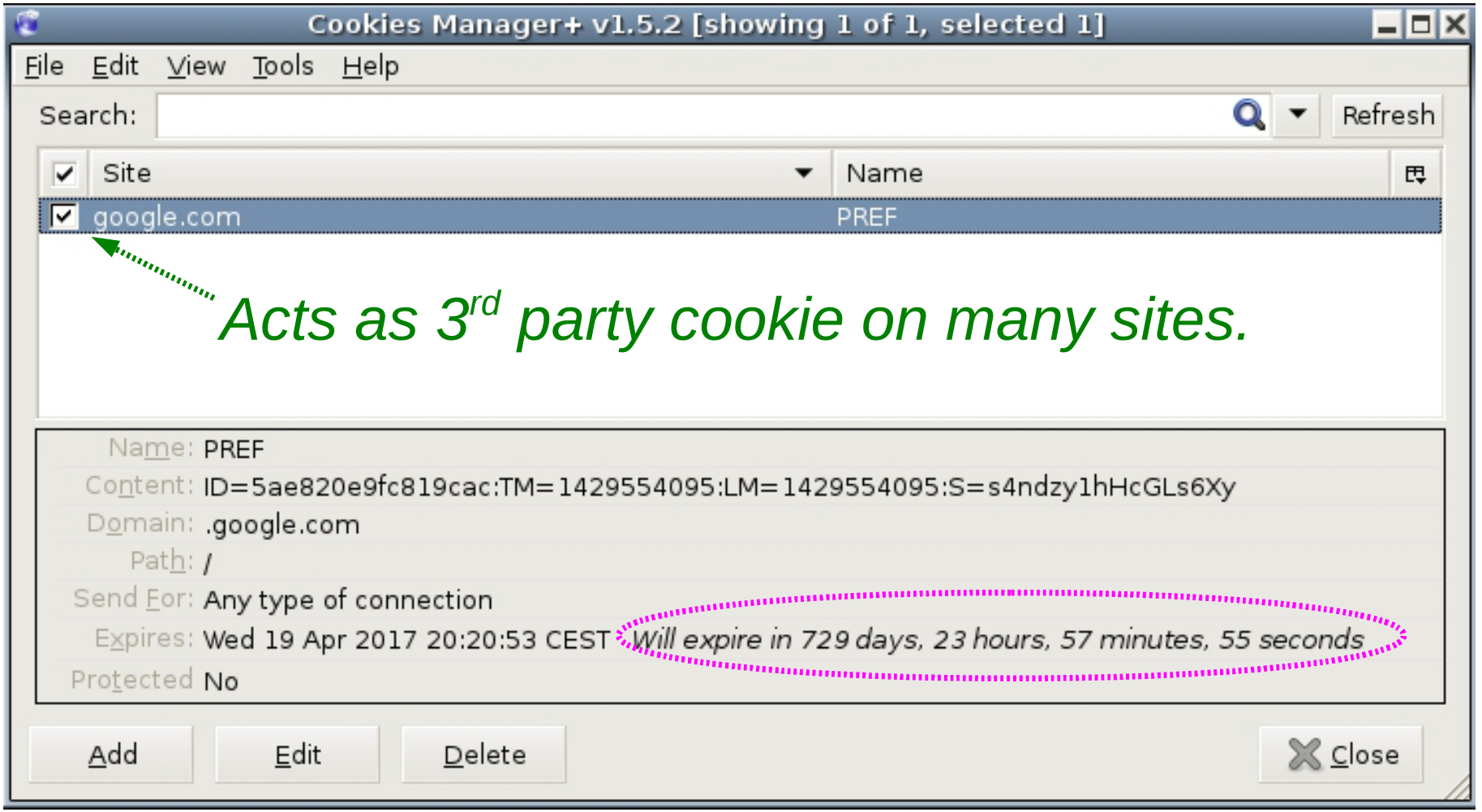
Alexa Top 20 Austria, Tue, 2015-04-21

Without tracking companies (no other trackers on their sites) and double sites: amazon.com, amazon.de, ebay.at, facebook.com, gmx.net, google.at, google.com, google.de, googleadservices.com, yahoo.com, youtube.com

1) orf.at, 2) de.wikipedia.org, 3) willhaben.at,
4) gmx.at, 5) derstandard.at, 6) ebay.de,
7) raiffeisen.at, 8) live.com, 9) sparkasse.at,
10) xhamster.com, 11) krone.at, 12) twitter.com,
13) streamcloud.eu, 14) geizhals.at, 15) xvideos.com
16) pornhub.com, 17) bankaustria.at, 18) a1.net,
19) herold.at, 20) spiegel.de

Standard Browser. Total surveillance!

The 300 M$ Cookie. First start of new F'fox:



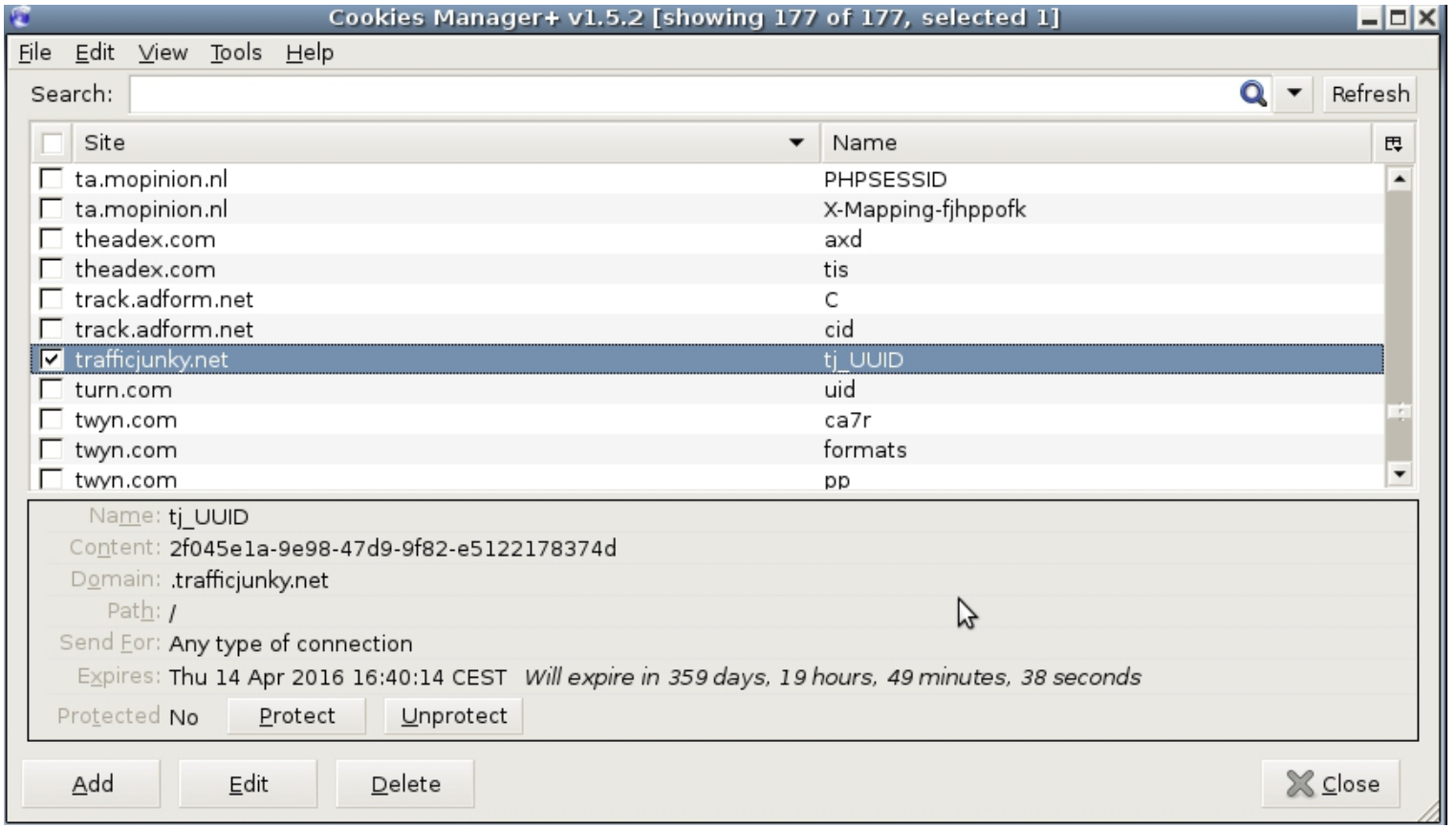
2012 – 2014: Ca. 300 M$ p.a. for being the default search.
Since 2015: US Yahoo, CN Baidu, RU Yandex, rest Google

Mozilla is nevertheless your friend!

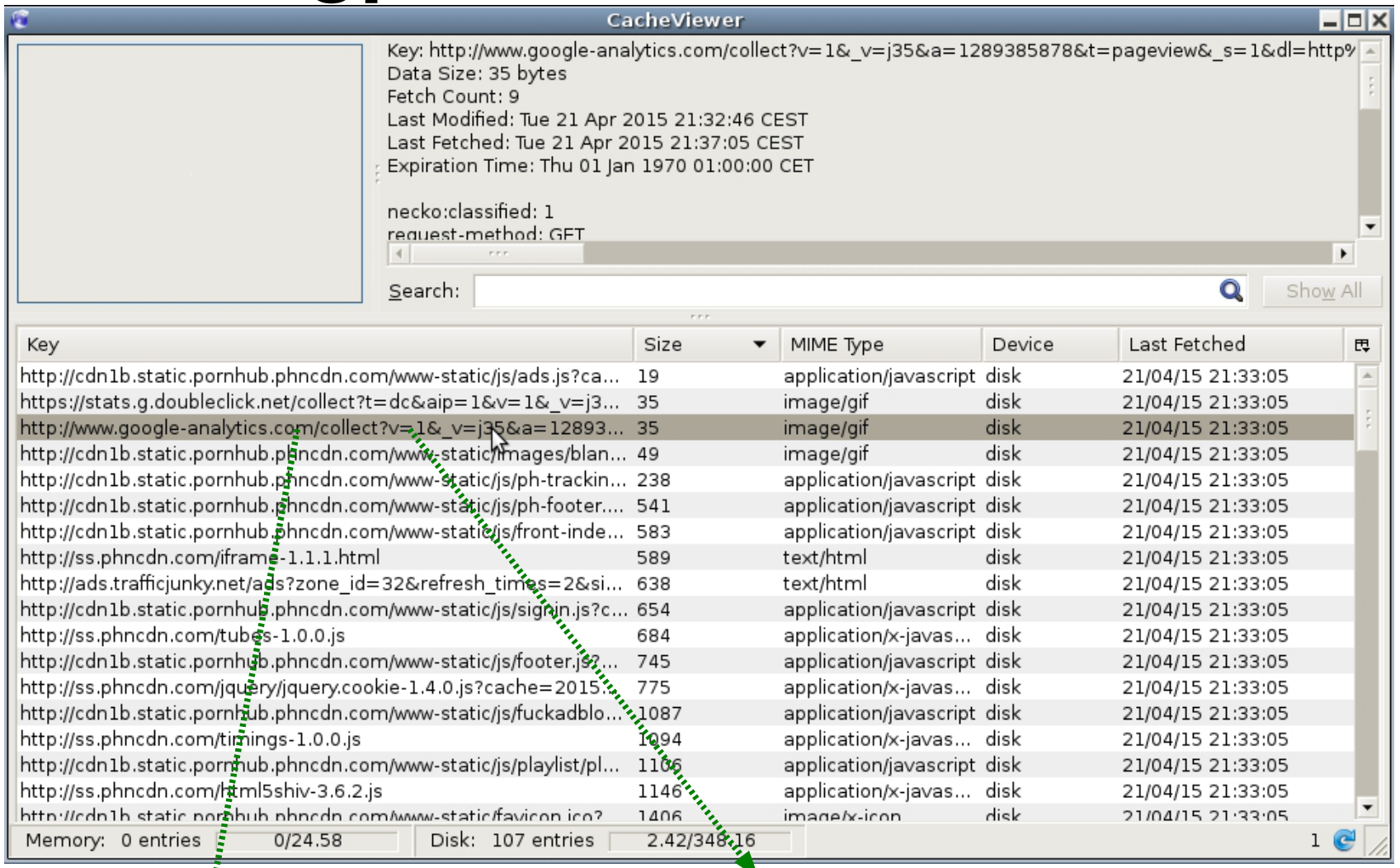
=> They just need money for the coders.

=> Buy merch articles, donate money!

Cookies after normal surfing



Trackingpixels in Cache



http://www.**google-analytics.com**/collect?
v=1&_v=j35&a=1289385878&t=pageview&_s=1&dl= http%3A%2F
%2F**www.pornhub.com** *(...) CENSORED (...)*
&**sd=24it&sr=1280x800&vp=1250x579**&je=0 &fl=11.2%20r202&_u=AGAAgAAB~
&**jid=984469428&cid=193702535.1429644766&tid=UA-2623535**-1&z=1925177428

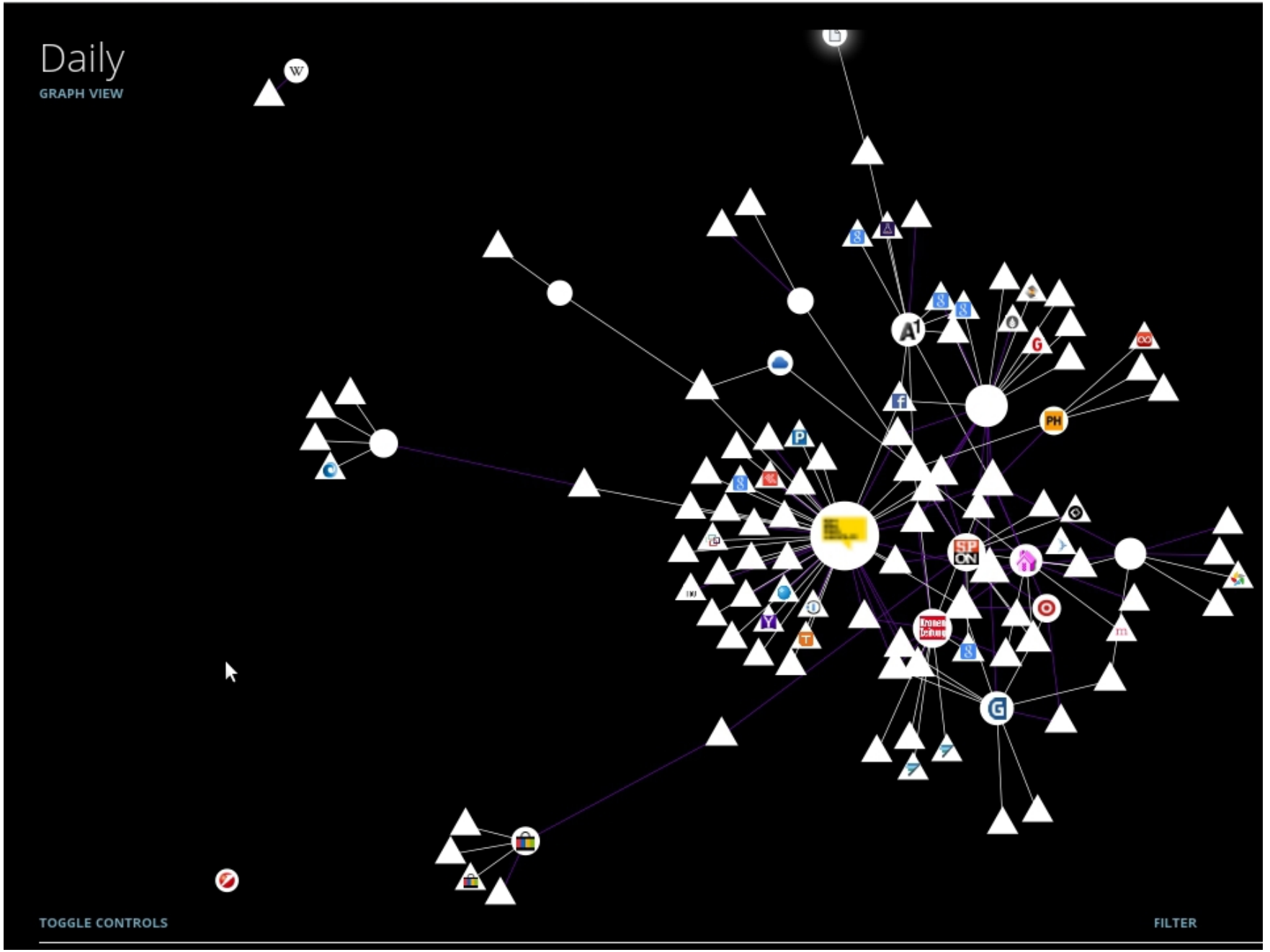
Stalking parties

DATA GATHERED SINCE
APR 20, 2015

YOU HAVE VISITED
19 SITES

YOU HAVE CONNECTED WITH
115 THIRD PARTY SITES

TRACKING PR



Visualisation from Lightbeam

Browser Fingerprinting

- Sending of technical data from browser, programs, operating system and device to server.

- Passive via HTTP protocol and active via JavaScript (JS)

- Fingerprint = combination of many single data --> Very low probability for 2nd combination of browser - OS - machine with identical fingerprint

- Example Fingerprinters: Panopticlick, Am I Unique

Example adspirit fingerprinter:
IP, browser, OS, time, timezone, screen resolution, colour depth, CPU type, DNT header, language

Futher tracking technologies

Browser based

Flash Cookies (LSO)

Canvas Fingerprinting via JS

Measurement of browser latency via JS

Potential misuse TLS (HSTS cookies)

Not browser based

TCP/IP Stack Fingerprinting

Clock Skew (see Heise, caida)

Deep packet injection by ISP

Countermeasures in Firefox

If possible: Use Firefox ESR (higher frequency!)

Only search engines: Ixquick, DuckDuckGo, Qwant, Startpage. Disable "Provide search suggestions"

Only 3 local standard fonts allowed

Language set to en-us, en

External aplications: “Always ask”

Do not track header

Reject 3rd party cookies

NoScript:
Block 3rd party JS
Delete Whitelist
Block iFrames, WebGL

Clear history when Firefox closes (delete everything)

Limit disk-cache to 0 MB of space

Disable automatically update of search engines

Set necessary plugins to "always ask" (e. g. Flash)

Deactivate/deinstall unnecessary plugins

Firefox basis configuration, about:config

Broadcasted via HTTP and JS: Iceweasel user agent

`general.useragent.override =`

Mozilla/5.0 (X11; Linux i686; rv:37.0) Gecko/20100101 Firefox/37.0 *instead of*

Mozilla/5.0 (X11; Linux i686; rv:37.0) Gecko/20100101 Firefox/37.0 Iceweasel/37.0.1

via http: From which site you come

ESR v31 for one variant

`network.http.sendRefererHeader = 0`

via JS: YYYYMMDDhhmmss compilation and location

`general.buildID.override = empty`

`geo.enabled = false`

via JS: Public IP beside proxy via WebRTC

`media.peerconnection.enabled = false`

Stop pre-loading of linked sites (via HTTP)

`network.dns.disablePrefetch = true`

`network.prefetch-next = false`

More standard user agents and proposals in the annex

AddOns against webtracking:

- HTTPS everywhere v5.0.2
- uBlock v0.9.1.0 (default filter lists)
- NoScript v2.6.9.21
- Privacy Badger v0.2.6
- Request Policy Contd. v1.0b8.2
- User Agent Overrider v0.2.5

Available Standard solutions:

Tor Browser Bundle v4.0.8

JonDonym v00.19.001, JonDoFox v2.11.0

Immunity Zone with original Firefox

IMMUNITYZONE

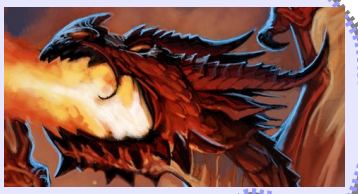
Project page: immunityzone.com
Test at: amune.org

Hosted-VM - ImmunityZone

DOM-Streaming

HTTP:// or HTTPS://

Internet (here *be* dragons ...)



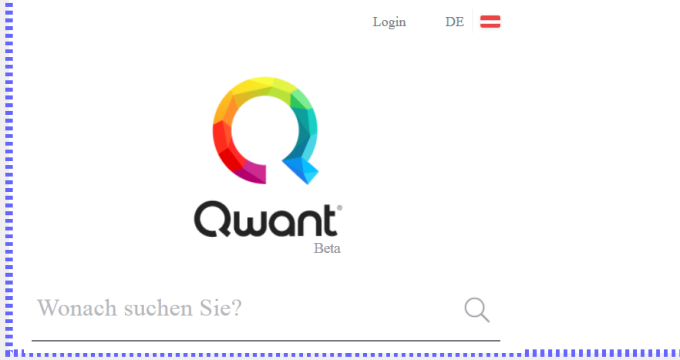
Smaug
(c) D. Melvin

Hosted Virtual Machine
blocks:
o) Cookies
o) Cache
o) HTML5-LocalStorage
o) Ads
Same fingerprint for all users!

https://immunityzone.com

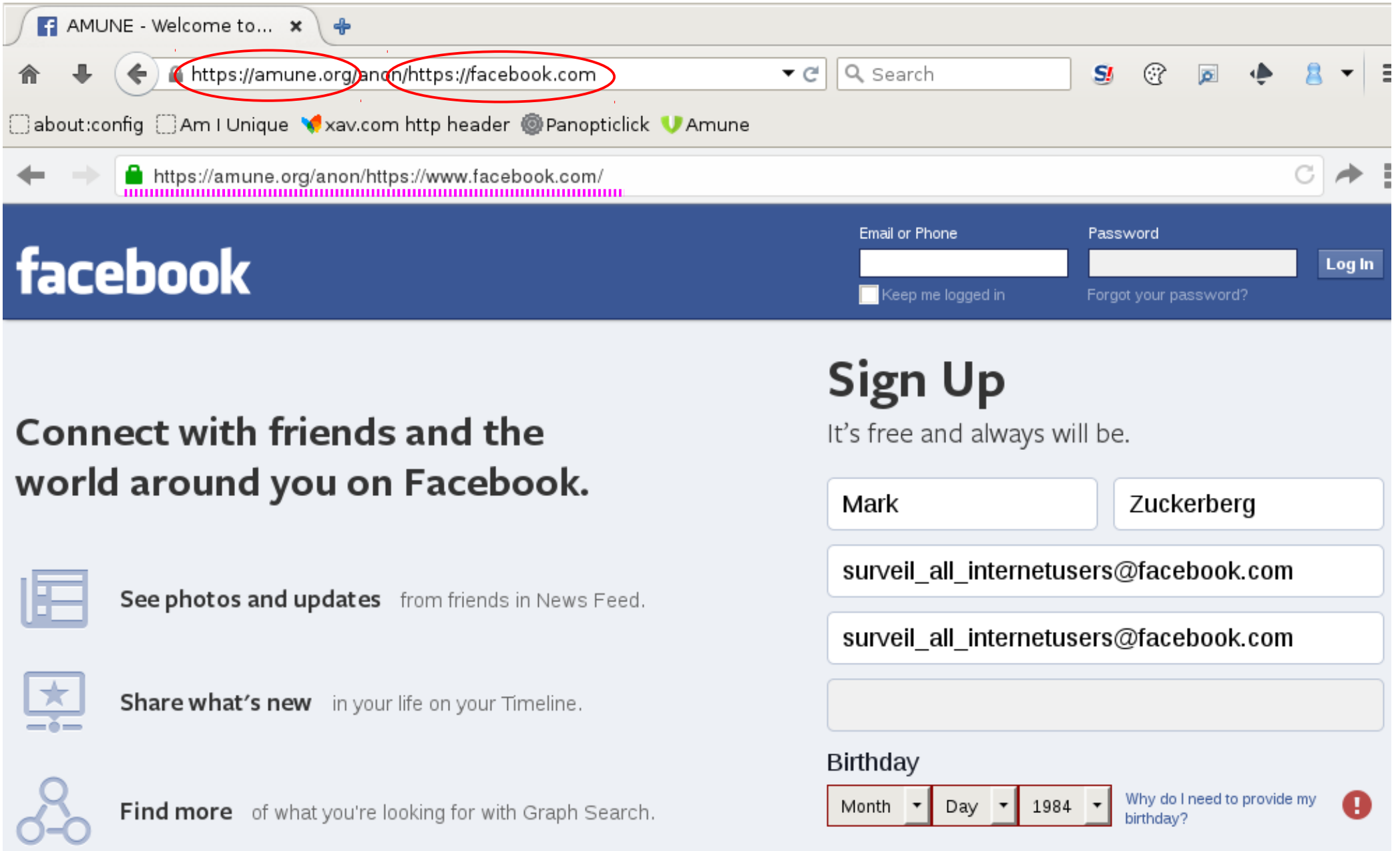
Device (Linux, BSD, Mac, Win, Android)

Default Browser

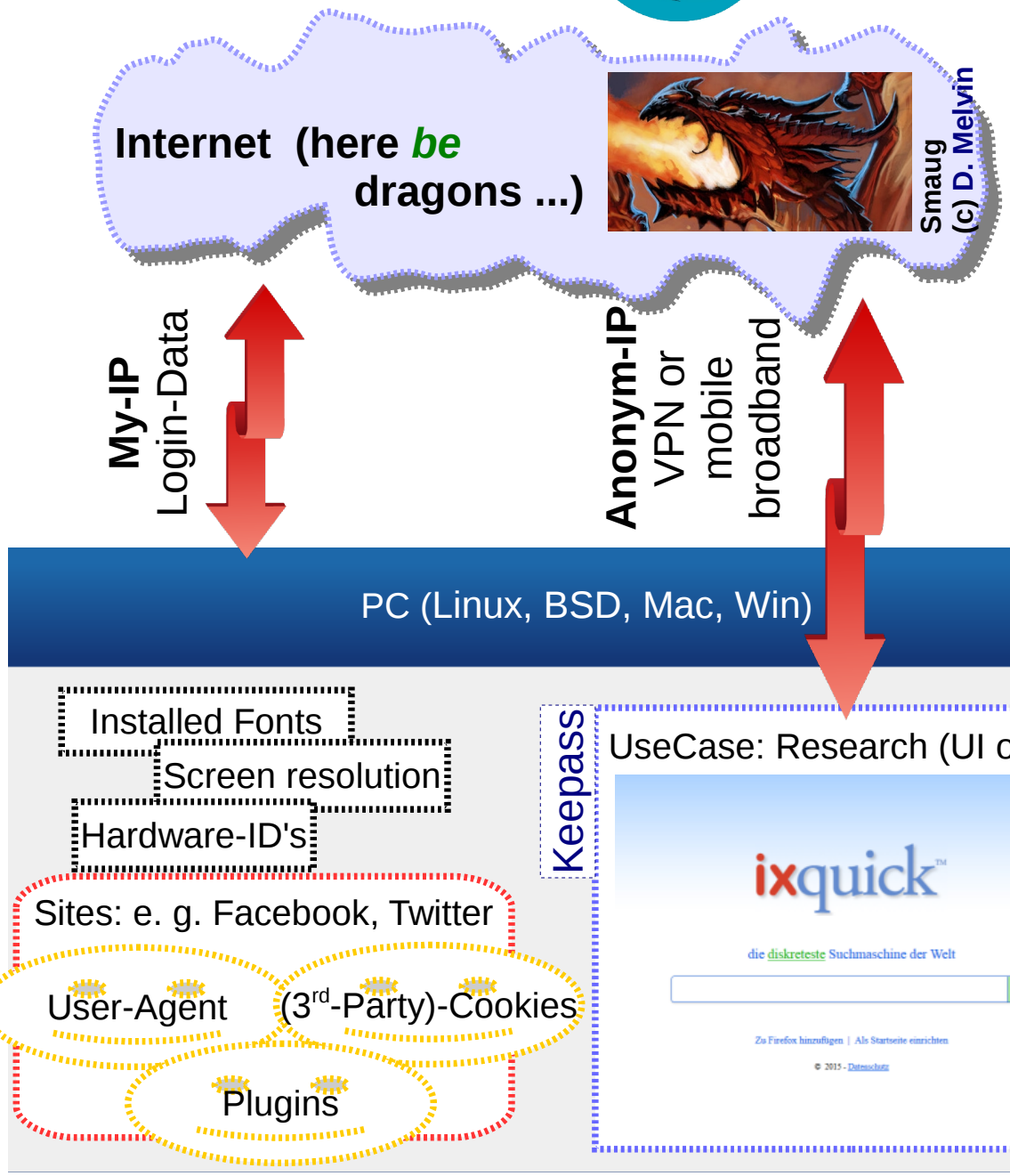


Status: Beta
good for Smartphones/Tablets
good for PC's on work (no admin)
bad for Netbanking

ImmunityZone.com
Paid Version
Amune.org
Ad-Based(tracking free)
Shared VM/Only for Anti-Web-Blocking


AMUNE - Welcome to...
https://amune.org/anon/https://facebook.com
Search
about:config
Am I Unique
xav.com http header
Panopticlick
Amune
https://amune.org/anon/https://www.facebook.com/
facebook
Email or Phone
Password
Log In
Keep me logged in
Forgot your password?
Connect with friends and the world around you on Facebook.
See photos and updates from friends in News Feed.
Share what's new in your life on your Timeline.
Find more of what you're looking for with Graph Search.
Sign Up
It's free and always will be.
Mark
Zuckerberg
surveil_all_internetusers@facebook.com
surveil_all_internetusers@facebook.com
Birthday
Month
Day
1984
Why do I need to provide my birthday?

Privacy Machine



Local Virtual Machine (VirtualBox)

o) (Flash-)Cookies/Cache/HTML5-LSO
-> Switchback VM-Snapshot: Delete all!
o) IP-Adress: changes via i.e. VPN
o) Browser-Fingerprint:
  x) changing Browser (+User-Agent)
  x) OS: install/deinstall fonts
  x) change language/timezone
  x) change screen resolution

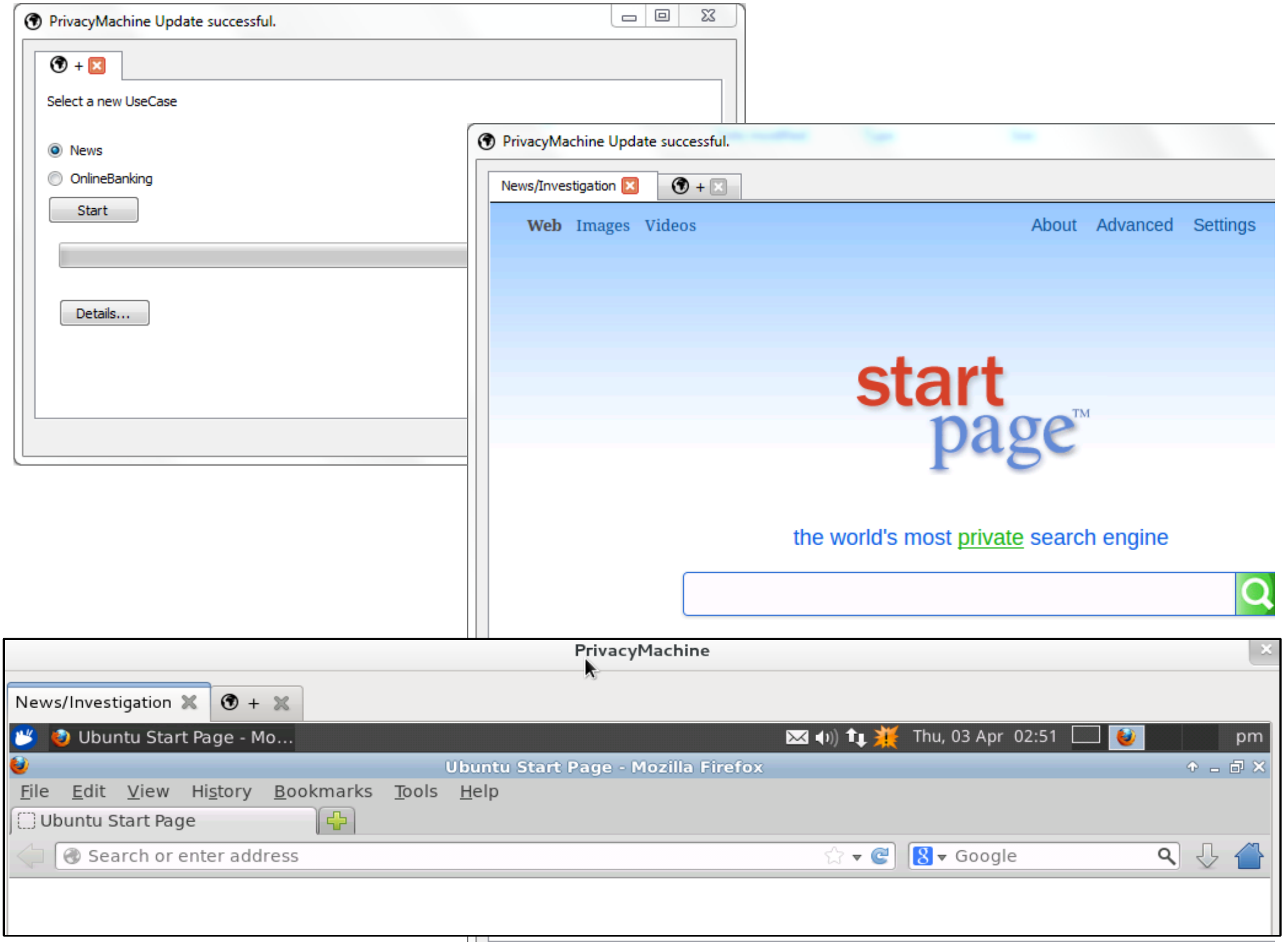
Browser-Fingerprint is unique, but changes in every Browsing-Session!

Status: Prototype

Join us!

C++ Devs needed, any OS

contact@privacymachine.eu


PrivacyMachine Update successful.
Select a new UseCase
News
OnlineBanking
Start
Details...
PrivacyMachine Update successful.
News/Investigation
Web
Images
Videos
About
Advanced
Settings
start page™
the world's most private search engine
PrivacyMachine
News/Investigation
Ubuntu Start Page - Mo...
Thu, 03 Apr 02:51
pm
Ubuntu Start Page - Mozilla Firefox
File
Edit
View
History
Bookmarks
Tools
Help
Ubuntu Start Page
Search or enter address
Google

Measurement of efficiency

Setup of experiment

- Debian Linux, i386, v7.8, fully patched
- Adobe Flash Player v11.2.202.451
- Firefox (Iceweasel) v37.0.1
- AddOns for measurement:
  - Cookies Manager+ v1.5.2
  - CacheViewer v0.8.6
  - NoScript v2.6.9.21
  - Lightbeam v1.2.1
  - User Agent Overrider v0.2.5

Variants to be measured

unmodified

a) Original open. Firefox w/o modifications, as installed. Browser stays open

b) Original closed. Like a), close + re-open

home-grown

c) DNT1. **DO! NOT! TRACK!** Base config, uBlock

d) DNT2. Base config, Privacy badger

e) DNT3. Base config, Request Policy

f) DNT4. Base config, no cookies, Request Policy block all, block all JS, all plugins off, *stepwise activation.*
User Agent v31 ESR → bigger anonymity group!

prefabricated

g) Original PW. Like b), but Priv. Window (Ctrl+Shift+P)

h) TBB. Tor Browser Bundle v4.0.8 (w. & w/o JS) *Free*

i) JDF. JonDonym v00.19.001, JonDoFox v2.11.0 *50-100 €/y 6 €/GB*

j) IZ. Raw F'fox, TLS to ext. VM ImmunityZone *0-240 €/y*

Results of measurement

Other working principle, connection from server ends at VM, see the slides

	2015-04-20, ISP: A1, dyn. IP in Graz/Austria					2015-04-21, ISP: A1, dyn. IP in Graz/Austria					
?: not counted, estimation	a) orig. open	b) orig. closed	c) DNT1	d) DNT2	e) DNT3	f) DNT4 "ESR"	g) orig. PW	h) TBB orig	h1) TBB no JS	i) JDF "ESR"	j) IZ
3rd party requests	?, many	-	?, many	?, many	?, many	10 (a)	?, many	?, many	?, many	?, many	0
Counted local markers before or after restart	before	after	before	before	before	before	after	before	before	before	before
Intended deletion of markers at closing OK?	not intend.	not intend.	yes	yes	yes	yes	in large part	yes	yes	yes	in large part
Cookies	267	180	83	86	86	73 (a)	4	0	0	?, 70 (a)	2
Cookies, 3rd party	?, many	95	0	0	0	0	4 (b)	0	0	0	1
Cache, elements disk	2030	2092	0	0	0	0	41	0	0	1114	1579
Cache, disk, in MB	45.7	45.5	0	0	0	0	1	0	0	20.8	27.8
Cache, elements RAM	168	0	9	28	22	31	0	1981	1225	1114	28
Cache, RAM, in MB	?	?	0.5	0.5	0.5	0.6	0	21.6	15.7	20.8	?, little
Cache, elements <= 76B	243	134	2	14	9	8	0	?, many	?, many	28	46
Cache, elements 3rd p.	?, many	?, many	0	10	5	7	41 (c)	?, many	?, many	?, few	2
Cache, "adult" pictures	?, many	?, many	0	0	0	0	0	?, many	?, many	?, some	?, some
Cache, "adult" videos	5	5	0	0	0	0	0	0	0	0	0
Cache, advert. videos	1	1	0	0	0	0	0	0	0	0	0
Flash cookies, LSO	1	1	0	0	0	0	1	0	0	0	0
Lightbeam, 3rd parties	89	89	11	24	17	8	0	8	0	10	1
Lightbeam, disconnected 1 st parties, no.	2, 8, 10, 17,	2, 8, 10, 17,	all	all	all	all	all	all	all	all	all
JS, 1st & 2nd party	20	-	20	20	20	8 (a)	20	20	8	8	1
JS, 3rd parties	63	-	5	5	5	5 (a)	?, 60	?	?, little	5	0
JS, 3rd p. on min. 2 pgs.	20	-	0	0	0	0	?, 20	?	0	0	0
JS, disconnected 1st parties, no.	2, 9, 17	2, 9, 17	all	all	all	all	?	all	all	all	all
Panopticlick, same Fp (d)	2	2	2	3	4	2430 (e)	3	1 (f)	10450	2430 (e)	6
share in %	0.00004	0.00004	0.00004	0.00006	0.00008	0.00015	0.00006	0.00002	0.20	0.00015	0.00011
Am I Unique, same Fp (g)	2	2	2	2	3	124 (e)	3	1 (f)	435	124 (e)	4
share in %	0.00282	0.00282	0.00282	0.00282	0.00423	0.00423	0.00423	0.00140	0.61	0.00423	0.00564
Broken sites		-	-	-	-	10, 13, 15, 16	-	10, 13, 15, 16	10, 13, 15, 16	10, 13, 15, 16	

(a) manual activation: 8 x cookie domains, 13 x JS domains, 10 x request (*request only DNT4*) (b) adnxs.com, google.com (c) wikipedia.org (d) basis 4/2015: 5.256 Mio Fingerpr. (e) JS off, user agent changed to Firefox v31 (ESR) on Linux i386 (preset in JDF). (f) browser windows size sent with activated JS, very individual, but only "fingerprintable" property (g) basis 4/2015: 0.071 Mio Fingerpr.

2015-04-23 **Frequency of fingerprints, dependent on user agent, setting DNT4**

```
Mozilla/5.0 (X11; Linux i686; rv:28.0) Gecko/20100101 Firefox/28.0
   version number increase to
Mozilla/5.0 (X11; Linux i686; rv:37.0) Gecko/20100101 Firefox/37.0
   same scheme for
Mozilla/5.0 (X11; Linux x86_64; rv:28.0) Gecko/20100101 Firefox/28.0
Mozilla/5.0 (Windows NT 6.1; rv:28.0) Gecko/20100101 Firefox/28.0
Mozilla/5.0 (Windows NT 6.1; WOW64; rv:28.0) Gecko/20100101 Firefox/28.0
```

https://amiunique.org

basis (b) of measured fingerprints: 71,302

https://panopticlick.eff.org

basis (b) of measured fingerprints: 5,262,400

b increased during ca. 4 h from 5,262,100 to 5,262,800

*one in x browsers have the same fingerprint as yours **(x)***

F'fox version	release date yymmdd	Linux i386	Linux x64	Windows i386	Windows x64
28	140318	75,174	21,391	59,126	12,126
29	140429	86,265	17,197	44,220	6,907
30	140610	142,220	13,704	38,132	8,771
31	140722	2,166	16,092	5,051	6,410
32	140902	99,286	50,598	58,475	9,265
33	141014	154,770	40,478	38,983	5,822
34	141201	122,376	37,320	58,475	8,557
35	150113	187,934	33,095	54,821	7,122
36	150224	219,257	39,865	49,649	10,807
37	150331	478,379	51,089	89,200	14,340

Hier könnte ihre Werbung stehen!

Number (n) of tests with identical fingerprint

n is displayed on site

F'fox version	release date yymmdd	Linux i386	Linux x64	Windows i386	Windows x64
28	140318	3	5	1	1
29	140429	2	5	1	27
30	140610	1	2	1	5
31	140722	124	9	440	13
32	140902	1	3	2	4
33	141014	1	5	4	61
34	141201	9	82	37	183
35	150113	5	29	8	105
36	150224	4	22	27	40
37	150331	5	9	7	19

n calculated: n = 1 / x * b

F'fox version	release date yymmdd	Linux i386	Linux x64	Windows i386	Windows x64
28	140318	70	246	89	434
29	140429	61	306	119	762
30	140610	37	384	138	600
31	140722	2,430	327	1,042	821
32	140902	53	104	90	568
33	141014	34	130	135	904
34	141201	43	141	90	615
35	150113	28	159	96	739
36	150224	24	132	106	487
37	150331	11	103	59	367

Rating of countermeasures

Surveillance scenarios - commercial

!! INCREASE OF COST !!

C1) Commercial standard. 3rd party cookies, tracking pixels, 3rd party JS fingerprinting, IP

C2) Commercial advanced. Like C1), plus: 1st party JS fingerprinting, clock skew, deep packet injection by ISP, TCP/IP stack fingerprinting, canvas fingerprinting, latency measurement

C3) Commercial unknown. Like C2, plus: yet unknown commercial tracking measures. E. g. the Verizon X-UIDH header was detected only by accident after > 2 yrs in 10/2014.

Surveillance scenarios – intel. services

!! INCREASE OF COST AND RISK !!

I1) Intel. services standard. Like C1), mainly passive wiretapping at net hubs. Automatized analysis of **all metadata**.

I2) Intel. services advanced. Like C2), plus: Automatized timing correlation at VPN servers (package flow in/out), automatized attacks at browsers.

I3) Intel. services targeted. Like I2), plus: (Manual) deanon. of obfuscated traffic (Tor, JonDo, multihop VPN), search for user errors (email addresses for accounts, non-obfuscated IPs, MAC addresses, machine fingerprints, ...), exploitation of programs, OS, firmware.

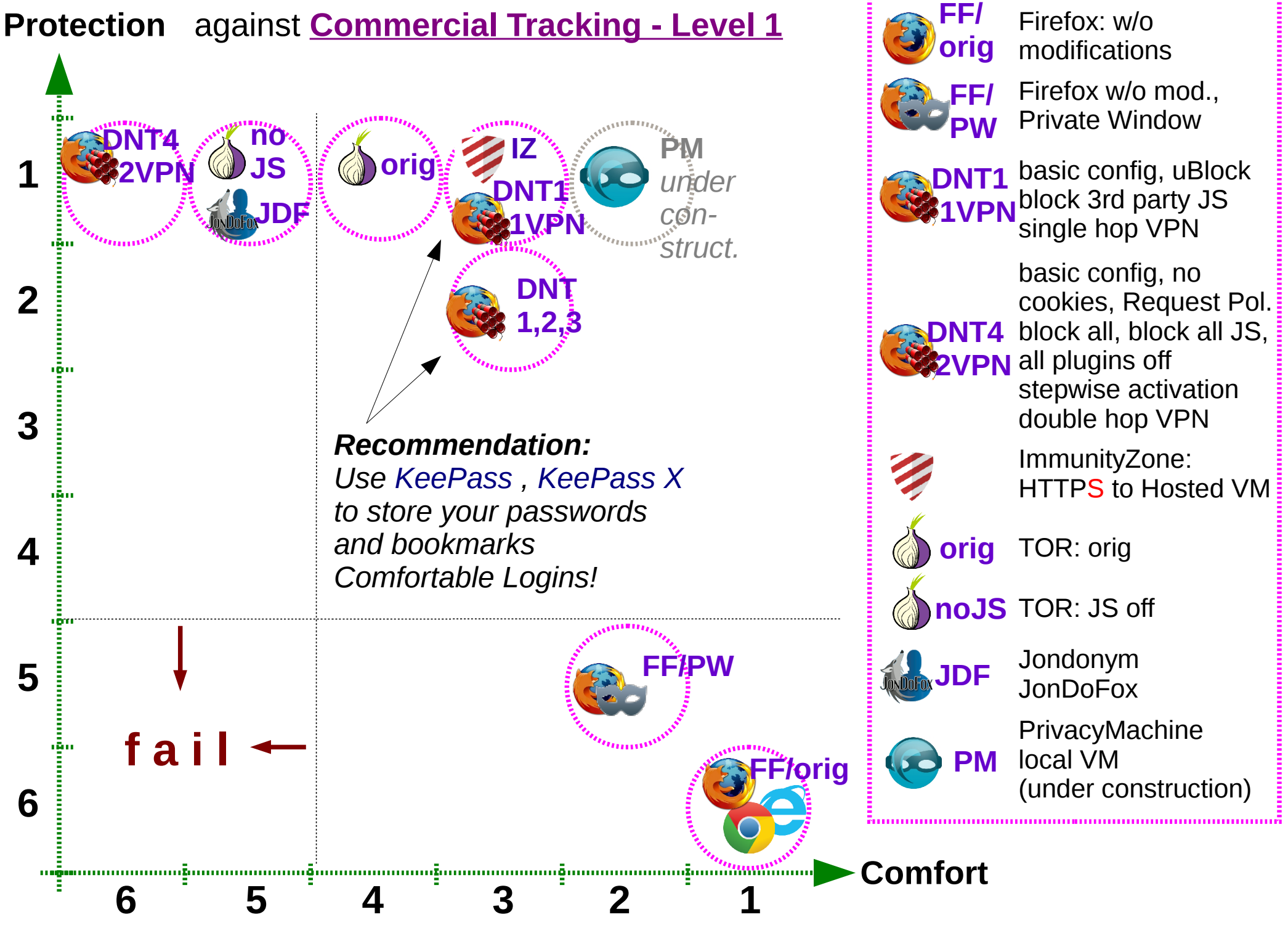
Rating of surveillance protection

Use at private internet connection, normal OS, browser closed once per day. Grades: *6 (insufficient)* to *1 (very good)*

	b) orig. closed	c) DNT1	*c) DNT1, 1 VPN (I)*	d) DNT2	e) DNT3	f) DNT4	*f1) DNT4, 2 VPN (II)*	g) orig. priv. Window	h) TBB orig.	h1) TBB no JS	i) JDF	j) IZ
C1	6	2	*1*	2 (III)	2 (III)	1	*1*	5	1	1	1	1
C2	6	5	*3*	5	5	2	*1*	6	1	1	1	1
C3	6	6	*4*	6	6	4	*3 (IV)*	6	2	1	2 (IV)	2 (VII)
I1	6	3	*2*	3	3	2	*1*	5	2	1	1	1
I2	6	5	*4*	5	5	3	*3 (IV)*	6	3 (V)	1	2 (IV)	4
I3	6	6	*5*	6	6	6	*5*	6	5	5+	5 (VI)	5
Comfort	1	3	*3*	3	3	6	*6*	2	4	5	5	3

(I): single hop VPN service *(0-50 €/y)*, block TCP timestamp (Firewall)
(II): double hop VPN service *(~ 100 €/y)*, block TCP timestamp
(III): filter algorithms / -lists should be improved, not further treated
(IV): JS on/off → 1st party fingerprintability
(V): activated JS increases attack surface
(VI): less JonDonym hubs than Tor hubs → deanonymization cheaper
(VII): depends on activity of operator

Choose commercial VPN services from EFF supporters!


Protection against Commercial Tracking - Level 1
DNT4
2VPN
no
JS
JDF
orig
IZ
DNT1
1VPN
PM
under
con-
struct.
DNT
1,2,3
Recommendation:
Use KeePass , KeePass X
to store your passwords
and bookmarks
Comfortable Logins!
FF/PW
FF/orig
f a i l
1
2
3
4
5
6
6
5
4
3
2
1
Comfort
FF/
orig
Firefox: w/o
modifications
FF/
PW
Firefox w/o mod.,
Private Window
DNT1
1VPN
basic config, uBlock
block 3rd party JS
single hop VPN
DNT4
2VPN
basic config, no
cookies, Request Pol.
block all, block all JS,
all plugins off
stepwise activation
double hop VPN
ImmunityZone:
HTTPS to Hosted VM
orig
TOR: orig
noJS
TOR: JS off
JDF
Jondonym
JonDoFox
PM
PrivacyMachine
local VM
(under construction)

Summary

- Unmodified browsers: Full surveillance from 1st click on. Be aware of that!

- Effective countermeasures are possible by own modifications.

- DNT1 is a good and approved compromise.

- DNT4: block everything by default.

Home-grown secure antitracking for masochists. ;-)

- Effective standard solutions are available (Tor, JonDonym, ImmunityZone. ***Check TLS cerficates! MITM!***)

- Future secure and comfortable countermeasures are under construction: PrivacyMachine. Join us!

- Find your own compromise between security and comfort, see the rating.

Annex

More tools to play with:

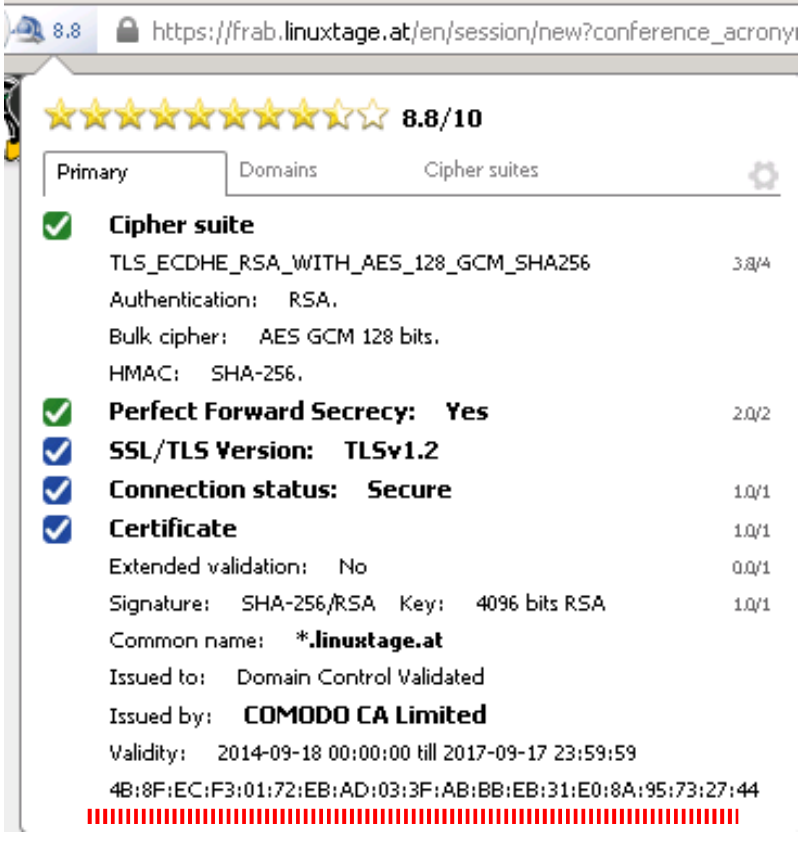
Cookie Monster . Administer your cookies.
Profile Switcher . Easy switching of F'fox profiles
Policeman . Similar to Request policy
Secret Agent . Creates obfuscation
Referrer Control . Easy setting of referer options.
Bleachbit . Cleaner, read the descriptions!
Fluxfonts . Creates obfuscation for sent system fonts.

Proposal for manual check of TLS certificates

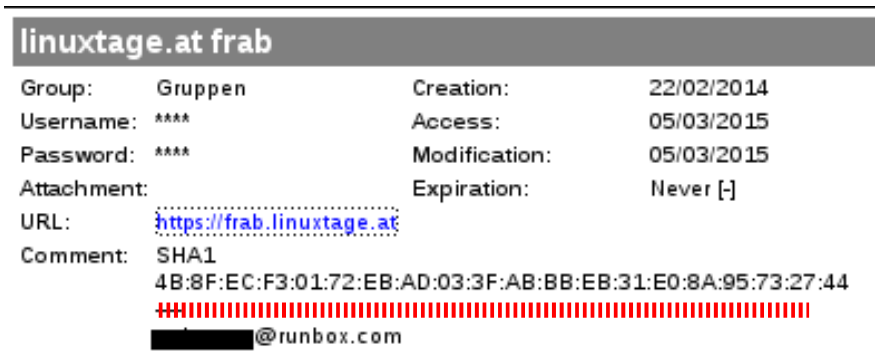
- Store the Fingerprint locally, e. g. in the appropiate entry of KeePass or KeePassX.

- Use SSLeuth to easily show the TLS fingerprint of the connected server and compare the two hash values.

- Be sure to enter your password in the right server, counteract possible MITM attacks.



AddOn for automatic check:
Certificate Patrol



More proposals for about:config

Filter for :// . Proposal: Delete, what does not aim at Mozilla URLs.

browser.contentHandlers.types.0.uri , browser.search.geoip.url , devtools.gcli.jquerySrc , devtools.gcli.lodashSrc , devtools.gcli.underscoreSrc , experiments.manifest.uri , gecko.handlerService.schemes.irc.0.uriTemplate , gecko.handlerService.schemes.ircs.0.uriTemplate , gecko.handlerService.schemes.mailto.0.uriTemplate , gecko.handlerService.schemes.mailto.1.uriTemplate , gecko.handlerService.schemes.webcal.0.uriTemplate , geo.wifi.uri , loop.oauth.google.scope , social.whitelist , toolkit.telemetry.server

!! Add Malware lists to uBlock from ***before*** changing safebrowsing !!
malwaredomainlist.com , malwaredomains.com

browser.safebrowsing.appRepURL , browser.safebrowsing.gethashURL , browser.safebrowsing.malware.reportURL , browser.safebrowsing.reportURL , browser.safebrowsing.updateURL

AddOns in about:config: Delete noscript-strings which contain "google"

More standard user agents:

Mozilla/5.0 (X11; Linux x86_64; rv:37.0) Gecko/20100101 Firefox/37.0

Mozilla/5.0 (Windows NT 6.1; rv:37.0) Gecko/20100101 Firefox/37.0

Mozilla/5.0 (Windows NT 6.1; WOW64; rv:37.0) Gecko/20100101 Firefox/37.0

3rd party JS, partly fingerprinters

1, orf.at, 2mdn.net, adworx.at, doubleclick.net, googlesyndication.com, meetrics.net, Mxcdn.net, oewabox.at, **2, de.wikipedia.org,** wikimedia.org, **3, willhaben.at,** adition.com, adnxs.com, akamaihd.net, Amazon-adsystem.com, apa.net, criteo.com, cxense.com, facebook.com, facebook.net, goldbach.com, google.at, googleadservices.com, oewabox.at, optimizely.com, revsci.net, Styria-digital.com, twyn.com, **4, gmx.at,** Ad-balancer.net, adform.net, adnxs.com, criteo.com, doubleclick.net, googlesyndication.com, meetrics.net, mxcdn.net, plista.com, tifbs.net, Ui-portal.de, uimserv.net, **5, derstandard.at,** adverserve.net, Google-analytics.com, meetrics.net, mxcdn.net, oewabox.at, **6, ebay.de,** ebayrtm.com, ebaystatic.com, ioam, **7, raiffeisen.at**, elba.at, Google-analytics.com, ttweb.net, **8, live.com,** bkrtx.com, bluekai.com, demdex.net, gfx.ms, omtrdc.net, **9, sparkasse.at,** 2mdn.net, adition.com, criteo.com, doubleclick.net, Google-analytics.com, googlesyndication.com, googletagservices.com, insightexpressai.com, ioam.de, meetrics.net, moatads.com, mxcdn.net, theadex.com, yieldlab.net, **10, xhamster.com,** trafficstars.com, **11, krone.a**t, adtech.de, chartbeat.com, Google-analytics.com, googlesyndication.com, Grm-pro.com, meetrics.net, mxcdn.net, oewabox.at, Serving-sys.com, **12, twitter.com,** Google-analytics.com, twimg.com, **13, streamcloud.eu,** Ajax-googleapis.com, Google-analytics.com, **14, geizhals.a**t, Ad-balancer.net, adworx.at, gzhls.at, maxymiser.net, meetrics.net, mxcdn.net, oewabox.at, **15, xvideos.com,** ajax.googleapis.com, trafficfactory.biz, **16, pornhub.com,** contentabc.com, doublepimp.com, etahub.com, Google-analytics, phncdn.com, trafficjunky.net, **17, bankaustria.a**t, **18, a1.net,** facebook.net, Google-analytics.com, google.at, googleadservices.com, mopinion.nl, visualwebsiteoptimizer.com, **19, herold.a**t, adform.net, adition.com, Ajax-googleapis.com, akamaihd.net, clicktale.net, facebook.com, Gogle-analytics.com, googletagmanager.com, meetrics.net, mxcdn.net, oewabox.at, revsci.net, **20, spiegel.de,** 2mdn.net, adition.com, criteo.com, doubleclick.net, Google-analytics.com, googlesyndication.com, googletagservices.com, insightexpressai.com, ioam.de, meetrics.net, moatads.com, mxcdn.net, theadex.com, yieldlab.net

DNT4, manual activations

		3rd party requests				Javascript		Cookies
1	**orf.at**	-				-		-
2	**de.wikipedia.org**	-				-		-
3	**willhaben.at**	apa.net				-		-
4	**gmx.at**	ui-portal.de	gmx.net (to)	gmx.net (from)		gmx.at	gmx.net	gmx.net
5	**derstandard.at**	-				-		-
6	**ebay.de**	ebayimg.com	ebaystatic.com	ebay.com (to)	ebay.com (from)	ebay.de	ebaystatic.at	ebay.de
7	**raiffeisen.at**	-				raiffeisen.at	elba.at	raiffeisen.at
8	**login.live.com**	gfx.ms				live.com	gfx.ms	live.com
9	**sparkasse.at**	-				sparkasse.at		sparkasse.at
10	***xhamster.com***	***broken***				-		-
11	**krone.at**	-				-		-
12	**twitter.com**	twimg.com				twitter.com	twimg.com	twitter.com
13	***streamcloud.eu***	***broken***				-		-
14	**geizhals.at**	-				-		-
15	***xvideos.com***	***broken***				-		-
16	***pornhub.com***	***broken***				-		-
17	**bankaustria.at**	-				bankaustria.at		bankaustria.at
18	**a1.net**	-				a1.net		a1.net
19	**herold.at**	-				-		-
20	**spiegel.de**	-				-		-