ZERO TOUCH App Deployment and Load Balancing

whoami

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Network Engineer @ Zendesk
- Unix since 90's
- IPv6 addicted
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http://nethero.org
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Problems

Traditional App Deploy - NetOps

What was wrong?

- Ticket asking LB resources
- Multiple teams
- Complex and manual process
- Prone to human errors
- Painful on growing companies

Solution

How to solve?

- End to end automation
- Pain less migration
- Known tool
- Not increasing architecture complexity

HOW?

(NetOps tasks)

Ingredients

- Load Balancer 👍
- Service Discovery 👍
- Template Config Render 👍

Load Balancer

What we already had

F5 BIG-IP Viprion 2400 (http://f5.com/)

Why we use it?

ASIC Routing / Linux / Partition

Alternatives?

Haproxy / Keepalived

Service Discovery

Consul
(http://consul.io/)

Why we use it?
Service catalog / Distributed Health Checks
query via REST or DNS / Agents are clients

Alternatives?
etcd / zookeeper, but just use consul :)

Consul
How we use it!

- Server register itself to Consul local datacenter cluster
- Publish own services with health checks
- Maintain a distributed key/value store
- lightweight binary that runs inside BIG-IP

Template Config Rendering

What we used?

consul-template (https://github.com/hashicorp/consul-template)

How we use it!

- lightweight binary that runs inside BIG-IP
- Subscribes to Consul services / hc / kv changes
- Generate new configuration at change
- reload load balancer with new config

Service Registration Example

```
{
    "service": {
        "name": "http",
        "tags": ["primary"],
        "port":80,
        "check": {
                "id": "http_check",
                "name": "HTTP Health Check",
   "script": "curl -H 'Host=www.mydomain.com' http://localhost",
         "interval": "5s"
        }
    }
}
```

Service Query
Example

DNS

```
$ host http.service.consul
http.service.consul has address 10.0.1.10
```

Service Query Example

HTTP API

```
$ curl localhost:8500/v1/catalog/service/http?pretty

    {
        "Node": "srv1.nethero.org",
        "Address": "10.0.1.10",
        "ServiceName": "http",
        "ServiceTags": [
            "primary"
        ],
        "ServiceAddress": "10.0.1.10",
        "ServicePort": 80
    }
```

Consul Template
Config Example

```
consul = "127.0.0.1:8500"
retry = "10s"
max_stale = "10m"
log_level = "warn"
pid_file = "/var/run/consul-template.pid"
syslog {
  enabled = true
  facility = "user"
}
template {
  source = "/etc/consul-templates/production.ctmpl"
  destination = "/config/partitions/CONSUL/rendered-config"
  command = "/sbin/zconsul_postrender CONSUL"
}
```

BIG-IP Consul Template (Golang)

```
{{ range services }}{{ with $serviceMap := .}}
{{if and (.Tags.Contains "load_balance") }}
{{ range service $serviceMap.Name }}
{{if and (.Tags.Contains "load_balance") }}
  ltm node {{ .Node }} {
    address {{ .Address }}
  }

  ltm pool POOL-{{ $serviceMap.Name | toUpper }} {
    members {  {{range service $serviceMap.Name }}{{if and (.Tags.Contains "load_balance") }}
        {{.Node}}:{{.Port}} {
          address {{.Address}}
        } {{end}}{{end}}
    }
    monitor /Common/tcp
  }

{{ range service $serviceMap.Name }}{{if (.Tags.Contains "vip") }}
  ltm virtual VS-{{ $serviceMap.Name | toUpper }}-VIP-{{.Port}} {
    destination {{.Address}}:{{.Port}}
    ip-protocol tcp
    mask 255.255.255.255
    pool POOL-{{ $serviceMap.Name | toUpper }}
    profiles {
        fastL4 { }
    }
    source 0.0.0.0/0
    source-address-translation {
        type automap
    }
  }
{{ end }}{{end}}{{end}}{{end}}{{end}}{{end}}{{end}}
```

BIG-IP Rendered Config example

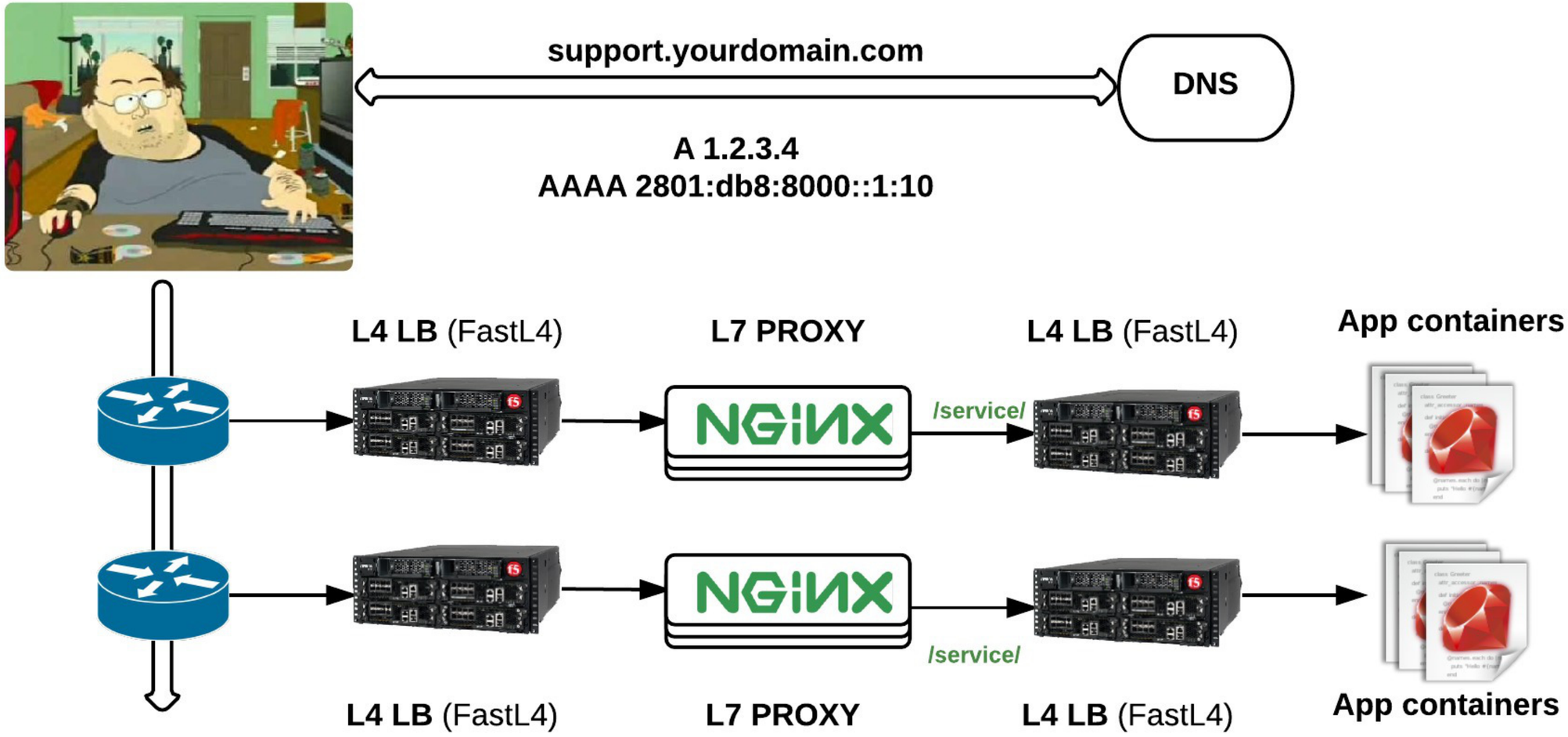
```
ltm node /CONSUL/docker3.aws1.nethero.org {
    address 10.0.100.6
}
ltm node /CONSUL/docker4.aws1.nethero.org {
    address 10.0.100.7
}
ltm pool /CONSUL/POOL-VOLUNTEER-WEB {
    members {
        /CONSUL/docker3.aws1.nethero.org:58358 {
            address 10.0.100.6
        }
        /CONSUL/docker4.aws1.nethero.org:58358 {
            address 10.0.100.7
        }

    }
    monitor /Common/tcp
}
ltm virtual /CONSUL/VS-VOLUNTEER-WEB-VIP-9080 {
    destination /CONSUL/10.0.250.10:9080
    ip-protocol tcp
    mask 255.255.255.255
    pool /CONSUL/POOL-VOLUNTEER-WEB
    profiles {
        /Common/fastL4 { }
    }
    source 0.0.0.0/0
    source-address-translation {
        type automap
    }
    translate-address enabled
    translate-port enabled
}
```

BIG-IP: /var/log/user.log

```
Thu Jul  9 20:50:04 PDT 2015 - [CONSUL] config sync started
Loading configuration... /config/partitions/CONSUL/bigip.conf
Saving running configuration... /config/partitions/CONSUL/bigip.conf
Thu Jul  9 20:50:06 PDT 2015 - [CONSUL] Virtual Servers loaded from Consul app catalog:
/CONSUL/VS-ALPHA-WEB-VIP-6090 (/CONSUL/10.0.250.10:6090)
/CONSUL/VS-LEGION-WEB-VIP-9033 (/CONSUL/10.0.250.10:9033)
/CONSUL/VS-VOLUNTEER-WEB-VIP-9080 (/CONSUL/10.0.250.10:glrpc)
/CONSUL/VS-XPTO-WEB-VIP-6080 (/CONSUL/10.0.250.10:6080)
Thu Jul  9 20:50:06 PDT 2015 - [CONSUL] import completed
```

```
$ curl 10.0.250.10:6080
Hello world%
```


support.yourdomain.com
DNS
A 1.2.3.4
AAAA 2801:db8:8000::1:10
L4 LB (FastL4)
L7 PROXY
L4 LB (FastL4)
App containers
NGINX
/service/
NGINX
/service/
L4 LB (FastL4)
L7 PROXY
L4 LB (FastL4)
App containers

TL;DR

- Consul for Service Discovery
- consul-template to render config and reload BIG-IP partition
- F5 BIG-IP as our Load Balancer choice
- new partition for each consul template instance

QUESTIONS?

THANKS