

1. TLS Early Data

TLS 1.3 comes with a lot of improvements for security and performance. A core performance feature is the support of “early data”, also known as 0-RTT data. This allows TLS to forgo the extra round trip when re-establishing connections. Scanning TLS can be done by hand or with specialized tools. In this exercise we take a look at `sslyze` and use it to scan TLS 1.3 support for “early data”.

Tools: `sslyze`¹. *Dataset:* The Alexa top 1M list located in `shared-data` on `mobi8`.

- (a) Read the documentation and get the basic example of “Scan Commands” running. Explain its workings.
- (b) Extend your script to check for TLS 1.3 and TLS 1.3 Early Data support.
- (c) Run your script over the first 1000 entries of the Alexa top 1M list and report on your findings.

2. Securing MX Records with DANE

While DANE has the potential to improve security of all TLS interactions it sees more use with mail servers than for general web browsing. In this exercise we will compare the deployment of DANE (estimated through the existence of TLSA records) for mail servers and web servers.

Tools: `dig`, `dnspython`, `pydig`, `ldns`. *Dataset:* The Alexa top 1M list located in `shared-data` on `mobi8`.

- (a) Implement the lookup for the TLSA records for the web and mail server of a given domain. (*Remember that the name of the TLSA records includes the port and transport protocol in addition to the domain.*)
- (b) Collect a dataset for the top 1000 entries of the Alexa list.
- (c) Visualize your findings. Check your mail provider for comparison.

¹<https://nabla-c0d3.github.io/sslyze/documentation/>

3. CT Log Verification and Usage

In 2018 Google made the use of certificate transparency mandatory for new certificates, at least for website that want to be considered trusted by the Chrome browser. CT requires publication of certificates in at least two different logs.

Tools: ctutilz². *Dataset:* The Alexa top 1M list located in `shared-data` on mobi8.

- (a) Use `verify-scts` CLI tool to verify `google.com`.
- (b) Implement a python script to do the measurement yourself based on ctutilz.
 - The REPL code in the README is missing a step, check the code of `verify_scts.py` for the ctlog setup.
 - Use the cert verification method per default.
 - Collect the number of logs that verify a domain, potential failures, as well as the related log names.
 - Handle exceptions and record errors.
- (c) Collect data for the Alexa top 1000 entries.
- (d) Visualize statistics for logs per certificate and log usage.

²<https://pypi.org/project/ctutilz/>