leigh capili











@capileigh



< Performance Art >









Service Unavailable



The Gotchas of Zero-Downtime Traffic

(with k8s!)















185.93.230.3 - - [20/Apr/2017:08:30:29 -0300] "GET /feeds/posts/default HTTP/1.1" 404 6919 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10 12 0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/54.0.2840.470 Safari/537.36" 192.88.135.6 - - [20/Apr/2017:08:34:03 -0300] "GET / HTTP/1.1" 200 4772 "http://www.phoenixhollow.com" "Mozilla/5.0+(compatible; UptimeRo bot/2.0; http://www.uptimerobot.com/)" 185.93.229.3 - - [20/Apr/2017:08:36:32 -0300] "GET /feeds/posts/default HTTP/1.1" 301 5 "http://www.slumpedoverkeyboarddead.com/feeds/pos ts/default" "Go 1.1 package http" 185.93.229.3 - - [20/Apr/2017:08:36:33 -0300] "GET /feeds/posts/default HTTP/1.1" 404 6919 "https://www.slumpedoverkeyboarddead.com/feeds /posts/default" "Go 1,1 package http" 192.88.134.3 - - [20/Apr/2017:08:43:37 -0300] "GET /my-website-is-down-now-what-part-4/ HTTP/1.1" 301 5 "-" "msnbot-media/1.1 (+http://se arch.msn.com/msnbot.htm)" 192.88.134.13 - - [20/Apr/2017:08:49:38 -0300] "GET /robots.txt HTTP/1.1" 200 1320 "-" "Mozilla/5.0 (compatible; bingbot/2.0; +http://www .bing.com/bingbot.htm)" 192.88.134.13 - - [20/Apr/2017:08:49:48 -0300] "GET /contact.php HTTP/1.1" 200 2223 "-" "Mozilla/5.0 (iPhone; CPU iPhone OS 7 0 like Mac OS X) AppleWebKit/537.51.1 (KHTML, like Gecko) Version/7.0 Mobile/11A465 Safari/9537.53 (compatible; bingbot/2.0; +http://www.bing.com/bi ngbot.htm)" 185.93.231.3 - - [20/Apr/2017:08:57:47 -0300] "GET /search/label/til?m=0 HTTP/1.1" 200 25347 "-" "Mozilla/5.0 (compatible; Baiduspider/2); +http://www.baidu.com/search/spider.html)" 185.93.229.6 - [20/Apr/2017:08:59:15 -0300] "GET /robots.txt HTTP/1.1" 200 114 "-" "Mozilla/5.0 (compatible; bingbot/2.0; +http://www.b ing.com/bingbot.htm)" 192.88.134.13 - - [20/Apr/2017:09:02:09 -0300] "GET /robots.txt HTTP/1.1" 200 1320 "-" "Mozilla/5.0 (compatible) bingbot/2.0; +http://www .bing.com/bingbot.htm)" 192.88.134.13 - - [20/Apr/2017:09:02:15 -0300] "GET /code/jquery.js HTTP/1.1" 200 57254 "-" "Mozilla/5.0 (iPhone; CPU iPhone OS 7 0 like Mac OS X) AppleWebKit/537.51.1 (KHTML, like Gecko) Version/7.0 Mobile/11A465 Safari/9537.53 (compatible; bingbot/2.0; +http://www.bing.co m/bingbot.htm)" 192.88.134.13 - - [20/Apr/2017:09:02:23 -0300] "GET /menu.css HTTP/1.1" 200 3727 "-" "Mozilla/5.0 (iPhone; CPU iPhone OS 7_0 like Mac OS X) AppleWebKit/537.51.1 (KHTML, like Gecko) Version/7.0 Mobile/11A465 Safari/9537.53 (compatible; bingbot/2.0; +http://www.bing.com/bingb ot.htm)" 192.88.134.13 - - [20/Apr/2017:09:02:29 -0300] "GET /styles.css HTTP/1.1" 200 2910 "-" "Mozilla/5.0 (iPhone) CPU iPhone 05 7 0 lik e Mac OS X) AppleWebKit/537.51.1 (KHTML, like Gecko) Version/7.0 Mobile/11A465 Safari/9537.53 (compatible; bingbot/2.0; +http://www.bing. com/bingbot.htm)" 185.93.230.3 - - [20/Apr/2017:09:08:02 -0300] "GET /feed HTTP/1.1" 301 5 "http://www.slumpedoverkeyboarddead.com/" "Mozilla/5.0 (compatib le; inoreader.com-like FeedFetcher-Google)" 185.93.230.3 - - [20/Apr/2017:09:08:03 -0300] "GET /feed/ HTTP/1.1" 304 0 "http://www.slumpedoverkeyboarddead.com/" "Mozilla/5.0 (compati ble; inoreader.com-like FeedFetcher-Google)" 185.93.228.3 - - [20/Apr/2017:09:16:24 -0300] "GET /jon-watson/ HTTP/1.1" 200 32007 "-" "Mozilla/5.0 (Windows NT 6.1; WOW64; rv:40.0) Gec ko/20100101 Firefox/40.1" 192.88.134.3 - - [20/Apr/2017:09:18:21 -0300] "GET /2009/10/29/ubuntu-9-10-screen-shots/ HTTP/1.1" 404 6919 "-" "Mozilla/5.0 (compatible; bingbot/2.0; +http://www.bing.com/bingbot.htm)" 185.93.231.3 - - [20/Apr/2017:09:19:14 -0300] "GET /tag/fidonet/feed/ HTTP/1.1" 200 3969 "-" "Mozilla/5.0 (compatible: Baiduspider/2.0: http://www.baidu.com/search/spider.html)" 185.93.231.18 - - [20/Apr/2017:09:20:22 -0300] "GET /feed/ HTTP/1.1" 200 11559 "-" "Mozilla/5.0 (compatible; Kraken/0.1; http://linkfluen ce.net/: bot@linkfluence.net)"





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Pod Shutdown

kube-apiserver receives delete
Pod marked as Terminating
+ aysnc consequence:
 Service controller removes Endpoint

PreStop hooks run PID 1 of all containers receive **SIGTERM** Termination Grace Period Seconds PID 1 of all containers receive **SIGKILL**





Dockerfile:

CMD nginx vs. ENTRYPOINT ["nginx"]





STOPSIGNAL

Shutdown Behavior

Normal shutdown behavior of kubernetes Pods and docker containers is:

- 1. send the process a SIGTERM
- 2. if the process has not exited after terminationGracePeriodSeconds, send SIGKILL

for the docker runtime, you can rewrite SIGTERM to a different signal using a
`STOPSIGNAL` layer/directive

(It's not clear whether this directive is formally supported by CRI)



Readiness / Liveness Probes

Kubernetes can't watch your logs... but it can watch these probes:

- Liveness used to check if Process is OK
- Readiness used to check if Pod should receive traffic

Be intentional with timeouts and periods



PreStop lifecycle hook or.... in-app integration

Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:
 Endpoints update async, independent of Pod Lifecycle.
 kube-proxy and ingress-controllers depend on Endpoints.
 When preStop is running or SIGTERM is sent,

your app will likely still be receiving connections.



PreStop lifecycle hook or.... in-app integration





PreStop lifecycle hook or.... in-app integration





PreStop lifecycle hook or.... in-app integration





PreStop lifecycle hook or.... in-app integration

- Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:



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stealthybox

PreStop lifecycle hook or.... in-app integration

- Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:



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PreStop lifecycle hook or.... in-app integration





PreStop lifecycle hook or.... in-app integration





PreStop lifecycle hook or.... in-app integration

- Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:

"Stop receiving connections" VS. "Start draining connections"



PreStop lifecycle hook or.... in-app integration

- Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:

Uwsgi: override the SIGTERM handler with an internal function...

https://github.com/unbit/uwsgi/issues/849#issuecomment-118869386

NGINX: need to build your own image with STOPSIGNAL SIGHUP

Was added in the upstream image and then removed

Both LB's also need "/bin/sleep" preStop hooks



PreStop lifecycle hook or.... in-app integration

- Important because the definition of Graceful shutdown for most programs is dissonant with Kubernetes' expectations:
- In-app integration leaks platform abstractions into your code
- Perhaps need to propose a new `sleep:` lifecycle hook for supporting "FROM scratch" images. (nothing to `exec:`)



https://github.com/ stealthybox/zero-downtime



Deployments:

.spec.strategy.rollingUpdate.**maxUnavailable** Use percentage or 0 when replica count == 1

This used to default to 1 -- Fixed in apps/v1beta1: https://github.com/kubernetes/kubernetes/pull/39683 Make sure you're using >= apps/v1 API



Deployments:

Make sure that your app can stay warm according to these periods:

.spec.strategy.**minReadySeconds** .spec.strategy.**progressDeadlineSeconds**

Also take care that this does not exceed capacity: .spec.strategy.rollingUpdate.maxSurge



Mismatched signal lifecycle with side-cars: *Example:*

If you're using **cloudsql-proxy** to connect your app to your db, your preStop hooks and graceful shutdown periods should be either **synchronized** or **scheduled** so that they do not effectively race.

If your app is in graceful shutdown and the proxy is not sleeping, it will exit and drop your db connections.



Rules of Uptime

- 1. entrypoint should handle or pass signals
- 2. **STOPSIGNAL** may need to be changed
- 3. Use diff. periods for Liveness/Readiness Probes
- 4. Sleep in **preStop** hooks to drain connections
- 5. Use the newer **apps/v1** Deployment
- 6. Keep your app **warm** during a RollingUpdate
- 7. Synchronize shutdown of side-cars









