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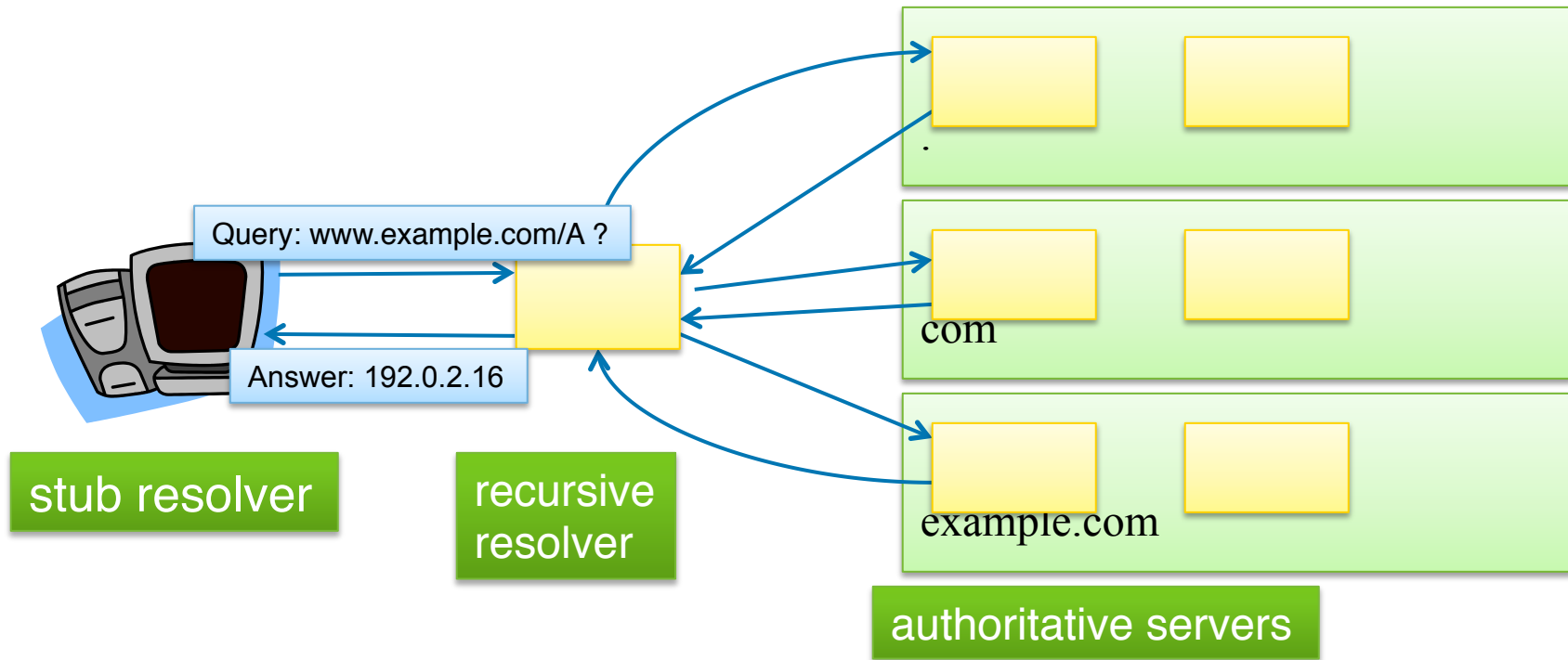
A Looking Glass for DNS Measurement

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DNS Name Resolution



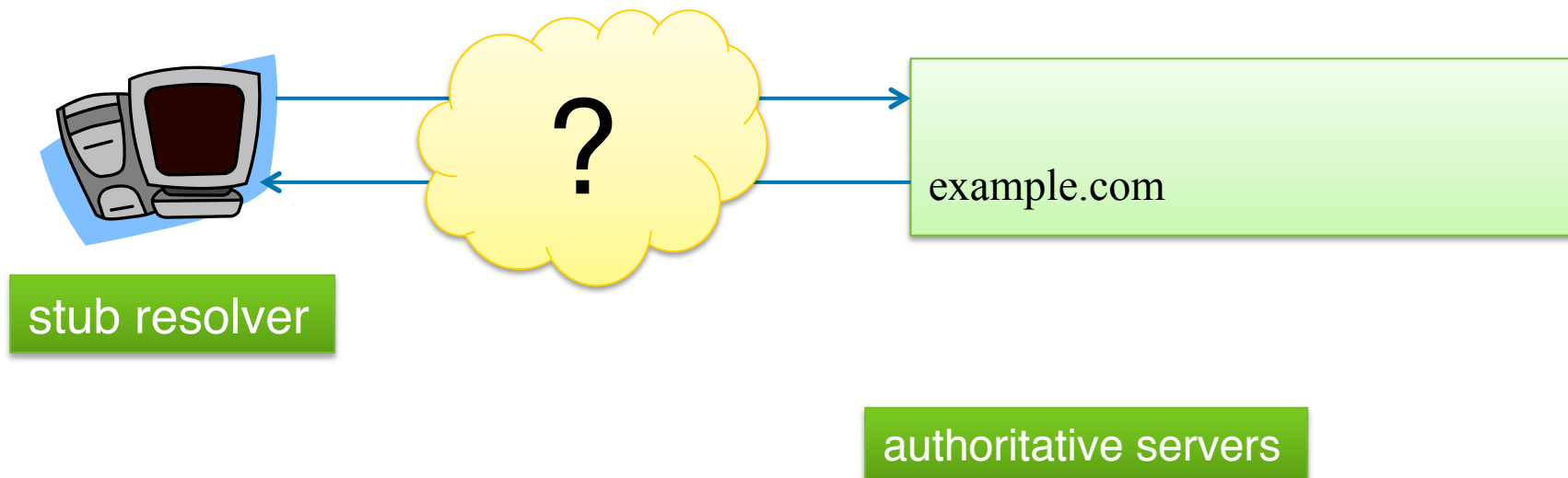
The Path Between Stub and Authoritative

- Unknowns

- Recursive resolver(s)
- Authoritative servers
- Anycast instances
- IPv4/IPv6 Network paths

- Perspective capabilities

- TCP/UDP connectivity, latency
- TLS/DTLS
- EDNS: version, options, flags
- DNSSEC records
- Large packets
- Record types



Measuring from Other Vantage Points

- Platforms

- CAIDA ARK
- RIPE Atlas
- NLNOG Ring

- Considerations

- Access – full shell vs. API
- Tests – canned vs. custom
- Availability of probes
 - Number
 - Location
- Synchronous vs. asynchronous execution
- Sequential progressive diagnostics

DNS Looking Glass – Desired Capabilities

- Request components

- Message (or optionally, parameters)
- Destination IP
- Destination port
- Source IP (optional)
- Source port (optional)
- Transport protocol (TCP/UDP)
- Timeout value

- Response components

- Message (if no error)
- Error (timeout or network error)
- Error description (errno)
- Source IP
- Source port
- Time elapsed

DNS Looking Glass – Desired Capabilities (2)

- Security

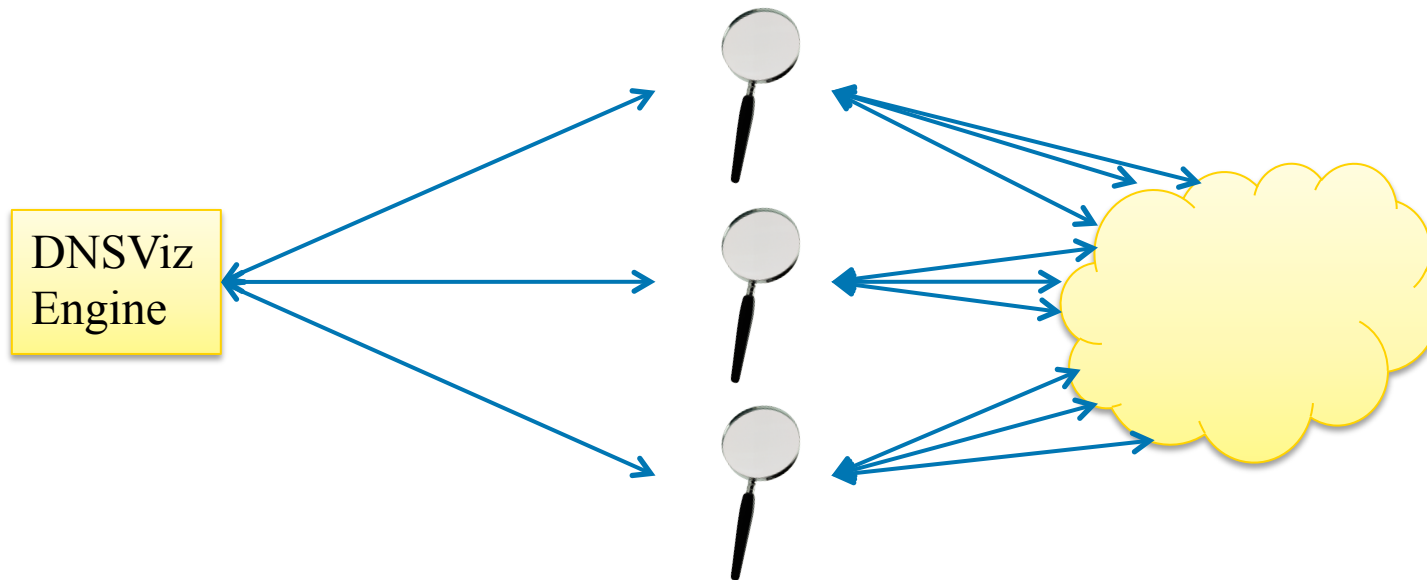
- Loopback/local queries
- Resource usage
- Number of simultaneous queries
- Authentication
- Privileges/access control
- Privacy/encryption

- Other

- Ease of deployment
- Accessibility (IPs, ports, protocol)
- Synchronous execution, for diagnostics
- Support for multiple queries per request
- Parallel execution

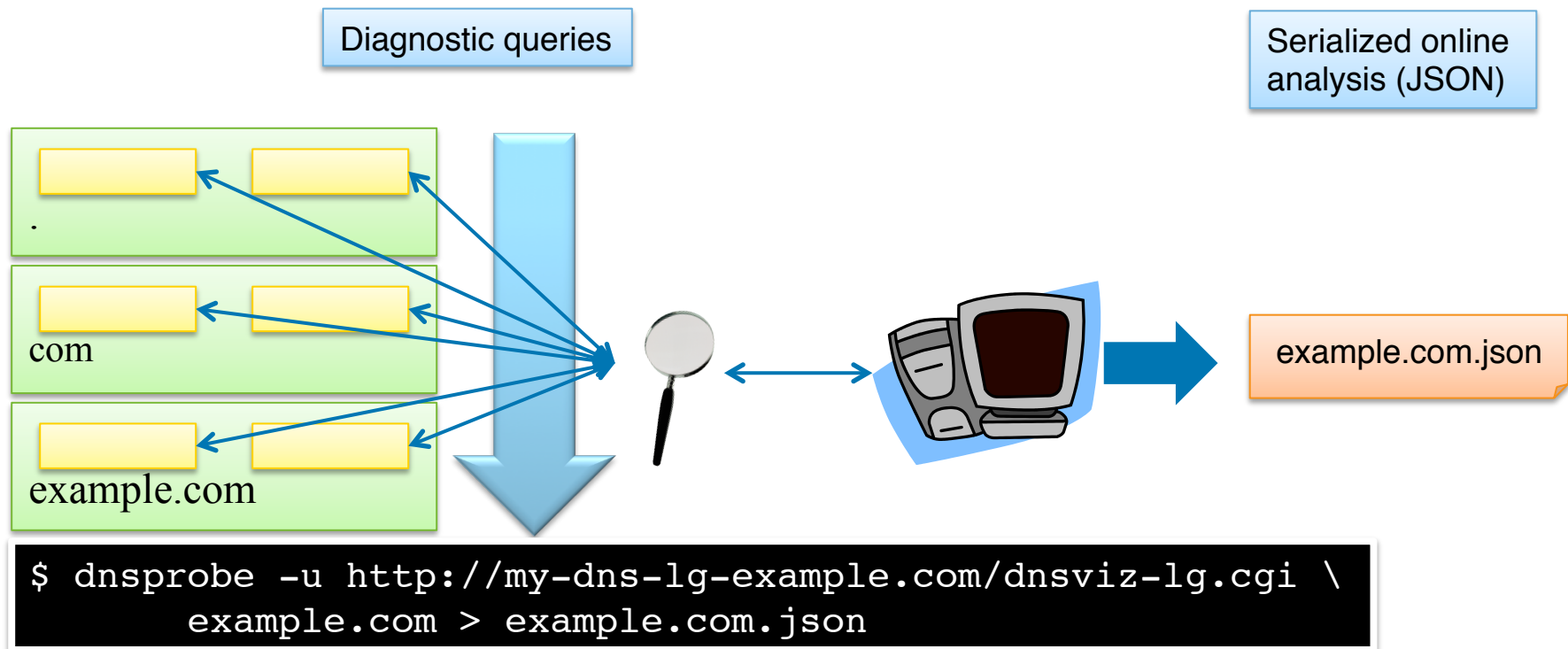
DNSViz Looking Glass Implementation

- Encapsulation
 - JSON
- Transports
 - HTTP (to CGI script)
 - WebSocket (to Java Applet in Web browser)



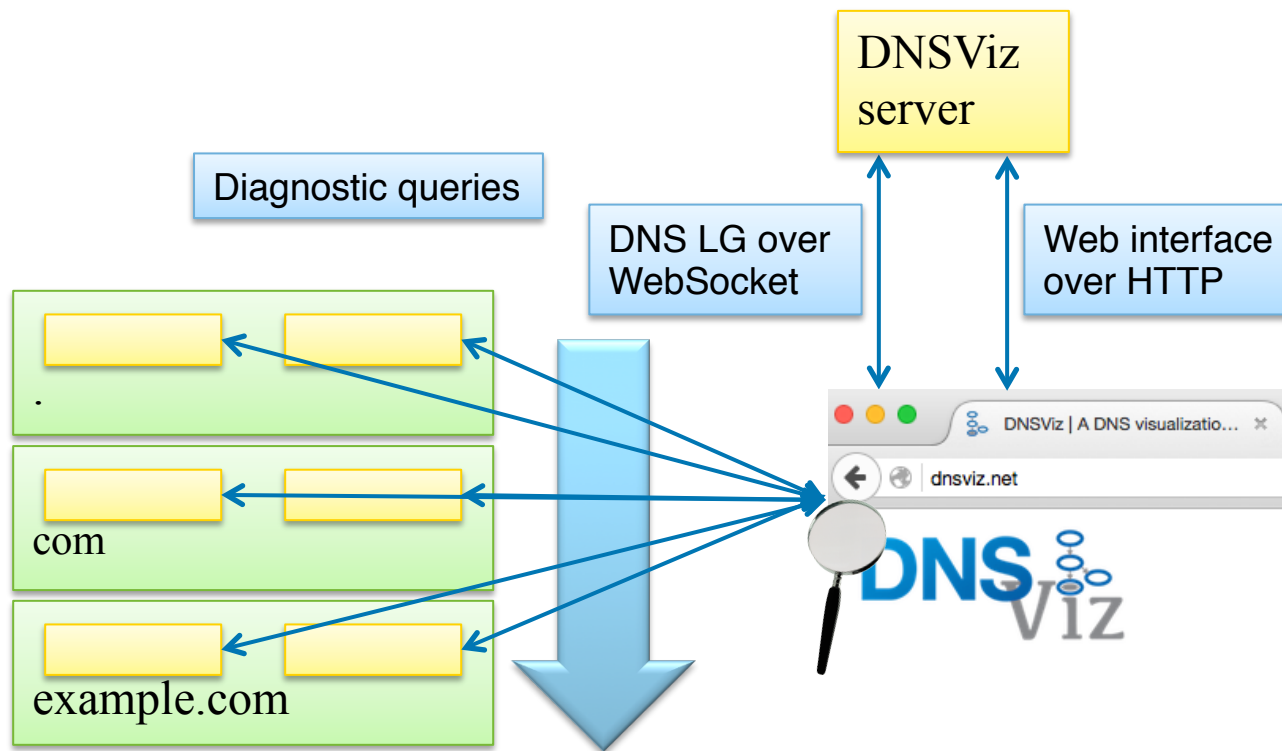
Example: dnsviz probe

- Specify DNS looking glass URL on command line.
- Diagnostic queries are issued through looking glass (CGI script accessible over HTTP POST).



Example: DNSViz Web Interface

- Indicate client-side analysis



DNS Looking Glass over HTTP - Benefits

- Relatively easy to deploy (CGI script).
- Uses sane security defaults.
- Flexible.
- Uses synchronous execution for sequential progressive diagnostics.
- Paradigm can be applied to other measurement models.
- Framework can be used for periodic automated measurement or on-demand measurement.
- Client-side diagnostics can be run in Web browser, without need for installation of custom software.

Summary

- DNS name resolution paths can be diverse.
- A multi-perspective analysis can help understand general resolver experience.
- A flexible DNS looking glass platform facilitates measurement from diverse vantage points.
- A DNS looking glass is implemented and available in the latest release of DNSViz.
 - <https://github.com/dnsviz/dnsviz>

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