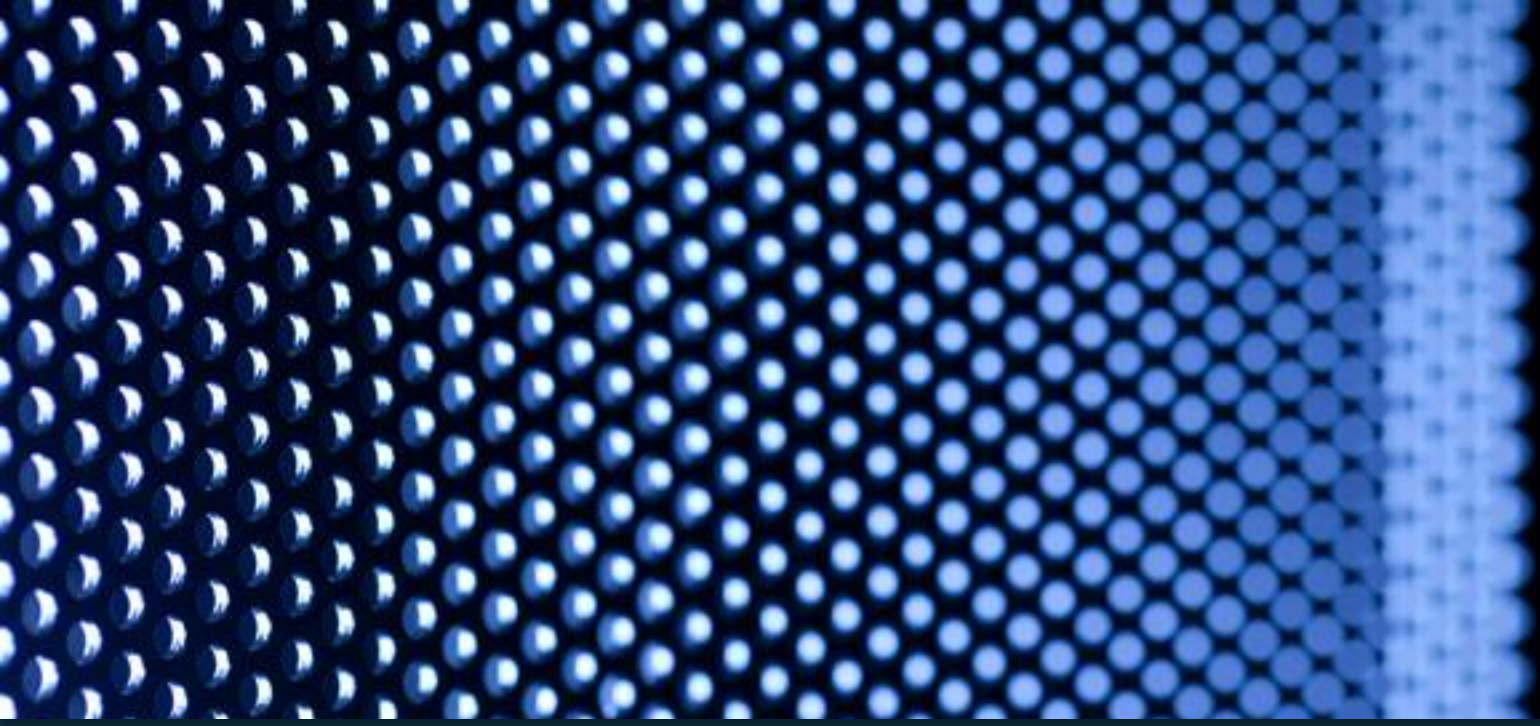

VERISIGN

DNSViz - Powerful and Extensible DNS Analysis

Casey Deccio

Verisign Labs

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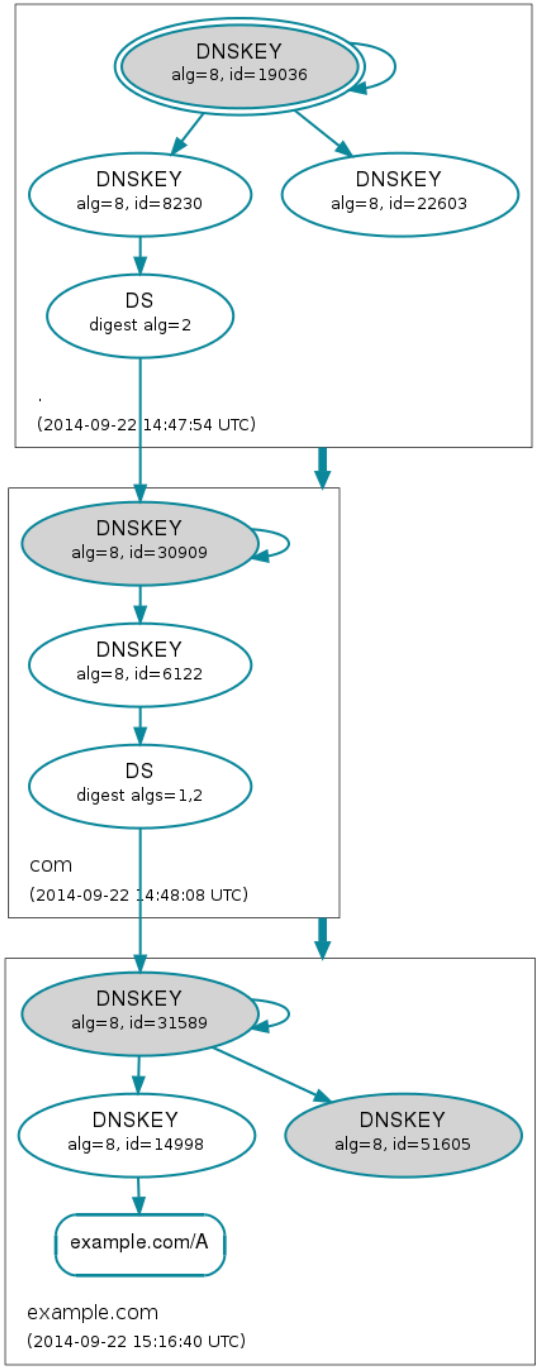
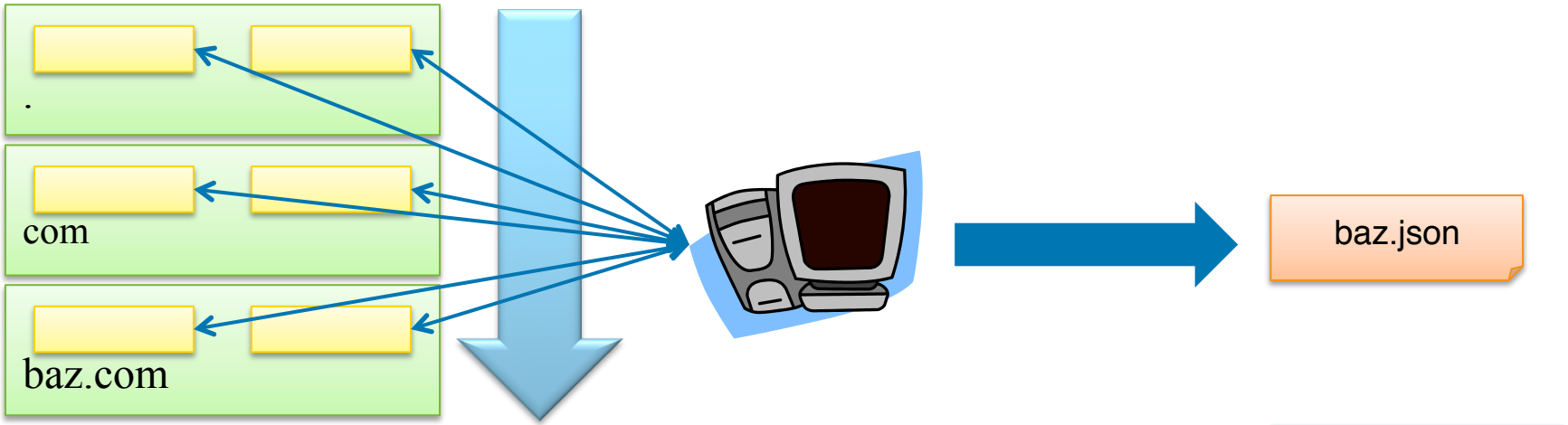
DNSViz History

- **2010** – dnsviz.net launched by Sandia National Labs to help with DNSSEC analysis
- **2011** – archive of DNS monitoring began
- **2013** – database backend rewritten
- **2014** – adopted by Verisign Labs
  - Analysis engine rewritten
    - Decoupled from graph and database
    - Made suitable for local installation/ invocation
  - Hosting migrated to Verisign Labs
  - 0.1.0 release under GPLv2



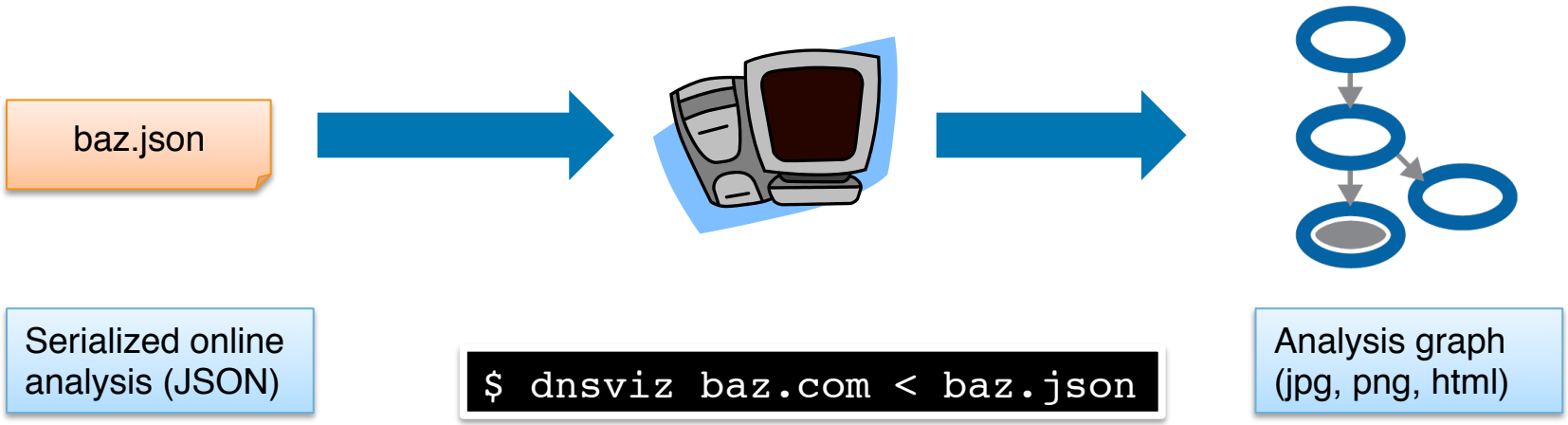
Local DNS Analysis Using DNSViz Command Line

- `dnsget`
  - **Description:** Online analysis (query/response) of DNS name, servers, and dependencies, following referrals
  - **Input:** One or more domain names
  - **Output:** Serialized (JSON) DNS analysis, including query/response diagnostics



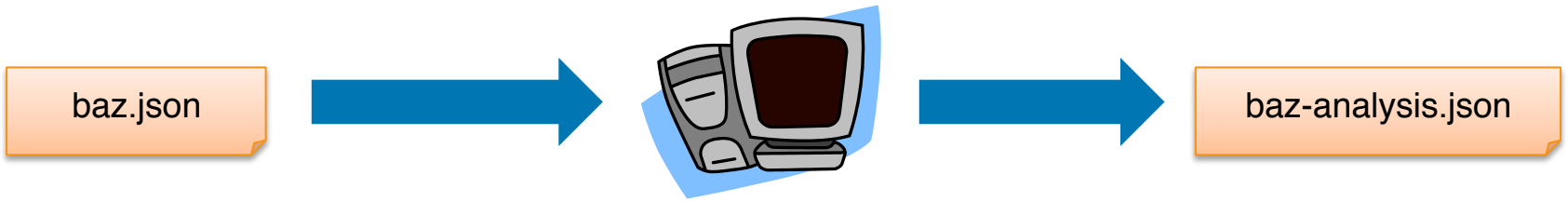
Local DNS Analysis Using DNSViz Command Line

- `dnsviz`
  - **Description:** Offline analysis (correctness/validation/consistency) of DNS name, servers, and dependencies
  - **Input:** One or more domain names and serialized (JSON) analysis (output from `dnsget`)
  - **Output:** Graph of DNS analysis, as an image - png, jpg, html (interactive) format



Local DNS Analysis Using DNSViz Command Line

- `dnsgrok`
  - **Description:** Offline analysis (correctness/validation/consistency) of DNS name, servers, and dependencies
  - **Input:** One or more domain names and serialized (JSON) analysis (output from `dnsget`)
  - **Output:** Serialized (JSON) DNS analysis, including error-level filtering



Features

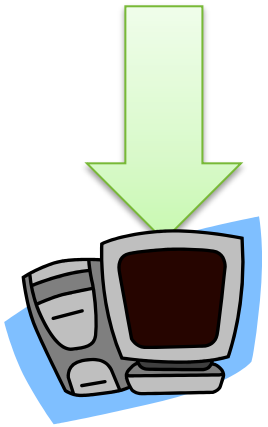
- Automatically detects IPv6 connectivity for related tests
- Works on arbitrary names – not just zones
- Follows CNAME dependencies
- Checks negative responses – both of names and zones
  - NXDOMAIN
  - No data
  - NSEC/NSEC3
- Other
  - DNAME
  - Wildcard

Features

- Stub/full analysis
  - **Default**: Analyze just the name itself (stub)
  - **Optional**: Analyze to the height of any ancestor, including root (full)
- Explicit delegation
  - **Default**: Infer name servers from delegation from IANA root
  - **Optional**: Specify arbitrary name servers for a domain
  - (This also allows for analysis with an alternate (non-IANA) root)
- DLV
  - **Default**: No DLV
  - **Optional**: Specify a DLV server (e.g., dlv.isc.org)
  - (Yes, there is still quite a presence of DLV users out there)
- Multiple names analyzed serially or in parallel (work-in-progress)

0.1.0 Release – download and install

- Dependencies
  - dnspython >= 1.10
  - pygraphviz >= 1.1
  - M2Crypto >= 0.21.0 (patches for DSA, ECDSA, GOST)
- Download location
  - TBD
- Install
  - Commands:
    - python setup.py build
    - sudo python setup.py install
  - Location:
    - Supporting python modules: PREFIX/lib/python$VER/
    - Scripts: PREFIX/bin
- License: GPLv2



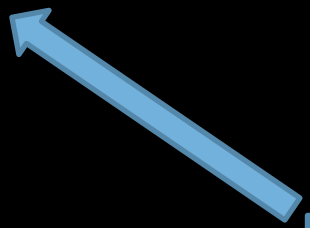
Example – verisignlabs.com

```
$ dnsget verisignlabs.com > v.json
Analyzing com (stub)
Analyzing verisignlabs.com
$ dnsgrok -l error verisignlabs.com < v.json
$ dnsgrok -l info verisignlabs.com < v.json
{
    "verisignlabs.com.": {
        "status": "YXDOMAIN",
        "answer": {
            "verisignlabs.com./IN/A": [
                {
                    "description": "RRset for verisignlabs.com./A",
                    "rrsig": [
                        {
                            "description": "RRSIG covering
verisignlabs.com./A",
                            "status": "VALID"
                        }
                    ]
                }
            ],
...
```

Online analysis

Offline analysis

Name status



RRSIG status

Example – verisignlabs.com

```
...
        "nxdomain": {
            "c1vw9md205.verisignlabs.com./IN/A": {
                "proof": [
                    {
                        "description": "NSEC3 record(s) proving the
non-existence (NXDOMAIN) of c1vw9md205.verisignlabs.com.",
                        "nsec3": [
                            {
                                "description": "RRset for
1p82sf5a4tdaeigps7d10gvp3lunl6io.verisignlabs.com./NSEC3",
                                "rrsig": [
                                    {
                                        "description": "RRSIG covering
1p82sf5a4tdaeigps7d10gvp3lunl6io.verisignlabs.com./NSEC3",
                                        "status": "VALID"
                                    }
                                ]
                            },
```

NXDOMAIN/ NSEC3 status

NSEC3 RRSIG status

Example – verisignlabs.com


```
 ...
      "dnskeys": [
           {
               "description": "DNSKEY for verisignlabs.com.
(algorithm 8 (RSA/SHA-256), key tag 63023)"
           },
           {
               "description": "DNSKEY for verisignlabs.com.
(algorithm 8 (RSA/SHA-256), key tag 19773)"
           }
       ],
       "delegation": {
           "ds": [
               {
                   "description": "DS record(s) corresponding to
DNSKEY for verisignlabs.com. (algorithm 8 (RSA/SHA-256), key tag
19773)",
                   "status": "VALID"
               }
           ],
           "status": "SECURE"
       },
```


DNSKEY status/errors

DS status/ delegation status

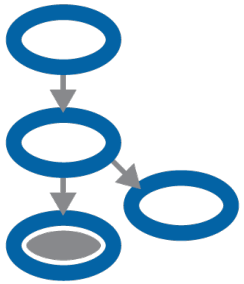
DNSViz Library – Lower Level Functionality

- Query engine
- Query/response handlers
- Subclass-able DNS Query
  - Define flags, types, response handling, etc.

Testing and Feedback

- Help requested!
- Usability Feedback
  - Command line
  - Serialized online analysis schema (`dnsget` output)
  - Offline analysis schema (`dnsgrok` and `dnsviz` output)
  - Error code and description
  - Low-level primitives
- Feature requests
- Bug reports

Future Work



- Regression tests
- Web front-end
  - General design
  - URL schema
- Recursive implementation and testing
- Arbitrary record types queried
- Community help welcome!
- Google Groups mailing list:

  https://groups.google.com/d/forum/dnsviz-interest

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