ZABBIX SUMMIT '19

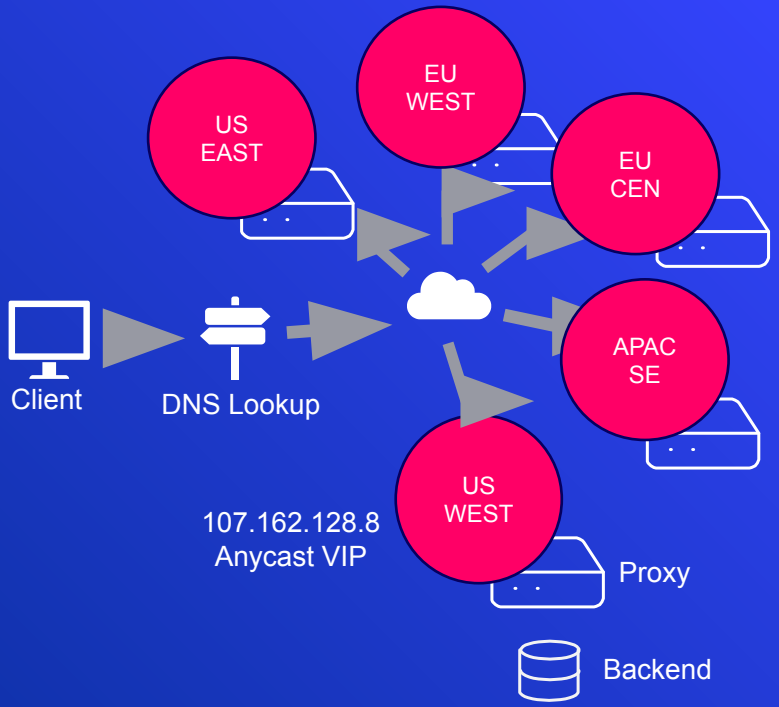
# A declarative and distributed interface for scheduling collection tasks with...

ZABBIX

Parker Green

F5 Networks | Silverline

# About us




- F5 Silverline offers Security-aaS
- We proxy traffic through a global proxy network
- Use ANYCAST IPs/Wide-IPs
- Rely on public transit providers
- Know that sooner or later infrastructure fails
- It is in our best interests to be aware of those failures

# What are we up against?

- Deeply invested in supporting our customers
- Configuration is constantly in-flight, and changes bring opportunity for failure
- Outage inquiries can arrive lacking technical information needed for troubleshooting
- Global and HA deployments create divergent behavior
- We need to collect network vitals, from an end-user's perspective
- We need to regularly monitoring thousands of entities

# Canned solutions?

There are great products, but they become costly at scale.  We need a cheap, reliable, scalable collection network to help us get ahead of issues.

pingdom solarwinds

10k applications =~ $150,000/year

| | Starter | Standard | Advanced | Professional |
|---|---|---|---|---|
| | $11.95 /mo | $36.00 /mo | $72.00 /mo | $199.00 /mo |
| | ~~$ 14.95 / mo~~ | ~~$ 45.95 / mo~~ | ~~$ 89.95 / mo~~ | ~~$ 249.0 / mo~~ |
| | START FREE TRIAL | START FREE TRIAL | START FREE TRIAL | START FREE TRIAL |
| Uptime checks ? Monitor your website every minute from different locations and it counts as just one check. | 10 | 50 | 80 | 250 |
| Check interval | 1 min | 1 min | 1 min | 1 min |
| Data retention | Unlimited | Unlimited | Unlimited | Unlimited |
| Select test location | ✓ | ✓ | ✓ | ✓ |
| Non-HTTP monitoring | ✓ | ✓ | ✓ | ✓ |
| Root cause analysis | ✓ | ✓ | ✓ | ✓ |
| Advanced check settings | ✓ | ✓ | ✓ | ✓ |
| SSL Monitoring | ✓ | ✓ | ✓ | ✓ |
| Threshold alerting | ✗ | ✓ | ✓ | ✓ |

ThousandEyes

20*5*10000*.0004 =~ $400/hr or $3,504,000/year

catchpoint™

> $50,000 a year for a handful of web applications

Wants an server-side agent, an area we do not control

New Relic®

ZABBIX

# Can Zabbix do it?

- We already use it for infrastructure monitoring
- Low-level discovery is declarative
- User-parameters facilitate execution of arbitrary logic
- Orchestration is centralized
- Proxies and agents offload work from the server
- Zabbix is available in containers
- Mechanisms for handling problem creation and alerting

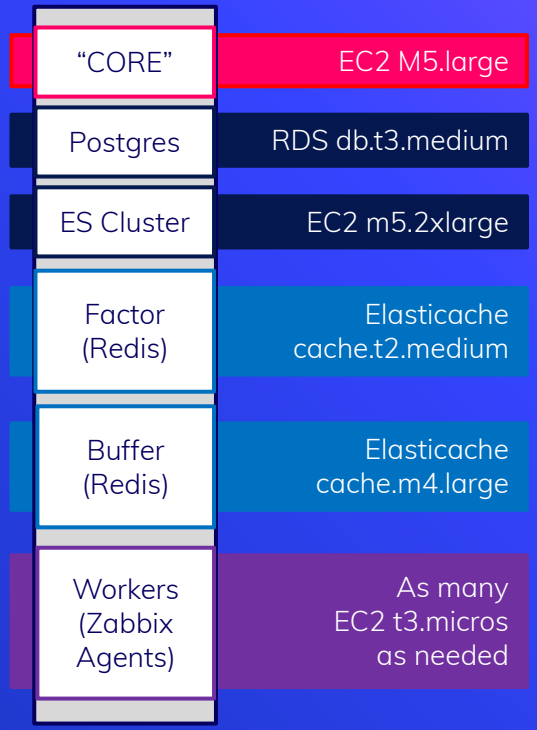
# Meet COSMOS

Zabbix meets distributed scheduling

# COSMOS

## Big Picture

- Zabbix agents monitor apps, not hosts
- LLD to install and remove work
- User-parameters wrap common Unix utilities (curl, etc.)
- User-parameters return data via Zabbix Traps
- User-parameters also generate rich JSON for Elasticsearch
- Redis houses placement state, facts, and buffers documents to elastic




COSMOS regional deployment

Core node runs a lot of supporting services:

- Zabbix server (orchestration)
- Zabbix GUI
- Logstash (ingestion)
- Curator (retention management)
- Kibana (visualization)

While workers run:

- Many many Zabbix agents (parallelism)

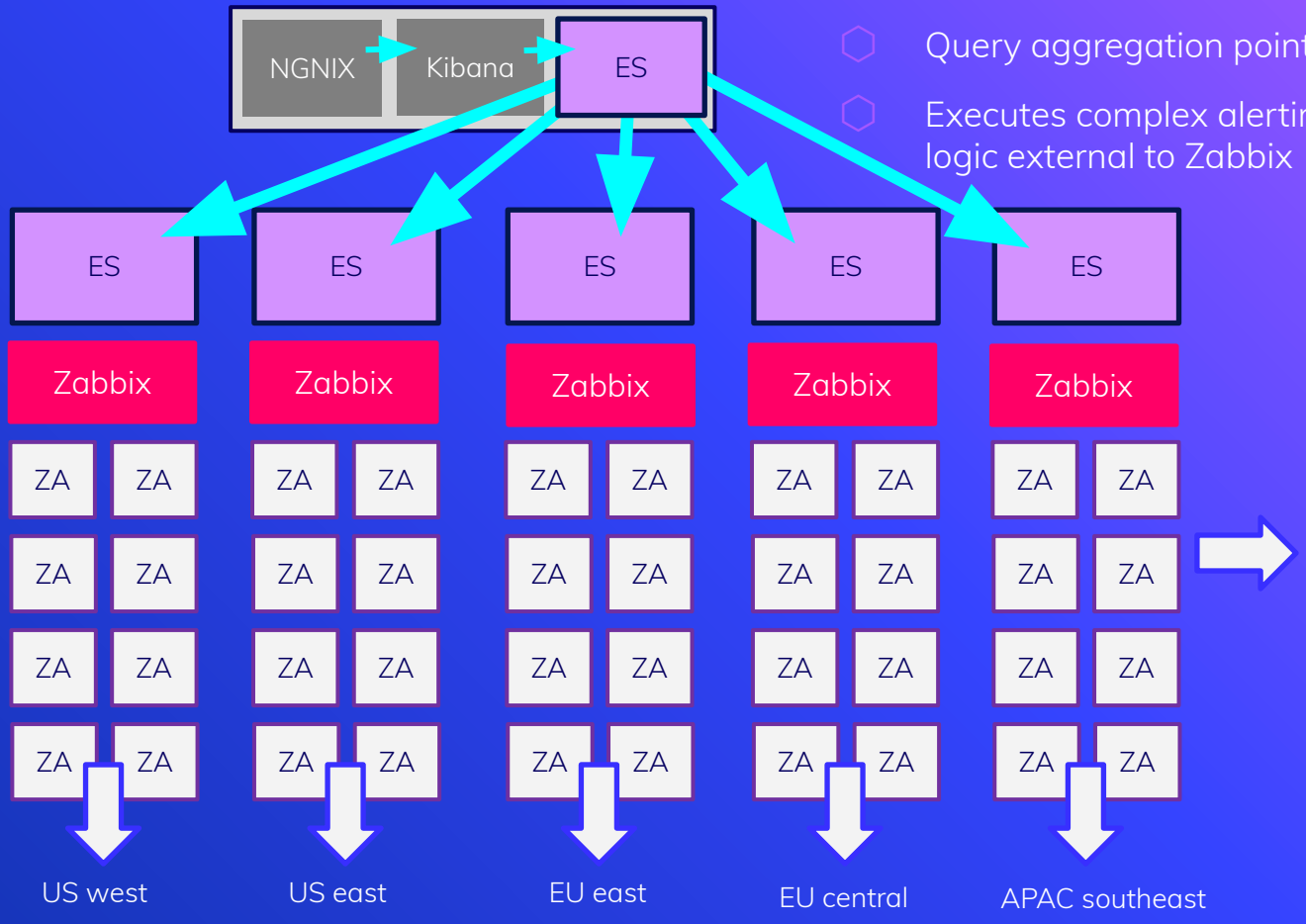
# At Scale

## COSMOS Regions

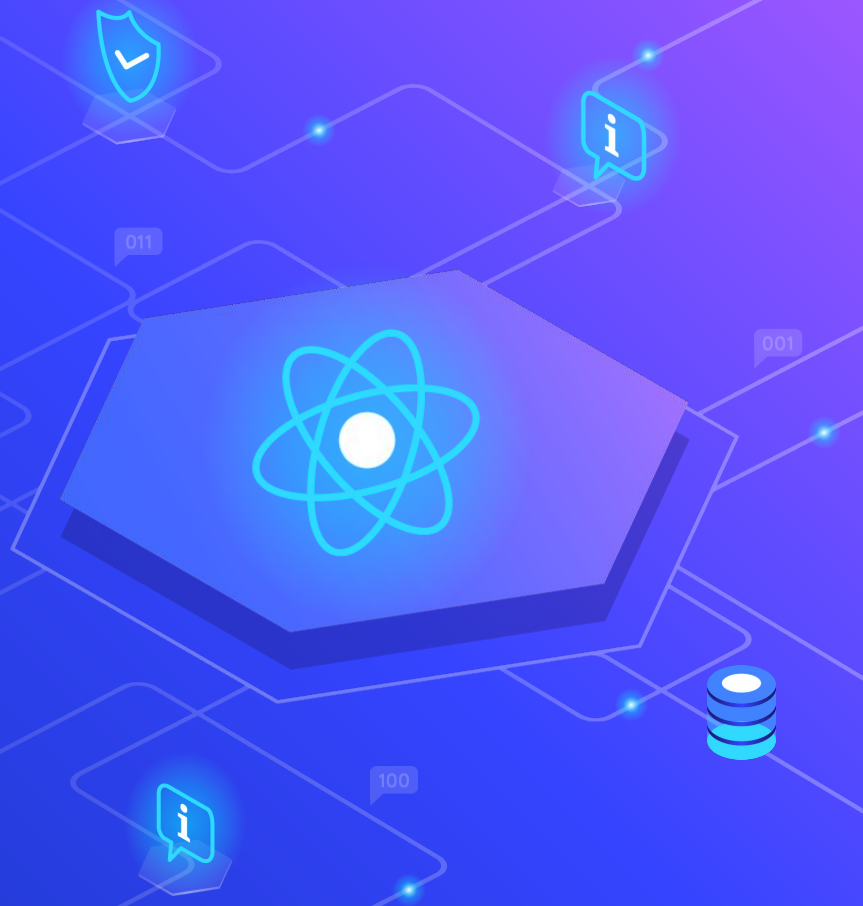
- Scale our presence by adding Regions
- Increase capacity by creating more t3.micros
- Self-sufficient
- Collects and stores terabytes of data

## COSMOS Aggregator

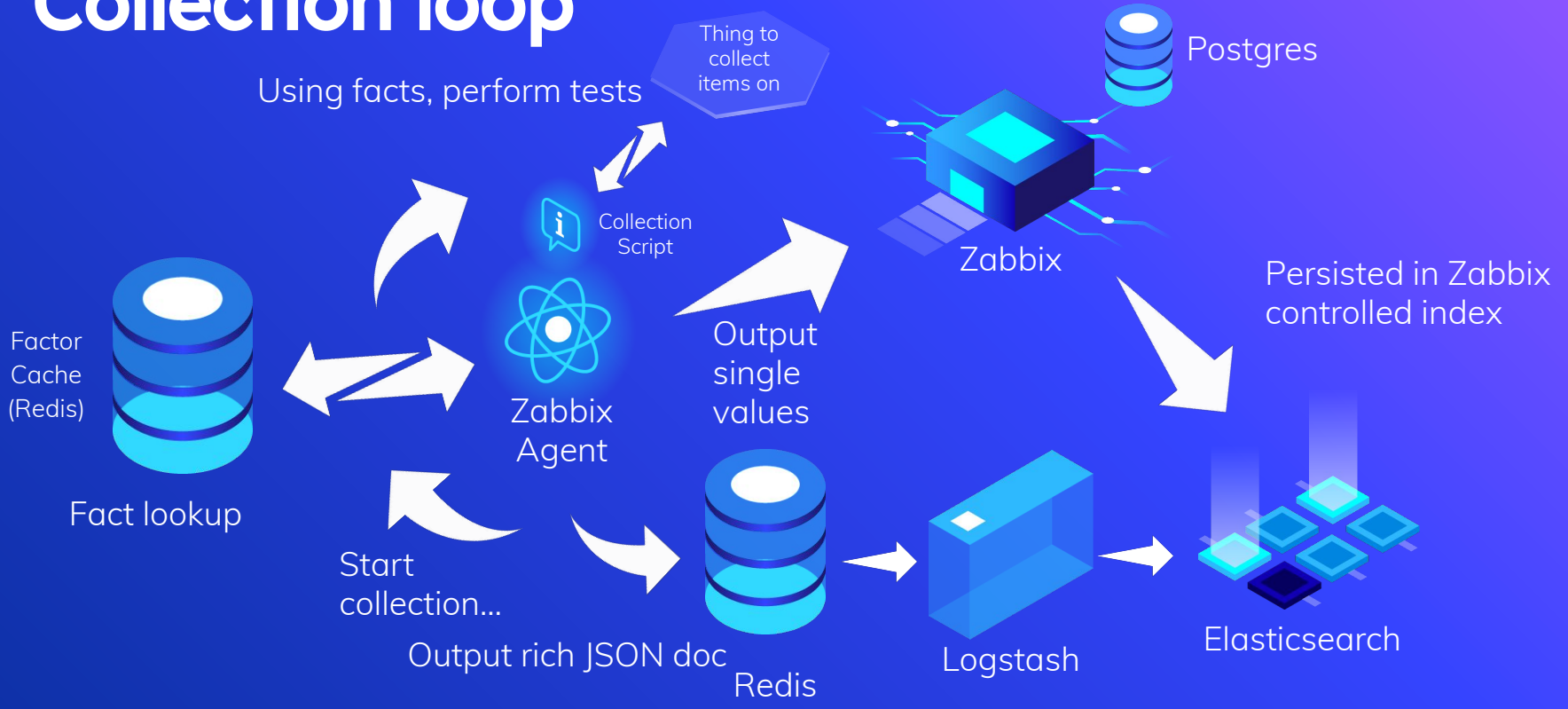
- Query aggregation point
- Executes complex alerting logic external to Zabbix



# The Collection Loop



# Collection loop



# What are facts?

COSMOS facts are a place to store variables used for collection.

They always have a TTL and are accessed by a “COSMOS Key”.

A “COSMOS Key” looks like this

**cosmos-v1-4THS:ducky_2891_1900_www.ducky.example.com_**

Items within Zabbix, just receive the COSMOS Key as input, because we want to:

- Occasionally send more than nine item parameters
- Avoid unnecessary item destroys, due to changing item parameters
- Avoid the Zabbix item key length restriction

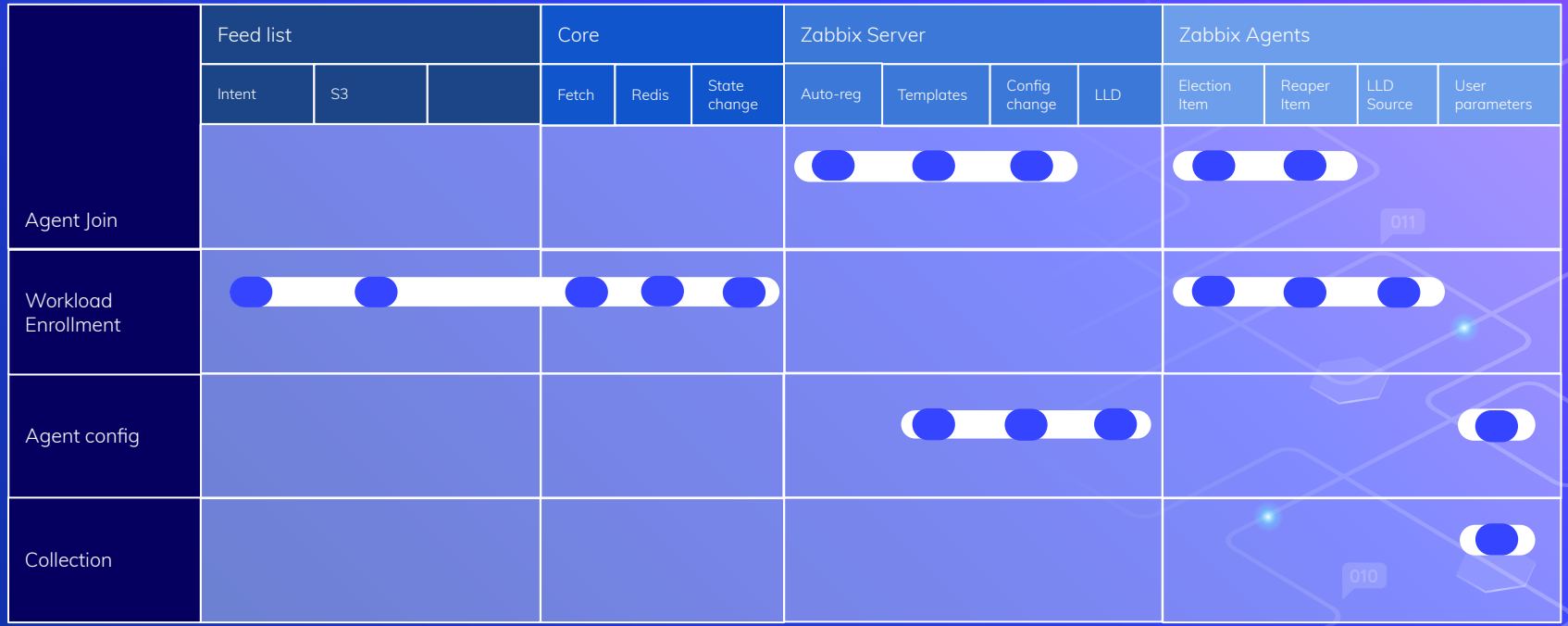
# A fact entry

KEY = cosmos-v1-4THS:goo_1_443_www.google.com_


```
{
  "{#CUSTOMER_NAME}": "Google.com",
  "{#CID}": "goo",
  "{#IDENTIFIER}": "Google Homepage",
  "{#HTTP_PROTOCOL}": "https",
  "{#SAFE_HOSTNAME}": "www.google.com",
  "{#VPORT}": "443",
  "{#VIP}": "172.217.14.228",
  "{#HTTP_PATH}": "",
  "{#HTTP_EXPECTED_CODE}": "200",
  "{#COSMOS_KEY}": "cosmos-v1-4THS:goo_1_443_www.google.com_"
}
```

How does the system take on workloads (collection tasks)?

# Configuration Lifecycle

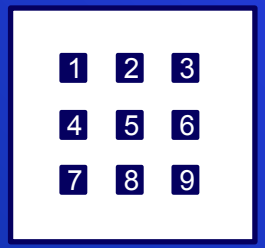


# Making of the LLD

Distributing the workload

# Feed pull

Receives a feed list contains 9 entities from S3, there is zero state in factor.




Fact entries

cosmos-joining-v1:cosw_http

cosmos-worker-v1:cosw1_http

cosmos-worker-v1:cosw2_http

cosmos-worker-v1:cosw3_http

cosmos-active-v1:cosw_http

cosmos-joining-v1:cosw_dns

cosmos-worker-v1:cosw1_dns

cosmos-worker-v1:cosw2_dns

cosmos-worker-v1:cosw3_dns

cosmos-active-v1:cosw_dns

cosmos-joining-v1:cosw_ssl

cosmos-worker-v1:cosw1_ssl

cosmos-worker-v1:cosw2_ssl

cosmos-worker-v1:cosw3_ssl

cosmos-active-v1:cosw_ssl

# Refresh

Core node runs refresh script, we start inserting things into factor

Fact entries get populated, join queues fill

Note 3,4,6 missing for SSL. The refresh script has determined these entities don't utilize SSL.

# Election

Workers run election the loop

As a precondition the loop checks the worker's capacity, causing a NOOP if it is already at capacity.

Else, the loop:

1. Pops a task
2. Checks if entity is already claimed by another worker (discards entity)
3. Assuming it is not...
4. Records in Active Set
5. Records ownership under it's worker set

# Election

Second iteration of an election loop.

Note that tasks may not be consumed at the same rate by each individual worker

# Election

All tasks are claimed

# LLD is

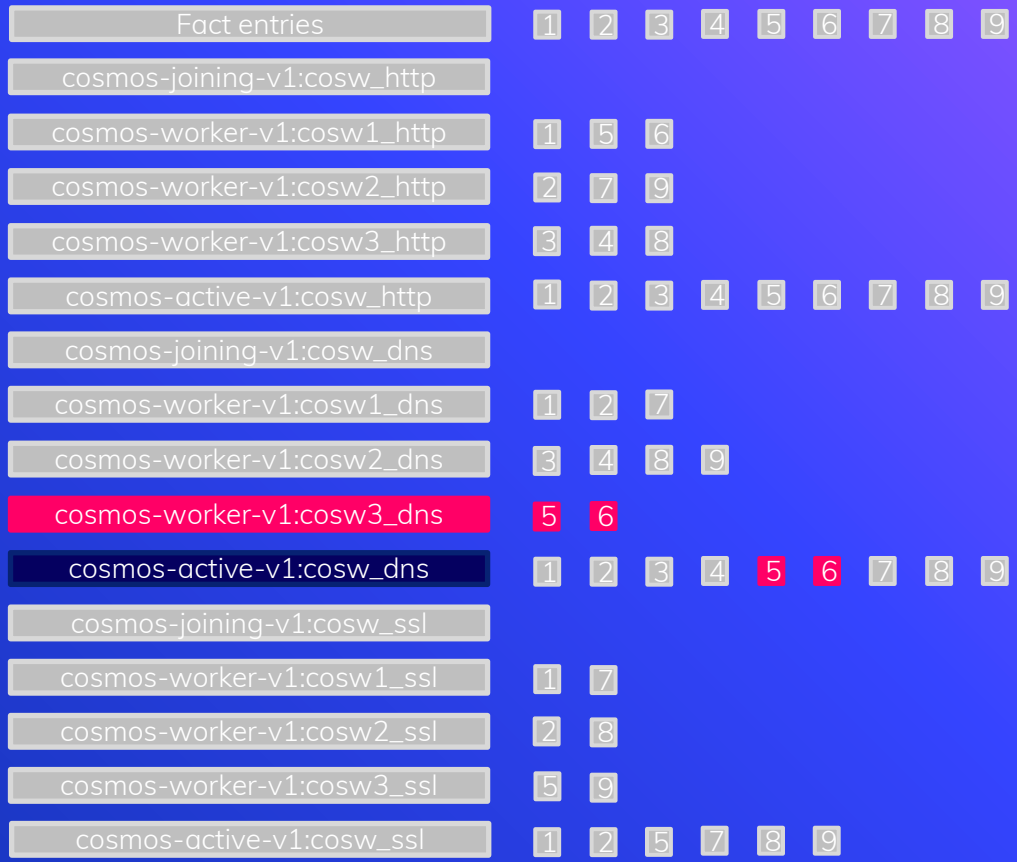
The union of the worker set and the corresponding active set.

For cosw3_dns it would be

5 6

Removing 6 from the active set would cause cosw3_dns LLD to only return

5



# Feed pull (2)

Given the same feed list:

- Join queues are repopulated
- Facts are refreshed
- Fact TTLs are reset (this is important, keeps entities in the system)

| Fact entries | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| cosmos-joining-v1:cosw_http | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| cosmos-worker-v1:cosw1_http | 1 | 5 | 6 | | | | | | |
| cosmos-worker-v1:cosw2_http | 2 | 7 | 9 | | | | | | |
| cosmos-worker-v1:cosw3_http | 3 | 4 | 8 | | | | | | |
| cosmos-active-v1:cosw_http | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| cosmos-joining-v1:cosw_dns | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| cosmos-worker-v1:cosw1_dns | 1 | 2 | 7 | | | | | | |
| cosmos-worker-v1:cosw2_dns | 3 | 4 | 8 | 9 | | | | | |
| cosmos-worker-v1:cosw3_dns | 5 | 6 | | | | | | | |
| cosmos-active-v1:cosw_dns | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| cosmos-joining-v1:cosw_ssl | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| cosmos-worker-v1:cosw1_ssl | 1 | 7 | | | | | | | |
| cosmos-worker-v1:cosw2_ssl | 2 | 8 | | | | | | | |
| cosmos-worker-v1:cosw3_ssl | 5 | 9 | | | | | | | |
| cosmos-active-v1:cosw_ssl | 1 | 2 | 5 | 7 | 8 | 9 | | | |

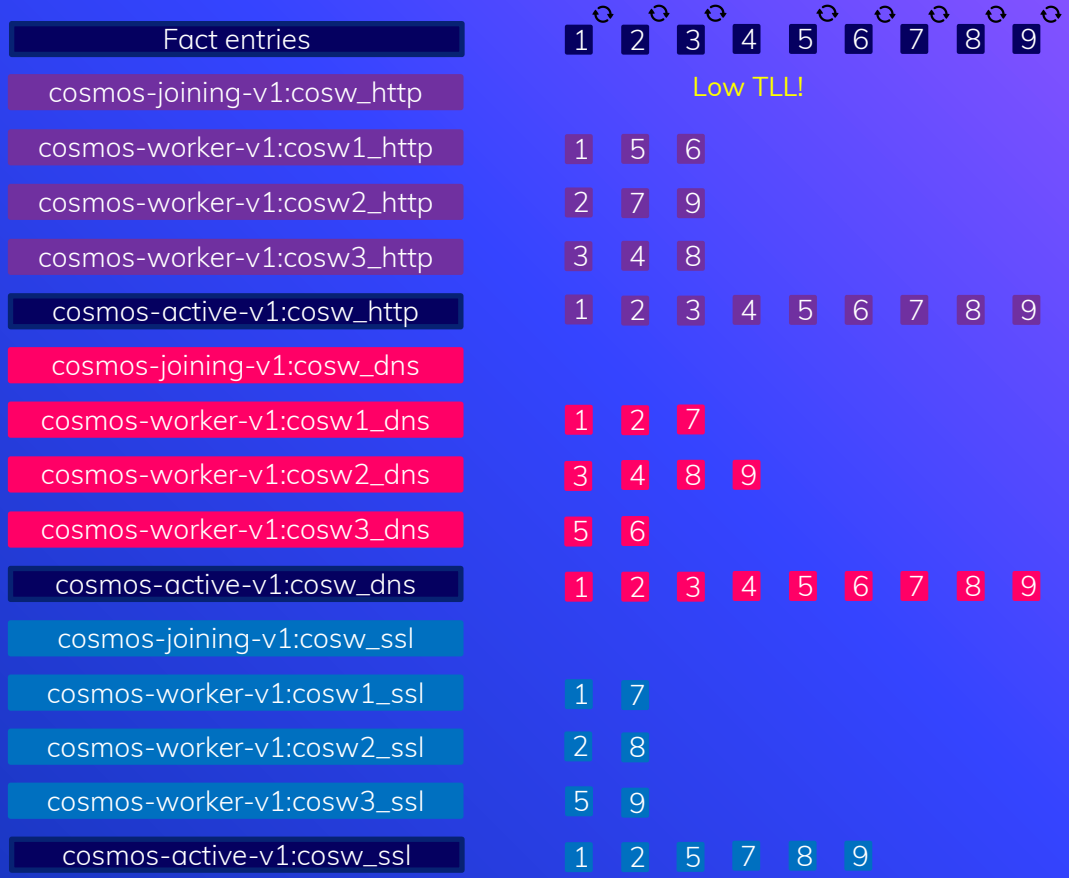
# Feed pull (2)

Work is redundant so workers throw it away!

# Reaping

Fact 4 hasn't been refreshed in a while, this triggers a reaper which removes associations from the factor.

After reaping Zabbix LLD process will no longer return this entity.



# Reaping...

Once the associations are removed the fact is left to naturally decay, using the native Redis TTL

# Reaping...

The fact has decayed, making room for other work

# Demo Videos

(time allowing)

# Simplicity

- Write a wrapper for anything we want
  - very extensible
- It’s not a magic black box
  - familiar utilities
- Easy to reproduce collection results
  - (copy & paste a Unix command)
- Compartmentalized fault tolerance
- Distributes the workload in a scalable way
- Easy to move into a Kubernetes environment (hyper scale)

# COSMOS Wishlist ☄️

1. Parallelism for active item checks
   - Allows for less significantly fewer agents
2. Mechanism for distributing item checks across a collection of Zabbix hosts
   - Replaces 1/3rd of COSMOS
3. Continued Elasticsearch integration and Container development

# Thanks!

**Questions?**

Twitter @hwshadow

Email p.green@f5.com