

# DNSXplore

A DNSSEC Archival & Diagnostic Platform



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DNSXplore Project

# A Follow-Up Since ICANN84 Dublin

First presented DNSXplore at ICANN84 Dublin

Gathered valuable feedback from the community

Acted on the feedback & advanced the platform

Back at ICANN86 Spain with our progress & updates



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## DNSXplore Team

We are working in to develop the **DNSXPLORE platform** for the internet community that will help in DNSSEC archival, verification requirements of end users and DNS/DNSSEC implementers (telcos)



**Naveed Bin Rais**  
Director DNSXplore Project  
Professor Ajman University, UAE



**Hafiz Farooq**  
NomCom 2026 Delegate  
RSSAC Caucus, GNSO CBUC (Large)

**Jehandad Khan** (Project Architect)  
**Shahzaib Jutt** (BE Developer)  
**Ahmad Waqar** (FE Developer)  
**Sara Abduljalil** (Junior Developer)



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## (Recap) What's DNSXplore

DNSXplore is a project to develop a DNSSEC Archiving and Diagnostic Platform, supported by ICANN through the ICANN Grant Program. Currently there are no comprehensive platforms in the world for the Internet community (especially gTLD and ccTLD community), which provides historical DNSSEC data to better understand the implementation flaws, security weaknesses and design loopholes



**DNSXplore**



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# Project Features

Analyze DNSSEC Records for 300Million+ Internet Domains

DNSSEC Crawl rate: 10Million Domains / Day

DNSSEC Data Retention: 1 Year

Free DNSSEC Data Access to Internet Community



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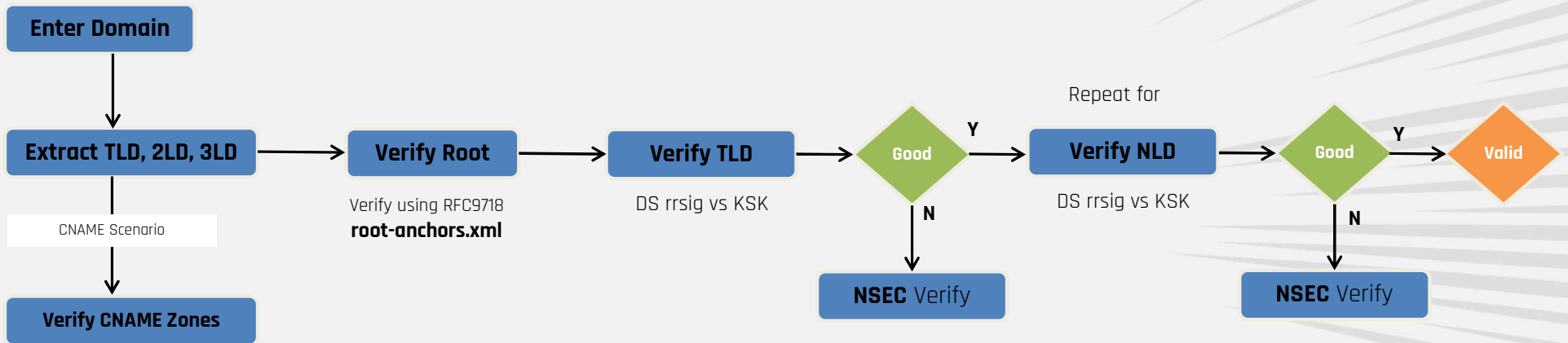


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# SOFTWARE WORKFLOW



CNAME Chaining | CNAME Cloaking | Domain Fronting

- RFC **8027** DNSSEC Roadblock
- RFC **4431** DNSSEC Lookaside Validation (DLV)
- RFC **9824** Compact Denial of Existence in DNSSEC
- RFC **9718** DNSSEC Trust Anchor Publication
- RFC **9364** DNS Security Extensions (DNSSEC)



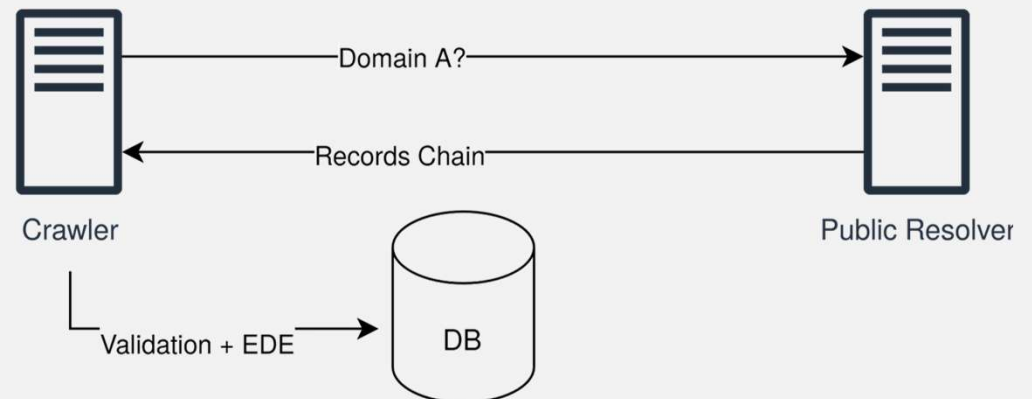
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## Conformance with RFC 8914 (EDE codes)

Our Crawler is compatible with **RFC 8914**, We get the DNS records for each domain from public resolver and do validation and assign the EDE code based on the validation

- **Supported EDE Codes**
- **EDE 1,2**
- **EDE 6,7**
- **EDE 8,9**
- **EDE 10,11**
- **EDE 12**
- **EDE 22**
- **EDE 23**





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# DNSSEC Validation Outcomes

Validation from DNSXplore Results into 4 outcomes

- **Secure**      DNSSEC validation chain is secure
- **Insecure**    Unable to establish the Chain of Trust
- **Bogus**        Cannot securely determine that the Chain exists
- **Error**         There is timeout error or other transient error from the Resolver



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# DNSSEC Validation Outcomes

We sourced zone data for **1,000+** TLDs and ran DNSSEC validation through DNSXplore, processing **259,166,895** domains.

DNSSEC Status	Domains	Percentage
Secure	14,721,882	5.68%
Insecure	217,639,648	83.98%
Bogus	312,809	0.12%
Error	26,492,556	10.22%
Total	259,166,895	100%



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# Project Status

## COMPLETED

- DNSSEC validation engine
- 259M+ domains validated, 1,000+ TLDs
- Infrastructure & Monitoring
- RFC 8914 EDE code conformance

## AVAILABLE TO COMMUNITY NOW

- Free lookups & results at [dnsxplore.com](https://dnsxplore.com)
- TLD-wise & zone-wise DNSSEC stats
- Blog & learn-more resources

## IN PROGRESS

- Migration of DNSXplore to Production Infrastructure
- Scaling crawl toward 10M domains/day
- 1-year historical DNSSEC archive

## PLANNED / REMAINING

- Full coverage of all TLDs + ccTLDs domains
- Improved UI and UX and DNSSEC Stats
- Public API access for DNSSEC Stats



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# Calling ccTLDs to Collaborate

## WHAT WE HAVE

Full gTLD coverage via ICANN's Centralized Zone Data Service (CZDS) – we already pull and validate DNSSEC across 1,000+ gTLD zones.

## WHAT WE NEED FROM ccTLDs

ccTLD zones are not part of CZDS. To reach full internet-scale coverage, we need ccTLD operators to share access to their zone data.

*Together, we extend DNSSEC analysis from gTLDs to the whole internet.*

Let's collaborate – email us at [contact@dnsxplore.com](mailto:contact@dnsxplore.com)



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DNSXplore Project

# Calling ccTLDs to Collaborate

Free access to historical DNSSEC data for your ccTLD

Diagnostics that surface DNSSEC flaws & weaknesses

Joint research to strengthen ccTLD DNSSEC health

Let's collaborate – email us at [contact@dnsxplore.com](mailto:contact@dnsxplore.com)



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## Learn More

- <https://circleid.com/posts/how-dnsxplore-strengthens-internet-trust-across-the-global-dnssec-landscape>
- <https://www.dnsxplore.com/blog>

<https://dnsxplore.com>



SHORT DEMO

**DNSXplore**



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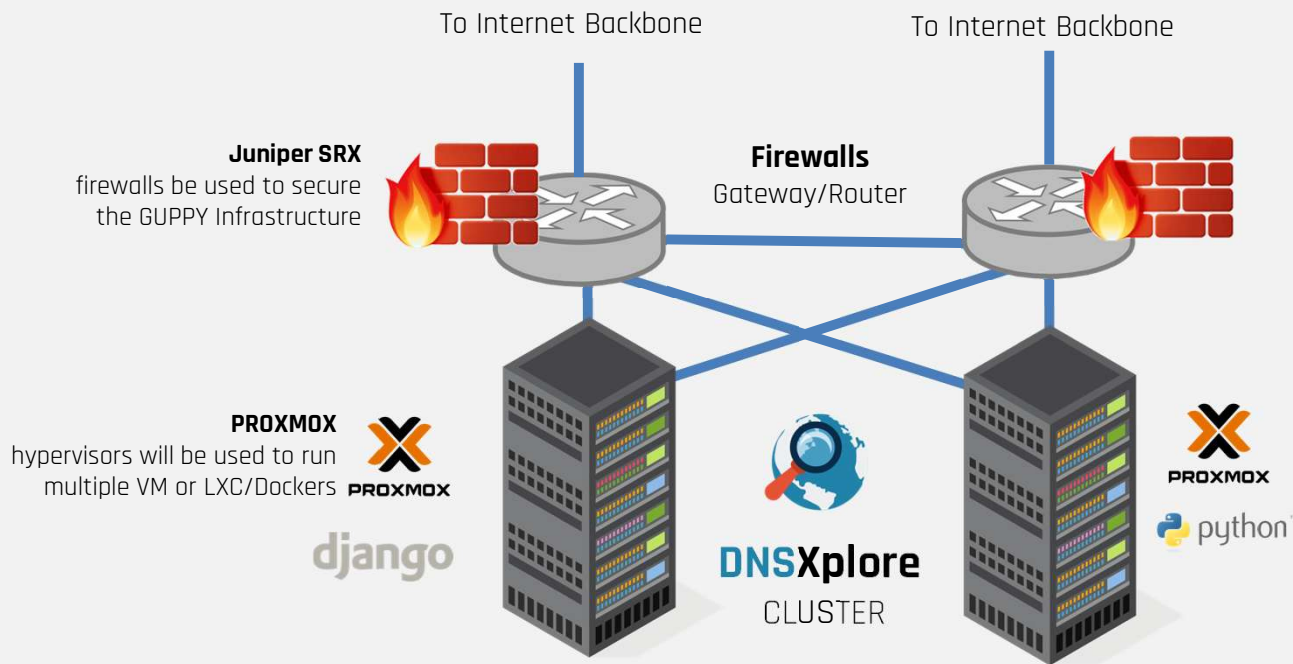
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<https://dnsxplore.com>

QUESTIONS & ANSWERS  
**DNSXplore Project**



# DNSXplore Project DNSSEC Research Lab



Apache **Kafka** will be used for streaming the Passive DNNSEC data collected through crawlers



**Grafana** will be used for the real time dashboarding and visualizations



**BIND9** service will be used for DNSSEC validation



**MongoDB** will store all the DNSSEC raw data objects for longer duration



**GraphQL** will be used for the API interface for the Data Warehousing



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# DNSXPLORE

PASSIVE DNSSEC PLATFORM

Uniting the Impact | Together We Shape Futures

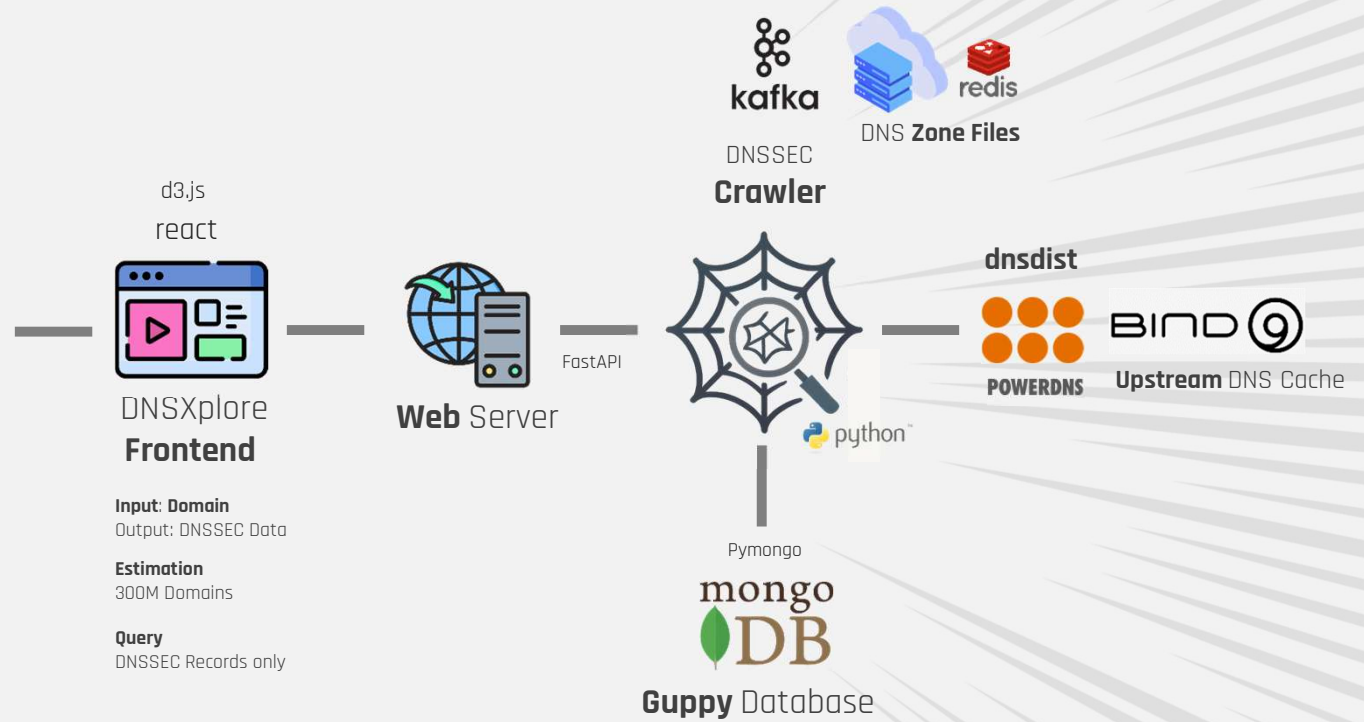
# DNSXPLORE



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# SYSTEM ARCHITECTURE

A global DNSSEC Crawler will crawl



d3.js  
react

**DNSXplore Frontend**

**Input: Domain**  
Output: DNSSEC Data

**Estimation**  
300M Domains

**Query**  
DNSSEC Records only

**Crawl Frequency**  
One Month or Higher



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