Bizarre and unusual uses of DNS

Rule 53: If you can think of it, someone's done it in the DNS

Peter Lowe
Principal Security Researcher | **DNSFilter**

whoami

- Peter Lowe
- Principal Security Researcher at DNSFilter
- We provide protective DNS services for companies
- So I spend a lot of time thinking about DNS and malware techniques
- Worked in DNS security for around 3 years now, 27 years in tech
- You *might* know me from my blocklist for ads and trackers at pgl.yoyo.org
- Ask me about DNS Abuse
- Terrible, absolutely terrible, at slides

- https://twitter.com/pgl

Potential Titles

- **How I Learned To Stop Worrying And Love DNS**
- **The things people do with DNS**
- **20 Wacky DNS Tricks - #5 will SHOCK YOU**
- **DNS Museum***
- Went with something descriptive in the end

What

DNS in 2 minutes

- DNS is an always available, highly resilient, incredibly fast, fundamental part of the internet.
- ... so of course people have done some interesting things with it.
- "Questions" are sent to resolvers, which return "answers" - the records you're looking for. These are *normally* domains.
- It's often called the "phone book of the internet" - you look up a domain and get records back about it (not just IPs, but TXT records, MX records, etc.)
- This makes it a general records system.

Why

Not my fault

- It's John Todd's fault really
- This became a Twitter thread
- DNS Abuse SIG work - first.org/global/sigs/dns
- Rule 34 implies that thinking of something brings it into existence...
- ... so let's not suggest anything too out there

Caveats

And notes

- Most not around anymore
- ~~Thought I'd have more time for this talk~~
- Links at the end
- No really, I'm terrible at slides, I hate doing them

Traceroutes

OK, so maybe not 100% DNS…

Traceroutes

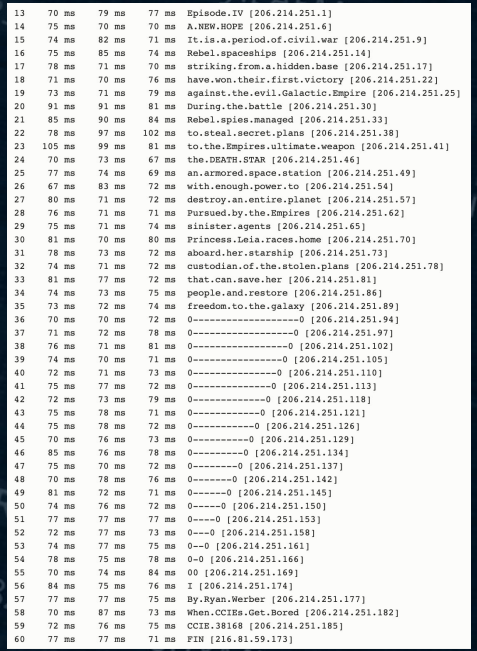
Star Wars

From Ryan Werber at beagle.net in Feb 11th 2013

Down because of DDoS

IPv6 versions popped up

Gone but not forgotten



```
13    70 ms    79 ms    77 ms  Episode.IV [206.214.251.1]
14    75 ms    70 ms    70 ms  A.NEW.HOPE [206.214.251.6]
15    74 ms    82 ms    71 ms  It.is.a.period.of.civil.war [206.214.251.9]
16    75 ms    85 ms    74 ms  Rebel.spaceships [206.214.251.14]
17    78 ms    71 ms    70 ms  striking.from.a.hidden.base [206.214.251.17]
18    71 ms    70 ms    76 ms  have.won.their.first.victory [206.214.251.22]
19    73 ms    71 ms    79 ms  against.the.evil.Galactic.Empire [206.214.251.25]
20    91 ms    91 ms    81 ms  During.the.battle [206.214.251.30]
21    85 ms    90 ms    84 ms  Rebel.spies.managed [206.214.251.33]
22    78 ms    97 ms   102 ms  to.steal.secret.plans [206.214.251.38]
23   105 ms    99 ms    81 ms  to.the.Empires.ultimate.weapon [206.214.251.41]
24    70 ms    73 ms    67 ms  the.DEATH.STAR [206.214.251.46]
25    77 ms    74 ms    69 ms  an.armored.space.station [206.214.251.49]
26    67 ms    83 ms    72 ms  with.enough.power.to [206.214.251.54]
27    80 ms    71 ms    72 ms  destroy.an.entire.planet [206.214.251.57]
28    76 ms    71 ms    71 ms  Pursued.by.the.Empires [206.214.251.62]
29    75 ms    71 ms    74 ms  sinister.agents [206.214.251.65]
30    81 ms    70 ms    80 ms  Princess.Leia.races.home [206.214.251.70]
31    78 ms    73 ms    72 ms  aboard.her.starship [206.214.251.73]
32    74 ms    71 ms    72 ms  custodian.of.the.stolen.plans [206.214.251.78]
33    81 ms    77 ms    72 ms  that.can.save.her [206.214.251.81]
34    74 ms    73 ms    75 ms  people.and.restore [206.214.251.86]
35    73 ms    72 ms    74 ms  freedom.to.the.galaxy [206.214.251.89]
36    70 ms    70 ms    72 ms  0------------------0 [206.214.251.94]
37    71 ms    72 ms    78 ms  0------------------0 [206.214.251.97]
38    76 ms    71 ms    81 ms  0-----------------0 [206.214.251.102]
39    74 ms    70 ms    71 ms  0----------------0 [206.214.251.105]
40    72 ms    71 ms    73 ms  0---------------0 [206.214.251.110]
41    75 ms    77 ms    72 ms  0---------------0 [206.214.251.113]
42    72 ms    73 ms    79 ms  0-------------0 [206.214.251.118]
43    75 ms    78 ms    71 ms  0------------0 [206.214.251.121]
44    75 ms    78 ms    72 ms  0-----------0 [206.214.251.126]
45    70 ms    76 ms    73 ms  0----------0 [206.214.251.129]
46    85 ms    76 ms    78 ms  0---------0 [206.214.251.134]
47    75 ms    70 ms    72 ms  0--------0 [206.214.251.137]
48    70 ms    78 ms    76 ms  0-------0 [206.214.251.142]
49    81 ms    72 ms    71 ms  0------0 [206.214.251.145]
50    74 ms    76 ms    72 ms  0-----0 [206.214.251.150]
51    77 ms    77 ms    77 ms  0----0 [206.214.251.153]
52    72 ms    77 ms    73 ms  0---0 [206.214.251.158]
53    74 ms    77 ms    75 ms  0--0 [206.214.251.161]
54    78 ms    75 ms    78 ms  0-0 [206.214.251.166]
55    70 ms    74 ms    84 ms  00 [206.214.251.169]
56    84 ms    75 ms    76 ms  I [206.214.251.174]
57    77 ms    77 ms    75 ms  By.Ryan.Werber [206.214.251.177]
58    70 ms    87 ms    73 ms  When.CCIEs.Get.Bored [206.214.251.182]
59    72 ms    76 ms    75 ms  CCIE.38168 [206.214.251.185]
60    77 ms    77 ms    71 ms  FIN [216.81.59.173]
```

Traceroutes

hand.bb0.nl

Interesting extension using IPv6 - apparently there's more if you increase hops

```
mael@edge-fra:~$ traceroute -6 -m 35 hand.bb0.nl
traceroute to hand.bb0.nl (2a0e:fd45:2a0a:2::cafe), 35 hops max, 80 byte packets
 1  ptp-core2edge.l2.fra.bb0.nl (2a0e:fd45:2a00:1::7)  8.364 ms  8.241 ms  8.169 ms
 2  ptp-dro-fra.l2.dro.bb0.nl (2a0e:fd45:2a00:1::3)  17.471 ms  17.481 ms  17.416 ms
 3  e19-vlan1-up6.vm2.dro.bb0.nl (2a0e:fd45:2a0a:b::a)  18.913 ms  18.852 ms  18.841 ms
 4  ___________36936936936936936_________________ (2a0e:fd45:2a0a:2::ca01)  20.263 ms  20.189 ms  20.479 ms
 5  ___________36936936936936936_________________ (2a0e:fd45:2a0a:2::ca02)  20.663 ms  20.886 ms  21.283 ms
 6  ___________3693693693693693_________________ (2a0e:fd45:2a0a:2::ca03)  21.773 ms  18.223 ms  18.479 ms
 7  ___________369369369369369333_______________ (2a0e:fd45:2a0a:2::ca04)  18.801 ms  19.709 ms  19.703 ms
 8  __________3693693693693693693_______________ (2a0e:fd45:2a0a:2::ca05)  19.915 ms  19.694 ms  19.697 ms
 9  _________369369369369369369369_____________ (2a0e:fd45:2a0a:2::ca06)  19.916 ms  20.265 ms  20.784 ms
10  _________369369369369369693699_____________ (2a0e:fd45:2a0a:2::ca07)  20.911 ms  21.158 ms  21.278 ms
11  ________3693693693693693693699_____________ (2a0e:fd45:2a0a:2::ca08)  21.569 ms  22.065 ms  22.013 ms
12  _______369369396936936936936936936693_____ (2a0e:fd45:2a0a:2::ca09)  22.368 ms  22.581 ms  19.652 ms
13  _____3693693693693693693693693693636936____ (2a0e:fd45:2a0a:2::ca0a)  23.370 ms  25.254 ms  20.075 ms
14  ___369369369369369369369369369___369369369__ (2a0e:fd45:2a0a:2::ca0b)  20.260 ms  20.491 ms  20.764 ms
15  __36936___3693369369369369369_____36936___ (2a0e:fd45:2a0a:2::ca0c)  20.881 ms  21.338 ms  21.885 ms
16  _36936___36936_369369336936936_____________ (2a0e:fd45:2a0a:2::ca0d)  21.509 ms  21.930 ms  22.333 ms
17  36933___36936__36936___3693636_____________ (2a0e:fd45:2a0a:2::ca0e)  22.509 ms  22.899 ms  23.105 ms
18  693____36936__36936_____369363_____________ (2a0e:fd45:2a0a:2::ca0f)  19.232 ms  19.489 ms  19.793 ms
19  ______36936__36936______369369_____________ (2a0e:fd45:2a0a:2::ca10)  20.674 ms  20.390 ms  20.845 ms
20  _____36936___36936_______36936_____________ (2a0e:fd45:2a0a:2::ca11)  21.083 ms  21.577 ms  22.128 ms
21  _____36936___36936_______36936_____________ (2a0e:fd45:2a0a:2::ca12)  22.193 ms  22.975 ms  23.920 ms
22  _____36936___36936_______36936_____________ (2a0e:fd45:2a0a:2::ca13)  23.450 ms  24.425 ms  25.414 ms
23  ______369____36936_____369_________________ (2a0e:fd45:2a0a:2::ca14)  25.387 ms  19.247 ms  19.189 ms
24  ____________369_____________________________ (2a0e:fd45:2a0a:2::ca15)  19.578 ms  19.287 ms  19.722 ms
25  ____________6_______________________________ (2a0e:fd45:2a0a:2::ca16)  19.712 ms  20.174 ms  20.335 ms
26  _____________________________________________ (2a0e:fd45:2a0a:2::ca17)  20.771 ms  21.114 ms  21.133 ms
27  ___0000000000000000000000000000000000000000___ (2a0e:fd45:2a0a:2::ca18)  21.420 ms  21.789 ms  22.128 ms
28  ___0_______the_traceroute_hand_is_________0___ (2a0e:fd45:2a0a:2::ca19)  22.262 ms  22.554 ms  18.943 ms
29  ___0_________stealing_your_data___________0___ (2a0e:fd45:2a0a:2::ca1a)  19.189 ms  19.515 ms  24.880 ms
30  ___0_____________________________________0___ (2a0e:fd45:2a0a:2::ca1b)  25.154 ms  25.564 ms  26.128 ms
31  ___0000000000000000000000000000000000000000___ (2a0e:fd45:2a0a:2::ca1c)  26.494 ms  26.649 ms  27.711 ms
32  _____________________________________________ (2a0e:fd45:2a0a:2::ca1d)  27.132 ms  27.972 ms  28.546 ms
33  ___________________________________enpls.org (2a0e:fd45:2a0a:2::ca1e)  29.140 ms  28.616 ms  29.609 ms
34  _____________________________________________ (2a0e:fd45:2a0a:2::ca1f)  19.518 ms  19.352 ms  20.277 ms
35  ____________________________________________ (2a0e:fd45:2a0a:2::ca20)  19.472 ms  19.377 ms  19.668 ms
```

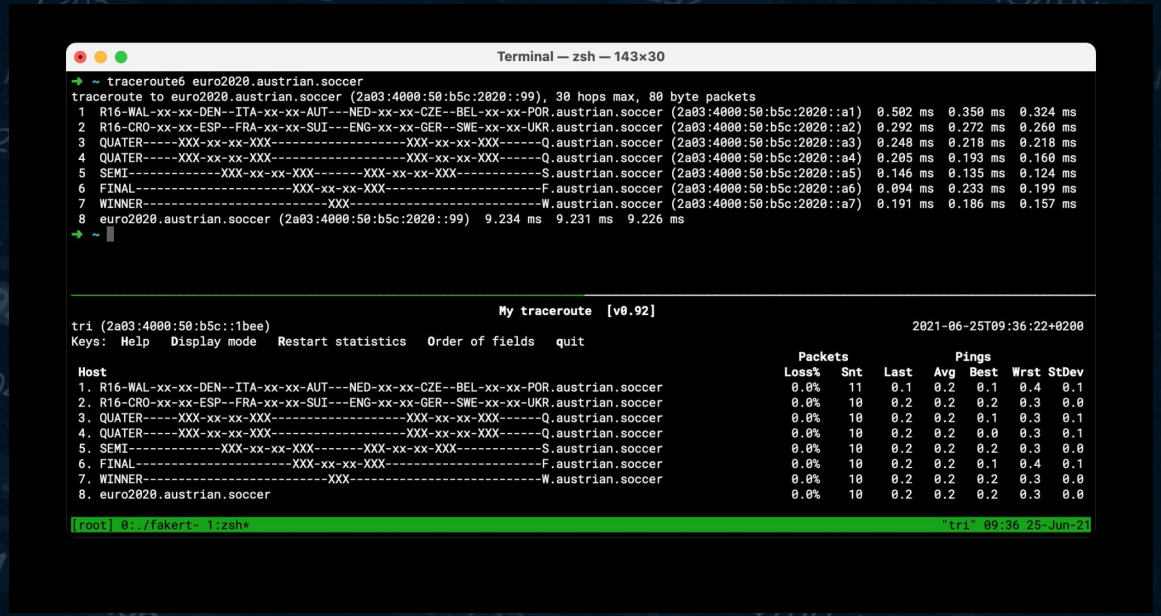
Traceroutes

Euro 2020

Sebastian Haas' "fakert" that creates a TUN device

IP range routed to where the fakert is running

@_sehaas on Twitter

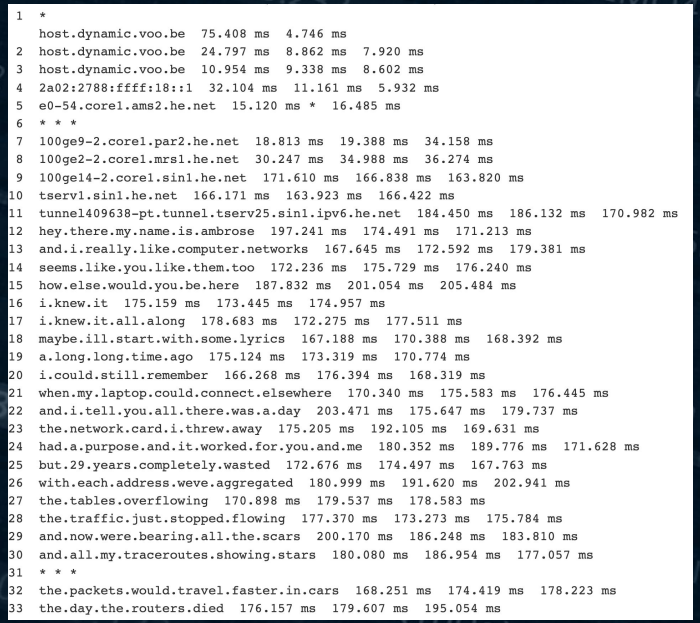


Traceroutes

makerforce.io

By Ambrose Chua

To the tune of "American Pie"



```
 1  *
    host.dynamic.voo.be  75.408 ms  4.746 ms
 2  host.dynamic.voo.be  24.797 ms  8.862 ms  7.920 ms
 3  host.dynamic.voo.be  10.954 ms  9.338 ms  8.602 ms
 4  2a02:2788:ffff:18::1  32.104 ms  11.161 ms  5.932 ms
 5  e0-54.core1.ams2.he.net  15.120 ms *  16.485 ms
 6  * * *
 7  100ge9-2.core1.par2.he.net  18.813 ms  19.388 ms  34.158 ms
 8  100ge2-2.core1.mrs1.he.net  30.247 ms  34.988 ms  36.274 ms
 9  100ge14-2.core1.sin1.he.net  171.610 ms  166.838 ms  163.820 ms
10  tserv1.sin1.he.net  166.171 ms  163.923 ms  166.422 ms
11  tunnel409638-pt.tunnel.tserv25.sin1.ipv6.he.net  184.450 ms  186.132 ms  170.982 ms
12  hey.there.my.name.is.ambrose  197.241 ms  174.491 ms  171.213 ms
13  and.i.really.like.computer.networks  167.645 ms  172.592 ms  179.381 ms
14  seems.like.you.like.them.too  172.236 ms  175.729 ms  176.240 ms
15  how.else.would.you.be.here  187.832 ms  201.054 ms  205.484 ms
16  i.knew.it  175.159 ms  173.445 ms  174.957 ms
17  i.knew.it.all.along  178.683 ms  172.275 ms  177.511 ms
18  maybe.ill.start.with.some.lyrics  167.188 ms  170.388 ms  168.392 ms
19  a.long.long.time.ago  175.124 ms  173.319 ms  170.774 ms
20  i.could.still.remember  166.268 ms  176.394 ms  168.319 ms
21  when.my.laptop.could.connect.elsewhere  170.340 ms  175.583 ms  176.445 ms
22  and.i.tell.you.all.there.was.a.day  203.471 ms  175.647 ms  179.737 ms
23  the.network.card.i.threw.away  175.205 ms  192.105 ms  169.631 ms
24  had.a.purpose.and.it.worked.for.you.and.me  180.352 ms  189.776 ms  171.628 ms
25  but.29.years.completely.wasted  172.676 ms  174.497 ms  167.763 ms
26  with.each.address.weve.aggregated  180.999 ms  191.620 ms  202.941 ms
27  the.tables.overflowing  170.898 ms  179.537 ms  178.583 ms
28  the.traffic.just.stopped.flowing  177.370 ms  173.273 ms  175.784 ms
29  and.now.were.bearing.all.the.scars  200.170 ms  186.248 ms  183.810 ms
30  and.all.my.traceroutes.showing.stars  180.080 ms  186.954 ms  177.057 ms
31  * * *
32  the.packets.would.travel.faster.in.cars  168.251 ms  174.419 ms  178.223 ms
33  the.day.the.routers.died  176.157 ms  179.607 ms  195.054 ms
```

Traceroutes

bad.horse

From Dr Horrible's Sing-Along

Bonus: cert chain from `signed.bad.horse`

```
28  that.you.just.sent.in (162.252.205.137)  145.235 ms  140.127 ms  142.031 ms
29  it.needs.evaluation (162.252.205.138)  157.680 ms  158.919 ms  157.703 ms
30  so.let.the.games.begin (162.252.205.139)  166.198 ms  161.045 ms  162.113 ms
31  a.heinous.crime (162.252.205.140)  158.500 ms  159.342 ms  159.434 ms
32  a.show.of.force (162.252.205.141)  171.488 ms  173.116 ms  176.063 ms
33  a.murder.would.be.nice.of.course (162.252.205.142)  168.989 ms  168.968 ms  170.628 ms
34  bad.horse (162.252.205.143)  182.039 ms  181.306 ms  185.953 ms
35  bad.horse (162.252.205.144)  187.067 ms  184.486 ms  174.820 ms
36  bad.horse (162.252.205.145)  193.093 ms  203.858 ms  193.048 ms
37  he-s.bad (162.252.205.146)  194.453 ms  190.647 ms  191.710 ms
38  the.evil.league.of.evil (162.252.205.147)  197.050 ms  196.938 ms  197.654 ms
39  is.watching.so.beware (162.252.205.148)  204.124 ms  196.130 ms  199.735 ms
40  the.grade.that.you.receive (162.252.205.149)  213.120 ms  210.741 ms  211.747 ms
41  will.be.your.last.we.swear (162.252.205.150)  219.164 ms  222.347 ms  221.067 ms
42  so.make.the.bad.horse.gleeful (162.252.205.151)  211.919 ms  296.725 ms  282.108 ms
43  or.he-ll.make.you.his.mare (162.252.205.152)  223.274 ms  218.716 ms  304.596 ms
44  o_o (162.252.205.153)  226.813 ms  225.629 ms  254.561 ms
45  you-re.saddled.up (162.252.205.154)  281.657 ms  236.534 ms  238.029 ms
46  there-s.no.recourse (162.252.205.155)  232.807 ms  233.217 ms  233.022 ms
47  it-s.hi-ho.silver (162.252.205.156)  350.421 ms  251.033 ms  247.865 ms
48  signed.bad.horse (162.252.205.157)  237.987 ms  264.826 ms  239.413 ms
```

Traceroutes

bad.horse

Traceroutes

Christmas

Ho

Ho

Ho

```
12  ooooxooooooxooo.v.oooooxooooxoooo (82.133.91.37)  32.520 ms  85.029 ms  84.417 ms
13  ooxoooooxooooo.mmm.ooooooooxxooooxo (82.133.91.18)  28.508 ms  29.413 ms  159.747 ms
14  ooooxooooxooo.eeeee.oooxooooooxoooo (82.133.91.63)  30.813 ms  27.738 ms  28.727 ms
15  ooooxooxoooox.rrrrrrr.ooooooxooooox (82.133.91.56)  98.966 ms  26.433 ms  26.304 ms
16  oxooooooxoo.rrrrrrrr.oooxooooooxo (82.133.91.55)  25.990 ms  25.856 ms  175.046 ms
17  xoooxooooo.yyyyyyyyyy.oooxooooxoo (82.133.91.58)  35.091 ms  28.833 ms  27.252 ms
18  ooxoooooxooooo.ccc.ooooooooxoooxoo (82.133.91.96)  33.924 ms  27.624 ms  28.044 ms
19  oooooxooo.hhhhhhhhhhhh.oxoooxoooo (82.133.91.23)  26.037 ms  27.727 ms  27.233 ms
20  ooxooxoo.rrrrrrrrrrrrrr.ooxooooxo (82.133.91.49)  27.114 ms  26.809 ms  27.727 ms
21  oxooxo.iiiiiiiiiiiiiiii.ooooxoxo (82.133.91.60)  27.393 ms  79.425 ms  35.691 ms
22  oooxoo.sssssssssssssssss.ooxoooo (82.133.91.42)  38.394 ms  26.477 ms  27.073 ms
23  oooxoooxoooooo.ttt.ooooooooooooxoo (82.133.91.61)  26.567 ms  27.164 ms  27.260 ms
24  ooxoo.mmmmmmmmmmmmmmmmmmmm.oooxo (82.133.91.34)  26.268 ms  26.292 ms  27.335 ms
25  xxoo.aaaaaaaaaaaaaaaaaaaaaaa.oxoo (82.133.91.80)  27.087 ms  26.545 ms  25.758 ms
26  oxo.sssssssssssssssssssssssss.ooo (82.133.91.40)  28.201 ms  26.604 ms  31.071 ms
27  ooxooooooooooo.xxx.oooooooooooooxo (82.133.91.35)  27.685 ms  34.823 ms  27.358 ms
28  oxooooooooooo.xxx.oooooooooooooxxo (82.133.91.10)  26.663 ms  30.052 ms  28.420 ms
29  oh.the.weather.outside.is.frightful (82.133.91.41)  28.655 ms  27.795 ms  28.863 ms
30  but.the.fire.is.so.delightful (82.133.91.19)  26.172 ms  26.577 ms  26.777 ms
31  and.since.weve.no.place.to.go (82.133.91.77)  26.537 ms  28.931 ms  35.163 ms
32  let.it.snow.let.it.snow.let.it.snow (82.133.91.43)  28.258 ms  30.653 ms  43.191 ms
33  xxx (82.133.91.24)  30.019 ms  30.663 ms  31.834 ms
34  it.doesnt.show.signs.of.stopping (82.133.91.36)  26.373 ms  29.913 ms  25.671 ms
35  and.ive.bought.some.corn.for.popping (82.133.91.73)  27.470 ms  26.959 ms  26.904 ms
36  the.lights.are.turned.way.down.low (82.133.91.76)  26.997 ms  28.610 ms  32.095 ms
```

Tools and Toys

Tools and Toys

Calculator

Sadly not around anymore

There's a reverse Polish calculator out there as well

```
dig @dns.postel.org 2.8.add.calc.postel.org +short
0.10.0.0

dig @dns.postel.org 8.2.sub.calc.postel.org +short
0.6.0.0

dig @dns.postel.org 2.8.mul.calc.postel.org +short
0.16.0.0

dig @dns.postel.org 8.2.div.calc.postel.org +short
0.4.0.0
```

Tools and Toys

"My IP"

Google

```
[pgl-macbook-pro:pgl]:~ $ host -t txt o-o.myaddr.l.google.com ns1.google.com
Using domain server:
Name: ns1.google.com
Address: 216.239.32.10#53
Aliases:

o-o.myaddr.l.google.com descriptive text "77.97.197.133"
```

OpenDNS

```
[pgl-macbook-pro:pgl]:~ $ dig myip.opendns.com @resolver1.opendns.com +short
77.97.197.133
```

Tools and Toys

"My IP"

Tools and Toys

IP to ASN

```
[pgl-macbook-pro:pgl]:~ $ dig +short 8.8.8.8.origin.asn.cymru.com TXT
"15169 | 8.8.8.0/24 | US | arin | 1992-12-01"
```

```
[pgl-macbook-pro:pgl]:~ $ dig +short 1.1.1.1.peer.asn.cymru.com TXT
"1103 2914 3257 7195 | 1.1.1.0/24 | AU | apnic | 2011-08-11"
```

```
[pgl-macbook-pro:pgl]:~ $ dig +short 192.168.0.1.origin.asn.cymru.com TXT
"23969 | 1.0.128.0/17 | TH | apnic | 2011-04-08"
"23969 | 1.0.128.0/18 | TH | apnic | 2011-04-08"
"23969 | 1.0.160.0/19 | TH | apnic | 2011-04-08"
"23969 | 1.0.168.0/24 | TH | apnic | 2011-04-08"
```

From Team Cymru - similar to Whois but faster

Tools and Toys

Postcodes

```
[pgl-macbook-pro:pgl]:~ $ host -t LOC kt112ra.find.me.uk
kt112ra.find.me.uk location 51 19 42.141 N 0 23 56.076 W 0.00m 0.00m 0.00m 0.00m
```

```
[pgl-macbook-pro:pgl]:~ $ dig PASSAU.zipde.jpmens.net TXT

; <<>> DiG 9.10.6 <<>> PASSAU.zipde.jpmens.net TXT
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 2408
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;PASSAU.zipde.jpmens.net.       IN      TXT

;; ANSWER SECTION:
PASSAU.zipde.jpmens.net. 604800 IN      TXT     "94036"
PASSAU.zipde.jpmens.net. 604800 IN      TXT     "94034"
PASSAU.zipde.jpmens.net. 604800 IN      TXT     "94032"
```

Tools and Toys

dns.toys

Currency conversion (forex)

```
dig 100USD-INR.fx @dns.toys
dig 50CAD-AUD.fx @dns.toys
```

$Value$FromCurrency-$ToCurrency. Daily rates are from exchangerate.host.

World time

```
dig mumbai.time @dns.toys
dig newyork.time @dns.toys
dig paris/fr.time @dns.toys
```

Pass city names without spaces suffixed with `.time` optionally.

IP echo

```
dig ip @dns.toys
```

Echo your IP address.

Number to words

```
dig 987654321.words @dns.toys
```

Convert numbers to English words.

Usable CIDR Range

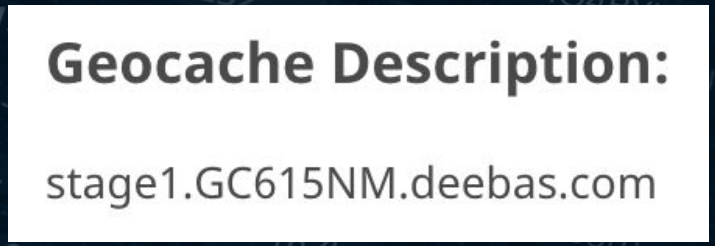
```
dig 10.0.0.0/24.cidr @dns.toys
dig 2001:db8::/108.cidr @dns.toys
```

Parse CIDR notation to find out first and last usable IP address in the subnet.

From Kailash Nadh, CTO of Zerodha

Tools and Toys

Geocaching




```
[pgl-macbook-pro:pgl]:~ $ host -t txt stage1.GC615NM.deebas.com
stage1.GC615NM.deebas.com descriptive text "hint: reverse of six"
```

From Sebastian Haas:

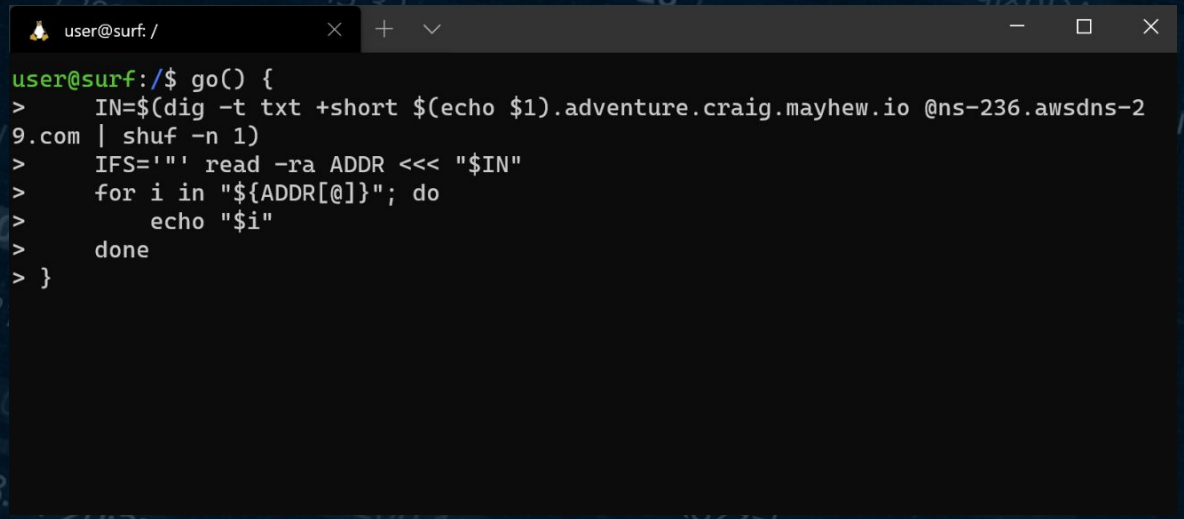
Mockapetris himself wasn't involved in the geocache. "Mockapetris_1876" is just a hint to DNS and RFC 1876 ;)
The cache is maintained by me.
To solve the complete riddle you have to execute multiple queries (TXT, AAAA, PTR, LOC). You can find the solution in the screenshot.

Tools and Toys

Text adventure

By Craig Mayhew, @craigmayhew

Uses round robin DNS for chance-based actions




Tunneling

Tunneling

General idea

Discussed on Slashdot back in 2000

Any record types

General Approach to DNS tunneling [back]

DNS Tunneling works by abusing DNS records to traffic data in and out of a network. In principle, every type of record can be used, but the speed of the connection differs by the amount of data that can be stored in a single record. Below are some obvious ones:

- **TXT records** allow free-form data and can even include spaces. You can as such store information in it encoded with base64, allowing 220 bytes of data per record. TXT records are intended for "generic" use within the DNS framework. Users can place whichever data in it, as long as it meets the protocol requirements: a maximum length of 255 octets according to RFC 1035. In the recent past, TXT records had virtually been depreciated, which would have enabled highly security conscious environments to discard them at the enterprise DNS server. Today however, they have regained use as the carrier of the antispam-related SPF record.
- **CNAME records** allow only the characters A through Z, digits 0-9 and the hyphen. As such you require base32 encoding and are limited to about 110 bytes per record
- **EDNS0 messages** can be larger than the 512 byte maximum for UDP DNS, and can carry a 1280 byte payload by default. OzyManDNS uses a 768 byte payload for stability
- **A and MX records** can be used as well, but with more limitations. These cannot store all types of data.

https://www.daemon.be/maarten/dnstunnel.html

Tunneling

Wikipedia

```
$ host -t txt foo.wp.dg.cx
foo.wp.dg.cx descriptive text "Foo may refer to: Foo, bar, and baz: metasyntactic variables,
\"Fool\", as a nonstandard spelling to indicate a nonstandard pronunciation, Foo Fighters, a post-
grunge group formed by Dave Grohl, Foo fighters, a World War II term for various UFOs or
mysterio\" \"us aerial phenomena seen in the skies over Europe and the Pacific theatre, Foo, also
a known surname or last name of a... http://a.vu/w:Foo"
```

```
$ dig +short txt '新疆.wp.dg.cx' | perl -pe's/\\(\d{1,3})/chr $1/eg'
"Xinjiang (Uyghur: , Shinjang\; \; Postal map spelling: Sinkiang) is an autonomous region
(Xinjiang Uyghur Autonomous Region) of the People's Republic of China. It is a large, sparsely
populated area (spanning over 1.6 million sq. km) which takes up about on" "e sixth of the
country's territory. Xinjiang borders the Tibet Autonomous Region to the south and Qinghai and
Gansu... http://a.vu/w:Xinjiang"
```

David Leadbetter

Tunneling

Blogging

Add TXT records to "publish" a post

By Harshad Sharm - trying to "break coder's block"

- View latest post:

```
$ dig @127.0.0.1 -p 10053 TXT +short rex.latest
"# Hello"
"This is a test."
```

- See recent posts:

```
$ dig @127.0.0.1 -p 10053 TXT +short rex.index
"Latest: rex.latest"
"Recent:"
"    rex.hello"
"    rex.trying.something.silly"
```

- Read a specific post:

```
$ dig @127.0.0.1 -p 10053 TXT +short rex.trying.something.silly
"# Woohoo!"
"This actually works?!"
```

Tunneling

IP over DNS

Erik Eckman - @yarrick on GitHub

IPv4 only inside the tunnel, but server can listen on IPv6

Iodine has the atomic number 53

Try it out within your own LAN! Follow these simple steps:

- On your server, run: `./iodined -f 10.0.0.1 test.com`. If you already use the `10.0.0.0` network, use another internal net like `172.16.0.0`.
- Enter a password.
- On the client, run: `./iodine -f -r 192.168.0.1 test.com`. Replace `192.168.0.1` with your server's ip address.
- Enter the same password.
- Now the client has the tunnel ip `10.0.0.2` and the server has `10.0.0.1`.
- Try pinging each other through the tunnel.
- Done! :)

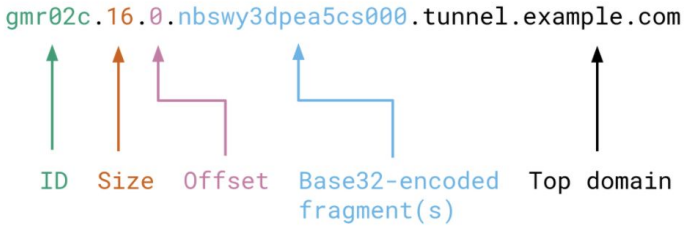
Tunneling

HTTP over DNS

Jessie Li,
@veggiedefender
on GitHub

HTTP over DNS
over HTTPS?

Browsertunnel can send arbitrary strings over DNS by encoding the string in a subdomain, which is forwarded to the browsertunnel server when the browser attempts to recursively resolve the domain.



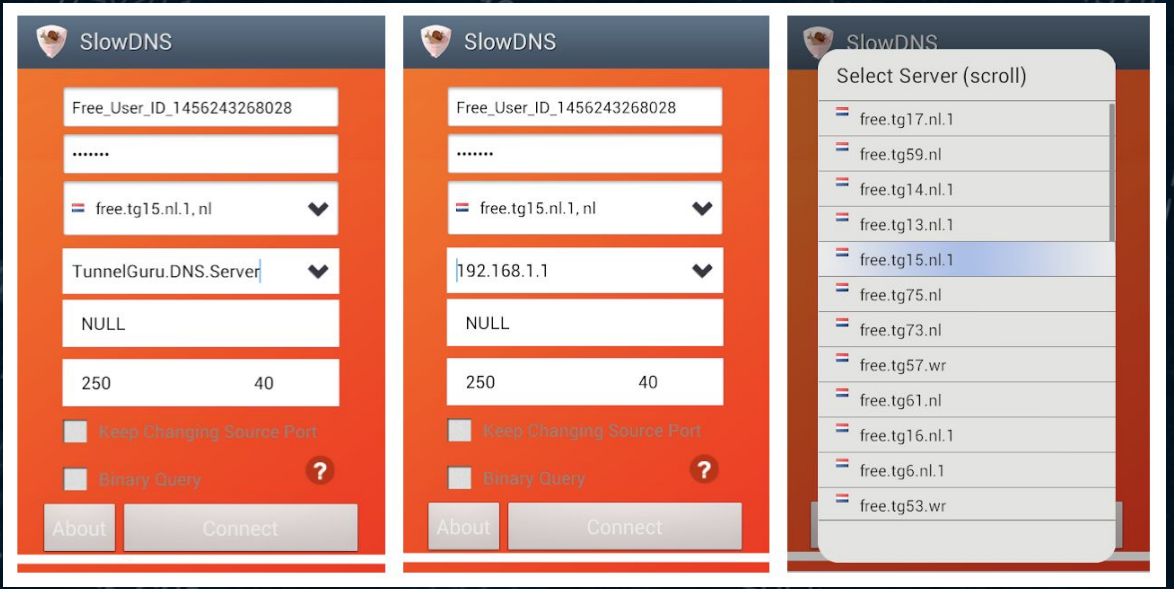
Longer messages that cannot fit in one domain (253 bytes) are automatically split into multiple queries, which are reassembled and decoded by the server.

```
ya4iee.40.0.orugs4zanf.zsayjanr.tunnel.example.com
ya4iee.40.18.xw4z3foiqg.2zltonq.tunnel.example.com
ya4iee.40.35.wozi0.tunnel.example.com
```

Tunneling

VPN over DNS

"Contains ads"



Tunneling

dnscat2

- lagox86 on GitHub, or "Ron"
- Doesn't need a domain
- Looks exactly like normal DNS traffic

```
dnscat2> window -i dns1
New window created: dns1
Starting Dnscat2 DNS server on 0.0.0.0:53531
[domains = skullseclabs.org]...

Assuming you have an authoritative DNS server, you can run
the client anywhere with the following:
  ./dnscat2 skullseclabs.org

To talk directly to the server without a domain name, run:
  ./dnscat2 --dns server=x.x.x.x,port=53531

Of course, you have to figure out <server> yourself! Clients
will connect directly on UDP port 53531.

Received:  dnscat.9fa0ff178f72686d6c716c6376697968657a6d716800 (TXT)
Sending:  9fa0ff178f72686d6c716c6376697968657a6d716800
Received:  d17cff3e747073776c776d70656b73786f646f616200.skullseclabs.org (MX)
Sending:  d17cff3e747073776c776d70656b73786f646f616200.skullseclabs.org
```


And more

Bigger things

DNS for config

Corey Quinn

Using Route 53 for config management

@quinnypig on Twitter

About the Author

Corey is the Chief Cloud Economist at The Duckbill Group, where he specializes in helping companies improve their AWS bills by making them

Episode Summary

Join me as I launch a new series called Whiteboard Confessional that explores how whiteboard architecture diagrams might look pretty but rarely work as designed in production. To kick off the series, we're taking a look at everyone's favorite database, AWS Route 53, while touching upon a number of topics, including what data centers used to look like, the emergence of virtualization and the impact it had, configuration management databases and how they differ from configuration management tools like Chef and Puppet, why using DNS as a configuration management database is inherently an awful idea, how there's almost always a better solution than whatever you built in your own isolated environment, how just because someone built something doesn't mean they knew what they were doing, and more.

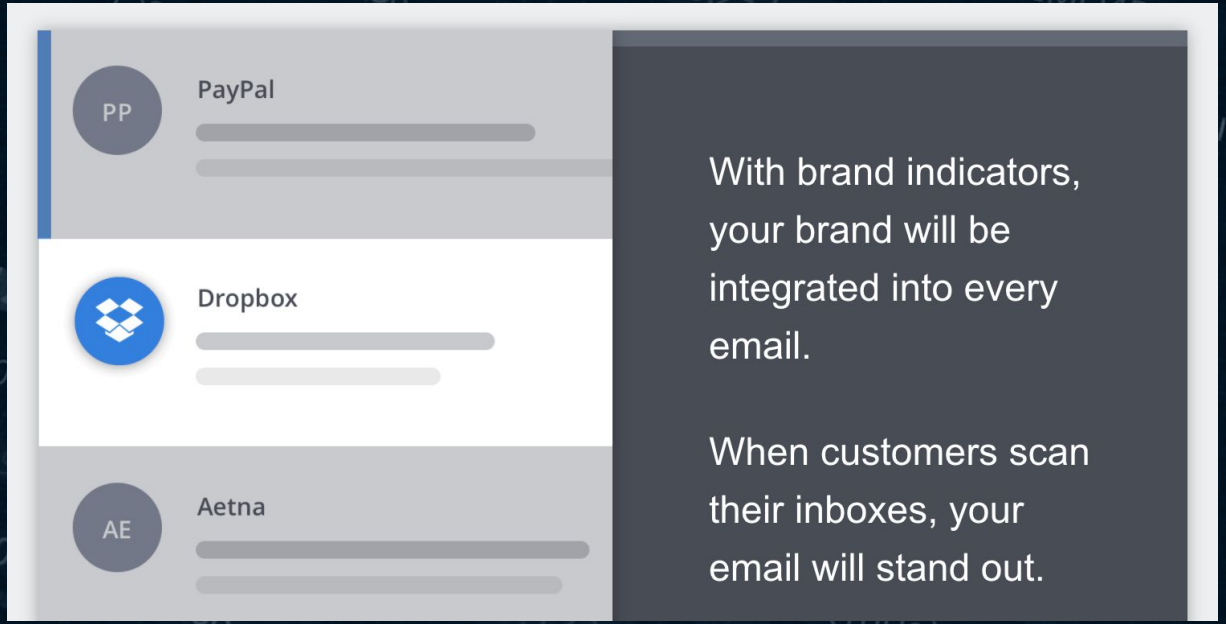
Bigger things

Brands

BIMI records

Really just TXT records starting `_bimi`

https://bimi.agari.com/



Bigger things

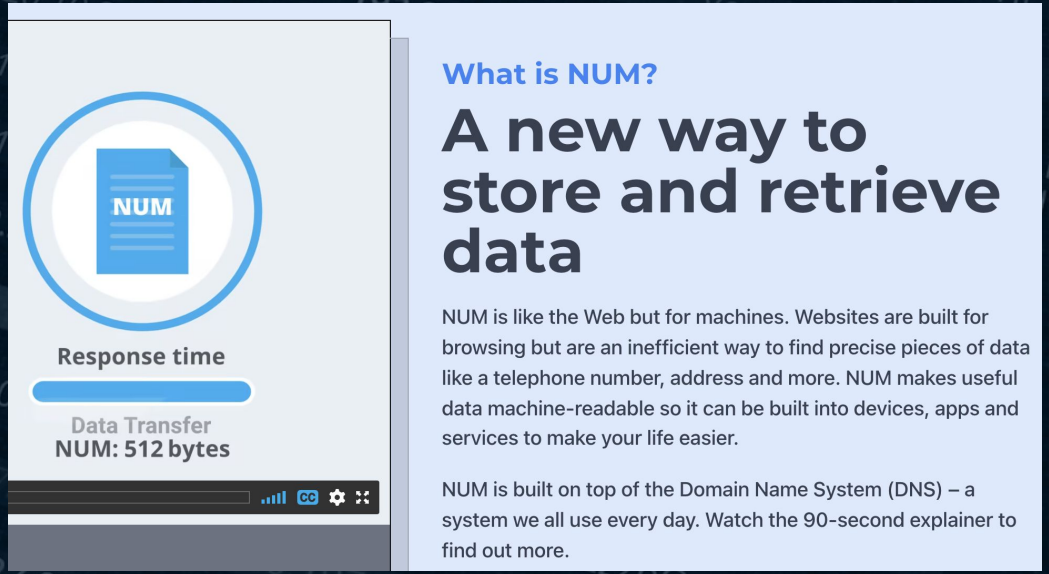
Contacts DB

"Free, unlimited, unrestricted access to data about every company in the UK*"

npm modules, developer docs

Numprotocol.com

NUM technology

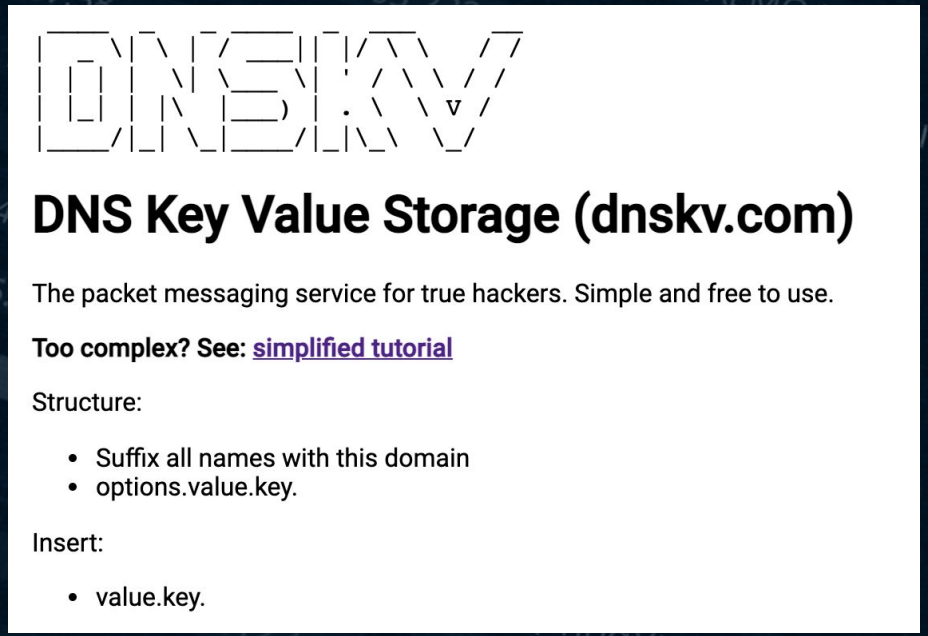


Bigger things

Key-value store

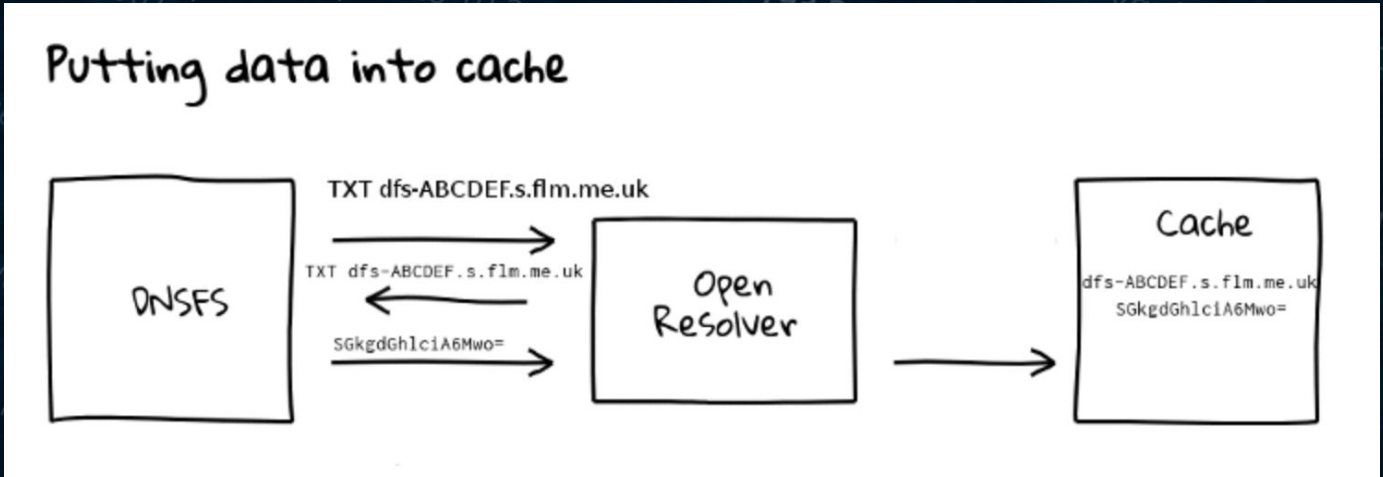
Generic service offered to allow people to set and retrieve values

Not sure who's behind this!



Bigger things

DNSFS

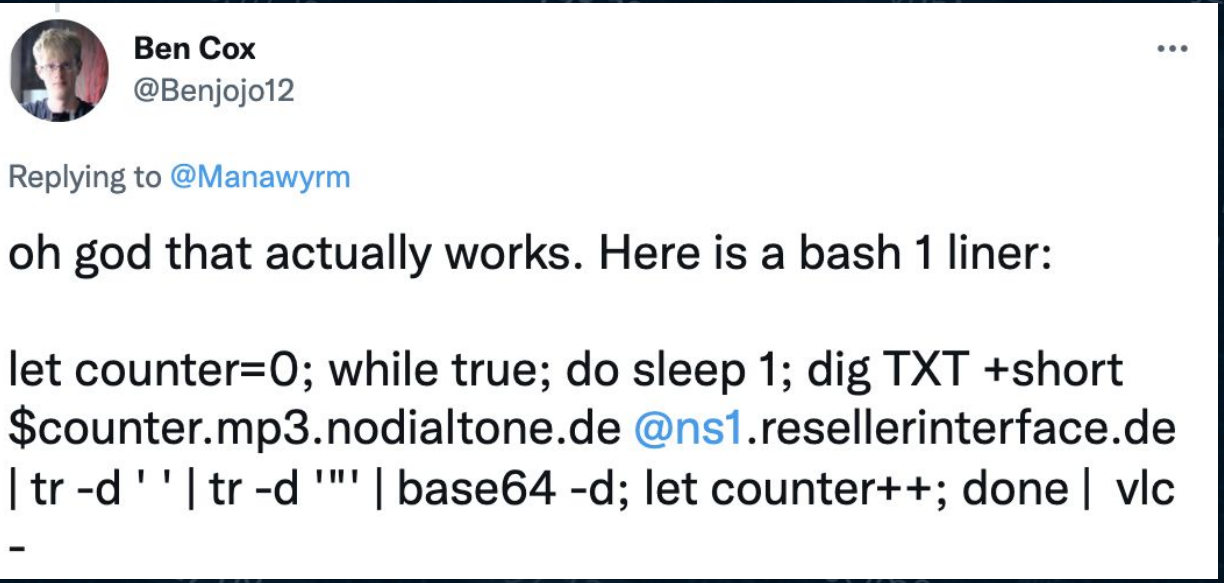


Ben Cox, benjojo.co.uk

Bigger things

MP3s

One use of DNSFS …



Links

https://dnsfilter.com/ - DNSFilter
https://github.com/sehaas/fakert - Sebastian Haas' fakert
https://beaglenetworks.net/post/42707829171/star-wars-traceroute - Star Wars traceroute
https://dgl.cx/wikipedia-dns - Wikipedia over DNS
https://www.youtube.com/watch?v=_y36fG2Oba0 - The Day The Router Died
https://www.youtube.com/watch?v=O03k0DV2m1k - Bad Horse
https://asciinema.org/a/15020 - Christmas traceroute
https://team-cymru.com/community-services/ip-asn-mapping/#dns - IP to ASN mapping
https://www.cambus.net/interesting-dns-hacks/ - few things including the calculator, My IP
https://jpmens.net/2020/10/04/airports-of-the-world/ - Airports
https://github.com/gryphius/ch-loc - Oli Schacher's Swiss location stuff
https://www.daemon.be/maarten/dnstunnel.html - Discussion of DNS tunneling
https://coord.info/GC615NM - Geocache
https://github.com/craigmayhew/dns-adventure-game - text adventure over DNS
https://github.com/hiway/txtrex - blogging via DNS (Harshad Sharma - @hiway)
https://gist.github.com/Manawyrm/718cf8ab6ba59ba95d9743d01b1763dd - MP3 streaming
https://github.com/yarrick/iodine - iodine - IP over DNS
https://github.com/veggiedefender/browsertunnel - HTTP over DNS
https://www.lastweekinaws.com/podcast/aws-morning-brief/whiteboard-confessional-route-53-db/ - DNS for config management
https://play.google.com/store/apps/details?id=com.in.troiddns - SlowDNS - VPN over DNS
https://dnskv.com/ - DNS Key Value Storage
https://github.com/iagox86/dnscat2 - dnscat2
https://bimi.agari.com/ - Brand Indicator Records
https://tools.ietf.org/id/draft-blank-ietf-bimi-00.html - BIMI draft
https://www.num.uk/ - num.uk business
https://www.numprotocol.com/ - the NUM protocol
https://github.com/benjojo/dnsfs - DNSFS
https://xkcd.com/1361/
https://team-cymru.com/community-services/ip-asn-mapping/#dns - IP to ASN mapping

https://github.com/pgl/rule53 - Rule53 list on GitHub
https://twitter.com/pgl/status/1405614755000295427 - Twitter thread

Questions?

Principal ~~Museum of DNS Curator~~
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