

# DevOps buzzword or strength ?

M. Finelli  
BioDec

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# Cloud + Virtualization = Distributed Infrastructure

**T**HANKS TO THE CLOUD AND TO THE VIRTUALIZATION technologies every company will need tools and techniques to deal with the complexities of a distributed infrastructure.

The **timeframe** is the next *few* years, not decades.

The **alternative** is *giving up* controlling or *giving up* the advantages of those technologies.

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## A *large* distributed infrastructure

Your infrastructure will be not only *distributed*, but also **large**: a very different scenario from that of traditional (yesterday's, perhaps today's if you are a laggard) infrastructures.

Different rules, different problems and different solutions.

Hint: adapting to the **large** what happens in the **small** is not a good strategy ...

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## A timeline\*

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**Agile 2008** Andrew Shafer proposes a session on “*Agile Infrastructure*”, but exactly zero people show up.

**June 2009** John Allspaw gives the talk “*10+ deploys per day: Dev & Ops cooperation at Flickr*”.

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THE HASHTAG #DEVOPS is adopted. The *devops* topic — even if still undefined — gets debated in conferences and a new brand of community-driven meetings are organized all over the world.

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Attendees discuss about:

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4. bridging the gap between developers and operations — does it ring a bell ?

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# All that is old is new again

Uncle Bob Martin says:

*In 2001 a few of us met in hopes that we could agree on a simple statement that defines lightweight processes. We wrote a simple manifesto, and chose the name Agile. We had no idea how successful this idea would be. At that meeting, Kent Beck stated a prime goal: **“To heal the divide between business and development”**.*



# Today

**M**ARCH, 2011. Gartner Group publishes the report “*The Rise of a New IT Operations Support Model*”, where it is stated that by year **2015** (*i.e.* exactly in 80 days from tomorrow) the DevOps movement would have grown from *a niche movement for cloud companies* to **adoption in more than a fifth of *Global 2000* enterprises.**

## Italy: what's happening ?

**October 2012** first Italian DevOpsDays, in Rome. A lot of people ( 200 participants) from all over the world.

**February, 2013** in Florence, first Italian DevOps Meeting (Incontro DevOps Italia), 80+ people, community driven.

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## So, what is this DevOps thing ?

**M**Y VERY PERSONAL OPINION is that DevOps is a *pot-pourri* of different things, ideas, techniques and practices. I would say that it is a blend of:

1. agile *stuff*,
2. lean methodologies,
3. some characteristics of the free software communities:  
openness, sharing, open standards,
4. and probably something else.

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## ... and what it is not

Defining DevOps by *negation*. That part is easier:

1. it is *not* a certification,
2. it is *not* a job title,
3. it is *not* a tool nor a software.

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## An acronym: CAMS

C *culture*

A *automate*

M *measure*

S *share*

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# Culture

**1** CREATE A CULTURE of collaboration. The first issue is the harder to get in practice, but it is probably the most important.

*People and process first. If you don't have culture, all automation attempts will be fruitless. (John Willis)*

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## Automate

**2** **AUTOMATE** everything. Let any task that can be done with software, be done by a program: write it, deploy it and run it.

*All software is born equal under the sun: a system program is not an excuse for sloppy practices, lack of quality or misfeasance.*  
*Corollary: sysadmin is not an insult.*

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## Infrastructure as code

Since only software determines what can be done, it means that also the *lack of it* defines what *cannot be done*, and in particular it is not acceptable to have:

1. hand-made configurations (*i.e.* snowflakes servers),
2. things that happens clicking on interfaces, with no versioning or change management in place,
3. people (*a.k.a.* consultants) that come, cast a spell and run away with money.

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## *Measure everything*

**3** MEASURE all the parts of the infrastructure. Monitoring is not a new idea, and it has obviously not been invented by the DevOps community: the novelty of the DevOps approach is in considering monitoring *as a whole*: systems, applications, network. **Everything has to be available for anybody involved.**

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## *Measure everything*

The traditional approach to monitoring consists of some system management tool, **usually just for the system administrators**, tracking server resources or hardware performance data. Trouble arise since that tool is usually decoupled from an **ad hoc solution devised for the applications, by the application developer themselves**.

## Share

**4** SHARE a project outcome, an objective, practices, techniques, tools among different groups that have different roles and responsibilities.

*Sharing is the loopback in the CAMS cycle. Creating a culture where people share ideas and problems is critical.  
(John Willis)*

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## Wrapping up

There is a chain of implications, and if you accept the premises the conclusion is inescapable:

1. if only the code defines the infrastructure,
2. and every action on the infrastructure has to be automated (that means: translated into code),
3. then the only way of determining an effect on the infrastructure is by programming,
4. and this means that **you are programmer**, willing or not, independently of your job title.

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## My personal interpretation

THE FOLLOWING PART OF THE TALK is my own personal view of DevOps' ideas. My aim is fostering the collaboration between programmers and ops (and front-end engineers, and QA, and whatever): to achieve that goal there are recent tools and techniques that I suggest to adopt.

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## DevOps as an evolution of XP ?

**Agile / XP movement** Good software is tested: you can disagree of course, but it is undoubted that “test first” was a (disrupting) novelty when it was introduced by eXtreme Programming.

**DevOps** Testing is not enough: good software is also monitored, logged and instrumented.

Should it have been called eXtreme sYstem Administration ? XYA ?  
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# A theory of monitoring, logging and alerting architectures

LET US DEFINE some key concepts: it will help us to properly understand how the components fit together. When we are *observing a system* we are interested in:

**Logging** that we define mainly as **events** management.

**Monitoring** that amounts to **measuring the system** and measure management.

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## Three components, a single system

An important issue: a lot of tools try to do many things at once, because of some misplaced sense of *simplicity* or *easy of use*. For example a software may store log data *and* check for conditions that trigger an alert.

Better would have been to stick with the Unix principle of doing *just one thing and doing it best*.

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## Beyond `tail -f /var/log/syslog`

LOGGING IS ABOUT MANAGING EVENT DATA. Often tools murk the waters putting together log data and measurement data, and sometimes log data do *murk themselves* because event information and measurement information are **mixed together**.

A log is not a *measurement system*, even if one of the characteristics of logs is *time information*.

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## Example

Let us have a look at this line from an Apache log:

```
109.234.57.170 - - [07/Jul/2011:09:34:26 +0200] "GET /clienti-e-progetti/biocomp/biocomp-ups  
HTTP/1.1" 302 5367 "-" "Mozilla/5.0 (X11; U; Linux x86_64; en-US; rv:1.9.2.18) Gecko/20110628  
Ubuntu/10.10 (maverick) Firefox/3.6.18"
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The *event* is that a certain URL has been served in a given moment in time. The other data helps in defining the context of that event, but do not change the nature of what happened (*i.e.* literally, the event itself).

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**5367** is the *size of response in bytes, excluding HTTP headers*

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**5367** is the *size of response in bytes, excluding HTTP headers*  
while **302** is the *HTTP status*

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## Beyond `tail -f /var/log/syslog`

A logging infrastructure has the following components:

**Route** syslog-ng, rsyslog, logstash, heka,

**Store** elasticsearch (with mongodb),

**Aggregate** graylog2,

**Visualize** graylog2, kibana3 (soon kibana4),

**Analyze** graylog2, kibana3 (soon kibana4),

**Alert** an alerting system.

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## Beyond `tail -f /var/log/syslog`

A “classical” system like syslog has a single software program doing almost everything — just alerting can be demanded to logwatch or similar scripts.

A classical system trades simplicity for scalability and extendability and is usually **useful only in the simplest scenarios**.


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# Graylog2


**GRAYLOG2**

[messages](#)
[streams](#)
[hosts](#)
[blacklists](#)
[settings](#)
[users](#)

Logged in as admin (Log out)

msg/s / sec [ 1n

5 min
 Type your search query here and press enter. ("not found" AND http) OR \_http\_response\_code:[400 TO \*]

Quickfilter

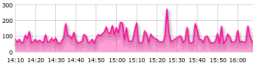
## Overview

Your Graylog2 version (0.11.0) is outdated. Get the current package from <http://www.graylog2.org/>.  
Currently containing **2,156,744** messages. **Showing recent messages.** (Show all messages)

Date	Host	Level	Facility	Message
2014-04-10 16:09:19	guevara	Info	security/authorization	guevara sshd[20083]: Connection closed by 172.16.1.50 [preauth]
2014-04-10 16:09:18	multi	Info	clock	multi /usr/bin/crontab[7374]: (multi) LIST (multi)
2014-04-10 16:09:17	g28	Info	security/authorization	g28 sshd[22462]: Connection closed by 172.16.1.50 [preauth]
2014-04-10 16:09:14	intranet	Info	mail	intranet spamd[5026]: spamd: result: -1 - BAYES_00 scantime=3.1_size=2865_user=andrea,uid=1007_required_score=5.0_rhost=localhost_raddr=127.0.0.1
2014-04-10 16:09:14	intranet	Info	mail	intranet postfix/qmgr[1792]: C3EEE20711B6: removed
2014-04-10 16:09:14	intranet	Info	mail	intranet spamd[28570]: prefork: child states: II
2014-04-10 16:09:14	intranet	Info	mail	intranet spamd[5026]: spamd: clean message (-1.9/5.0) for andrea:1007 in 3.1 seconds, 2865 bytes

### Welcome, admin!

Your current time: 2014.04.10 - 14:09:23



#### Favorite streams

No favorites.

Server health



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## *Measure ! Measure ! Measure everywhere !*

**T**O DEFINE MEASUREMENT, we have to define what a **measure** is. A measure is a **numerical value with a name** and the **time** when that measurement was done. A succession of measures is a temporal series of numerical values linked to a tag (or name).

## *Measure ! Measure ! Measure everywhere !*

A measurement infrastructure has the following components:

**Route** collectd, statsd, metricsd,

**Store** graphite (whisper), blueflood, influxdb,

**Aggregate** graphite (carbon), blueflood, influxdb,

**Visualize** graphite-web, grafana, graph-explorer,

**Analyze** sensu,

**Alert** an alerting system.

## *Measure ! Measure ! Measure everywhere !*

A very simple “classical” system is a Nagios server with maybe Cacti / Pnp4Nagios or Munin to display the graphics of some metrics.

- └ How can we walk the walk ?
- └ Monitoring

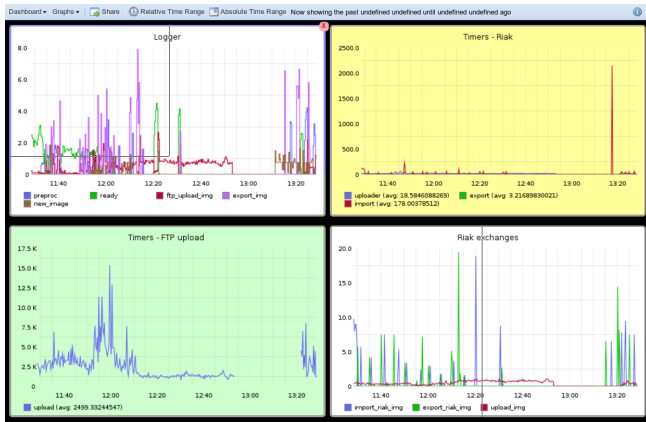
## Visualizing information is the key

**A**LL THE COMPONENTS are important, but one of them is more critical than the other. **Visualizing information is the key objective** of a monitoring infrastructure. Visualizing means making immediately available and **explicit** all the information gathered about the system.

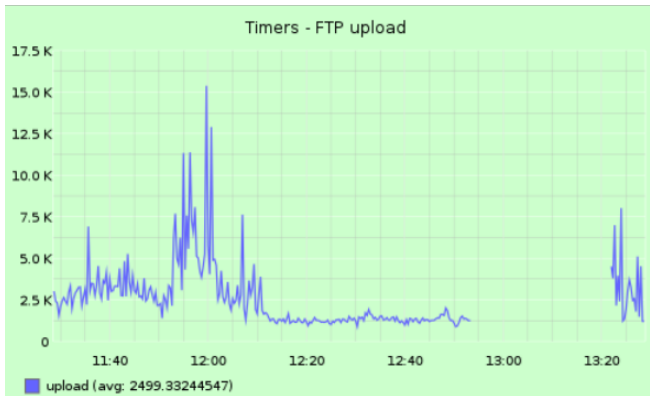
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# Graphite + Statsd

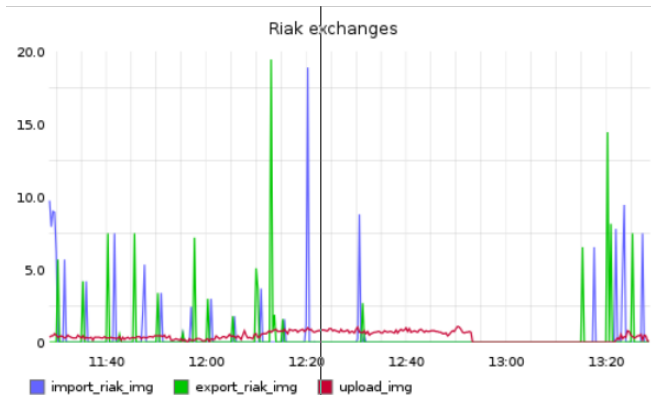


# Graphite + Statsd





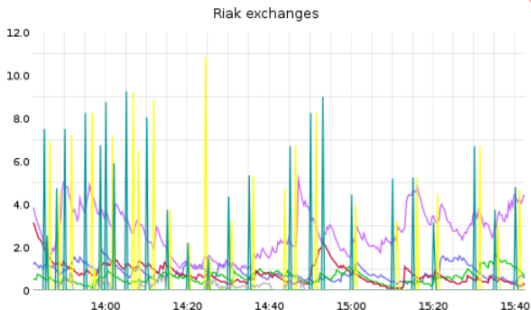
# Graphite + Statsd



- └ How can we walk the walk ?
- └ Monitoring

## Application and system data together

This is the same graph as before, plotted together with the CPU load of **each Riak** server.



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## A bell rings in the middle of the night

Address: node022.example.com

Service: Memory used

State: WARNING -> OK (RECOVERY)

Command: check\_mk-mem.used

Output: OK - 3.07 GB used (2.82 GB RAM + 0.24 GB  
SWAP, this is 4.9% of 62.89 GB RAM)

- └ How can we walk the walk ?
- └ Alerting

## An alerting system

**T**HE ALERTING SYSTEM was a common subcomponent of either the monitoring and the alerting system. An alerting system is a tool to **generate messages** related to a specific **state of the system**; the alerting system must also take care of **delivering** the messages to the correct **recipients**.

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## Building an alerting system

At minimum, an alerting system has the following components:

1. an alarm **generator**,
2. the **message** that describes the alarm,
3. the **recipients** of the message,
4. the **sub-system demanded to the delivery** of the message.

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## Building an alerting system

Which software to use for the various components of the alerting system:

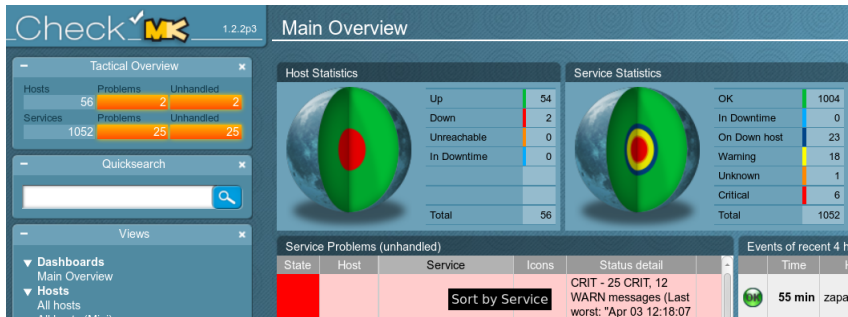
**Generator** nagios, icinga, flapjack (which calls this component *event processing*), sensu,

**Message** email, SMS, ...

**Router** nagios, icinga, flapjack, sensu,

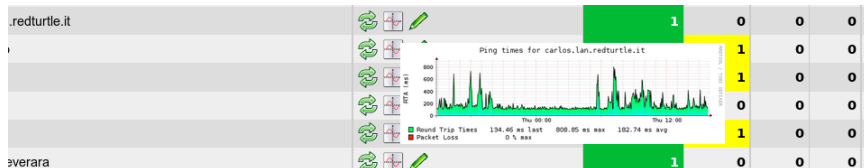
**Delivery** is determined from the message type: SMTP for email, etcetera.

# Good ol' Nagios Check\_MK Multisite



## Good ol' Nagios Check\_MK Multisite

Again: “classical” systems are characterized by having many different kind of data mixed together in the same interface: for example monitoring graphs mixed to event status and alerting information.



- └ How can we walk the walk ?
- └ Wrapping up

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# Fostering collaboration through a common core of tools and techniques

- ▶ Logging, monitoring and alerting are **useful** and more and more **mandatory** in the next future.
- ▶ They are components that — because of their nature — are **cross-functional**, since they integrate application (*Dev*) and system (*Ops*) information. The data integration is an **enabler** of activities (*i.e.* debug, continuous deployment, etcetera) that would otherwise be **impossible** or too expensive to achieve.
- ▶ There are modern tools in the free software world that allow companies to build **evolvable** and **modular** solutions.



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## Fostering collaboration through a common core of tools and techniques

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- └ How can we walk the walk ?
- └ Wrapping up

# Thanks & see you soon ...

Thanks for participating !

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