

The background of the slide is a dark, atmospheric photograph of the Golden Gate Bridge in San Francisco. The bridge's iconic orange-red towers and suspension cables are visible against a hazy, blue-toned sky and water. The bridge spans the frame from the bottom left towards the upper right.

Pivotal

PCF Operations Workshop - Platform & Application Health

<Presenter>

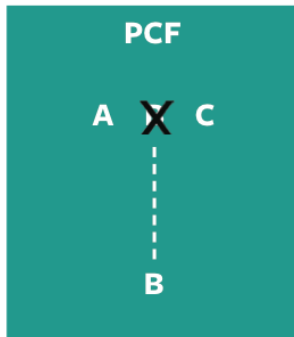
<Title>

Operations Workshop Agenda

- PCF Introduction
- Services Overview
- Platform Installation & Setup
- Role Based Access Control
- Platform & Application Scaling
- **Platform & Application Health**
- Patching & Updates
- Security
- Advanced BOSH

4 Layers of Self Healing

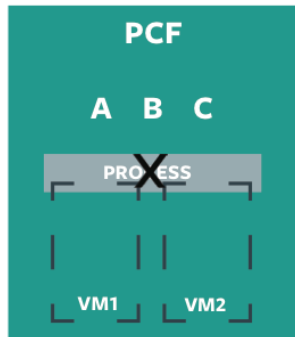
1



If an app fails, PCF reboots app in a new container

APP FAIL

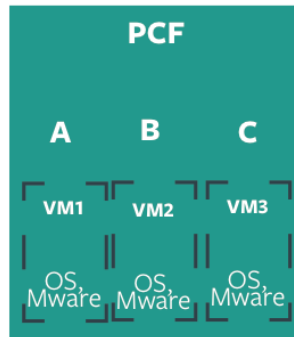
2



If a process fails, PCF reboots process in a new virtual machine

PROCESS FAIL

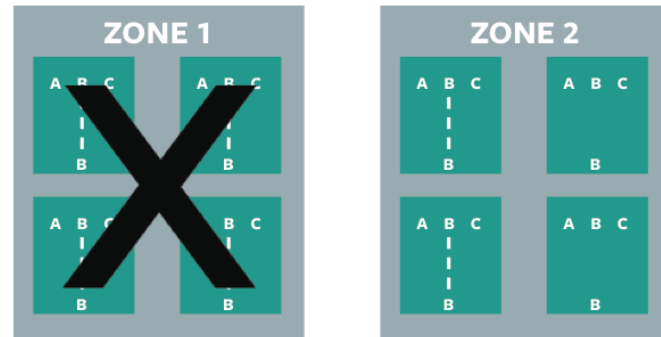
3



If an OS or network failure occurs, PCF kills the VM and reboots the host in a new virtual machine

VM FAIL

4

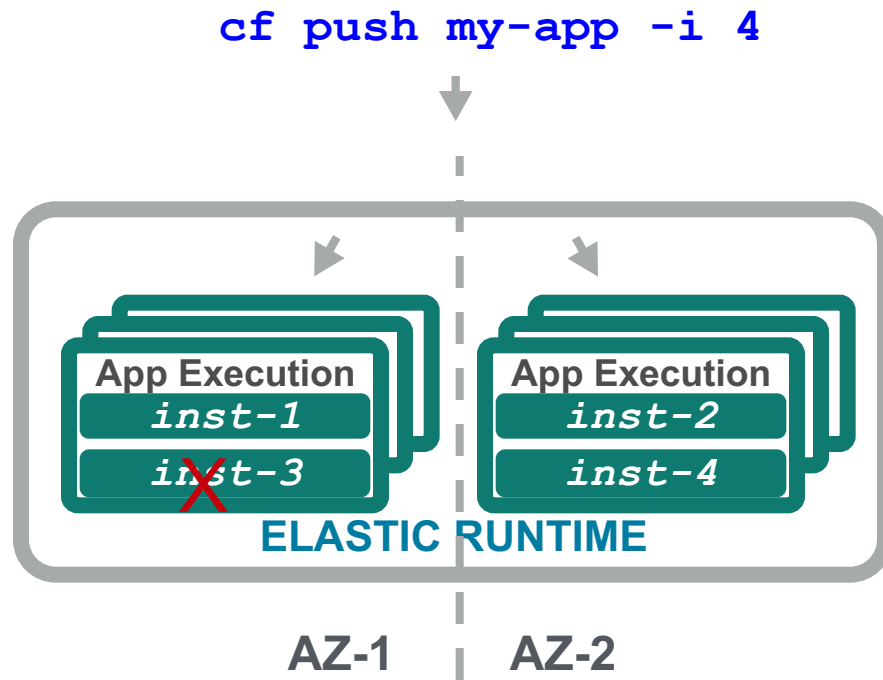


If a datacenter rack fails, PCF ensures applications stay running in multiple availability zones

RACK FAIL

Scenario 1: Application Failure & Recovery

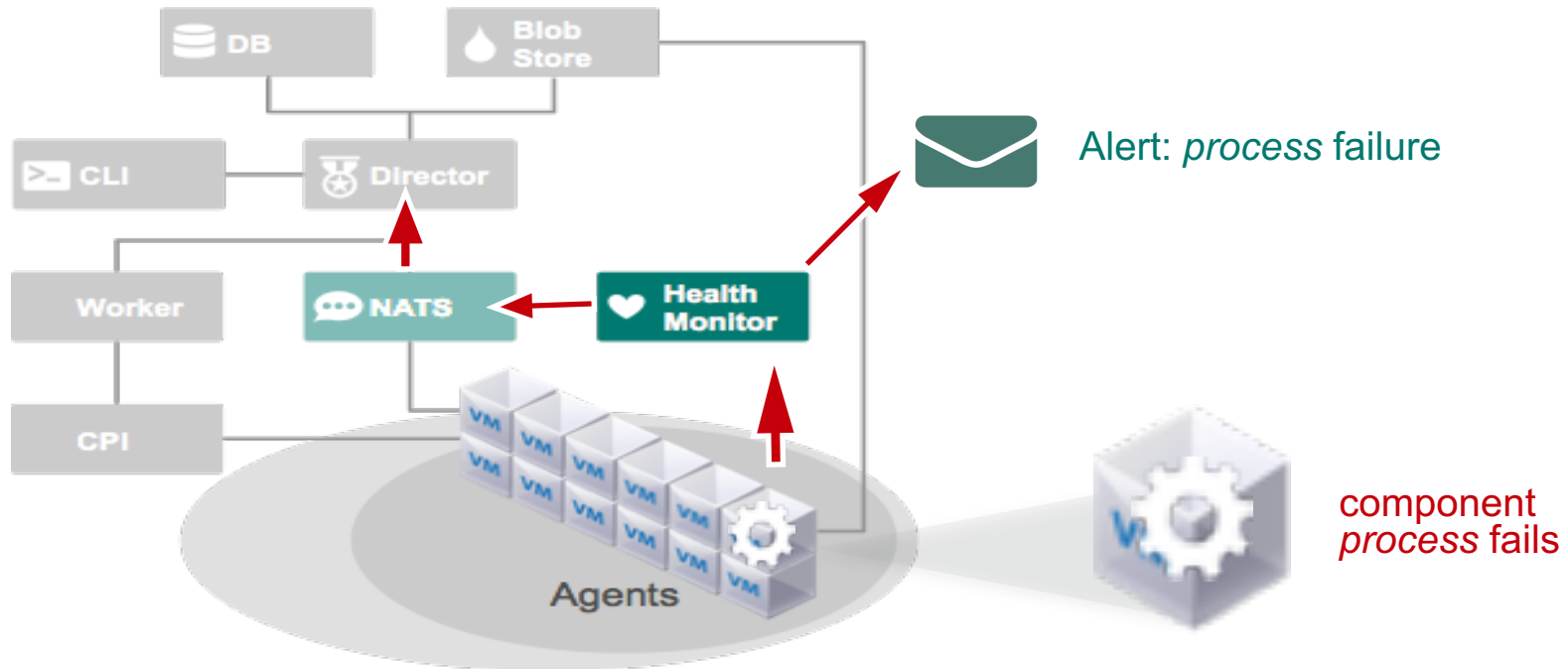
- The Elastic Runtime monitors application instance processes, and detects failures
- On failed instances, the container is destroyed and a new container is created
 - Droplet is copied from the Cloud Controller blobstore to the container and started



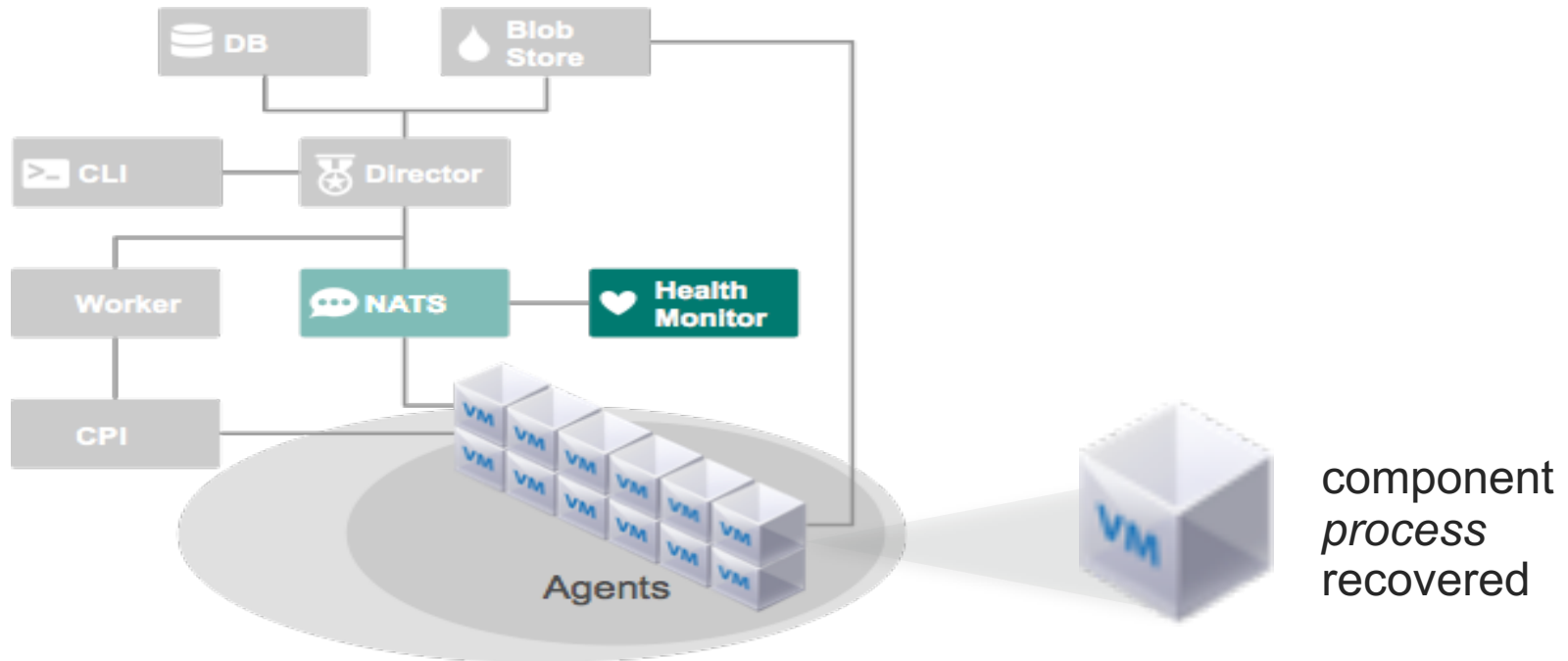
Scenario 2: Process Failure & Recovery

- Monit utility running on the component VMs automatically restarts failed processes
- BOSH release defines which processes to monitor

Scenario 2: Process Failure & Recovery



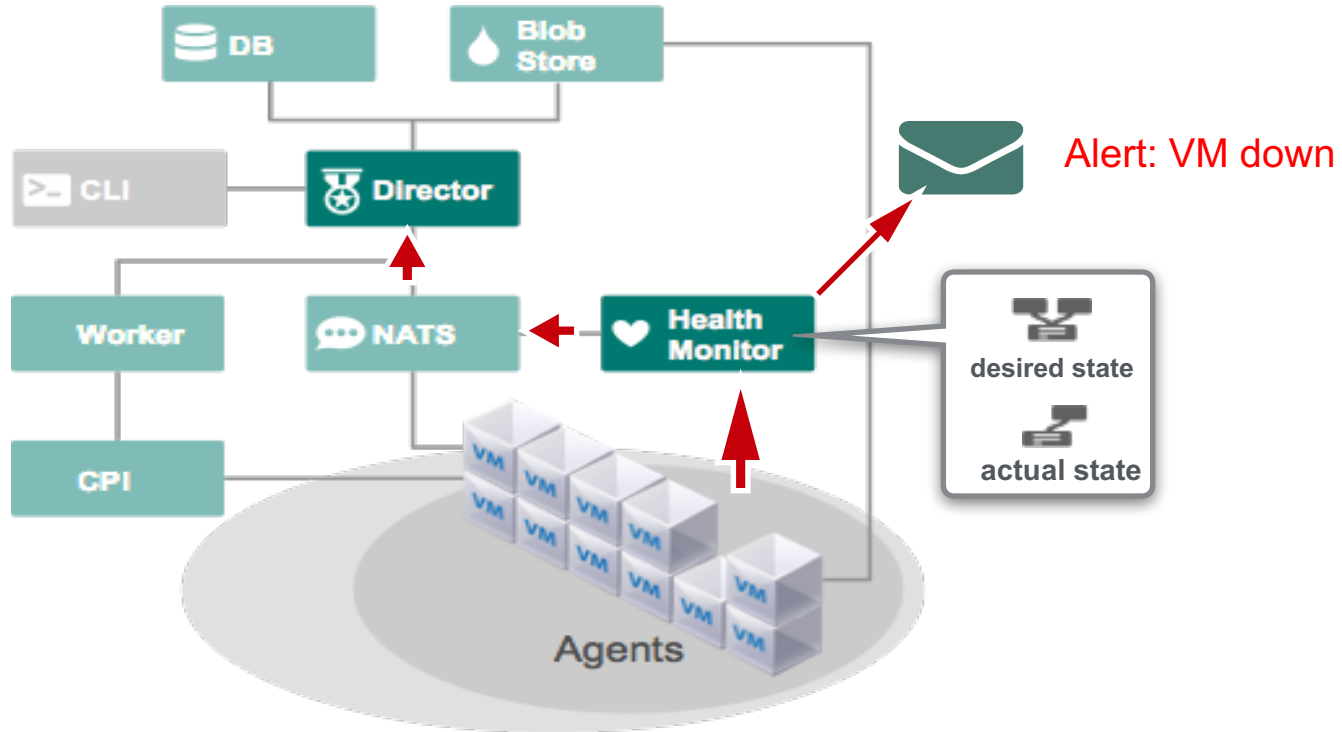
Scenario 2: Process Failure & Recovery



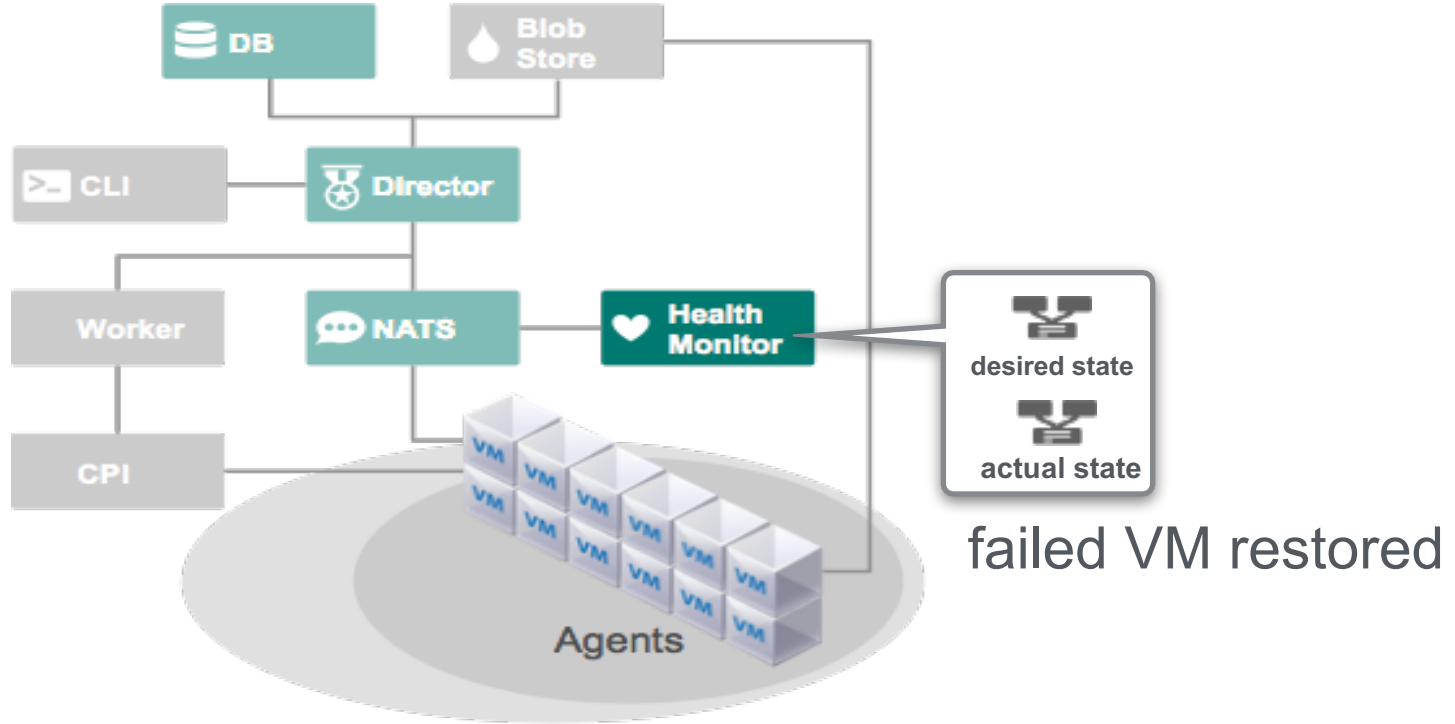
Scenario 3: VM Failure & Recovery

- Each component of Cloud Foundry is a VM deployed and managed by BOSH
- BOSH health monitor continuously compares current component state to desired state, including:
 - number of instances
 - running processes
- If current state differs from desired state, the health monitor:
 - triggers the VM resurrector, or
 - sends alerts

Scenario 3: VM Failure & Recovery

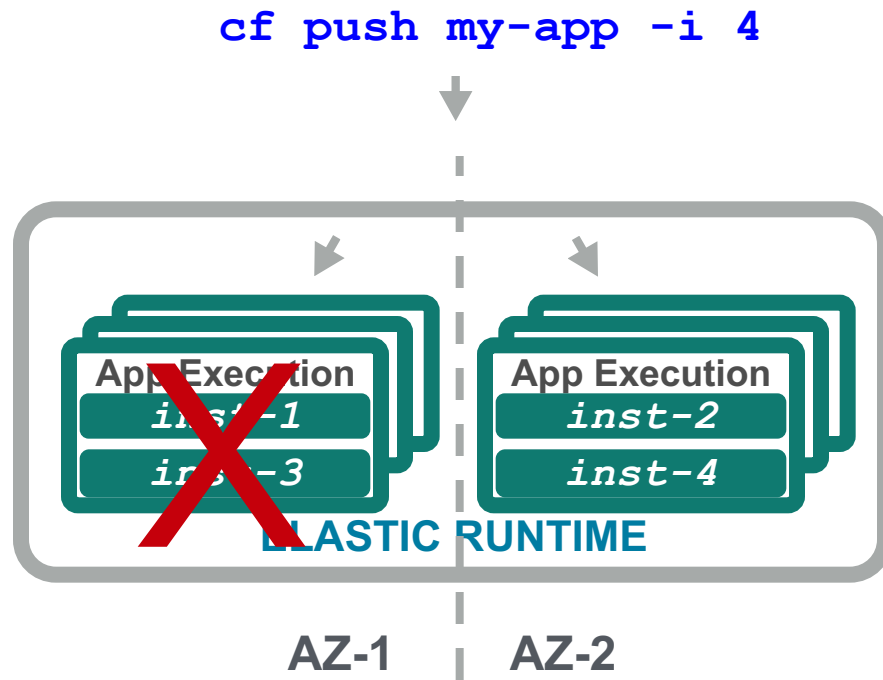


Scenario 3: VM Failure & Recovery



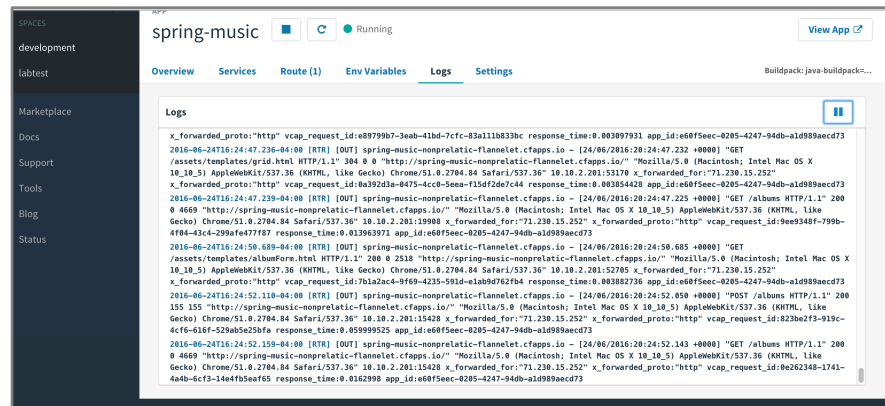
Scenario 4: AZ Failure & Recovery

- If one zone fails, the application instances in the other zone pick up the load
- No outage



Logging

- Available through the CLI and Apps Manager
- Application layer log aggregation provides consolidated view across all application instances and Routers.
- Ability to tail logs for real-time aggregated analysis
- Flush logs to permanent storage



Loggregator - The Voice of the System

- Provides logging and metrics for the Elastic Runtime
- A modern approach to logging that emphasizes:
 - Support for ephemeral, container-based applications
 - Productivity by streaming logs and metrics to operators and developers (no log shipping)
 - Accessibility and visibility into your applications and the platform
 - Seamless integration with modern log management services (e.g. Splunk, LogStash)

How can Loggregator help me?

- Debugging applications
- Application insights
- Monitoring system and application health
- Exporting metrics into visualization tools

Viewing App Logs Using Apps Manager

- In Apps Manager, select your app, then select Logs



The screenshot shows the Apps Manager interface with a dark sidebar on the left and a main content area. The main area has a horizontal tab bar with five tabs: 'Events', 'Services', 'Env Variables', 'Routes', and 'Logs'. The 'Logs' tab is selected and highlighted with a red circle. To the right of the tabs is a 'Delete App' button with a trash icon. Below the tabs, there is a 'RECENT LOGS' section with a refresh icon and a '</> Tail Logs' link. The log content is displayed in a monospace font, showing various system and application messages.

```
2015-12-08T00:57:32.000+00:00 [CELL] OUT Successfully created container
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 php-fpm | [08-Dec-2015 00:57:36] NOTICE: fpm is running, pid 31
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 php-fpm | [08-Dec-2015 00:57:36] NOTICE: ready to handle connections
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.497003 2015] [mpm_event:notice] [pid 29:tid 140562639148864] AH00489: Apache/2.4.16 (Unix) configured -- resuming normal operations
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.497108 2015] [mpm_event:info] [pid 29:tid 140562639148864] AH00490: Server built: Jul 22 2015 20:20:52
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.497122 2015] [core:notice] [pid 29:tid 140562639148864] AH00094: Command line: '/app/httpd/bin/httpd -f /home/vcap/app/httpd/conf/httpd.conf -D FOREGROUND'
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 php-fpm | [08-Dec-2015 00:57:36] NOTICE: fpm is running, pid 27
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 php-fpm | [08-Dec-2015 00:57:36] NOTICE: ready to handle connections
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.514493 2015] [mpm_event:notice] [pid 26:tid 140164087265088] AH00489: Apache/2.4.16 (Unix) configured -- resuming normal operations
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.514655 2015] [mpm_event:info] [pid 26:tid 140164087265088] AH00490: Server built: Jul 22 2015 20:20:52
2015-12-08T00:57:36.000+00:00 [APP] OUT 00:57:36 httpd | [Tue Dec 08 00:57:36.514716 2015] [core:notice] [pid 26:tid 140164087265088] AH00094: Command line: '/app/httpd/bin/httpd -f /home/vcap/app/httpd/conf/httpd.conf -D FOREGROUND'
```

Viewing Logs For an App Using the cf CLI

- Use “cf logs <app_name> --recent” to see recent logs
- Use “cf logs <app_name>” to tail application logs

```
my-php-app88 — bash — 66x10
greylag:my-php-app88 sbyrnes$ cf help logs
NAME:
  logs - Tail or show recent logs for an app

USAGE:
  cf logs APP_NAME

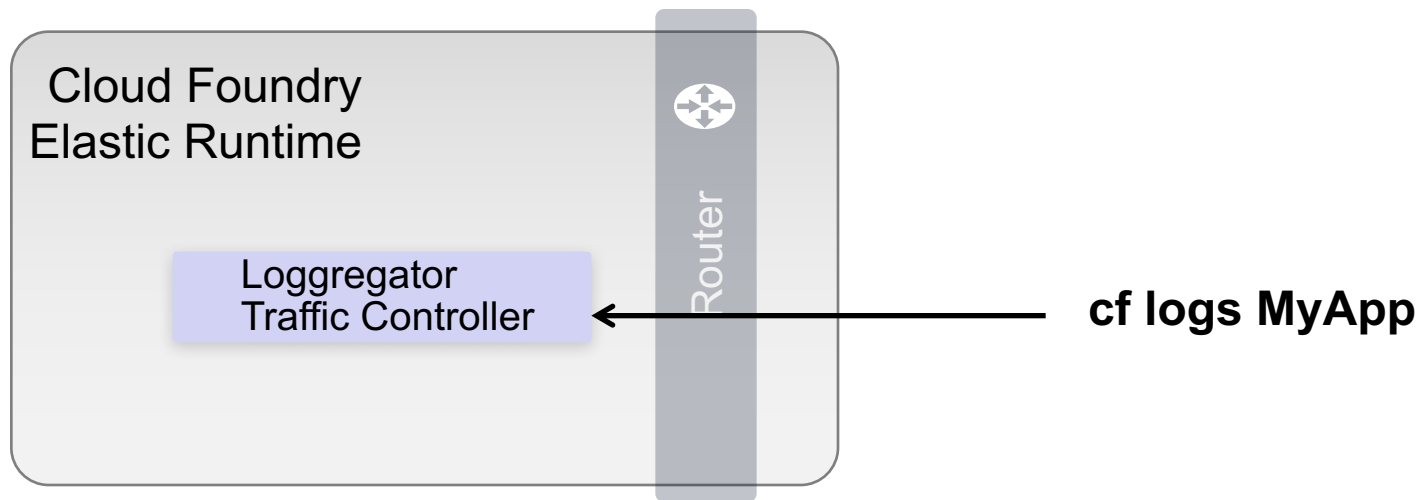
OPTIONS:
  --recent      Dump recent logs instead of tailing
greylag:my-php-app88 sbyrnes$
```

```
greylag:repos sbyrnes$ cf logs my-php-app88 --recent
Connected, dumping recent logs for app my-php-app88 in org sbyrnes-org / space development as sbyrnes@pivotal.io...

2015-12-22T13:14:36.13-0800 [CELL/0] OUT Creating container
2015-12-22T13:14:36.83-0800 [CELL/0] OUT Successfully created container
2015-12-22T13:14:40.13-0800 [APP/0] OUT 21:14:40 php-fpm | [22-Dec-2015 21:14:40] NOTICE: fpm is running, pid 27
2015-12-22T13:14:40.13-0800 [APP/0] OUT 21:14:40 php-fpm | [22-Dec-2015 21:14:40] NOTICE: ready to handle connections
2015-12-22T13:14:40.16-0800 [APP/0] OUT 21:14:40 httpd | [Tue Dec 22 21:14:40.153683 2015] [mpm_event:notice] [pid 25:
tid 140364163196736] AH00489: Apache/2.4.12 (Unix) configured -- resuming normal operations
2015-12-22T13:14:40.16-0800 [APP/0] OUT 21:14:40 httpd | [Tue Dec 22 21:14:40.153867 2015] [mpm_event:info] [pid 25:ti
d 140364163196736] AH00490: Server built: Mar 2 2015 15:50:48
2015-12-22T13:14:40.16-0800 [APP/0] OUT 21:14:40 httpd | [Tue Dec 22 21:14:40.153925 2015] [core:notice] [pid 25:tid 1
40364163196736] AH00094: Command line: '/home/vcap/app/httpd/bin/httpd -f /home/vcap/app/httpd/conf/httpd.conf -D FOREGROUND'
2015-12-22T13:14:40.28-0800 [HEALTH/0] OUT healthcheck passed
2015-12-22T13:14:40.28-0800 [HEALTH/0] OUT Exit status 0
2015-12-22T13:14:44.76-0800 [RTR/1] OUT my-php-app87.cfapps.io - [22/12/2015:21:14:44 +0000] "GET / HTTP/1.1" 200 0 185
"-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_2) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/47.0.2526.80 Safari/537.36
" 10.10.2.247:23755 x_forwarded_for:"209.234.137.222" x_forwarded_proto:"http" vcap_request_id:f210e3a5-24c1-41ca-7edd-56d406
da2cf7 response_time:0.00228655 app_id:a4263c77-3ada-4030-9ae9-fa2d0e6c5579
2015-12-22T13:14:44.77-0800 [APP/0] OUT 21:14:44 httpd | 209.234.137.222 - - [22/Dec/2015:21:14:44 +0000] "GET / HTTP/
1.1" 200 185 vcap_request_id=f210e3a5-24c1-41ca-7edd-56d406da2cf7 peer_addr=10.10.16.16
2015-12-22T13:14:48.88-0800 [APP/0] OUT 21:14:48 httpd | [Tue Dec 22 21:14:48.853886 2015] [core:info] [pid 36:tid 140
364103026432] [client 209.234.137.222:37018] AH00128: File does not exist: /home/vcap/app/htdocs/favicon.ico, referer: http:/
/my-php-app87.cfapps.io/
2015-12-22T13:14:48.88-0800 [APP/0] OUT 21:14:48 httpd | 209.234.137.222 - - [22/Dec/2015:21:14:48 +0000] "GET /favico
n.ico HTTP/1.1" 404 209 vcap_request_id=0968141d-f21a-44ab-53e7-ce571fbb9020 peer_addr=10.10.80.16
2015-12-22T13:15:10.30-0800 [HEALTH/0] OUT healthcheck passed
2015-12-22T13:15:10.30-0800 [HEALTH/0] OUT Exit status 0
```

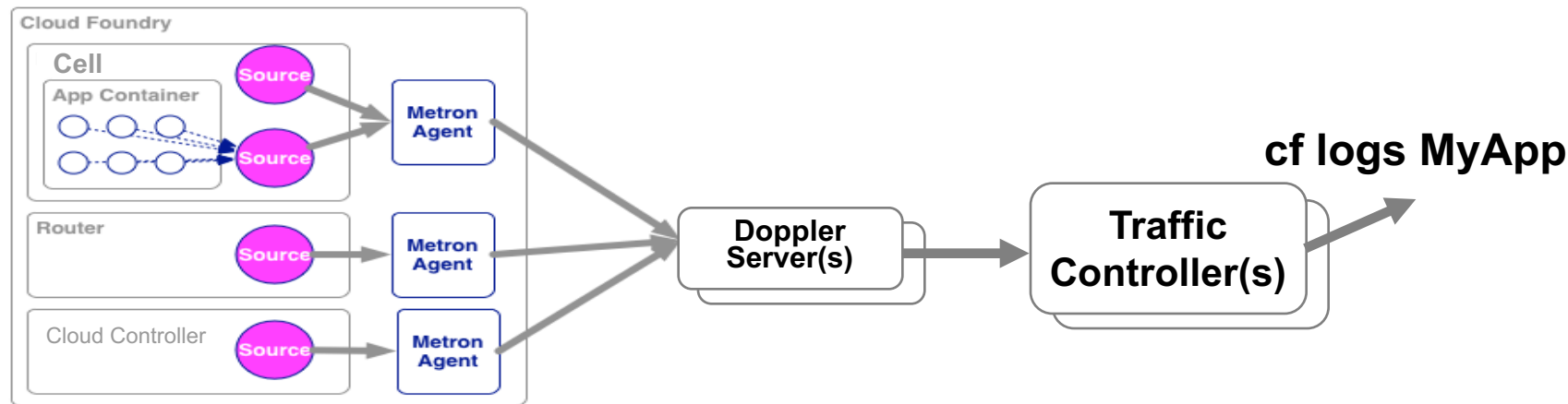

cf logs- Behind the Scenes

- A component of the Loggregator system called the Traffic Controller receives and responds to requests for logs and metrics



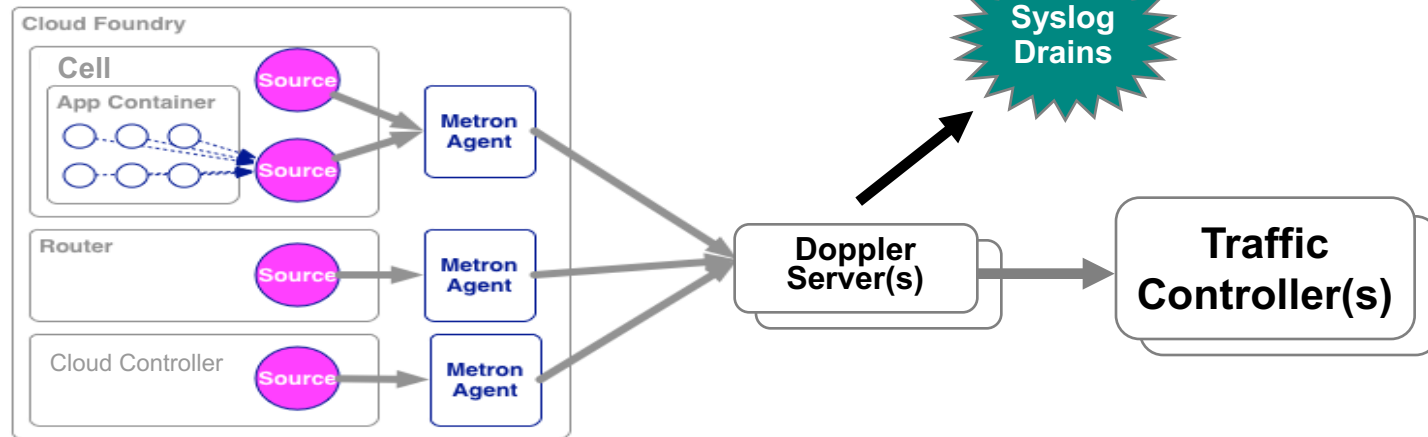
cf logs MyApp- Deeper Behind the Scenes

- Sources of logging and metrics data send data to Metron Agents, which reside on Cloud Foundry components
- The Metron Agents send the data to Doppler Servers
- When the request for logs is made, the Traffic Controller gets the data from the Doppler Servers



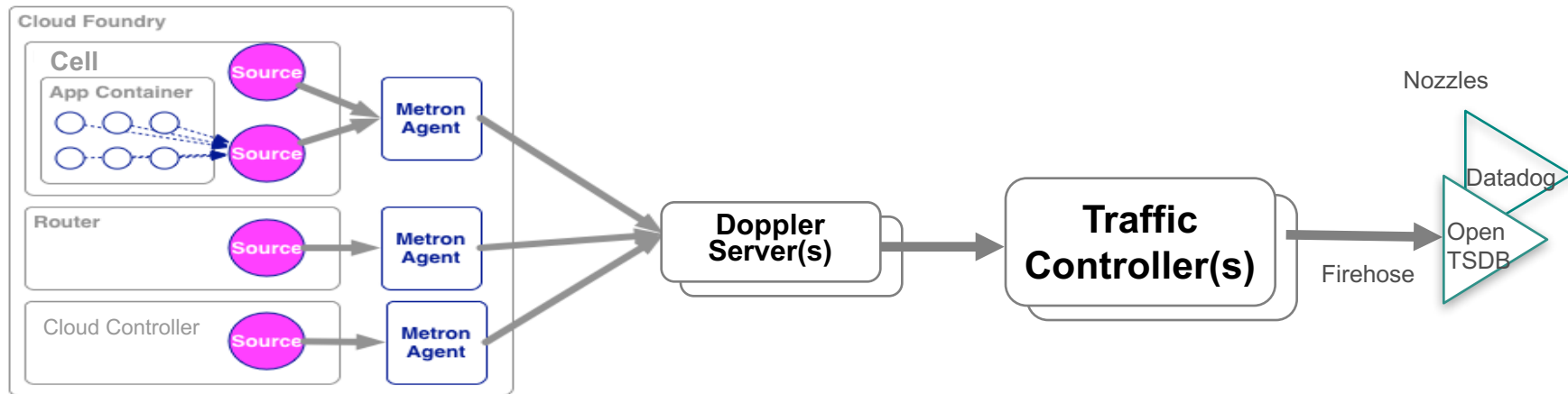
Syslog Drains

- Syslog drains allow data related to an application to be sent to third-party log managers
- The data from the Doppler Servers is sent to the Syslog drain
 - The Traffic Controller is not used



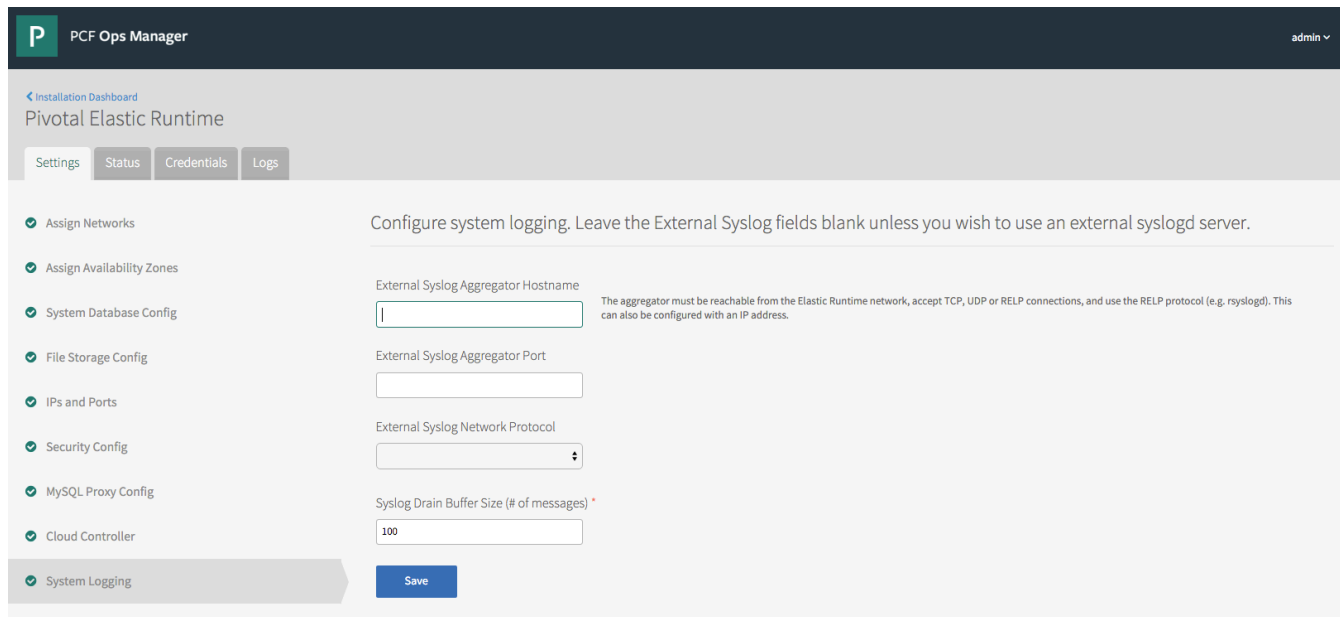
Firehose and Nozzles

- Traffic Controllers have a Firehose endpoint
- The Firehose streams all the event data coming from an Elastic Runtime deployment
 - Includes application logs, HTTP events and container metrics
 - Includes metrics from all Elastic Runtime components
 - Does not include Elastic Runtime component logs
- Operators can deploy nozzles to the Firehose endpoint, which listen for a subset of data from the Firehose



Platform syslog

- Elastic Runtime can send system logs to an external syslog server
- Configure this in the System Logging tab



The screenshot shows the 'System Logging' configuration page in the PCF Ops Manager interface. The page title is 'Pivotal Elastic Runtime'. The left sidebar contains a list of configuration tabs: Settings, Status, Credentials, and Logs. The main content area is titled 'Configure system logging. Leave the External Syslog fields blank unless you wish to use an external syslogd server.' It includes four input fields: 'External Syslog Aggregator Hostname' (with a text hint), 'External Syslog Aggregator Port', 'External Syslog Network Protocol' (a dropdown menu), and 'Syslog Drain Buffer Size (# of messages)' (with a value of 100). A 'Save' button is located at the bottom right of the configuration area.

PCF Ops Manager admin

< Installation Dashboard
Pivotal Elastic Runtime

Settings Status Credentials Logs

Assign Networks
Assign Availability Zones
System Database Config
File Storage Config
IPs and Ports
Security Config
MySQL Proxy Config
Cloud Controller
System Logging

Configure system logging. Leave the External Syslog fields blank unless you wish to use an external syslogd server.

External Syslog Aggregator Hostname
The aggregator must be reachable from the Elastic Runtime network, accept TCP, UDP or RELP connections, and use the RELP protocol (e.g. rsyslogd). This can also be configured with an IP address.

External Syslog Aggregator Port

External Syslog Network Protocol

Syslog Drain Buffer Size (# of messages) *

100





Save

PCF JMX Bridge

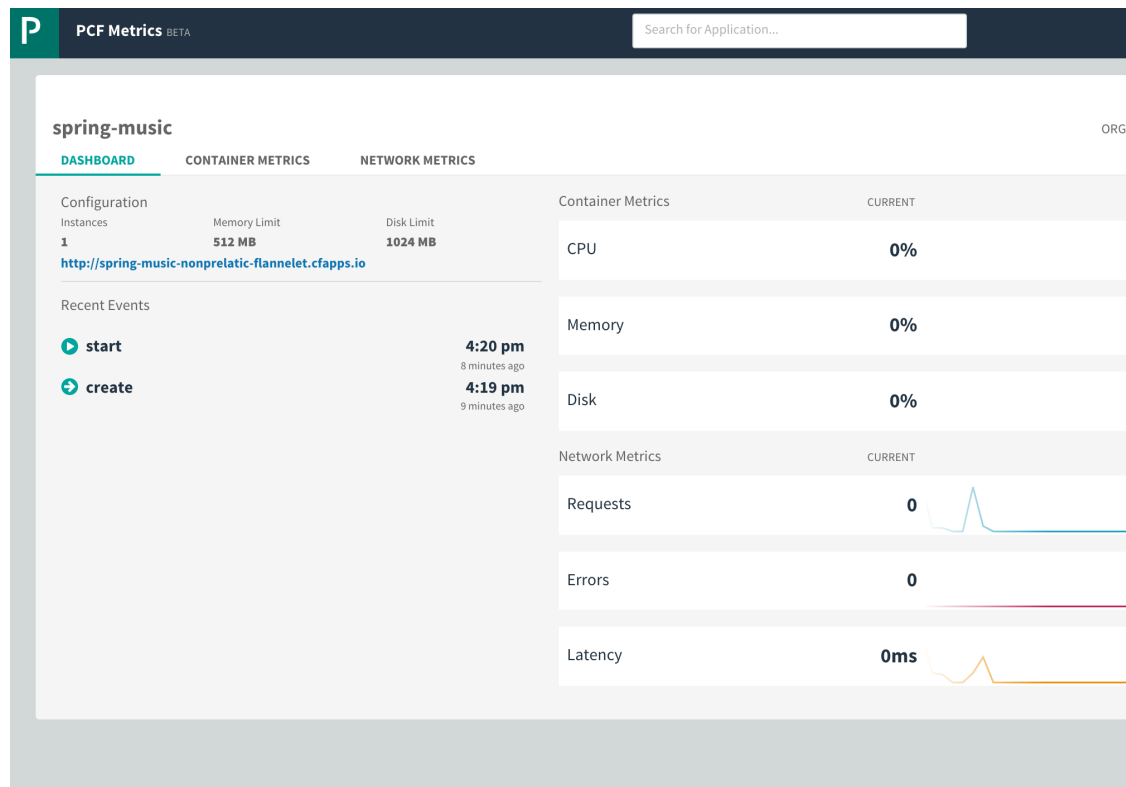
- Collects and exposes system data from PCF components via a JMX endpoint (Cloud Controller, Router, Diego, VMs, etc)
- Composed of the following VMs:
 - JMX provider
 - VM that governs compilation
 - Nozzle for the Loggregator Firehose
- Rebranded version of “Pivotal Cloud Foundry Ops Metrics”

Viewing the Events for your App

- In Apps Manager, select your app, then select Events
 - Or in the cf CLI `cf events <my-app-name>`

Events	Services	Env Variables	Routes	Logs
RECENT EVENTS				
	scaled app instances to 2 sbyrnes@pivotal.io 06/04/2015 at 12:24 AM UTC			
	updated app sbyrnes@pivotal.io 06/03/2015 at 11:09 PM UTC			
	scaled app instances to 1 sbyrnes@pivotal.io 06/03/2015 at 11:09 PM UTC			
	started app sbyrnes@pivotal.io 06/03/2015 at 10:52 PM UTC			

PCF Metrics



Application Performance Monitoring

- PCF Metrics provides a real-time application monitoring dashboard
- 3rd Party Tiles provide in-depth monitoring of applications running on PCF via an embedded agent bundled with applications that are deployed using Buildpacks
 - Dynatrace
 - New Relic
 - AppDynamics

PCF Platform Health

JMX Bridge Demo