MONITORING CONTAINERS

JASON YEE, DATADOG

@gitbisect
IS THE DOCKER FAD OVER?
JASON YEE
DOCS & TALKS
DEVOPSDAYS ORGANIZER
TRAVEL HACKER
POKEMON TRAINER
WHISKEY HUNTER

TW: @gitbisect
EM: jyee@datadoghq.com
DATADOG
SAAS-BASED MONITORING
TRILLIONS OF POINTS/DAY
WE’RE HIRING:
www.datadoghq.com/careers
TW: @datadoghq
This PR enables instrumentation on Docker (LXC/cgroups) containers for:

- Memory
- CPU
- Disk

It uses the native Unix socket to communicate with `dockerd`, and thus doesn't need any
Docker Adoption - Docker pulls?
8 SURPRISING FACTS ABOUT REAL

DOCKER ADOPTION

https://www.datadoghq.com/docker-adoption/
Docker Adoption

**Dabbler**: used Docker during a given month, but hadn’t reached significant use as defined by Adopter.
Docker Adoption

**Dabbler**: used Docker during a given month, but hadn’t reached significant use as defined by Adopter.

**Adopter**: the average number of containers running during the month was at least 50% the number of distinct hosts run, or there were at least as many distinct containers as distinct hosts run during the month.
Docker Adoption

**Dabbler:** used Docker during a given month, but hadn’t reached significant use as defined by Adopter.

**Adopter:** the average number of containers running during the month was at least 50% the number of distinct hosts run, or there were at least as many distinct containers as distinct hosts run during the month.

**Abandoner:** a currently active company that used Docker in the past, but hasn't used it at all in the last month.
Docker Adoption Behavior

- **ADOPTED**
- **DABBING**
- **ABANDONED**

**DOCKER ADOPTION UP 5X IN ONE YEAR**

Source: Datadog
Docker Adoption Behavior

**DOCKER ADOPTION IS UP 40% IN ONE YEAR**

Source: Datadog
DOCKER RUNS ON 15% OF HOSTS

Source: Datadog
WHO’S ADOPTING DOCKER?
Docker Adoption Status by Infrastructure Size

2015

1-99 HOSTS

100-499 HOSTS

500+ HOSTS

2016

1-99 HOSTS

100-499 HOSTS

500+ HOSTS

Percent of Companies

LARGER COMPANIES ARE LEADING ADOPTION

NEVER TRIED

ABANDONED

DABBING

Adopted

Source: Datadog
Docker Adoption Status by Infrastructure Size

LARGER COMPANIES ARE LEADING ADOPTION

Source: Datadog
2/3rds of companies that try Docker adopt it.
THE AVERAGE COMPANY QUINTUPLES ITS DOCKER USAGE WITHIN 9 MONTHS

Source: Datadog
WHAT’S RUNNING?
% Customers Running a Tech in Containers

- NGINX: 30%
- Redis: 22.5%
- ElasticSearch: 15%
- PostgreSQL: 15%
- Registry: 10.5%
- MySQL: 7.5%
- MongoDB: 7.5%
- etcd: 7.5%
- RabbitMQ: 7.5%
- HAproxy: 0%
% Customers Running Data Stores in Containers

- Redis: 28%
- ElasticSearch: 21%
- PostgreSQL: 14%
- MySQL: 14%
- MongoDB: 14%
- etcd: 7%
- RabbitMQ: 0%
HOW DENSELY PACKED?
HOSTS RUN SEVEN CONTAINERS AT A TIME

Source: Datadog
Average Lifetimes of Hosts and Containers

CONTAINERS CHURN 9X FASTER THAN VMS

Source: Datadog
ENTER THE ORCHESTRATORS
ENTER THE ORCHESTRATORS
ORCHESTRATORS ARE THE NEW NORM
Usage of Orchestrators

40% of Docker organizations use orchestrators

Source: Datadog
CONTAINERS INCREASE COMPLEXITY

HOW DO WE MONITOR THEM?
Alcohol: The problem and solution to all of life’s problems.

HOMER SIMPSON
CONTAINERS

The problem and solution to all of life's problems.

HOMER SIMPSON
Side Car Containers
AS COMPLEXITY INCREASES
FUNDAMENTALS BECOME MORE IMPORTANT
4 QUALITIES OF GOOD METRICS

NOT ALL METRICS ARE EQUAL
1. MUST BE WELL UNDERSTOOD
<table>
<thead>
<tr>
<th>RANK</th>
<th>PARTICIPANT</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anthony ERVIN</td>
<td>21.40</td>
</tr>
<tr>
<td>2</td>
<td>Florent MANAUDOU</td>
<td>21.41</td>
</tr>
<tr>
<td>3</td>
<td>Nathan ADRIAN</td>
<td>21.49</td>
</tr>
<tr>
<td>4</td>
<td>Ben PROUD</td>
<td>21.68</td>
</tr>
<tr>
<td>5</td>
<td>Andrii GOVOROV</td>
<td>21.74</td>
</tr>
<tr>
<td>6</td>
<td>Bruno FRATUS</td>
<td>21.79</td>
</tr>
<tr>
<td>7</td>
<td>Bradley Edward TANDY</td>
<td>21.79</td>
</tr>
<tr>
<td>8</td>
<td>Simonas BILIS</td>
<td>22.08</td>
</tr>
</tbody>
</table>

2. SUFFICIENT GRANULARITY

TW: @gitbisect @datadoghq
1 second
Peak 46%

1 minute
Peak 36%

5 minutes
Peak 12%
3. TAGGED & FILTERABLE
**Datapoint**

**System.Net.Bytes_Rcvd**  
**2016-03-02 15:00:00**  
**[File-Server]**

**Metric Name:** What?  
**Metric Value:** How much?  
**Timestamp:** When?  
**Tags:** Where?
Query Based Monitoring

“What’s the average throughput of application:nginx per version?”

“Alert me when role:web-app running application:postgres hosted in region:eu-west-1 behaves differently than region:eu-west-2”
4. LONG-LIVED
OUTAGE? TUESDAY HOLIDAY?
TYPES OF METRICS
WORK METRICS
THROUGHPUT
SUCCESS
ERROR
PERFORMANCE
P.S. - June 1! Mark your calendar!
RECURSE UNTIL YOU FIND THE TECHNICAL CAUSES
PUTTING METRICS TO WORK
MTTR

THE MOST IMPORTANT METRIC
THE MOST IMPORTANT METRIC

MEAN TIME TO RECOVERY

1. Time to detection
   1. Monitoring
   2. Alerting

2. Time to resolution
   1. Investigation
   2. Remediation
Q: Are we losing money?
A: Can't answer that, but I can tell you what average CPU usage was 5ish mins ago..
WHAT TO PAGE ON?

PAGE ON
SYMPTOMS:
WORK METRICS
RESOURCE METRICS

INVESTIGATE USING
DIAGNOSTICS:
WORK METRICS
EVENTS
ALERT ON WORK METRICS, BUT RESOURCE METRICS BECOME WORK METRICS? ALERT ON EVERYTHING?

TW: @gitbisect @datadoghq
WHO TO ALERT?

Leadership ➔ BUSINESS ➔ SERVICES ➔ EVENTS

SERVICE ➔ COMPONENTS ➔ EVENTS

COMPONENT ➔ SERVERS ➔ EVENTS

SERVER ➔ RESOURCES ➔ EVENTS
WHO TO ALERT?

Developers

BUSINESS → SERVICES → EVENTS

SERVICE → COMPONENTS → EVENTS

COMPONENT → SERVERS → EVENTS

SERVER → RESOURCES → EVENTS
WHO TO ALERT?

Database Team

BUSINESS → SERVICES → EVENTS

SERVICE → COMPONENTS → EVENTS

COMPONENT → SERVERS ← EVENTS

SERVER ← RESOURCES ← EVENTS
WHO TO ALERT?

BUSINESS → SERVICES → EVENTS

SERVICE → COMPONENTS → EVENTS

COMPONENT → SERVERS → EVENTS

SERVERS → RESOURCES → EVENTS

Ops/SRE
THE MOST IMPORTANT METRIC

MEAN TIME TO RECOVERY

1. Time to detection
   1. Monitoring
   2. Alerting

2. Time to resolution
   1. Investigation
   2. Remediation
Cryptic Alerts

Date: January 1, 2011 11:06:41 AM GMT+09:00
From: Nagios Monitoring user
Subject: ** PROBLEM Host Alert: dbserver1 is DOWN **
To: support@frank4dd.com

***** Nagios *****

Notification Type: PROBLEM
Host: dbserver1
State: DOWN
Info: CRITICAL - Host Unreachable

Date/Time: Sat Jan 1 11:06:41 JST 2011

WHAT?
PUTTING METRICS TO WORK

MAKE ACTIONABLE ALERTS

1. What happened?
PUTTING METRICS TO WORK

MAKE ACTIONABLE ALERTS

1. What happened?
2. Why does it matter?
PUTTING METRICS TO WORK

MAKE ACTIONABLE ALERTS

1. What happened?
2. Why does it matter?
3. Investigation & remediation
PUTTING METRICS TO WORK

MAKE ACTIONABLE ALERTS

1. What happened?
2. Why does it matter?
3. Investigation & remediation
   1. Confirm there’s an issue
   2. Easy or temporary fixes
   3. How to investigate
   4. Help & resources
Home Page Response Time is Above 3s

Our home page is taking more than 5s to load. Our customers generally get board and abandon at 5s. Let's investigate before users become frustrated.

- Do we need more capacity? Check web tier resource utilization on this dashboard (http://........)
- Spin up more resources with this [jenkins job](http://jenkins.com/job/deploy-it-all/)
- Check this wiki page for more ideas.
- Still stuck? Call Jenny! 867-5309
Say what's happening

Home Page Response Time is Above 3s

Our home page is taking more than 5s to load. Our customers generally get board and abandon at 5s. Let's investigate before users become frustrated.

- Do we need more capacity? Check web tier resource utilization on this dashboard (http://........)
- Spin up more resources with this [jenkins job](http://jenkins.com/job/deploy-it-all/)
- Check this wiki page for more ideas.
- Still stuck? Call Jenny! 867-5309
Say what's happening

Home Page Response Time is Above 3s

Our home page is taking more than 5s to load. Our customers generally get board and abandon at 5s. Let's investigate before users become frustrated.

- Do we need more capacity? check web tier resource utilization on this dashboard (http://.........)
- Spin up more resources with this [jenkins job](http://jenkins.com/job/deploy-it-all/)
- Check this wiki page for more ideas.
- Still stuck? Call Jenny! 867-5309
Say what's happening

Our home page is taking more than 5s to load. Our customers generally get board and abandon at 5s. Let's investigate before users become frustrated.

- Do we need more capacity? check web tier resource utilization on this dashboard (http://........)
- Spin up more resources with this [jenkins job](http://jenkins.com/job/deploy-it-all/)
- Check this wiki page for more ideas.
- Still stuck? Call Jenny! 867-5309
Say what's happening

Home Page Response Time is Above 3s

Our home page is taking more than 5s to load. Our customers generally get board and abandon at 5s. Let's investigate before users become frustrated.

- Do we need more capacity? check web tier resource utilization on this dashboard (http://........)
- Spin up more resources with this [jenkins job](http://jenkins.com/job/deploy-it-all/)
- Check this wiki page for more ideas.
- Still stuck? Call Jenny! 867-5309
SUMMARY

1. Docker adoption (& system complexity) continues to grow
2. The fundamentals of monitoring are more important than ever
MASTER THE FUNDAMENTALS

1. Remember the 4 qualities of good metrics
2. Understand work vs resource metrics
3. Alert on the appropriate work metrics
4. Make your alerts actionable
QUESTIONS?

JASON YEE

@gitbisect

jason.yee@datadoghq.com