CURL

YLMRX

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ABOUT

Yoann "`fuzzy`" Lamouroux:

- Reverse-engineer and security expert @dataimpact
- (we're hiring 😀)
- Former sysadmin
- Trol ^ Wdocumented opinions:
  - `xoxopowo@twitter`
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- (so I made a slide about dealing with time)
- No more curling jokes (sorry)

TRIVIA

- Project started in 1996
- Still maintained by Daniel Stenberg (@badger)
- libcurl for about every language out there
- The curl binary is in EVERY default install

ALL OF THEM

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- GNU/Linux, *BSD

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- GNU/Linux, *BSD
- MacOS
- Windows 10 (recently)

SOME QUESTIONS

- curl is old
- curl is badly documented (?)
- DevTools (Firefox, Chrome) is good
- `httpie` is neater/prettier
- `python-requests`

SOME ANSWERS

- Old means:
  - Good
  - Stable/reliable
- DevTools are indeed good
- httpie is a curl wrapper
- python-requests is python (hang-on, brb)

DOCUMENTATION

- You usually need `curl` in critical situations
- No time to dig through 3k lines manual

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  - Just because you can run Chrome in docker,
  - … doesn't mean you should

BASICS

```
>> curl https://www.example.com/
```

Display body on stdout.

VERBOSE

```
curl -v https://httpbin.org  > /dev/null
* Rebuilt URL to: https://httpbin.org/
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0*   Trying 34.230.
* TCP_NODELAY set
* Connected to httpbin.org (34.230.136.58) port 443 (#0)
* ALPN, offering h2
* ALPN, offering http/1.1
* successfully set certificate verify locations:
*   CAfile: /etc/ssl/certs/ca-certificates.crt
  CApath: /etc/ssl/certs
} [5 bytes data]
* (304) (OUT), TLS handshake, Client hello (1):
} [512 bytes data]
* (304) (IN), TLS handshake, Server hello (2):
{ [89 bytes data]
* TLSv1.2 (IN), TLS handshake, Certificate (11):
{ [4832 bytes data]
```

PREFIXES:

- `*` : is information
- `>` : protocol verbose **FROM** your computer (*)
- `<` : protocol verbose **TO** your computer (*)
- `}` : encrypted data **FROM** your computer
- `{` : encrypted data **TO** your computer
- `[xxx]` : size (in bytes) of data transferred.

(ssl verbose with brackets is shown only when `stdout` is redirected)

(*) : doesn't mean it's not encrypted

MORE VERBOSE

tcpdump might not be the answer (yet).

`--trace` and `--trace-ascii` for byte-per-byte analysis.

Use `-` or `filename` as an argument to write to `stdout` or to a file.

CUSTOM HEADERS

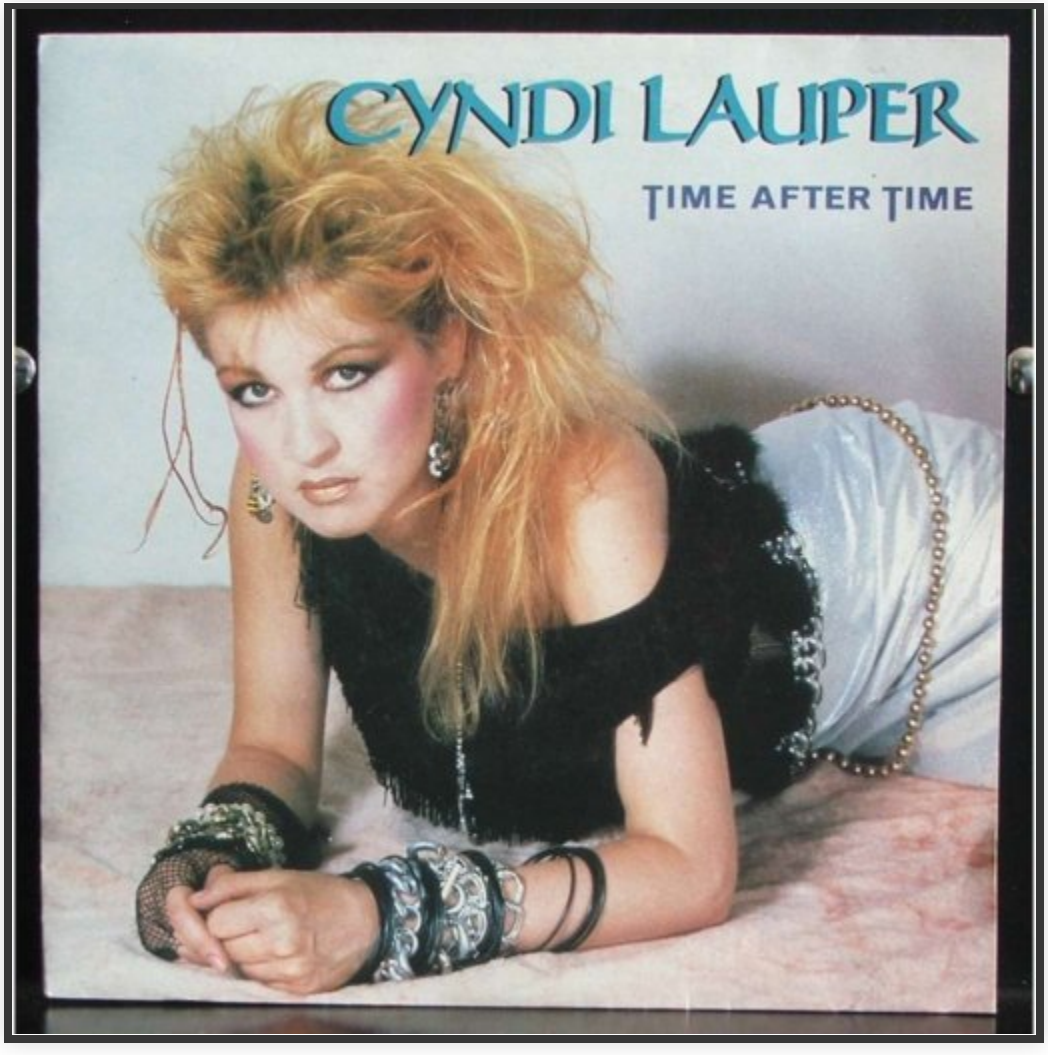
- `-H` (or `--header`) : to send custom headers
- Add 'Key: Value' for each headers
- `-A foo`: is a shortcut to `-H 'User-Agent: foo'`
- `-b foo=bar`: is a shortcut to `-H 'Cookie: foo=bar'`

(Cookies are just headers your browser is used to save)

COOKIES

- Not saved by default
- Use `-c` to **save** cookies to a file (`-` to display on stdout)
- Use `-b` to **read** from a file (**it won't by default**)

TIMER AFTER TIME



Have-you ever seen this ?:

```
time curl http://example.org
```

TRY :

```
curl --trace-time -v http://example.org
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(Only works in verbose or trace mode)

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(you don't)

ANOTHER APPROACH

You can `write` many variables on output, with the format string option including:

- Request information:
  - `http_code`
  - `http_version`
- Time and speed:
  - `time_total`
  - `speed_download`
- Many more…

FOR EXAMPLE:

```
curl -w "http/%{http_version} %{http_code} -- %{time_total}" -s -o/dev/null http://example.com
```

- Introducing `-oOUTFILE`, much prettier than "`>/dev/null`"
- Also introducing the `-s` (`--silent`) option to inhibit the ugly progress metric

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  - >15 years using shells, still can't handle std flows ?
  - `curl` got your back.

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Need to edit `/etc/hosts` ?

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```
curl -v --resolve www.example.com:443:1.2.3.4 https://www.example.com/
```

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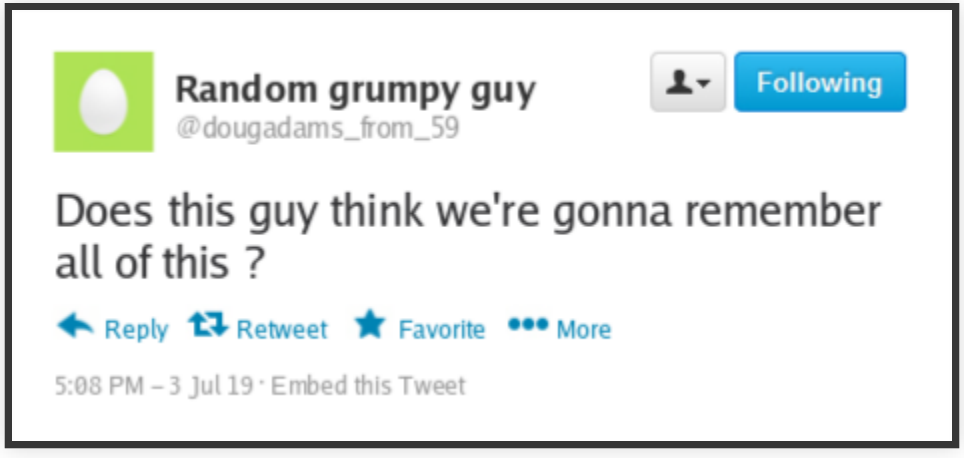
Need to edit `/etc/hosts` ?

```
curl -v --resolve www.example.com:443:1.2.3.4 https://www.example.com/
```

No need to play around with "`Host`" header

MEMORY ALLOCATION PROBLEMS



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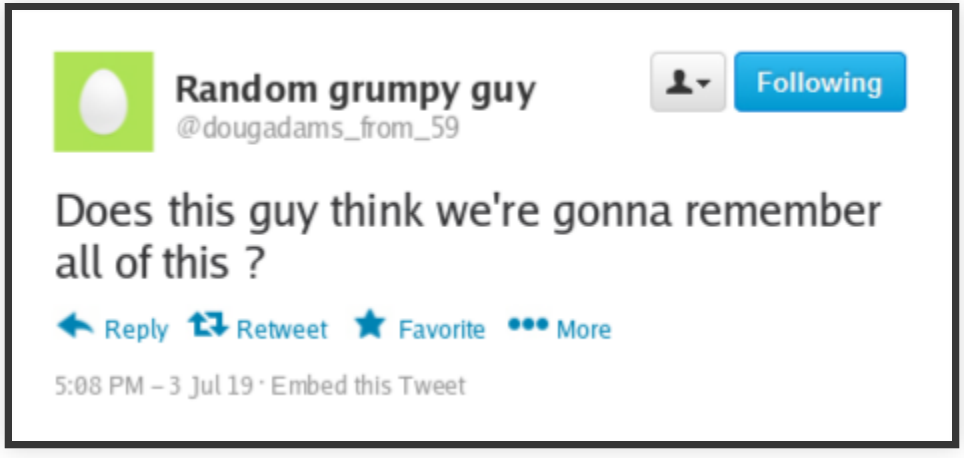

No. Don't.

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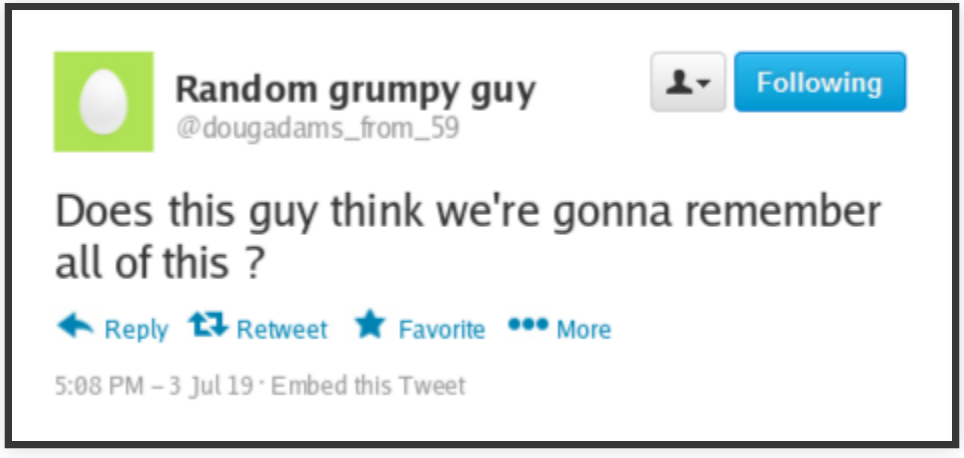

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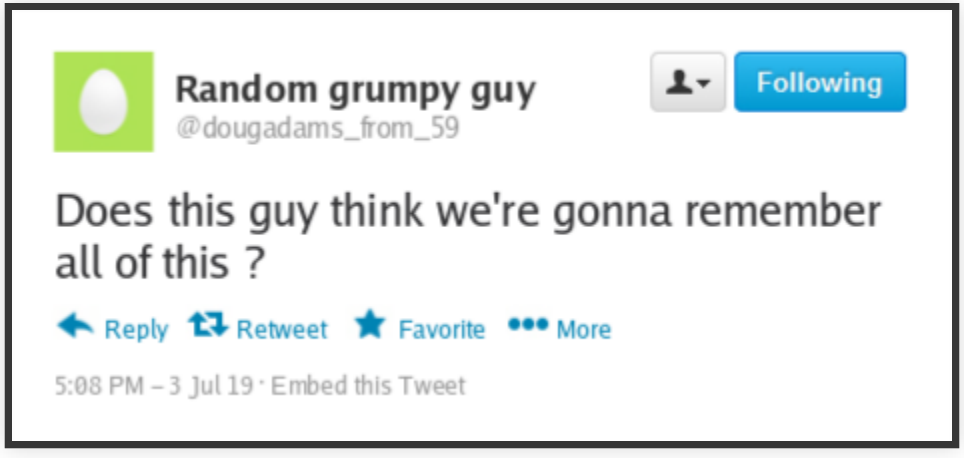

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All the options I mentioned can be added to `$HOME/.curlrc`

Or write several of these, and recall them with `-K filename`, or `--config`

CURL PLAYS NICE WITH OTHERS

Or you can avoid the options madness and ordering, by just right–clicking in Firefox (and Chrome) DevTools.

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It works in BurpSuite too.

CURL PUTS THE C IN CURL.

```
> curl https://example.com \
            --header "Hello: World" -w '# %{http_code} -- %{time_total}'\
            --libcurl test.c  -so/dev/null
# 200 -- 0,339792%
> cat test.c
```

TEST.C

```
/********* Sample code generated by the curl command line tool **********
 * All curl_easy_setopt() options are documented at:
 * https://curl.haxx.se/libcurl/c/curl_easy_setopt.html
 ************************************************************************/
#include <curl/curl.h>

int main(int argc, char *argv[])
{
  CURLcode ret;
  CURL *hnd;
  struct curl_slist *slist1;

  slist1 = NULL;
  slist1 = curl_slist_append(slist1, "Hello: World");

  hnd = curl_easy_init();
  curl_easy_setopt(hnd, CURLOPT_BUFFERSIZE, 102400L);
  curl_easy_setopt(hnd, CURLOPT_URL, "https://example.com");
  curl_easy_setopt(hnd, CURLOPT_NOPROGRESS, 1L);
```

YOUR OWN STRESS-TEST

- Because after all, they're just glorified (yet customisable) loops with precise metrics
- Let's roll our own apache–bench

```
#include <curl/curl.h>
#include <omp.h>
#define MAX_THREAD 64
#define LASERS 1000
#define URL "http://www.example.com"

int main(int argc, char *argv[]) {
  int tid, i = 0;
  FILE *devnull;
  devnull = fopen("/dev/null", "w");
  #pragma omp parallel private(i) num_threads(MAX_THREAD)
  {
  #pragma omp for
    for(i = 0; i < LASERS; ++i) {
      tid = omp_get_thread_num();

      CURLcode ret;
      CURL *hnd;
      double total;
```

- Just removing some comments

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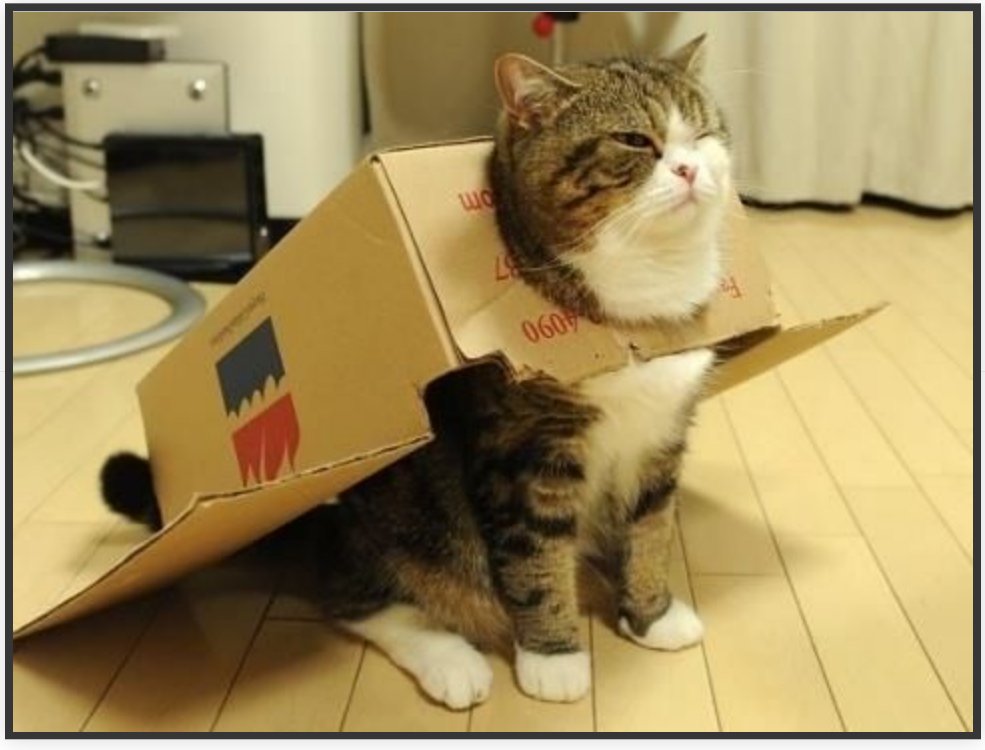
DEMO ?

THANK YOU

- Everyone @ PTS for all the event
- Dan Stanberg for all of the curling
- Have a safe trip back home ♥



QUESTIONS ?