

KubeCon



CloudNativeCon

Europe 2019



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Deep Dive CoreDNS

Yong Tang – MobileIron

John Belamaric – Google



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CoreDNS



**CLOUD NATIVE
COMPUTING FOUNDATION**

Speakers



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- Yong Tang

- GitHub: yongtang
- Maintainer: CoreDNS and Docker
- SIG IO Lead & Maintainer: TensorFlow
- Director of Engineering, MobileIron

- John Belamaric

- GitHub: johnbelamaric
- Maintainer: CoreDNS
- Reviewer/Approver, Kubernetes SIG-network
- Author: *Learning CoreDNS* (preview at <https://book.coredns.opensourceoftware.rocks>)
- Author: *OpenStack Cloud Application Development*
- Senior Staff Software Engineer, Google



CoreDNS



Agenda



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- Introduction
- Status Update
- Google Summer of Code
- Technical Deep Dive
- Demo Plugin: Source Based Service Discovery
- Q & A



CoreDNS



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- Flexible DNS server written in Go
- Focus on service discovery
- Plugin based architecture, easily extended
- Default DNS server in Kubernetes
- Supports DNS, DNS over TLS, DNS over gRPC
- Support Route53 DNS sync up
- Started and led by Miek Gieben



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CoreDNS Community



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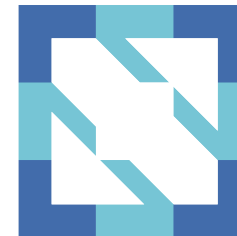
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- 148 Contributors (Big Thanks!)
- 16 Maintainers
- 29 Public Adopters
- 3997+ Stars



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CoreDNS Community



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- Most active:
 - GitHub: <https://github.com/coredns/coredns>
 - Slack: **#coredns** on <https://slack.cncf.io>
- More resources:
 - Web: <https://coredns.io>
 - Blog: <https://blog.coredns.io>
 - Twitter: [@corednsio](https://twitter.com/corednsio)
 - Mailing list/group (not very active):
 - coredns-discuss@googlegroups.com



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Google Summer of Code



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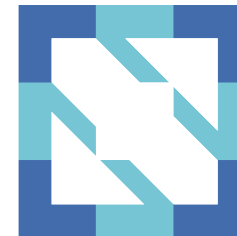
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- Participated 3 years in a row (2017-2019)
- 2017: Varyoo (GitHub: varyoo)
- 2018: Jiacheng Xu (GitHub: jiachengxu)
- 2019: Proposal accepted



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Technical Deep Dive



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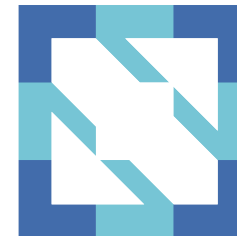
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- Updates for Kubernetes Users
- How Queries Are Resolved
- Building Your Own Plugin



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Updates for Kubernetes Users



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- Kubernetes 1.11 - 1.14 use CoreDNS 1.2.6
- Key, relevant changes from 1.2.6 to 1.5.0
 - k8s_external plugin proxy -> forward
 - health -> health & ready
 - grpc
 - kubernetes TTLs now apply to negative responses (e.g., NXDOMAIN)
 - upstream option no longer needed
 - multiple API server endpoints no longer supported
 - API server resync disabled



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Updates for Kubernetes Users



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- **BACKWARDS INCOMPATIBLE CHANGES**

- These are why 1.5.0 is not yet used by default in Kubernetes - different deprecation policies
- Corefile migration tool in progress
- proxy -> forward
- health -> health & ready
- upstream option changes
- multiple API endpoints no longer supported



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Resolving a Query



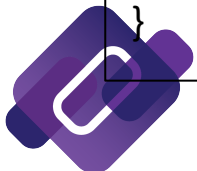
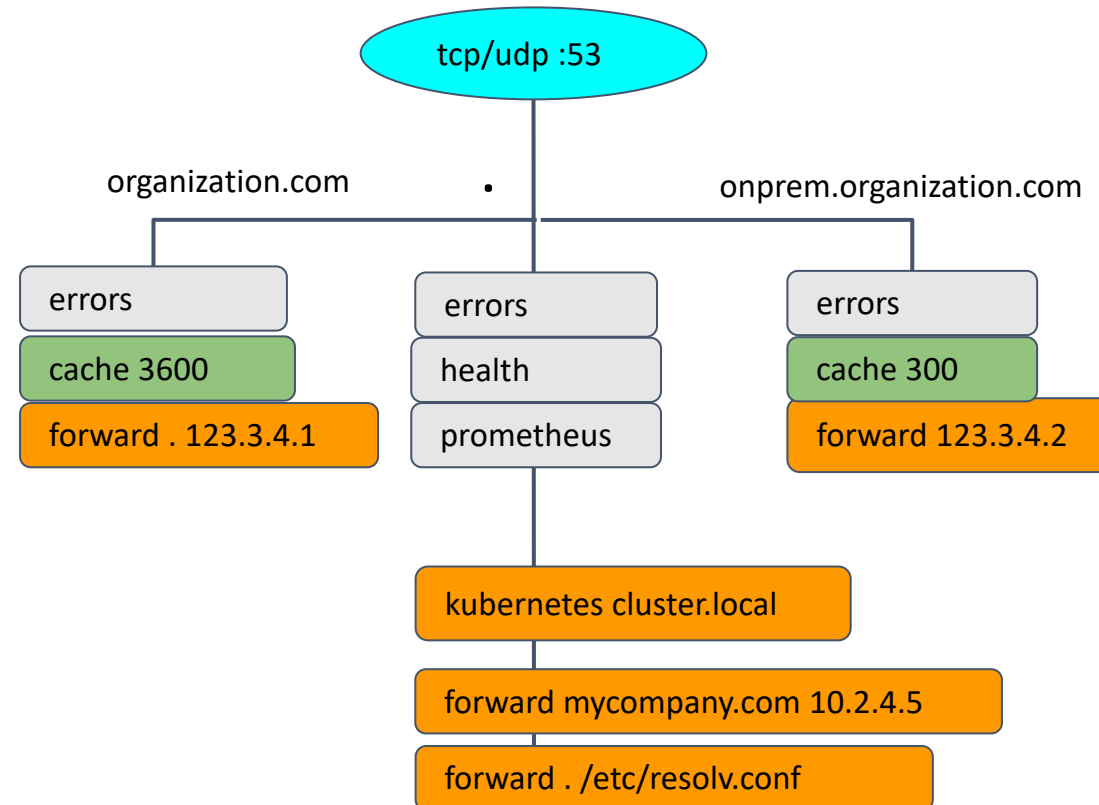
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```
organization.com:53 {  
  errors  
  cache 3600  
  forward . 123.3.4.1  
}  
onprem.organization.com:53 {  
  errors  
  cache 300  
  forward . 123.3.4.2  
}  
.:53 {  
  errors  
  health  
  kubernetes cluster.local ... {  
    ...  
  }  
  forward mycompany.com 10.2.4.5  
  forward . /etc/resolv.com
```



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Demo Plugin



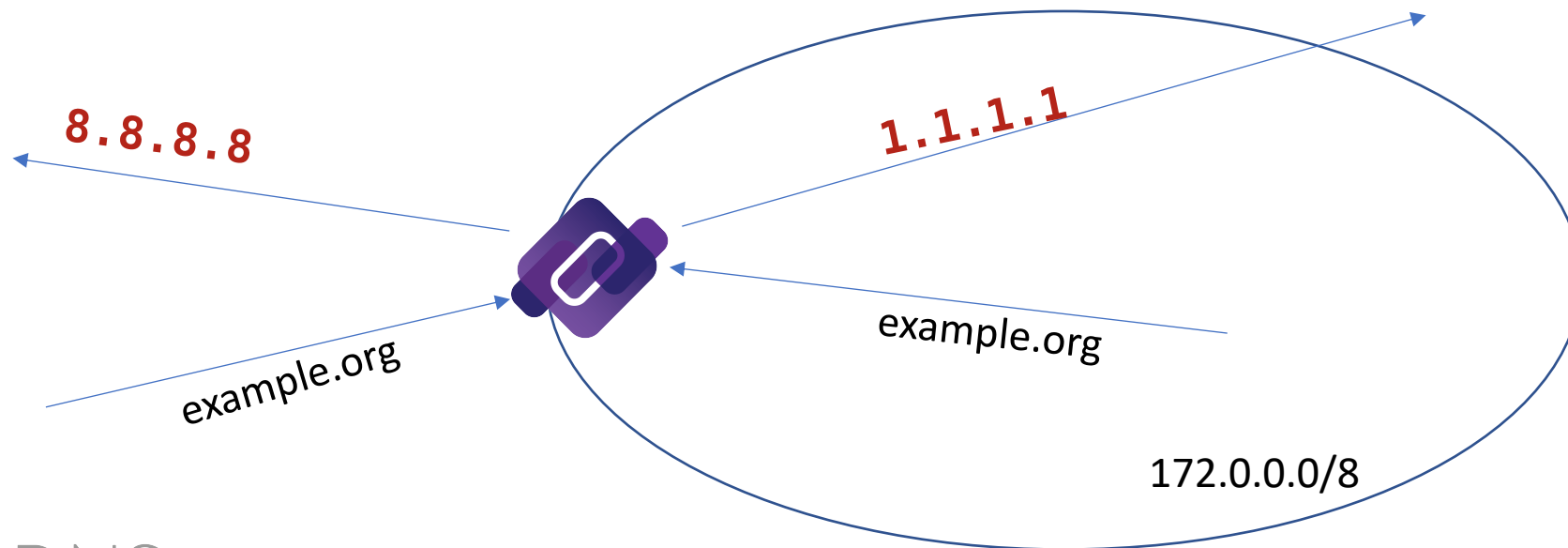
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- Source IP based service discovery
 - Returns **"1.1.1.1"** for 172.0.0.0/8 or 127.0.0.0/8
 - Returns **"8.8.8.8"** otherwise



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Demo Plugin: Three Functions



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setup.go

init()

- Performs one-time initializations, register the setup function with Caddy

setup(c *caddy.Controller) error

- Parses the configuration from the file and captures it in a struct
- Adds the handler to the Config object (represents a stanza)
- Called once for each use of the plugin in the Corefile

demo.go

ServeDNS(context.Context, dns.ResponseWriter, *dns.Msg) (int, error)

- Processes the DNS request and returns a response, or passes it down the chain



Demo Plugin: Setup



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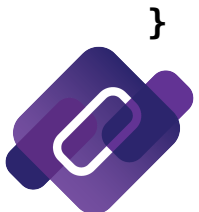


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```
func init() {
    caddy.RegisterPlugin("demo", caddy.Plugin{
        ServerType: "dns",
        Action:      setup,
    })
}

func setup(c *caddy.Controller) error {
    c.Next() // 'demo'
    if c.NextArg() {
        return plugin.Error("demo", c.ArgErr())
    }
    dnsserver.GetConfig(c).AddPlugin(func(next plugin.Handler) plugin.Handler {
        return Demo{}
    })
    return nil
}
```



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Demo Plugin: ServeDNS Part 1



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```
// ServeDNS implements the plugin.Handler.ServeDNS.  
func (p Demo) ServeDNS(ctx context.Context, w dns.ResponseWriter, r *dns.Msg) (int, error) {  
    state := request.Request{W: w, Req: r}  
    qname := state.Name()  
    reply := "8.8.8.8"  
    if strings.HasPrefix(state.IP(), "172.") || strings.HasPrefix(state.IP(), "127.") {  
        reply = "1.1.1.1"  
    }  
    fmt.Printf("Received query %s from %s, expected to reply %s\n", qname, state.IP(), reply)  
    ...  
}
```



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Demo Plugin: ServeDNS Part 2



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```
func (p Demo) ServeDNS(ctx context.Context, w dns.ResponseWriter, r *dns.Msg) (int, error) {  
    ...  
    rr := new(dns.A)  
    rr.Hdr = dns.RR_Header{Name: qname, Rrtype: dns.TypeA, Class: dns.ClassINET}  
    rr.A = net.ParseIP(reply).To4()  
    answers = append(answers, rr)  
    m := new(dns.Msg)  
    m.SetReply(r)  
    m.Authoritative = true  
    m.Answer = answers  
  
    w.WriteMsg(m)  
    return dns.RcodeSuccess, nil
```



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Demo Plugin: Corefile



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```
. :1053 {  
    # By default all plugins  
    # are disabled initially,  
    # unless enabled explicitly  
    #  
    demo  
}
```



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Demo Plugin: Build



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```
$  
$ # add demo:demo to plugin.cfg  
$  
$ # build with docker (golang:1.12)  
$ docker run --rm -i -t -v \  
$     $PWD:/v -w /v golang:1.12 make  
$  
$ # configure Corefile and run coredns  
$  
$ ./coredns  
$
```



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CoreDNS: Contribution Welcome



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- Star CoreDNS in GitHub:
 - <https://github.com/coredns/coredns>
- Add the name to **ADOPTERS.md**
- Participate in GitHub or Slack discussions
 - Slack: **#coredns** on <https://slack.cncf.io>
- Create a PR to become a contributor
- Become a maintainer
 - One significant pull request
 - Sponsored by one current maintainer



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THANK YOU



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