BIND9

Making a modern DNS Server

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BIND 9 - The History

- First released in y2k
- Written from scratch
- Design by Contract
    - Rather crash than overwrite memory
- First DNSSEC implementation

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BIND 9.11 ESV

- Released in 2016
- Extended Support Version
- Under Mozilla Public License
- New Features:
  - Catalog Zones
  - Addzone/Delzone Provisioning
  - DNSSEC Key Manager
  - Negative Trust Anchors
  - DNSTAP
  - DNS Cookies
  - Minimal responses to ANY

Photo by Nathan Dumlao on Unsplash

BIND 9.12

- Released in 2018
- NSEC Aggressive Use
- Serve Stale (TTL Stretching)
- Response Policy Interface
- Major Refactoring
- Speedup factor: 1.25-6
- CDS/CDNSKEY tools
- ED25519 Support
- Obsoleted by BIND 9.14

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BIND 9.14

- Released in March 2019
- New release schedule
- Refactoring and Modernization
- New features:
  - QNAME Minimization
  - Mirror Zones
  - Plugins for Query-Response Processing

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Modernization

- On *NIX, BIND requires:
  - C99 Support in Compiler
  - POSIX Threads
  - Advanced Sockets API for IPv6
  - Standard Atomic <stdatomic.h>
- Support for lot of old systems dropped

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Crypto Refactoring

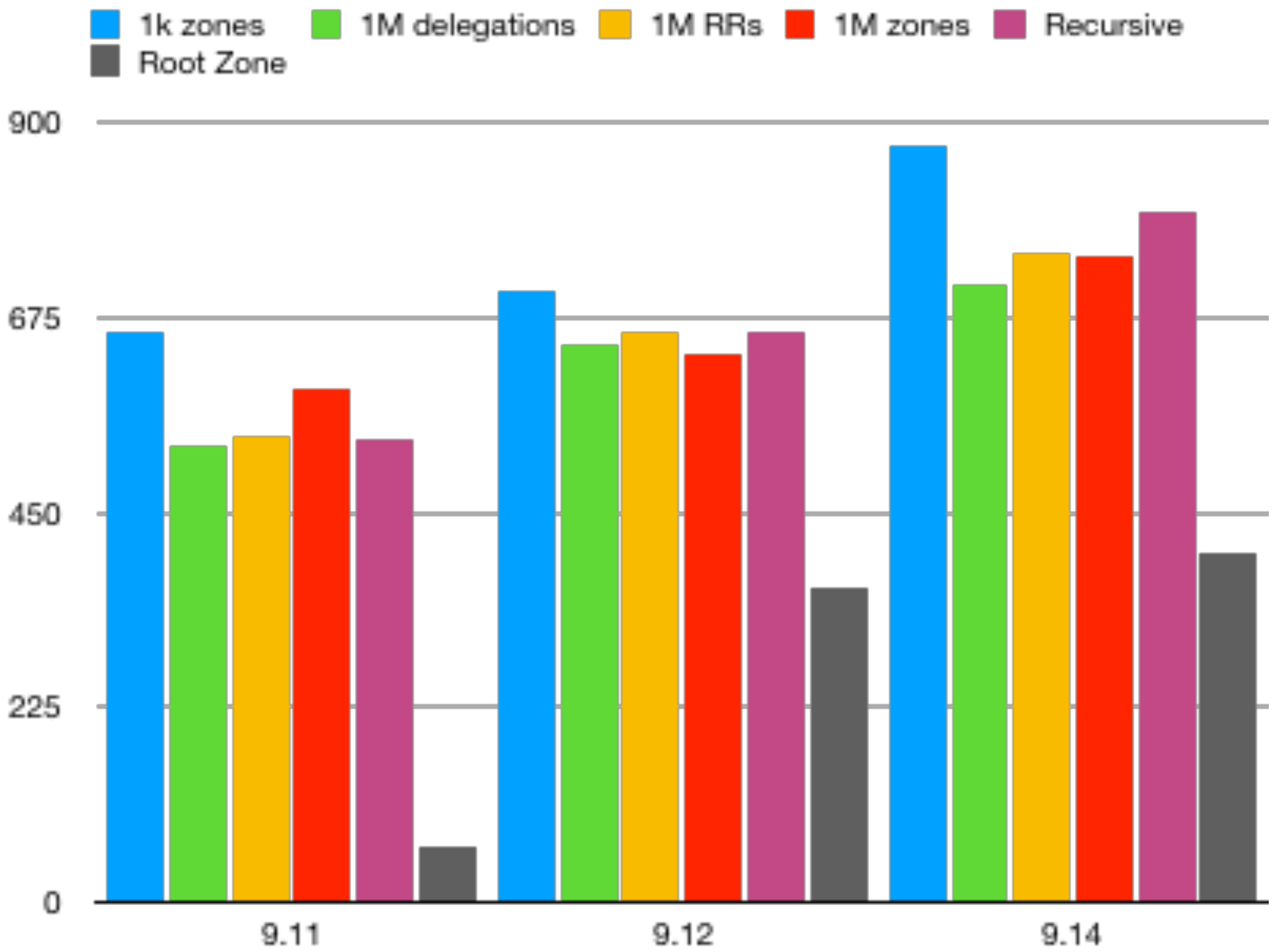
- PKCS#11 now used only for public-key cryptography
  - OpenSSL is mandatory
- Performance Improvements
  - Task Manager is now multithreaded
  - Socket Code has multiple event loops

Photo by Alex Jones on Unsplash

Performance Improvements

- Extra 100k or more QPS Improvement
- Due to Refactoring
    - Task Manager is now multithreaded
    - Socket Code has multiple event loops

Photo by Alex Jones on Unsplash



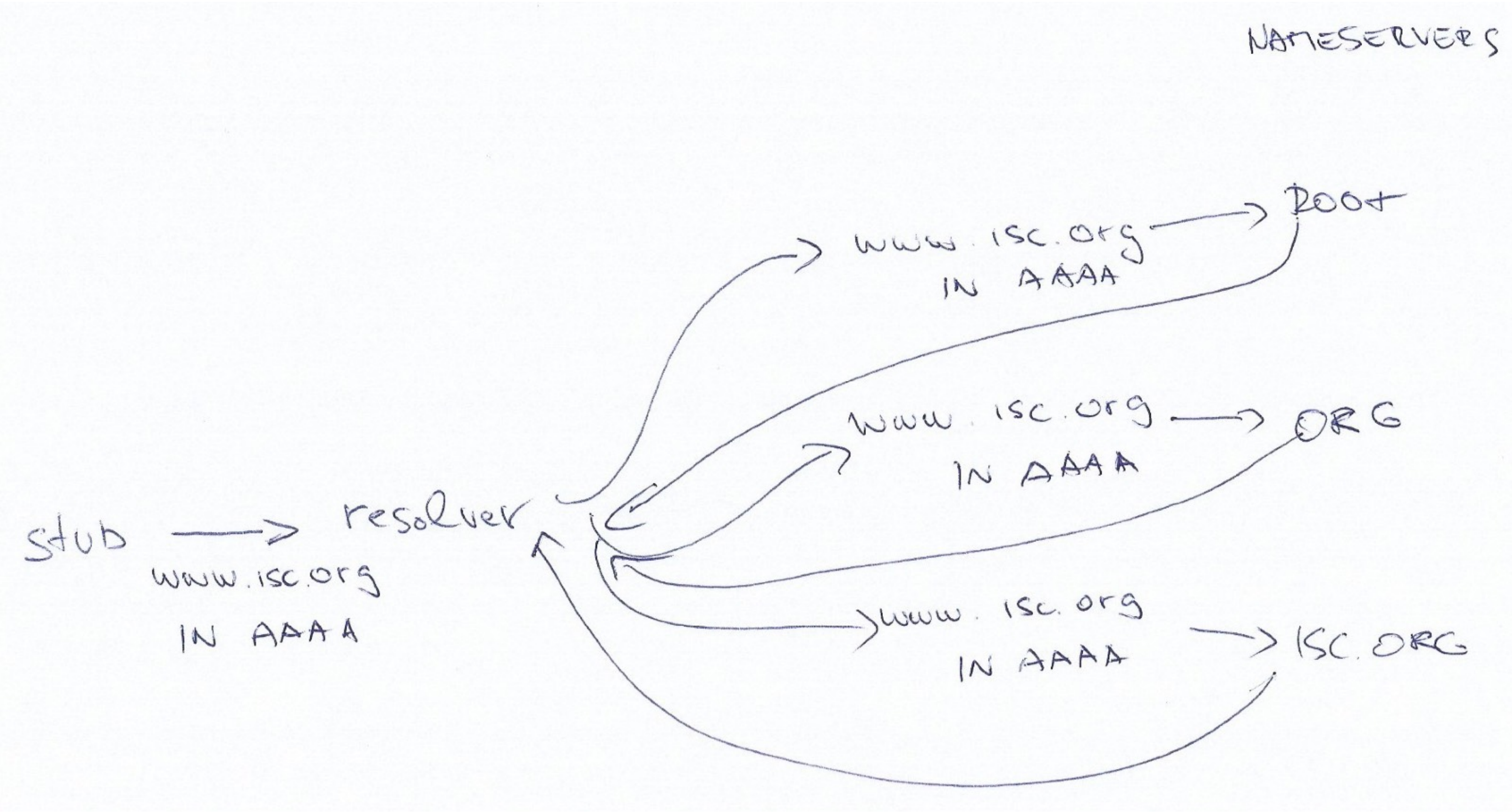
Performance

Responses Per Second

QNAME Minimization

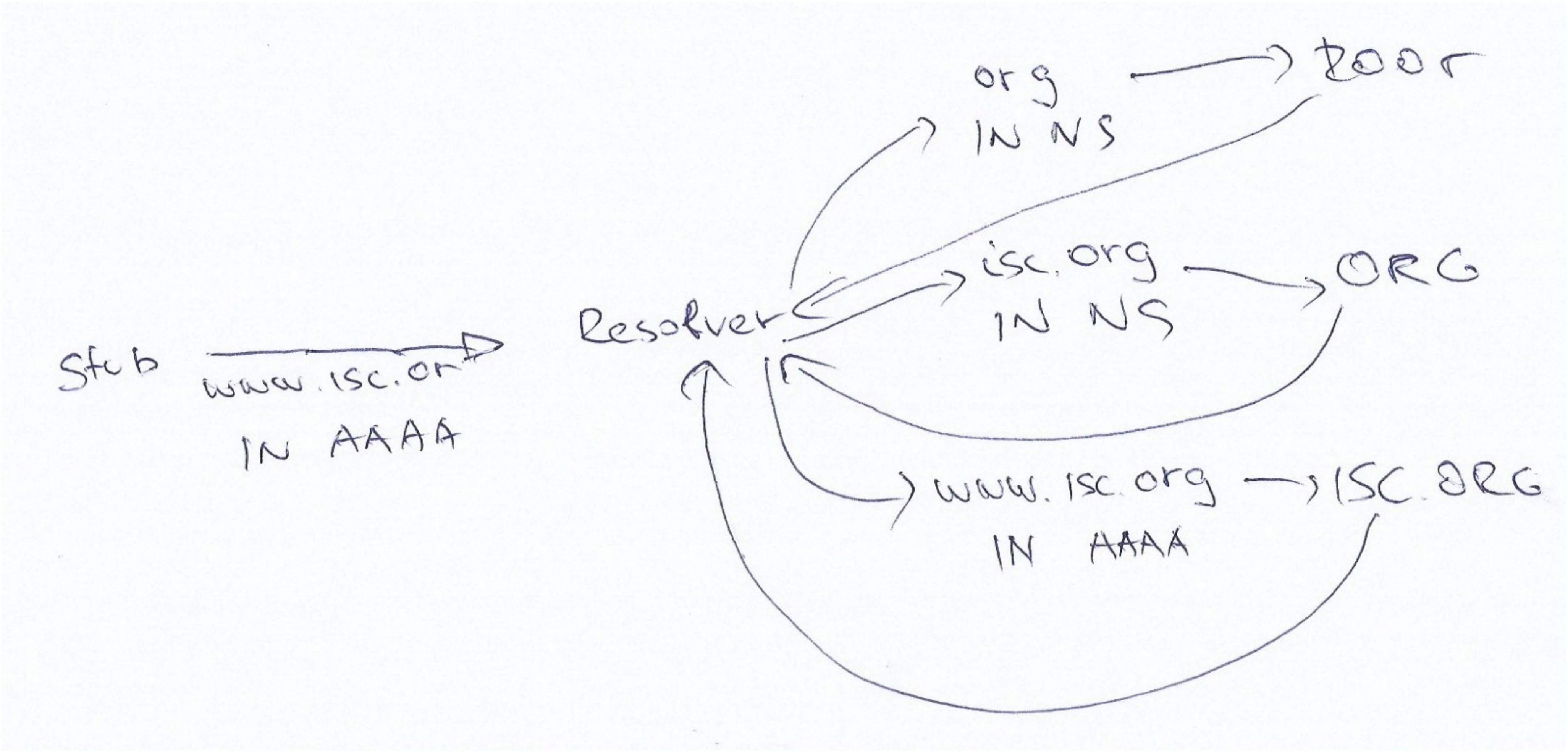
- Defined in RFC7816
- Improves DNS Privacy
- Protects DNS transactions
  - Resolver sends only the minimal info needed to resolve the query
- Enabled by default in a relaxed mode in BIND 9.14

Photo by Josh Shaw on Unsplash



QNAME Minimization

Normal DNS Traffic



QNAME Minimization

Minimized DNS

Root Zone Local Copy

- Defined in RFC7706
- Reduced traffic to the Root
- Transfer (XFR) RZ from well-known sources
- DNSSEC Validated
- Root Zone used only internally

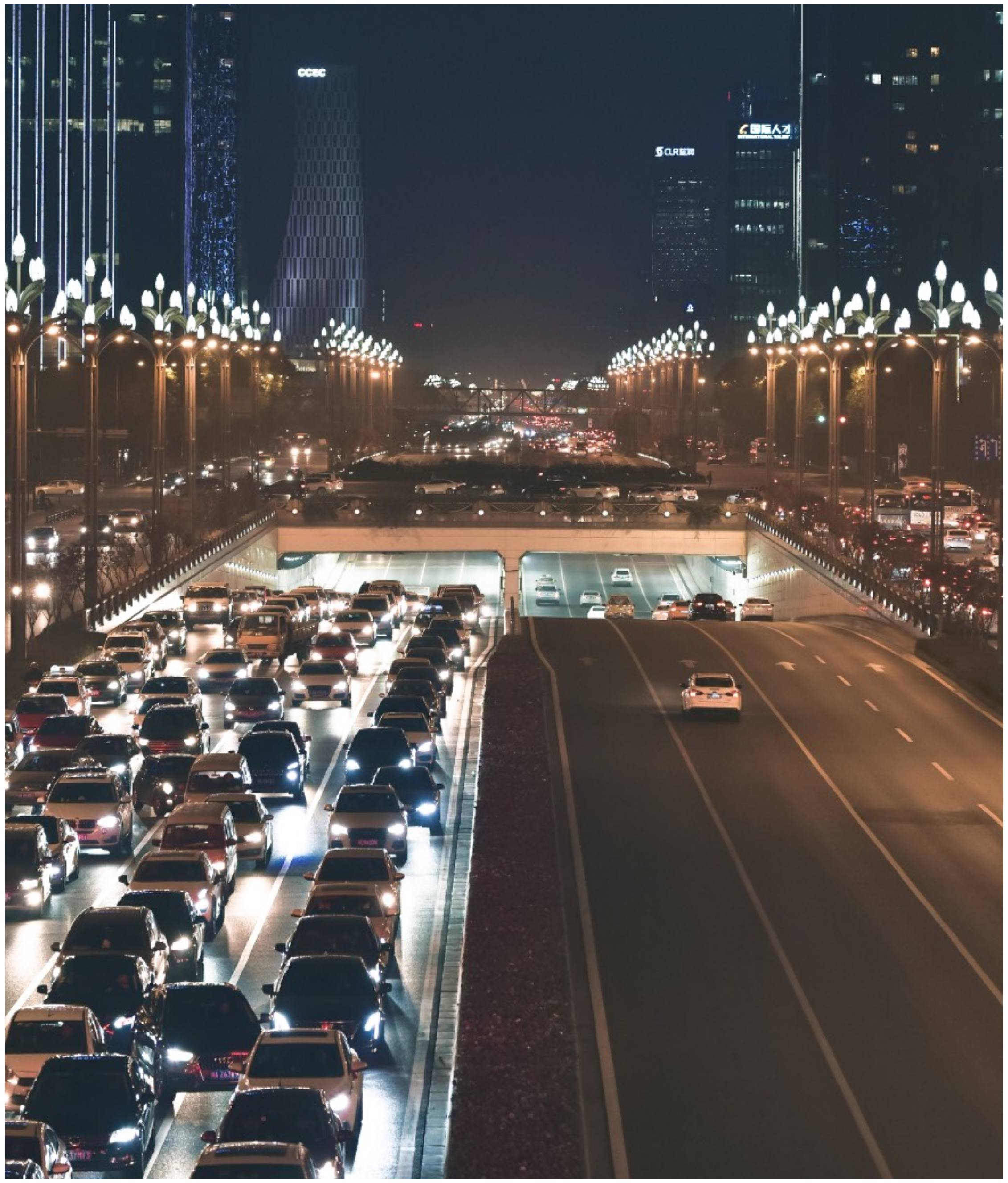


Photo by 7 SeTh on Unsplash

BIND 9.15 Plans

- Performance
- Management
- Security & Privacy
- Operations

Photo by Daniel McCullough on Unsplash

Performance

- Improve BIND performance, so you don’t have to care
- Network stack rewrite / reengineering
- Improve both UDP and TCP performance
- Using libuv
  - Full-featured event loop backed by epoll, kqueue, IOCP, event ports
  - Asynchronous TCP and UDP sockets
  - And more…
    - Thread pools
    - Signal handling
    - High resolution clock
- Using external library allows us to focus on DNS

Management

- Metrics, statistics, …
  - Too many?
  - Too few?
  - What’s missing?
  - What’s extra?
- Update Catalog Zones

I am American too!
Form Connection
Refuge in Sharing LOVE!
GOD is ALL THERE is!
hate.
Everyone will be alright
YOU ARE ENOUGH
Extreme vetting for Repubicans
Do all the good you can for all the people you can for as long as you can.
Believe in YOURSELF Believe in LOVE
Live to love
Separation of
Don't lose heart. We
Where there is ♥ There is life.
Now that its done - Lets move forward as 1
I am grateful for you
L♥VE WINS IN THE END
2018 TURN THE TIDE
RIGHT, temporarily defeated, is stronger than evil triumphant. MLK Jr
We are One people
Be Active
We are still here!
PLEASE
el amor gana... siempre
HATE! STOP THE VIOLENCE!
DON'T FEAR FIGHT!!
The good message are important but do not forget Trump is dangerous Do not be passive
HATE!

Photo by Kyle Glenn on Unsplash

DNS over TLS

- Defined in RFC 7858 & RFC 8310
- Running on port 853
- Add as a module to new networking stack
- Support in clients:
    - CLI Tools: dig, delv, …
    - Forwarder
- Support in server:
    - Stub to BIND Resolver

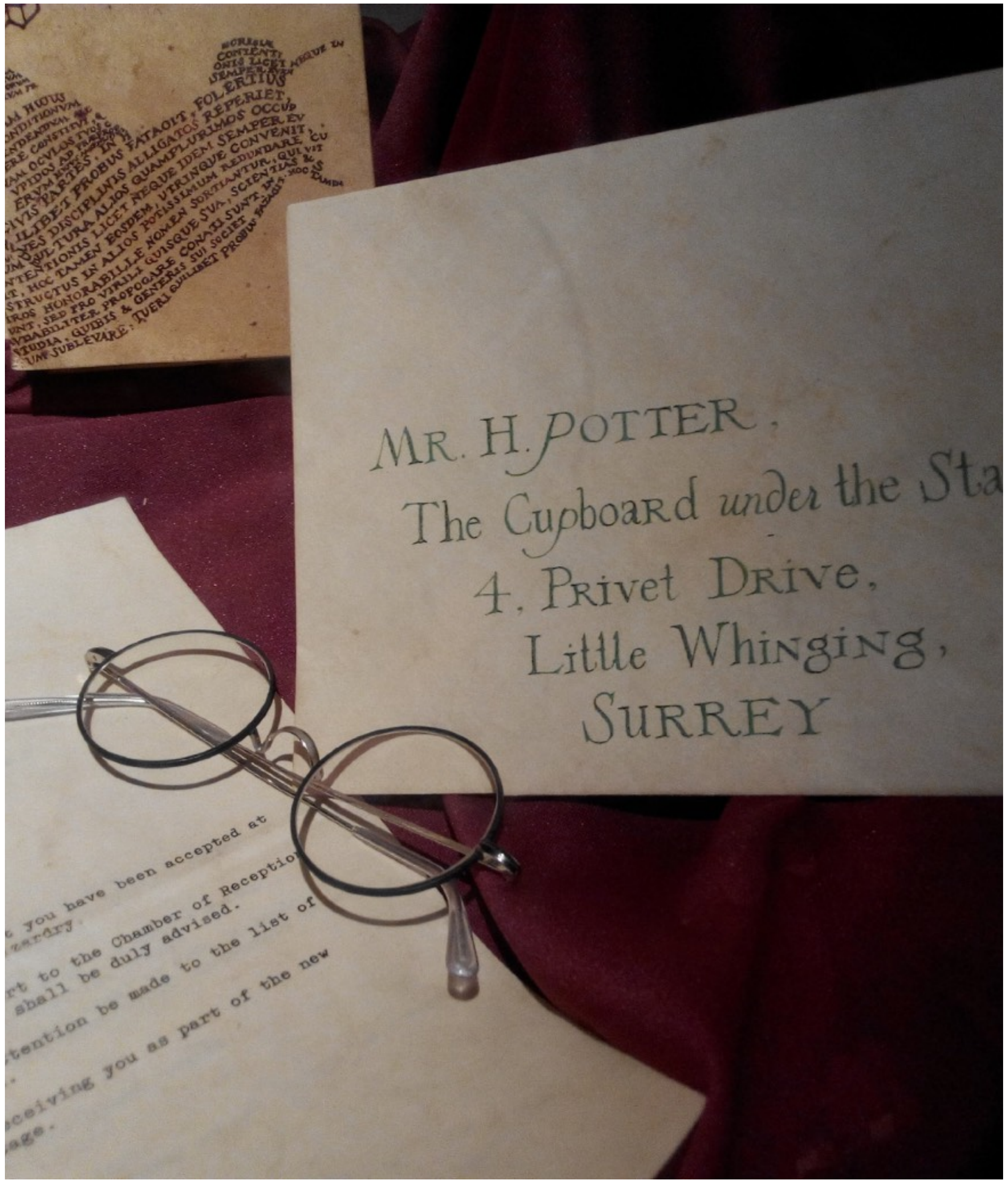


Photo by Rae Tian on Unsplash

DNS over HTTPS

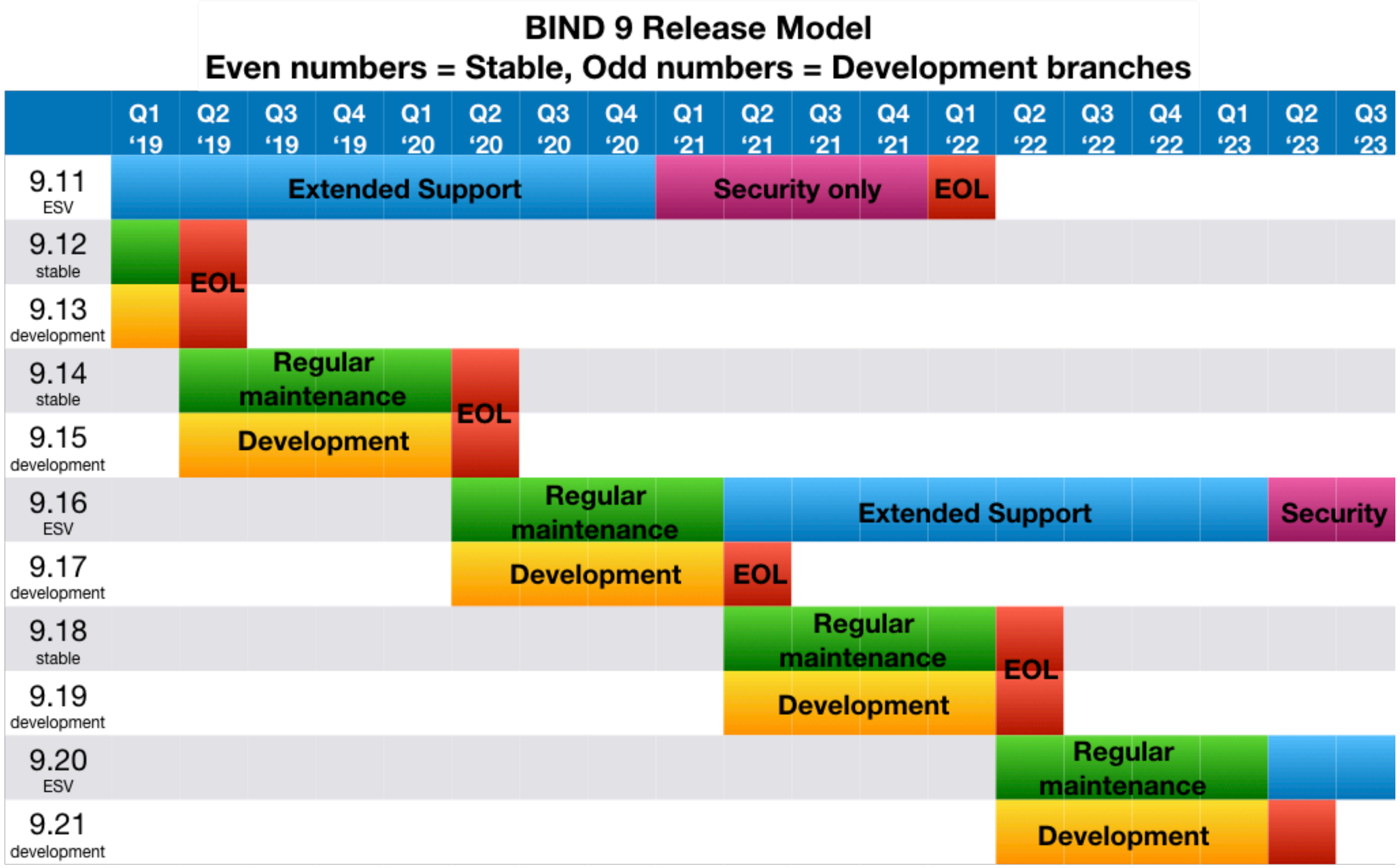
- RFC 8484
- Mixed traffic with HTTP
- Add counterweight to “DNS Silos”
- Support in clients
- Support in server via proxy:
  - Add support for “proxy” protocol (acl, RPZ, …)
  - Proxy module for popular webservers (nginx, apache2) as cross-vendor project

Photo by Pawel Nolbert on Unsplash

DNSSEC Made Easy

- Go from “DNSSEC in 6 minutes” to simple “Yes”
- Keep the existing tools (dnssec-signzone, …)
- Pick reasonable defaults
  - Elliptic Curve keys
- Automate everything
  - Key creation
  - Key rotation
  - Child-to-parent (both sides)
  - Periodic signing
- Add support for:
  - Offline KSKs
  - Combined Signing Keys (CSK)

Photo by John Salvino on Unsplash



BIND 9 Release Model
Even numbers = Stable, Odd numbers = Development branches

	Q1 ‘19	Q2 ‘19	Q3 ‘19	Q4 ‘19	Q1 ‘20	Q2 ‘20	Q3 ‘20	Q4 ‘20	Q1 ‘21	Q2 ‘21	Q3 ‘21	Q4 ‘21	Q1 ‘22	Q2 ‘22	Q3 ‘22	Q4 ‘22	Q1 ‘23	Q2 ‘23	Q3 ‘23
9.11 ESV	Extended Support								Security only				EOL						
9.12 stable	🟩	EOL																	
9.13 development	🟨																		
9.14 stable		Regular maintenance				EOL													
9.15 development		Development																	
9.16 ESV						Regular maintenance				Extended Support								Security	
9.17 development						Development				EOL									
9.18 stable										Regular maintenance				EOL					
9.19 development										Development									
9.20 ESV														Regular maintenance				🟦	🟦
9.21 development														Development				🟥	

Release Schedule

Predictable (Time-Based) Releases

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Questions?

Internet Systems Consortium