

Kubernetes Vanguard 作为一个Kubernetes的服务, 会监听每一个service, pod的增加,删除和修改. Vanguard对每一个事件作出反应, 增加,删除或者修改整个Kubernetes集群的dns记录.

相对于未配置Kubernetes的Vanguard, 除了提供普通dns服务, 如: 权威, 转发, 递归等, 还提供Kubernetes的支持, 可以连接集群内部所有service和pod, 为集群内部的顺利通信作出保证.

1. A记录(Service with ClusterIP)

生成条件: 创建Service时生成

说明: 返回一个service的A记录, pod的数量不会影响A记录的数量

组成: <service>.<ns>.svc.<zone>. <ttl> IN A <cluster-ip>

查询:

```
1 root@dig:/# dig user-dns.test.svc.cluster.local A
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> user-dns.test.svc.cluster.local A
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; -->HEADER<<- opcode: QUERY, status: NOERROR, id: 8059
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags:; udp: 4096
11 ;; QUESTION SECTION:
12 ;user-dns.test.svc.cluster.local. IN      A
13
14 ;; ANSWER SECTION:
15 user-dns.test.svc.cluster.local. 5 IN    A      10.43.156.85
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Wed Dec 26 09:05:53 UTC 2018
20 ;; MSG SIZE rcvd: 107
```

2. SRV记录(Service with ClusterIP)

生成条件: 创建Service时生成

说明: 返回一个service的SRV记录, pod的数量不会影响SRV记录的数量

组成: _<port>._<proto>.<service>.<ns>.svc.<zone>. <ttl> IN SRV <weight> <priority> <port-number>
<service>.<ns>.svc.<zone>.

查询:

```

1 root@dig:/# dig _dns-port._udp.user-dns.test.svc.cluster.local SRV
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> _dns-port._udp.user-
   dns.test.svc.cluster.local SRV
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 4557
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 2
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;_dns-port._udp.user-dns.test.svc.cluster.local.      IN SRV
13
14 ;; ANSWER SECTION:
15 _dns-port._udp.user-dns.test.svc.cluster.local. 5 IN SRV 0 100 53 user-
   dns.test.svc.cluster.local.
16
17 ;; ADDITIONAL SECTION:
18 user-dns.test.svc.cluster.local. 5 IN      A      10.43.156.85
19
20 ;; Query time: 0 msec
21 ;; SERVER: 10.43.0.10#53(10.43.0.10)
22 ;; WHEN: Wed Dec 26 09:14:46 UTC 2018
23 ;; MSG SIZE rcvd: 219

```

3. PTR记录(Service with ClusterIP)

生成条件: 创建Service时生成

说明: 返回一个service的PTR记录, pod的数量不会影响SRV记录的数量

组成: <d>.<c>..<a>.in-addr.arpa. <ttl> IN PTR <service>.<ns>.svc.<zone>.

查询:

```

1 root@dig:/# dig 85.156.43.10.in-addr.arpa. PTR
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> 85.156.43.10.in-addr.arpa. PTR
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 42003
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;85.156.43.10.in-addr.arpa. IN  PTR
13
14 ;; ANSWER SECTION:

```

```
15 85.156.43.10.in-addr.arpa. 5      IN PTR user-dns.test.svc.cluster.local.
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Wed Dec 26 09:21:26 UTC 2018
20 ;; MSG SIZE rcvd: 124
```

4. A记录(Deployment Headless Service)

生成条件: 创建Deployment Headless Service时生成

说明: 返回Headless service的endpoint的A记录, A记录数量与pod数量相同

组成: <service>.<ns>.svc.<zone>. <ttl> IN A <endpoint-ip>

查询:

```
1 root@dig:/# dig user-dns-headless.test.svc.cluster.local A
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> user-dns-headless.test.svc.cluster.local A
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3125
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags:; udp: 4096
11 ;; QUESTION SECTION:
12 ;user-dns-headless.test.svc.cluster.local. IN A
13
14 ;; ANSWER SECTION:
15 user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.1.134
16 user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.2.57
17 user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.0.139
18
19 ;; Query time: 0 msec
20 ;; SERVER: 10.43.0.10#53(10.43.0.10)
21 ;; WHEN: Wed Dec 26 09:25:16 UTC 2018
22 ;; MSG SIZE rcvd: 237
```

5. A记录(Statefulsets Headless Service)

生成条件: 创建Statefulsets Headless Service时生成

说明: 返回Headless service的endpoint的A记录, A记录数量与pod数量相同

组成: <service>.<ns>.svc.<zone>. <ttl> IN A <endpoint-ip>

查询:

```

1 root@dig:/# dig nginx.test.svc.cluster.local A
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> nginx.test.svc.cluster.local A
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 62394
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;nginx.test.svc.cluster.local. IN A
13
14 ;; ANSWER SECTION:
15 nginx.test.svc.cluster.local. 5 IN A 10.42.0.137
16 nginx.test.svc.cluster.local. 5 IN A 10.42.1.135
17
18 ;; Query time: 0 msec
19 ;; SERVER: 10.43.0.10#53(10.43.0.10)
20 ;; WHEN: Wed Dec 26 09:31:32 UTC 2018
21 ;; MSG SIZE rcvd: 145

```

6. SRV记录(Deployment Headless Service)

生成条件: 创建Deployment Headless Service时生成

说明: 返回Headless service的endpoint的SRV记录, SRV记录数量与pod数量相同

组成: `_<port>._<proto>.<service>.<ns>.svc.<zone>. <ttl> IN SRV <weight> <priority> <port-number> <hostname>.<service>.<ns>.svc.<zone>.`

查询:

```

1 root@dig:/# dig _dns-port._udp.user-dns-headless.test.svc.cluster.local SRV
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> _dns-port._udp.user-dns-
4 headless.test.svc.cluster.local SRV
5 ;; global options: +cmd
6 ;; Got answer:
7 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38802
8 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 4
9
10 ;; OPT PSEUDOSECTION:
11 ; EDNS: version: 0, flags;; udp: 4096
12 ;; QUESTION SECTION:
13 ;_dns-port._udp.user-dns-headless.test.svc.cluster.local. IN SRV
14
15 ;; ANSWER SECTION:
16 _dns-port._udp.user-dns-headless.test.svc.cluster.local. 5 IN SRV 0 33 53 10-42-0-
17 139.user-dns-headless.test.svc.cluster.local.

```

```

16 _dns-port._udp.user-dns-headless.test.svc.cluster.local. 5 IN SRV 0 33 53 10-42-1-
134.user-dns-headless.test.svc.cluster.local.
17 _dns-port._udp.user-dns-headless.test.svc.cluster.local. 5 IN SRV 0 33 53 10-42-2-
57.user-dns-headless.test.svc.cluster.local.
18
19 ;; ADDITIONAL SECTION:
20 10-42-0-139.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.0.139
21 10-42-2-57.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.2.57
22 10-42-1-134.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.1.134
23
24 ;; Query time: 0 msec
25 ;; SERVER: 10.43.0.10#53(10.43.0.10)
26 ;; WHEN: Thu Dec 27 01:43:22 UTC 2018
27 ;; MSG SIZE rcvd: 667

```

设置了hostname的deployment

hostname: dns-host

subdomain: user-dns-headless

```

1 root@dig:/# dig _dns-port._udp.user-dns-headless.test.svc.cluster.local. SRV
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> _dns-port._udp.user-dns-
headless.test.svc.cluster.local. SRV
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 21111
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 4
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags; udp: 4096
11 ;; QUESTION SECTION:
12 ;_dns-port._udp.user-dns-headless.test.svc.cluster.local. IN SRV
13
14 ;; ANSWER SECTION:
15 _dns-port._udp.user-dns-headless.test.svc.cluster.local. 5 IN SRV 0 33 53 dns-
host.user-dns-headless.test.svc.cluster.local.
16
17 ;; ADDITIONAL SECTION:
18 dns-host.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.0.151
19 dns-host.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.1.153
20 dns-host.user-dns-headless.test.svc.cluster.local. 5 IN A 10.42.2.64
21
22 ;; Query time: 0 msec
23 ;; SERVER: 10.43.0.10#53(10.43.0.10)
24 ;; WHEN: Wed Jan 02 01:36:56 UTC 2019
25 ;; MSG SIZE rcvd: 403

```

7. SRV记录(Statefulsets Headless Service)

生成条件: 创建Statefulsets Headless Service时生成

说明: 返回Headless service的endpoint的SRV记录, SRV记录数量与pod数量相同

组成: `_<port>._<proto>.<service>.<ns>.svc.<zone>. <ttl> IN SRV <weight> <priority> <port-number> <hostname>.<service>.<ns>.svc.<zone>.`

查询:

```
1 root@dig:/# dig _web._tcp.nginx.test.svc.cluster.local SRV
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> _web._tcp.nginx.test.svc.cluster.local SRV
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 31951
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 3
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags:; udp: 4096
11 ;; QUESTION SECTION:
12 ;_web._tcp.nginx.test.svc.cluster.local.      IN SRV
13
14 ;; ANSWER SECTION:
15 _web._tcp.nginx.test.svc.cluster.local. 5 IN SRV 0 50 80 web-
16   1.nginx.test.svc.cluster.local.
17 _web._tcp.nginx.test.svc.cluster.local. 5 IN SRV 0 50 80 web-
18   0.nginx.test.svc.cluster.local.
19
20 ;; ADDITIONAL SECTION:
21 web-1.nginx.test.svc.cluster.local. 5 IN A 10.42.0.137
22 web-0.nginx.test.svc.cluster.local. 5 IN A 10.42.1.135
23
24 ;; Query time: 0 msec
25 ;; SERVER: 10.43.0.10#53(10.43.0.10)
26 ;; WHEN: Thu Dec 27 01:47:30 UTC 2018
27 ;; MSG SIZE rcvd: 351
```

8. PTR记录(Deployment Headless Service)

生成条件: 创建Deployment Headless Service时生成

说明: 返回Headless service的endpoint的PTR记录,PTR记录数量与pod数量相同

组成: `<d>.<c>..<a>.in-addr.arpa. <ttl> IN PTR <hostname>.<service>.<ns>.svc.<zone>.s>.svc.<zone>.`

查询:

```
1 root@dig:/# dig 139.0.42.10.in-addr.arpa. PTR
```

```

2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> 139.0.42.10.in-addr.arpa. PTR
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 32243
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;139.0.42.10.in-addr.arpa. IN PTR
13
14 ;; ANSWER SECTION:
15 139.0.42.10.in-addr.arpa. 5 IN PTR 10-42-0-139.user-dns.test.svc.cluster.local.
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Thu Dec 27 01:53:46 UTC 2018
20 ;; MSG SIZE rcvd: 134

```

9. PTR记录(Statefulsets Headless Service)

生成条件: 创建Statefulsets Headless Service时生成

说明: 返回Headless service的endpoint的PTR记录,PTR记录数量与pod数量相同

组成: <d>.<c>..<a>.in-addr.arpa. <ttl> IN PTR <hostname>.<service>.<ns>.svc.<zone>.s>.svc.<zone>.

查询:

```

1 root@dig:/# dig 137.0.42.10.in-addr.arpa. PTR
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> 137.0.42.10.in-addr.arpa. PTR
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24977
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;137.0.42.10.in-addr.arpa. IN PTR
13
14 ;; ANSWER SECTION:
15 137.0.42.10.in-addr.arpa. 5 IN PTR web-1.nginx.test.svc.cluster.local.
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Thu Dec 27 02:01:26 UTC 2018
20 ;; MSG SIZE rcvd: 125

```

10. CNAME记录(External Service)

生成条件: 创建External Service时生成

说明: 返回External service的CNAME记录

组成: <service>.<ns>.svc.<zone>. <ttl> IN CNAME <extname>.

```
1 root@dig:/# dig my-service.test.svc.cluster.local CNAME
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> my-service.test.svc.cluster.local CNAME
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 50492
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
12 ;my-service.test.svc.cluster.local. IN CNAME
13
14 ;; ANSWER SECTION:
15 my-service.test.svc.cluster.local. 5 IN CNAME www.baidu.com.
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Thu Dec 27 02:04:17 UTC 2018
20 ;; MSG SIZE rcvd: 122
```

11. TXT 记录(DNS Version)

生成条件: DNS服务初始化时生成

说明: 返回DNS的TXT记录, 其中包含DNS版本信息

组成: dns-version.<zone>. <ttl> IN TXT <schema-version>

```
1 root@dig:/# dig dns-version.cluster.local. TXT
2
3 ; <<>> DiG 9.9.5-3ubuntu0.2-Ubuntu <<>> dns-version.cluster.local. TXT
4 ;; global options: +cmd
5 ;; Got answer:
6 ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24450
7 ;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
8
9 ;; OPT PSEUDOSECTION:
10 ; EDNS: version: 0, flags;; udp: 4096
11 ;; QUESTION SECTION:
```



```
12 ;dns-version.cluster.local. IN  TXT
13
14 ;; ANSWER SECTION:
15 dns-version.cluster.local. 30  IN  TXT "1.0.1"
16
17 ;; Query time: 0 msec
18 ;; SERVER: 10.43.0.10#53(10.43.0.10)
19 ;; WHEN: Thu Dec 27 02:06:39 UTC 2018
20 ;; MSG SIZE  rcvd: 97
```

12. 添加

Service with ClusterIP,

Deployment Headless Service,

Statesfulsets Headless Service

说明: 生成对应的A, SRV, PTR记录

13. 删除

Service with ClusterIP,

Deployment Headless Service,

Statesfulsets Headless Service

说明: 删除对应的A, SRV, PTR记录

14. 修改

Deployment Headless Service,

Statesfulsets Headless Service 的 replication sets 数量

说明: 对应的A, SRV, PTR记录数量与修改后的数量相同

15. 修改

Deployment Headless Service,

Statesfulsets Headless Service 的 seletor

说明: 对应的A, SRV, PTR记录与seletor对应的endpoint相同

16. 修改

增加Service with ClusterIP,

Deployment Headless Service,

Statesfulsets Headless Service的 port

说明: 生成对应port的A, SRV, PTR记录

17. 修改

减少Service with ClusterIP,

Deployment Headless Service,

Statesfulsets Headless Service的 port

说明: 删除对应port的A, SRV, PTR记录

18. 添加

External Service

说明: 增加对应的CNAME记录

19. 删除

External Service

说明: 删除对应的CNAME记录