Under the dome
(of failure driven pipeline)

Maciej Lasyk

4developers – Warsaw

2015-04-20

Join Fedora Infrastructure!

- learn Ansible
- learn Docker with Fedora Dockerfiles

http://fedoraproject.org/en/join-fedora

Agenda?

Don't run away ;)

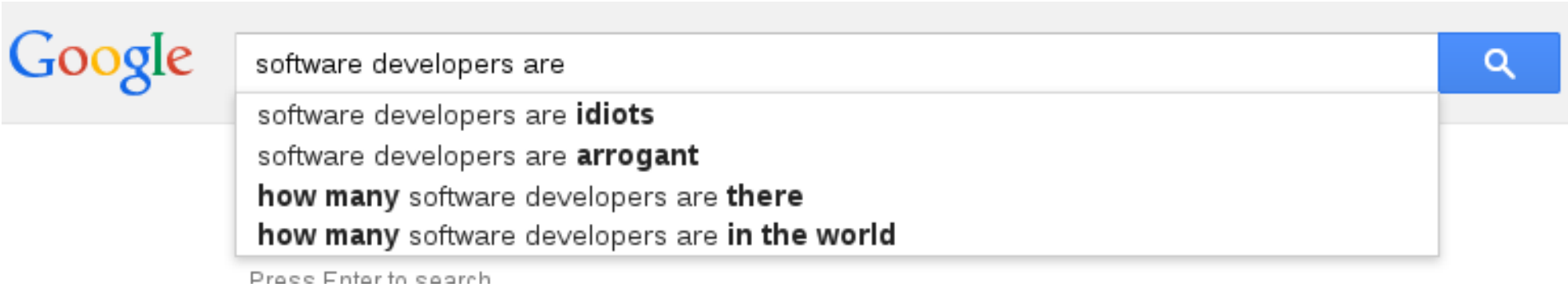
[…]

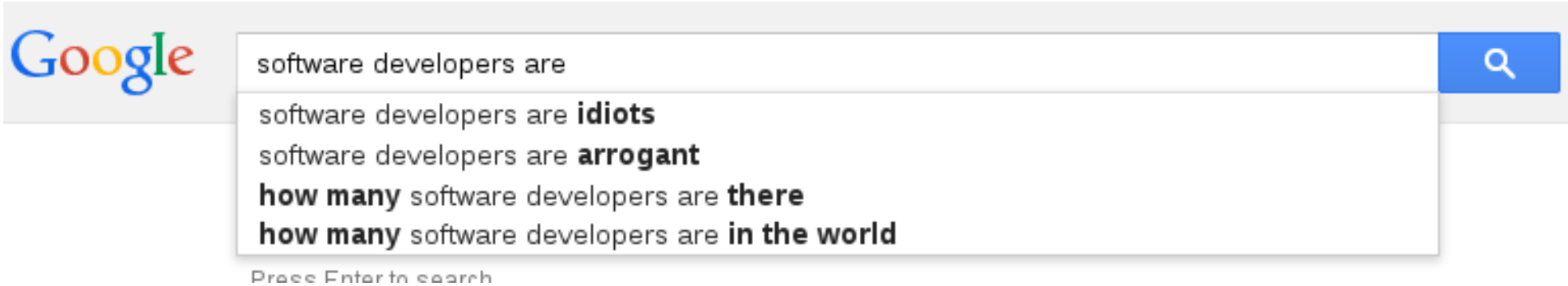
Situations like this only reinforce my deep suspicion of developers: They're often carelessly breaking things and then disappearing, leaving Operations to clean up the Mess.

[…]

“The Phoenix Project”

by Gene Kim, Kevin Behr and George Spafford


Google
software developers are
software developers are idiots
software developers are arrogant
how many software developers are there
how many software developers are in the world
Press Enter to search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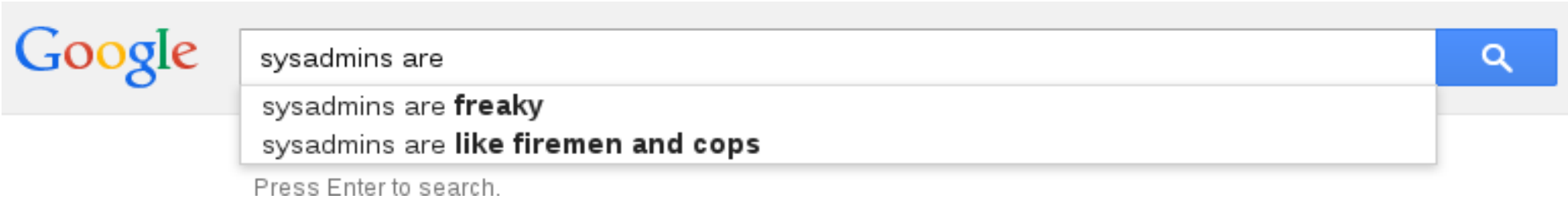
Google
sysadmins are
sysadmins are freaky
sysadmins are like firemen and cops
Press Enter to search.

Conway's law (1968)

organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations

http://en.wikipedia.org/wiki/Conway%27s_law

Ruth Malan (2008)

if the architecture of the system and the architecture of the organization are at odds, the architecture of the organization wins.

The organizational divides are going to drive the true seams in the system.

http://traceinthesand.com/blog/2008/02/13/conways-law/

Yup, you're gut is telling truth...

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This will be another devops indoctrination

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What did you expect? ;)

This presentation includes gentle product placement

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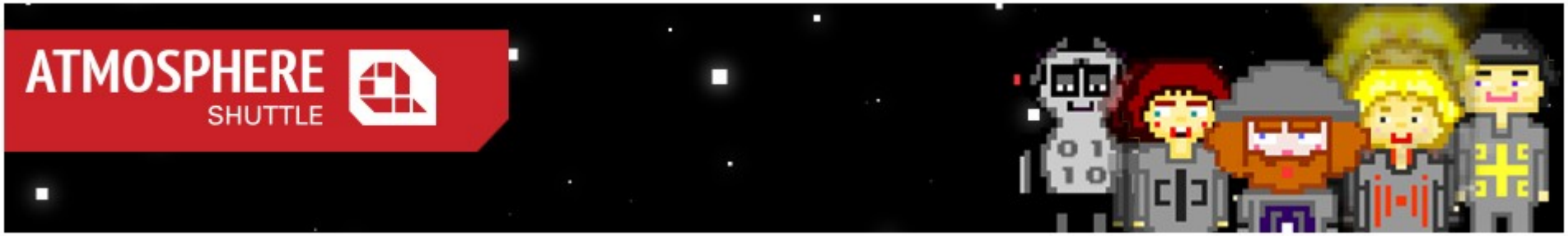


DevOps Anti-Types & patterns

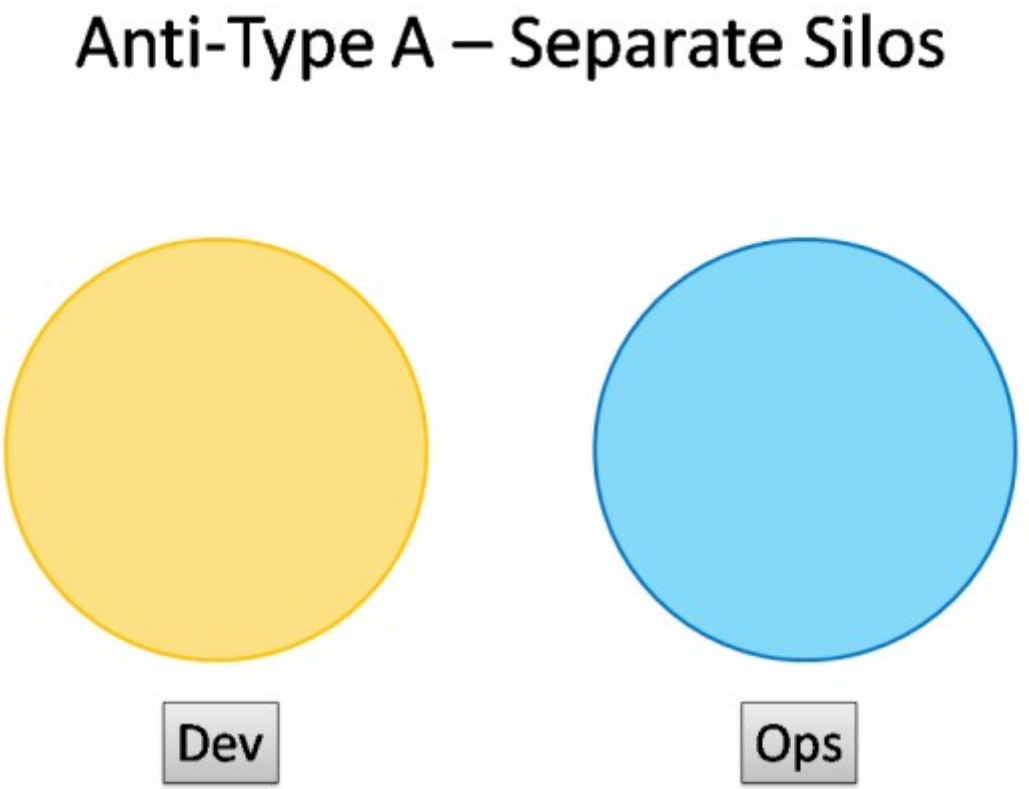
This is a copy/paste from

http://blog.matthewskelton.net/

w/my comments included

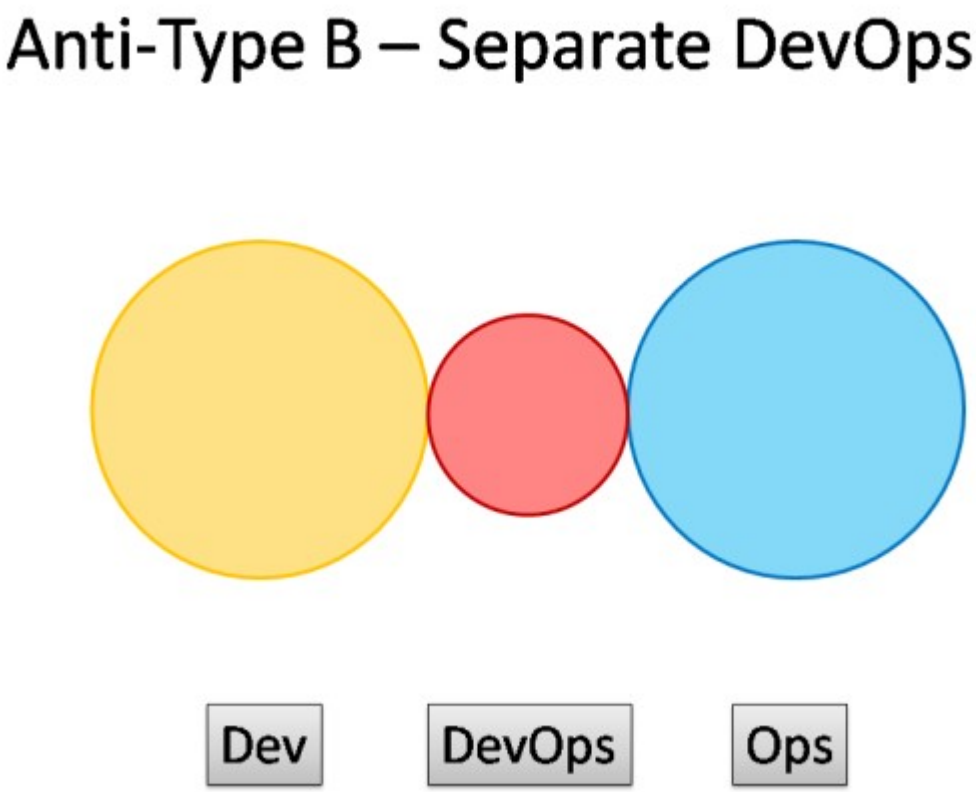
Great job Matthew! Thanks!

DevOps Anti-Types



http://blog.matthewskelton.net/2013/10/22/what-team-structure-is-right-for-devops-to-flourish/

DevOps Anti-Types



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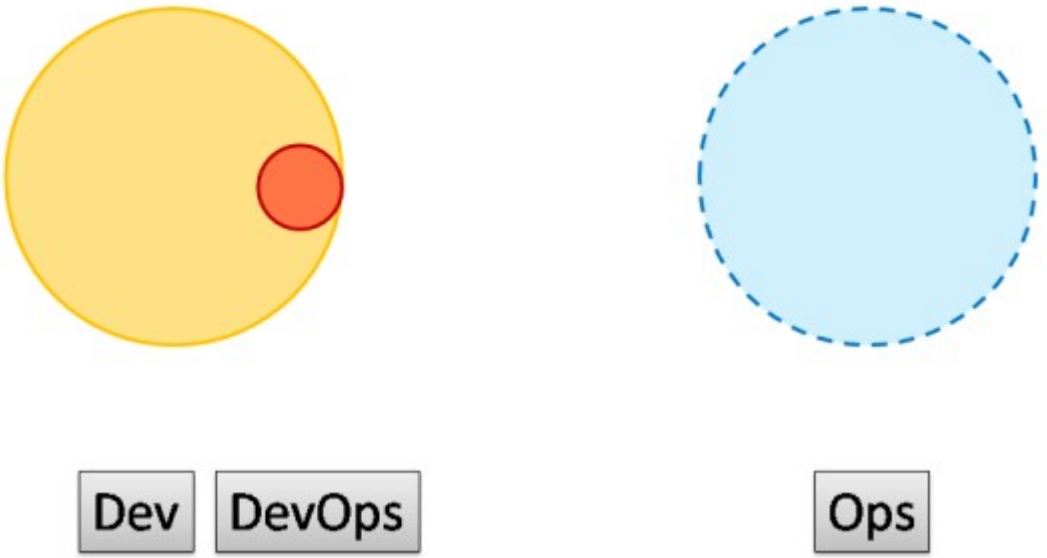
DevOps Anti-Types

Anti-Type C – “We Don’t Need Ops”



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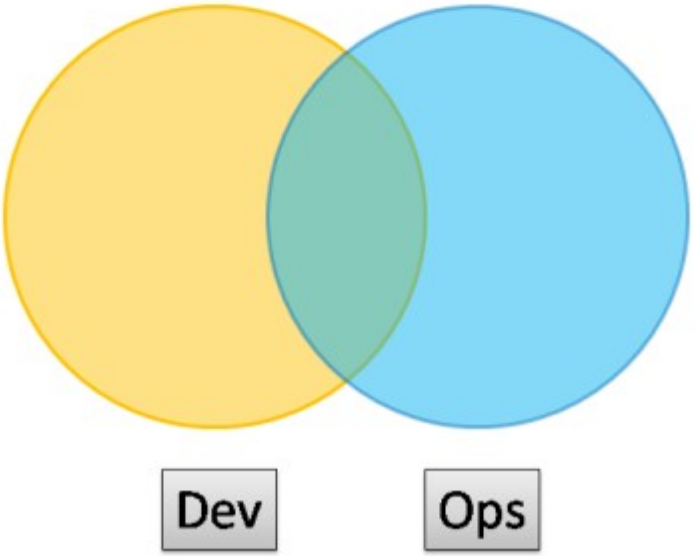
DevOps Patterns

Type 1 – Smooth Collaboration



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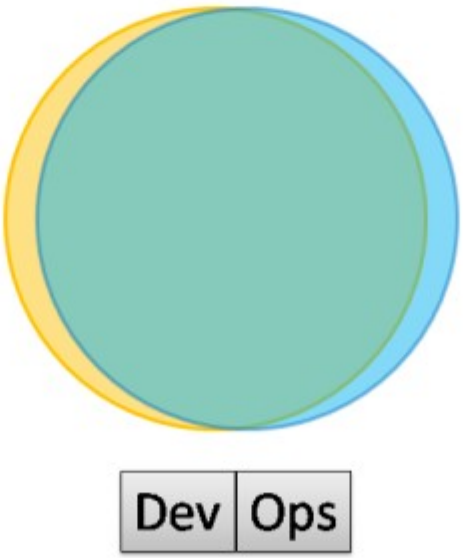
DevOps Patterns

Type 2 – Fully Embedded



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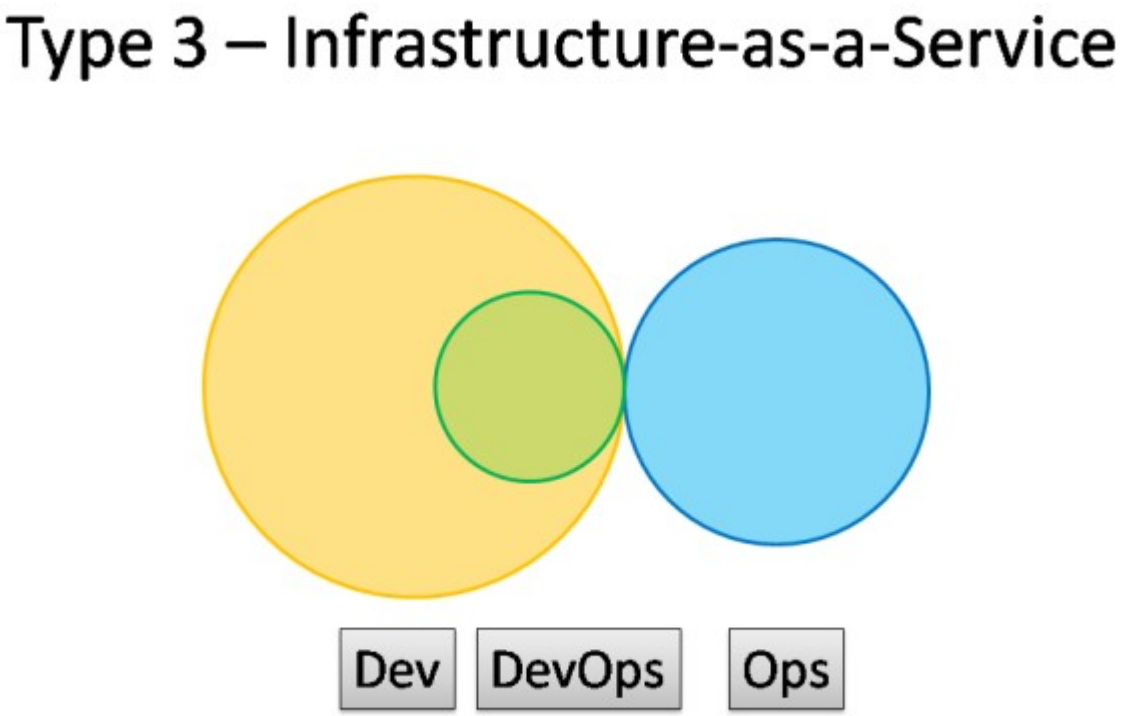
DevOps Patterns



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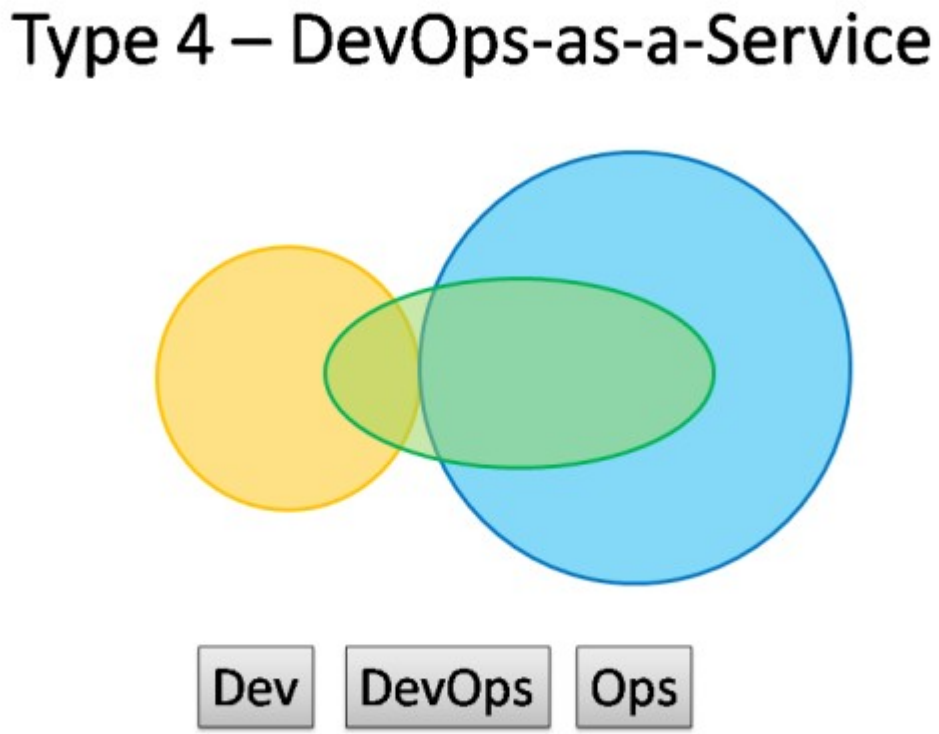

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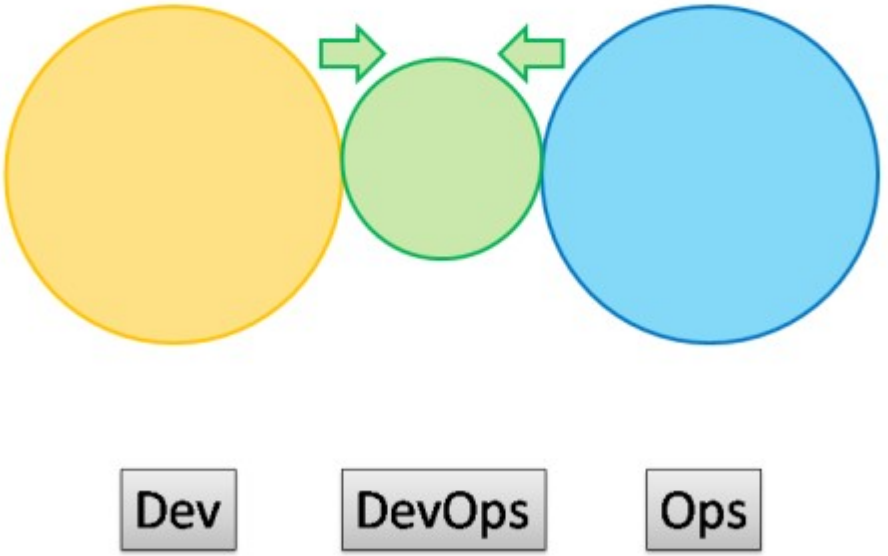
DevOps Patterns

Type 5 – Temporary DevOps Team



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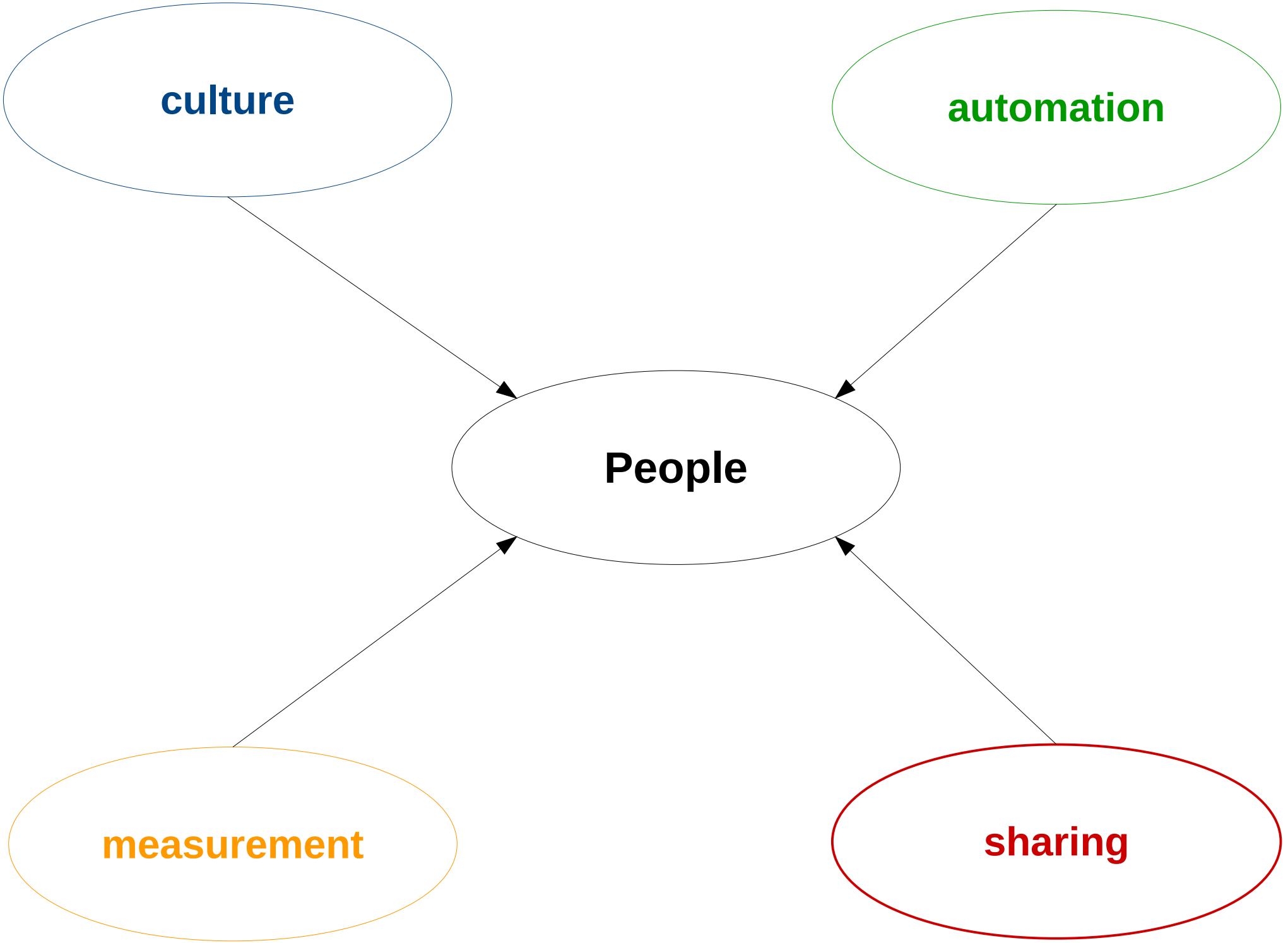
Ok let's CAMS

DevOPS ?== CAMS

(culture, automation, measurement, sharing)

DevOPS !== CAMS

DevOPS === people!

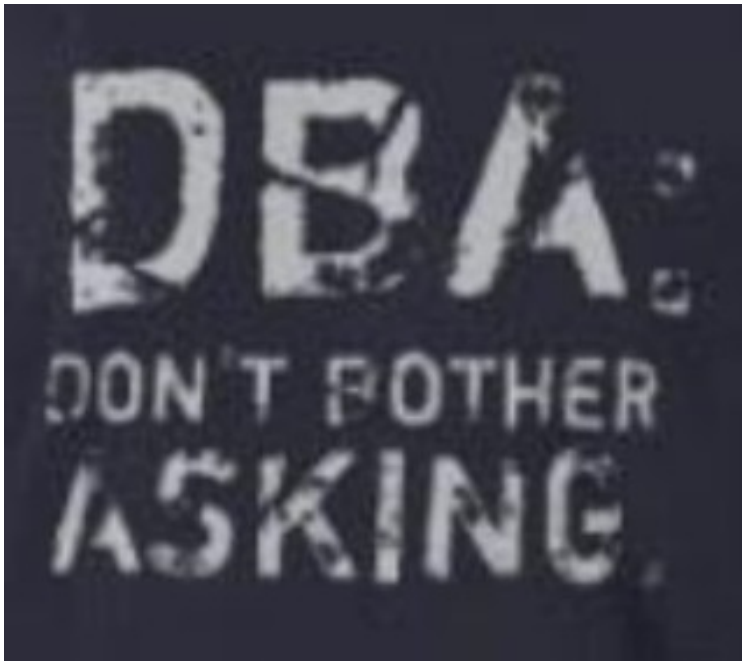

culture
automation
People
measurement
sharing

C for Culture

A for Automation

M for Monitoring

S for Sharing


DBA
DON'T BOTHER
ASKING

Is there a need for change?

“agile” and “cloud”:

→ focus on delivery

→ close collaboration

→ lightweight environment and components

cultural change

modification of a society through innovation, invention, discovery, or contact with other societies

Dead sea effect

→ most talented evaporates

→ the residue

→ maintenance experts & bus factor == 1

http://brucefwebster.com/2008/04/11/the-wetware-crisis-the-dead-sea-effect/

→ talk. often. and get along

→ take responsibility - from beginning to the end

→ continuous improvement. seriously

→ be brave. don't be silent

→ it's better to be unpolite l/German than polite l/Englishman

GTD? (getting things done)

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JFDI? (just fuckin' do it)

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MFBT? (move fast, break things)

GTD + JFDI + MFBT = FCH

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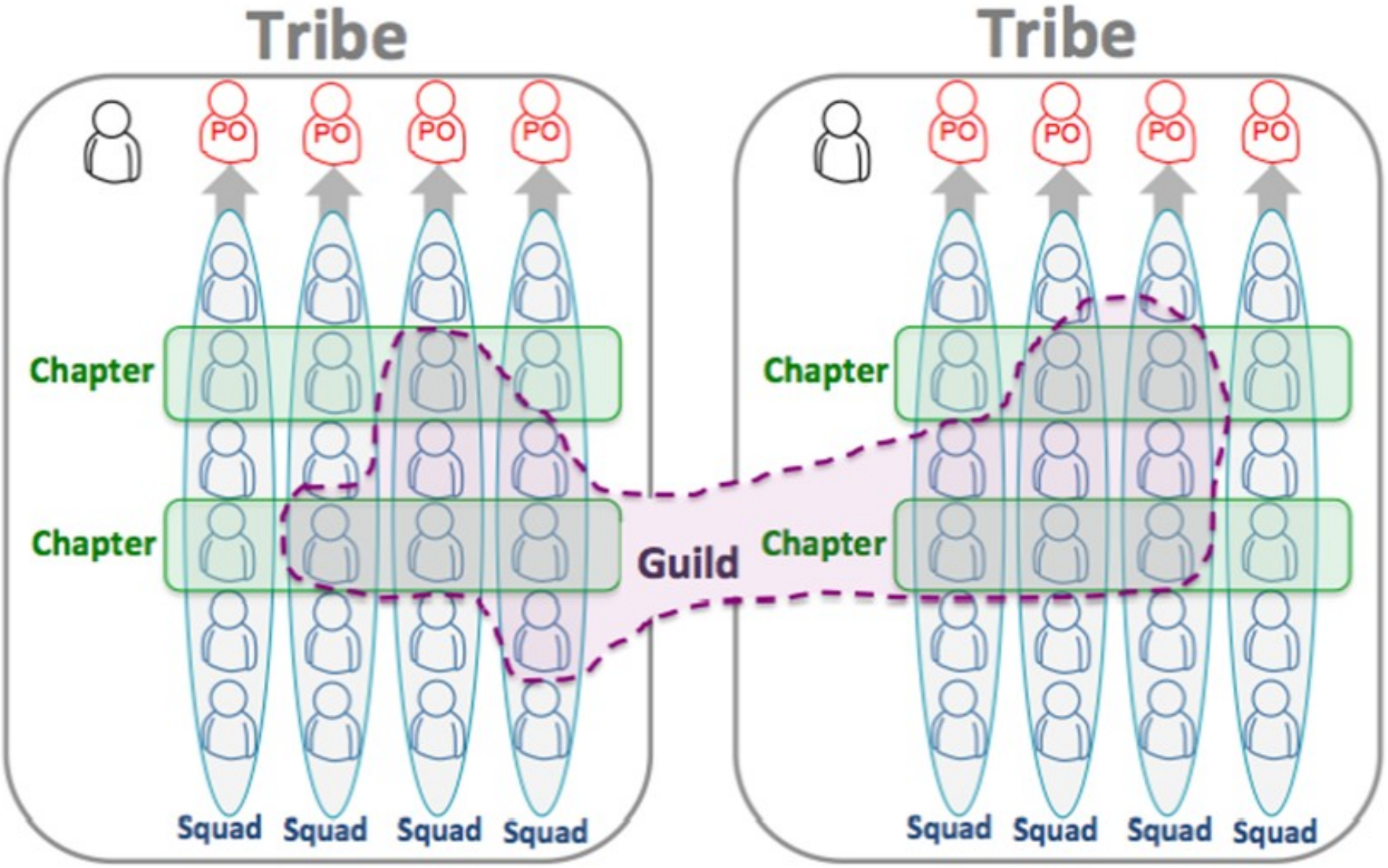
(Fuckin' Customer Happy)

Scaling Agile @ Spotify

with Tribes, Squads, Chapters & Guilds

Henrik Kniberg & Anders Ivarsson
Oct 2012



C for Culture

A for Automation

M for Monitoring

S for Sharing

Automation is big for most sysadmins. We're inherently lazy, so the idea of pushing a button and making programs work for us? Appealing.

Standalone Sysadmin

http://www.standalone-sysadmin.com/blog/2011/04/view-from-the-other-side/

→ it has to be simple

→ don't reinvent the wheel. don't fabric

→ automate from very beginning

→ repeatable tasks leads to automation

→ repeatable tasks leads to automation

→ automation leads to consistency

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→ consistency reduces errors

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→ reducing errors leads to stable environment

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→ stable environment leads to less unplanned work

→ repeatable tasks leads to automation

→ automation leads to consistency

→ consistency reduces errors

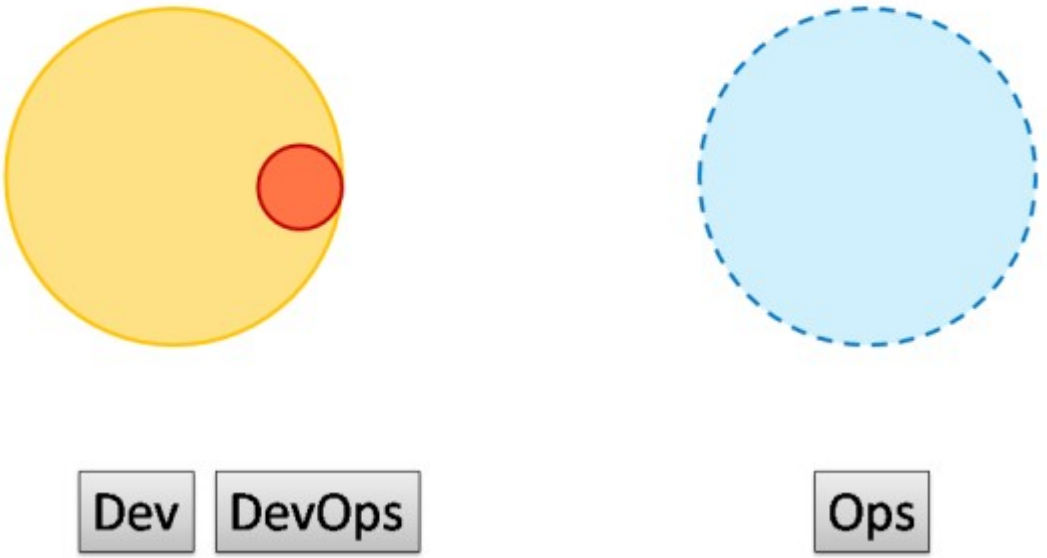
→ reducing errors leads to stable environment

→ stable environment leads to less unplanned work

→ less unplanned work leads to focus on delivery

Remember?

Anti-Type C – “We Don’t Need Ops”



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Short story of Anti-Type C
“we don't need ops”

```
# it's madness with paths for different users and such option as:
# sudo su
# sudo -i
# su -
# su
# that is why we add variables to two places

ENVIRONMENT_FILE = '/etc/environment'
PROFILE_FILE     = '/etc/profile'
INITIAL_PATH     = '/usr/local/bin:/usr/bin:/bin'

# due to sudo issues (resetting PATH by /etc/sudoers)
# we have to add PATH to /root/.profile as well
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- → sudo su: interactive, non-login, .bashrc
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- → sudo -i: interactive, login, /root/.profile;/root/.bashrc;/root/.login
- → sudo /bin/bash: interactive, non-login, ~/.bashrc
- → sudo -s: reads $SHELL and executes it

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def install_apache_fix():
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        else:
            sudo("apt-get -y install libssl0.9.8")
    else:
        #Debian
        if exists("/usr/lib/libssl.so.0.9.8"):
            print "libssl.so.0.9.8 already installed - SKIPPING"
        else:
            #download if necessary
             url = "http://.../libssl0.9.8_0.9.8o-squeeze14_amd64.deb"


if download.sync_opt_download(_download_libssl_lock, url, store_file_path):
    sudo('chmod ug+x %s' % store_file_path)
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    else:
        #Debian What about RHEL, Fedora, Slackware, Gentoo?
        if exists("/usr/lib/libssl.so.0.9.8"):
            print "libssl.so.0.9.8 already installed - SKIPPING"
        else:
            #downl. if necessary So whole this is for particular distro version?
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if download.sync_opt_download(_download_libssl_lock, url, store_file_path):
    sudo('chmod ug+x %s' % store_file_path) # declarative madness
    sudo("dpkg -i %s" % store_file_path)
```

Imperativeness vs declarativeness

Imperativeness vs declarativeness

```
def configure(dst_dir, config_properties, installer_file):
      _copy_conf_file(dst_dir, properties)
def _copy_conf_file(dst_dir, properties):
    sudo("cp %s %s" % (srcConfigPath, targetConfigPath))
    change_directory_owner(targetConfigPath)
    sudo('chmod ug+x %s' % store_file_path)
```

```
 - name: configure this
   hosts: all
   tasks:
       - name: copy conf file
         file: >
             src={{ some_source }}
             dest={{ some_destination }}
             perms=0750
```

Imperativeness vs declarativeness

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ANSIBLEWORKS

→ flat learning curve

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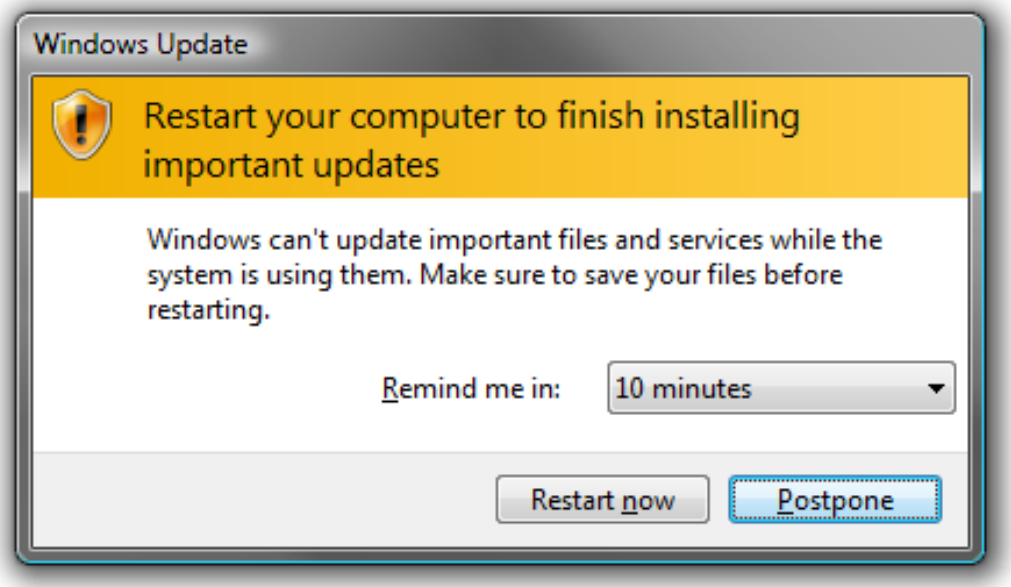
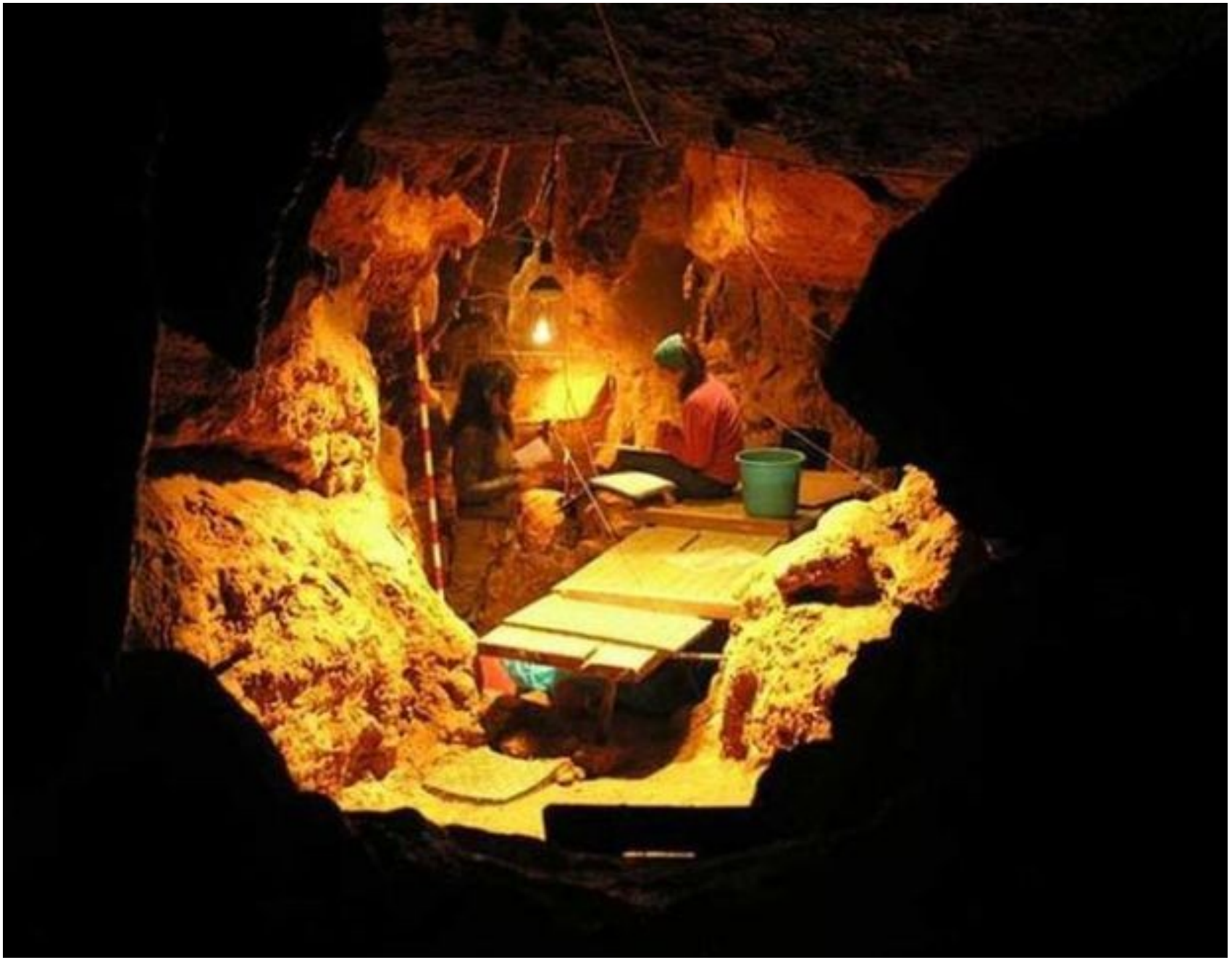
- → deals with “deployment specs”
- → might be easily adopted as universal language


Windows Update
Restart your computer to finish installing important updates
Windows can't update important files and services while the system is using them. Make sure to save your files before restarting.
Remind me in:
10 minutes
Restart now
Postpone

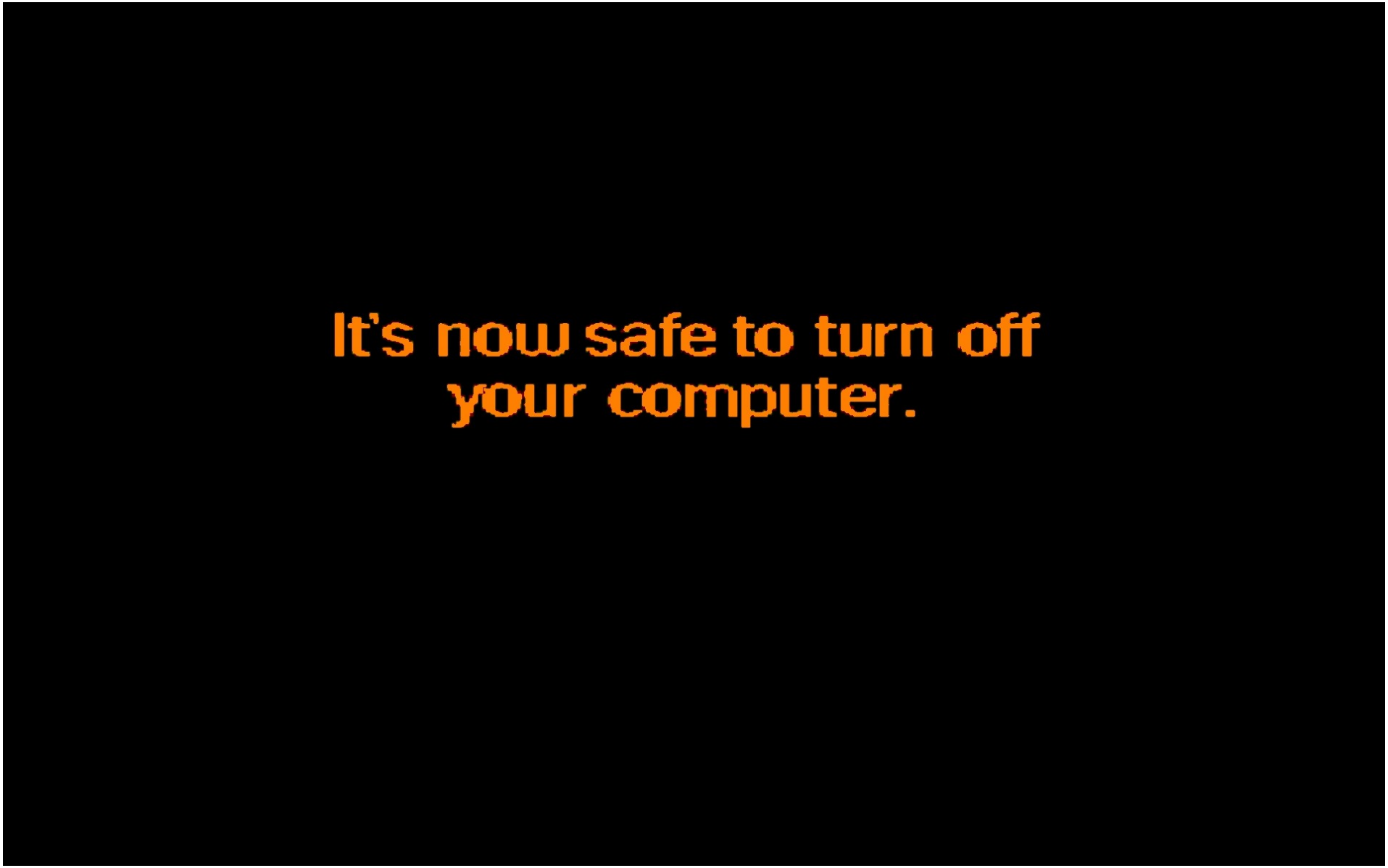


→ selinux enforcing i -rw-r--r--. stash stash unconfined_u:object_r:mysqld_db_t:s0 authorized_keys

→ /etc/ssh/sshd_config && /etc/network/interfaces

→ iptables-save nope?

→ broken _netfs ?


It's now safe to turn off
your computer.

What if...

→ ./configure && make && make install → .zip

→ Dev & Ops have 2 different build & installation methods?

Plz..

→ pkg repos (or Nexus)

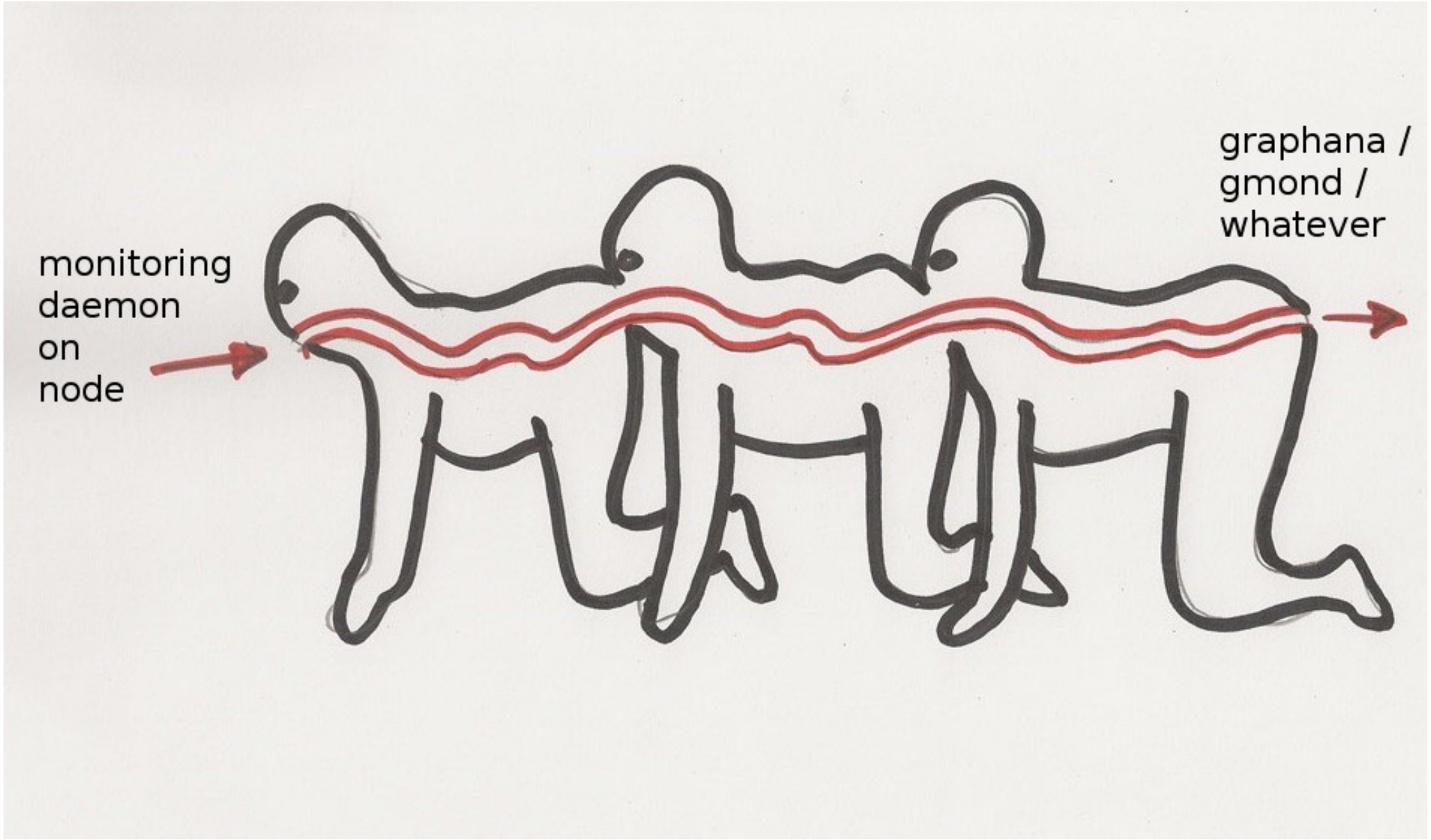
→ use fpm for creating pkgs if needed (demo)

C for Culture

A for Automation

M for Monitoring

S for Sharing


graphana /
gmond /
whatever
monitoring
daemon
on
node

→ make developers create monitoring

→ find yourself between RRD and InfluxDB

→ will product team be able to query your monitoring DB?

→ Etsy case (Ganglia / Graphite)

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C for Culture

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→ learn on OPS mistakes

→ Major Incident Reports – source of improvement

→ Learn developers about change management

→ Make CM an easy process. Use simple tools.

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Let's arch the infrastructure

Addressing the space

→ VLSM

→ DHCP & DDNS

→ KISS: flat networks!

→ stop /24!

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Prefix	1st octet	2nd octet	3rd octet	4th octet	Max.Subnets /0	Max Subnets for /0,8,16,24	Hosts	IPs	0th subnet	1st subnet
/30	255	255	255	252	1073741824	64 for /24 network	2	4	0.0.0.0	0.0.0.4
/29	255	255	255	248	536870912	32 for /24 network	6	8	0.0.0.0	0.0.0.8
/28	255	255	255	240	268435456	16 for /24 network	14	16	0.0.0.0	0.0.0.16
/27	255	255	255	224	134217728	8 for /24 network	30	32	0.0.0.0	0.0.0.32
/26	255	255	255	192	67108864	4 for /24 network	62	64	0.0.0.0	0.0.0.64
/25	255	255	255	128	33554432	2 for /24 network	126	128	0.0.0.0	0.0.0.128
/24	255	255	255	0	16777216	0 for /24 network	254	256	0.0.0.0	0.0.1.0
/23	255	255	254	0	8388608	128 for /16 network	510	512	0.0.0.0	0.0.2.0
/22	255	255	252	0	4194304	64 for /16 network	1022	1024	0.0.0.0	0.0.4.0
/21	255	255	248	0	2097152	32 for /16 network	2046	2048	0.0.0.0	0.0.8.0
/20	255	255	240	0	1048576	16 for /16 network	4094	4096	0.0.0.0	0.0.16.0
/19	255	255	224	0	524288	8 for /16 network	8190	8192	0.0.0.0	0.0.32.0
/18	255	255	192	0	262144	4 for /16 network	16382	16384	0.0.0.0	0.0.64.0
/17	255	255	128	0	131072	2 for /16 network	32766	32768	0.0.0.0	0.0.128.0
/16	255	255	0	0	65536	0 for /16 network	65534	65536	0.0.0.0	0.1.0.0
/15	255	254	0	0	32768	128 for /8 network	131070	131072	0.0.0.0	0.2.0.0
/14	255	252	0	0	16384	64 for /8 network	262142	262144	0.0.0.0	0.4.0.0
/13	255	248	0	0	8192	32 for /8 network	524286	524288	0.0.0.0	0.8.0.0
/12	255	240	0	0	4096	16 for /8 network	1048574	1048576	0.0.0.0	0.16.0.0
/11	255	224	0	0	2048	8 for /8 network	2097150	2097152	0.0.0.0	0.32.0.0
/10	255	192	0	0	1024	4 for /8 network	4194302	4194304	0.0.0.0	0.64.0.0
/9	255	128	0	0	512	2 for /8 network	8388606	8388608	0.0.0.0	0.128.0.0
/8	255	0	0	0	256	0 for /8 network	16777214	16777216	0.0.0.0	1.0.0.0
/7	254	0	0	0	128	128 for /0 network	33554430	33554432	0.0.0.0	2.0.0.0
/6	252	0	0	0	64	64 for /0 network	67108862	67108864	0.0.0.0	4.0.0.0
/5	248	0	0	0	32	32 for /0 network	134217726	134217728	0.0.0.0	8.0.0.0
/4	240	0	0	0	16	16 for /0 network	268435454	268435456	0.0.0.0	16.0.0.0
/3	224	0	0	0	8	8 for /0 network	536870910	536870912	0.0.0.0	32.0.0.0
/2	192	0	0	0	4	4 for /0 network	1073741822	1073741824	0.0.0.0	64.0.0.0
/1	128	0	0	0	2	2 for /0 network	2147483646	2147483648	0.0.0.0	128.0.0.0
/0	0	0	0	0	1	0 for /0 network	4294967294	4294967296	-	-

What about DNS?

→ BIND roxx (views etc)

→ KISS: maybe decentralized w/Ansible?

```
view "internal-view" {
        match-clients { internal; };
        recursion yes;

        zone "lasyk.info" IN {
                type master;
                file "internal.lasyk.info.conf";
                allow-transfer { any; }
        };

view "external-view" {
        match-clients { any; };
        recursion no;

        zone "lasyk.info" IN {
                type master;
                file "external.lasyk.info.conf";
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        };
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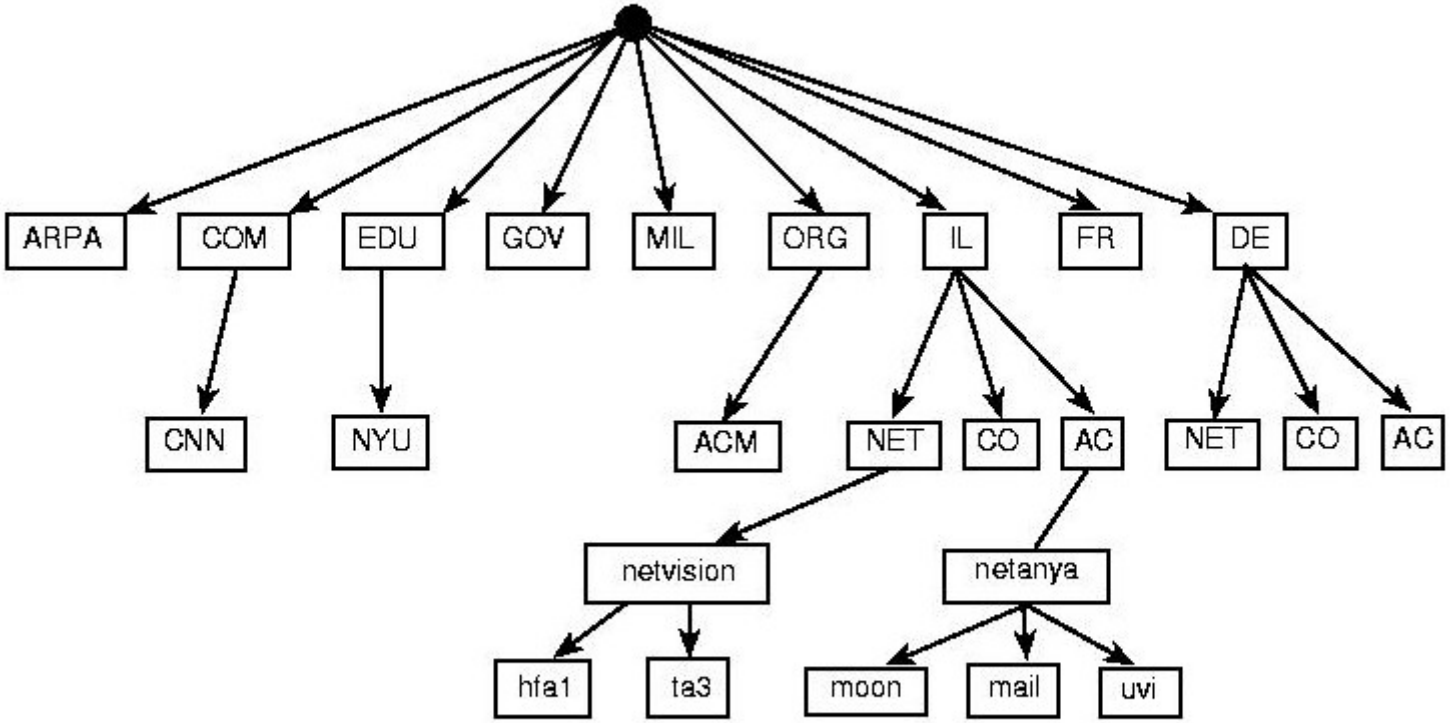
ARPA
COM
EDU
GOV
MIL
ORG
IL
FR
DE
CNN
NYU
ACM
NET
CO
AC
NET
CO
AC
netvision
netanya
hfa1
ta3
moon
mail
uvi

Linux containers equation

Linux Containers = namespaces + cgroups + storage

control groups (cgroups)

Control Groups provide a mechanism for aggregating/partitioning sets of tasks, and all their future children, into hierarchical groups with specialized behavior

control groups (cgroups)

- → grouping processes
- → allocating resources to particular groups
  - → memory
  - → network
  - → CPU
  - → storage bandwidth (I/O throttling)
  - → device whitelisting

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control groups (cgroups)

little demo?

Kernel Namespaces

Providing a unique views of the system for processes.

- → PID – PIDs isolation
- → NET – network isolation (via virt-ifaces; demo)
- → IPC – won't use this
- → MNT – chroot like; deals w/mountpoints
- → UTS – deals w/hostname

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Kernel Namespaces

little demo?

OverlayFS

→ hell fast (you'll see)

→ page cache sharing

→ finally in upstream kernel (in rhel from 7.2)

→ finally supported by docker (-s overlay)

→ SELinux not there yet (but will be)

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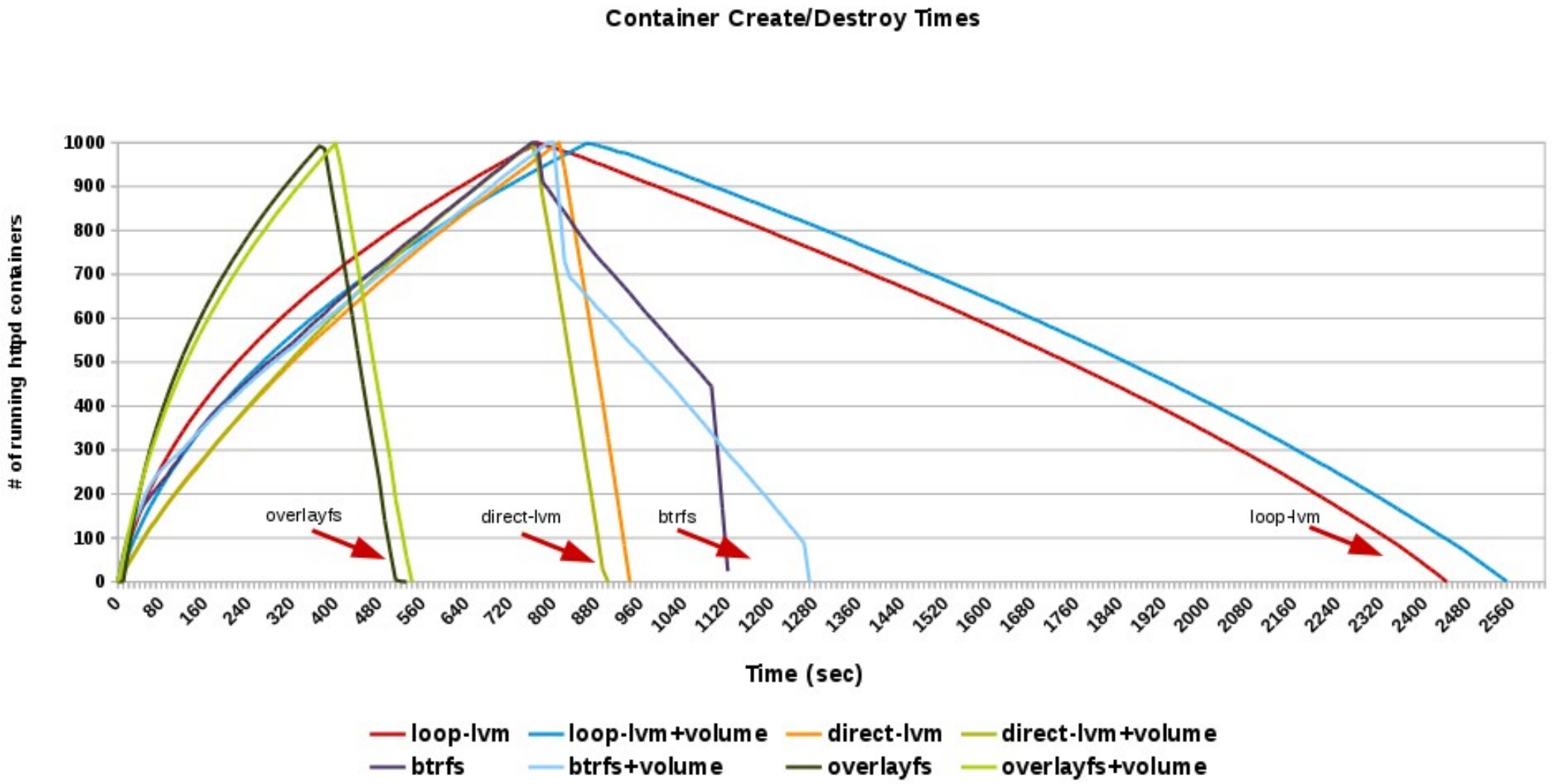
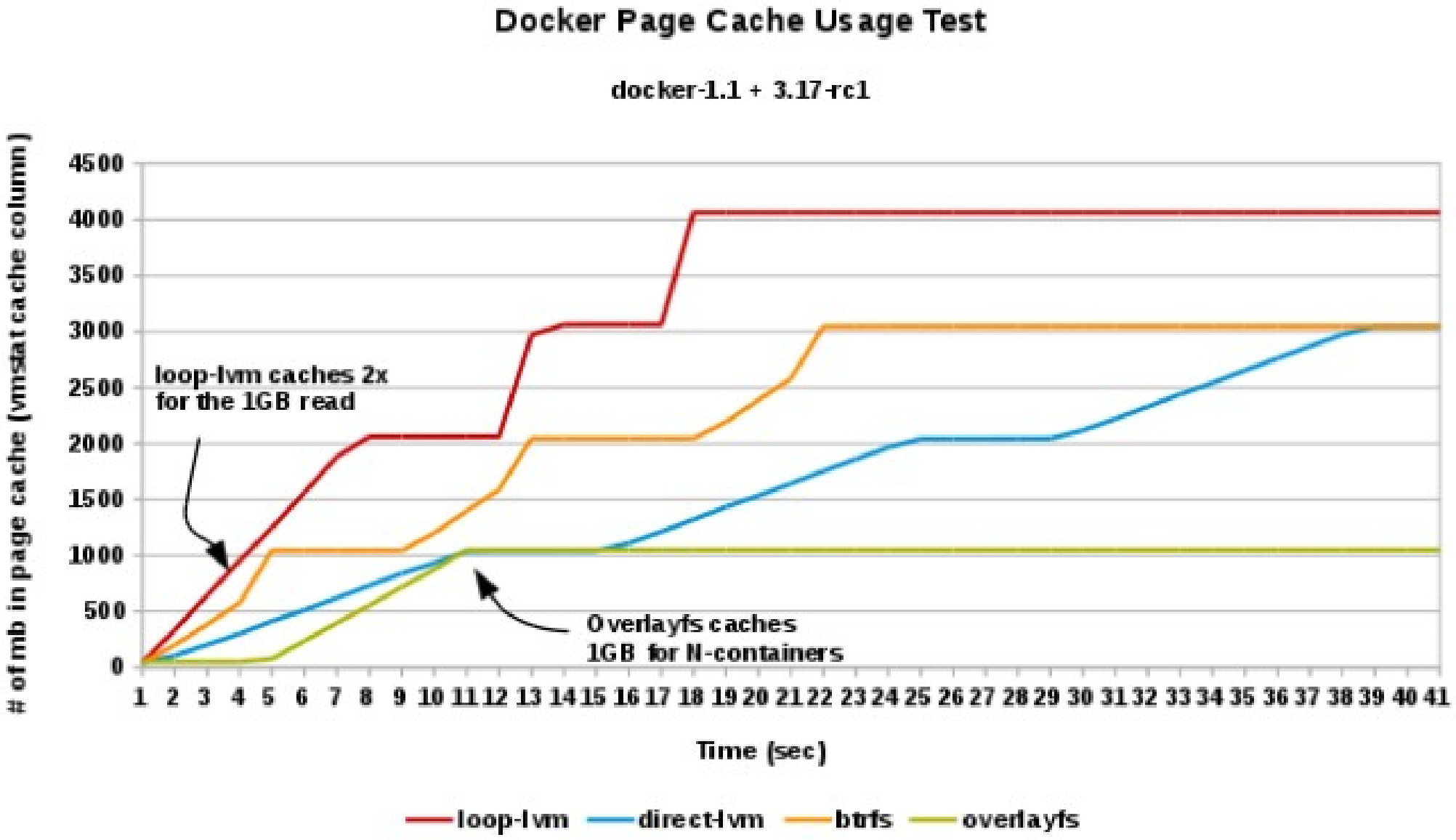


http://developerblog.redhat.com/2014/09/30/overview-storage-scalability-docker/

OverlayFS



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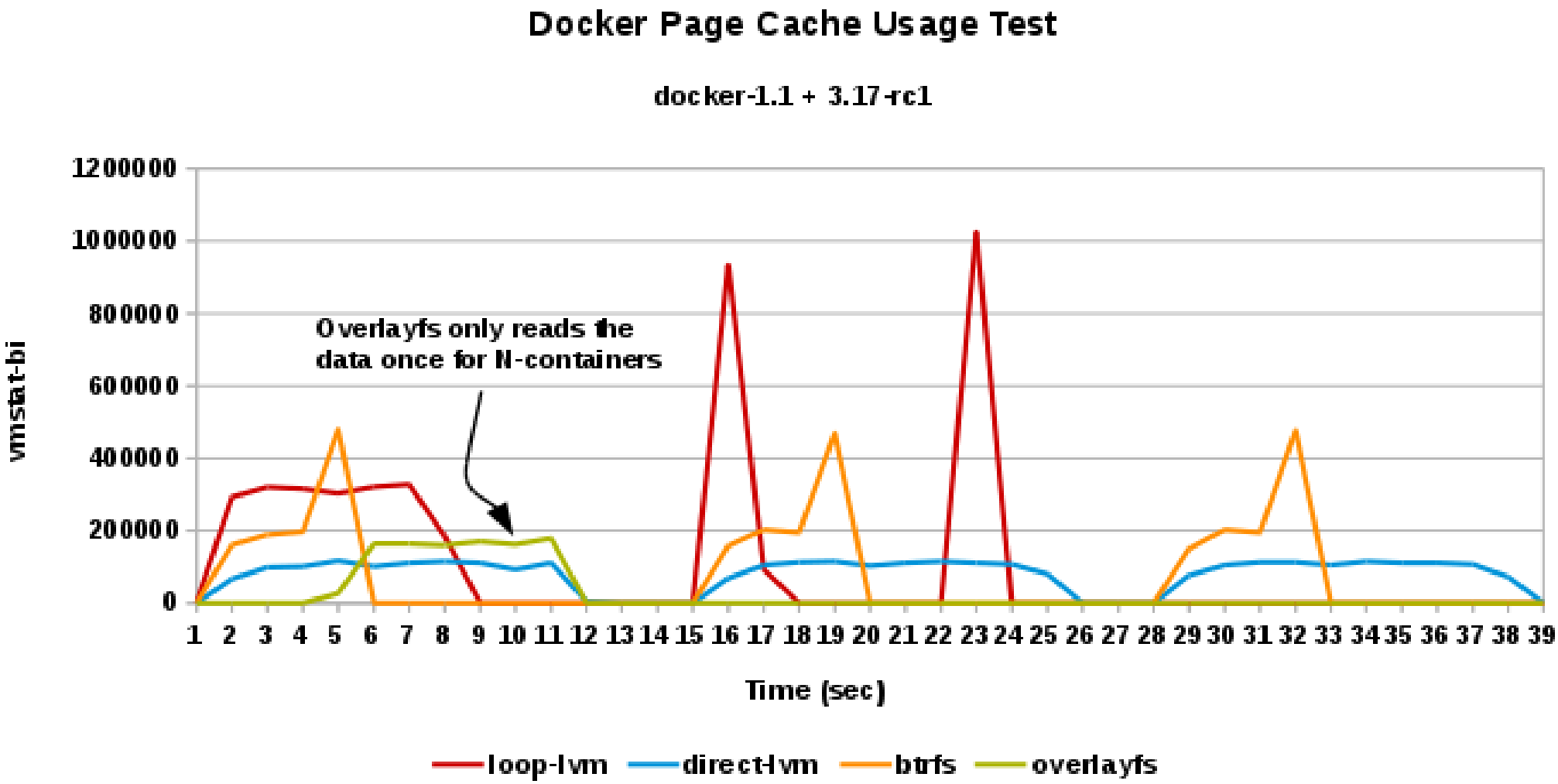

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Developers' envs?

→ use containers!

→ configure cgroups

→ use LXC / LXC Web Panel

→ use Ansible for spinning up anything!

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GENERAL

Overview

CONTAINERS

server1

server2

server3

server4

LXC SETTINGS

Networking

Check config

LXC WEB PANEL

Users

About

Server1

▶ Start ■ Stop ⏸ Freeze

Hostname: web

Start at boot: ✔

Network flag: Up

Network type: veth

Network link: lxcbr0

HW address: 00:16:3e:ac:5e:45

IP address: 10.0.3.10

Memory limit *: 1024 MB

Memory + Swap limit *: 2048 MB

CPUs **: All (e.g 0 or 0-1,3 or 0,3)

CPU Shares **: 1024

Root FS: /var/lib/lxc/server1/rootfs (e.g /var/lib/lxc/server1/rootfs)

✔ Apply

* Set to max to unset (unlimited)

** Leave empty to unset

INFOS

Status : Running

Pid : 18188

Network : Up

Mem. usage : 176 MB

Arch : amd64

Containers embraces granularity → microservices!

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Watch out for microservices architecture, or...

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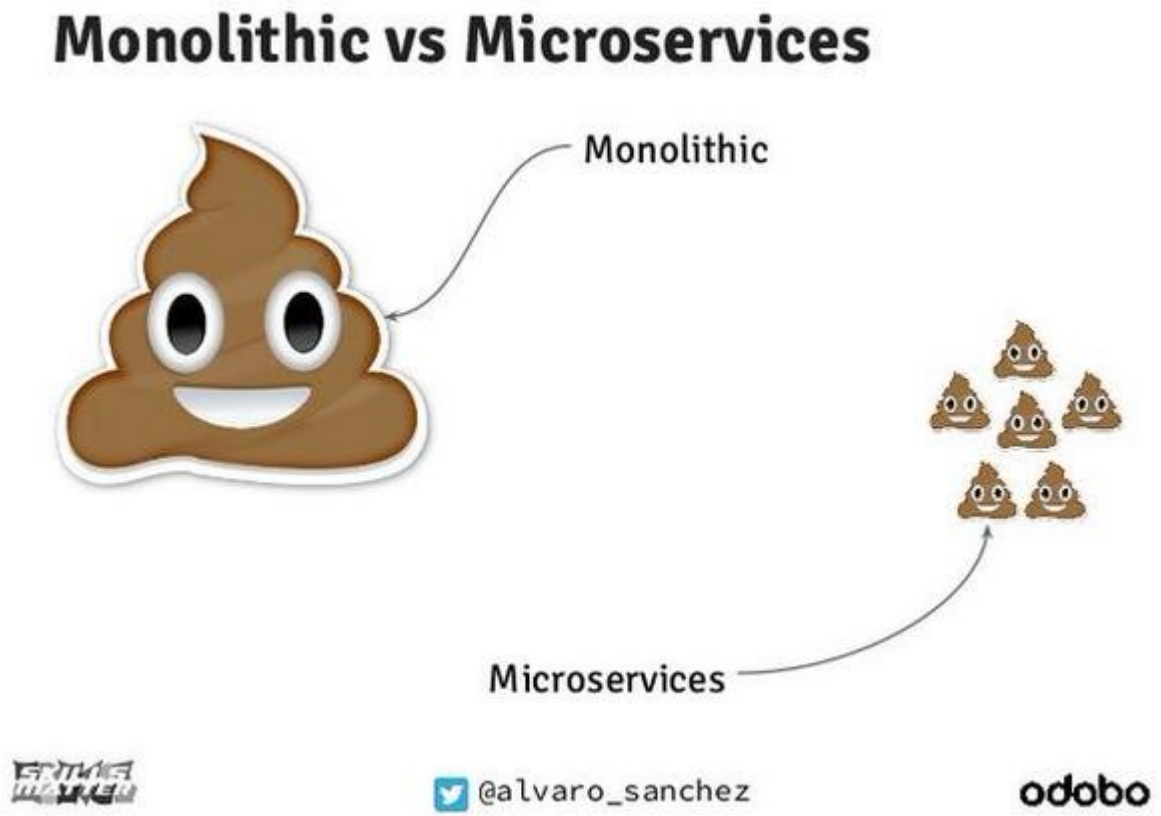

You might as well just kill yourself right now

Web Development With Assembly

O'REILLY®

Bob Johnson
with His Therapist

Who knows FHS?

Who knows FHS?

→ 'temp' – what it consist?

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→ actually: “This Entity Must Persist” ;)

Who knows FHS?

→ 'temp' – what it consist?

→ actually: “This Entity Must Persist” ;)

→ Define your FHS!

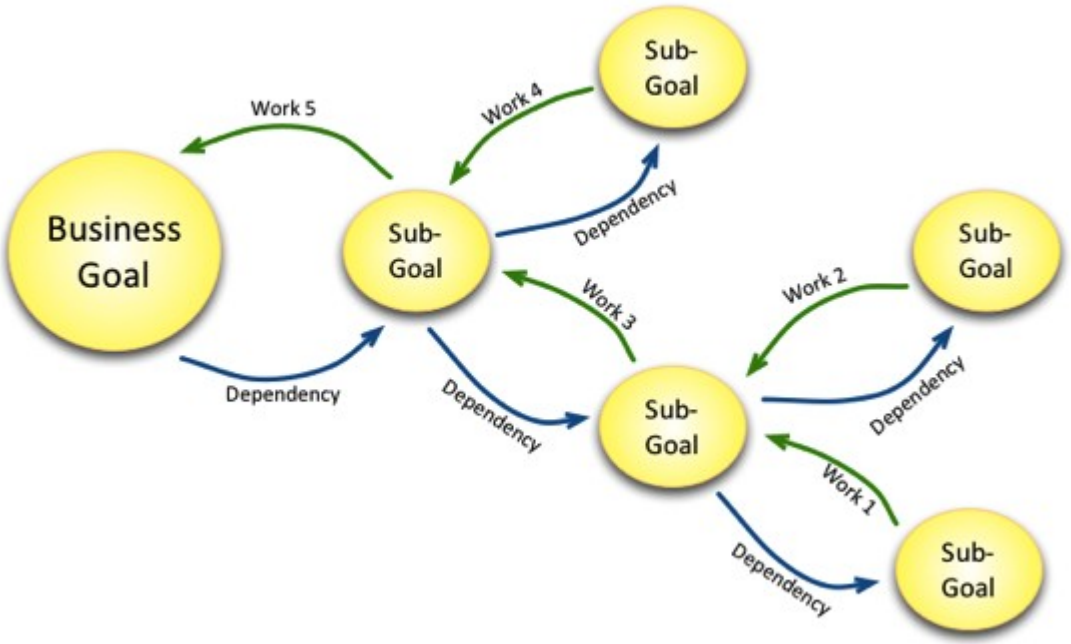
Mikado Method for the win!

→ set a goal

→ experiment

→ visualize

→ rollback



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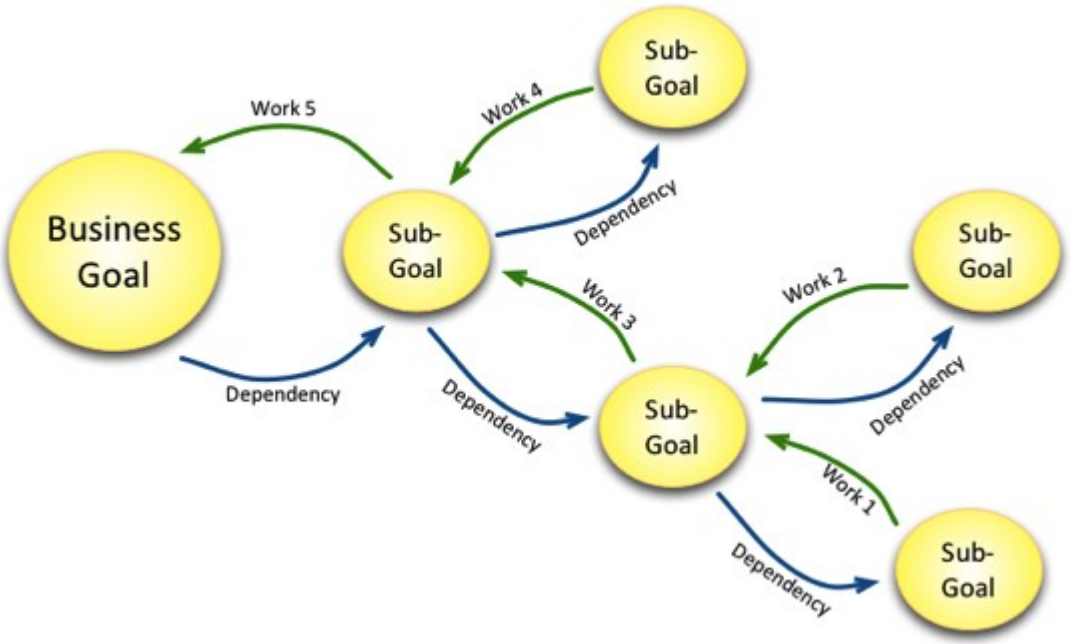

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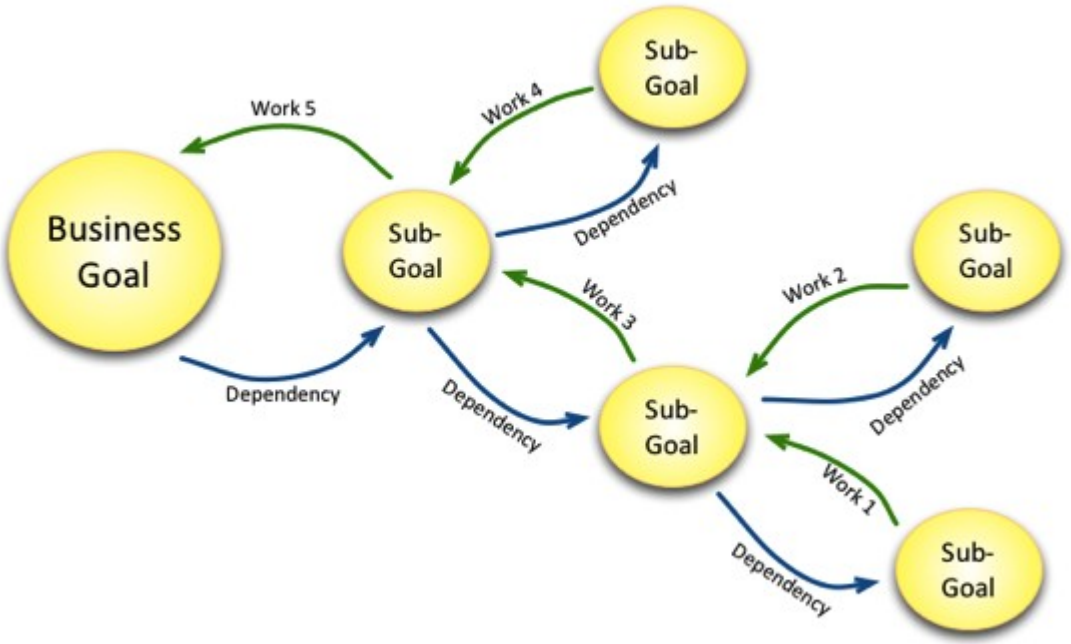

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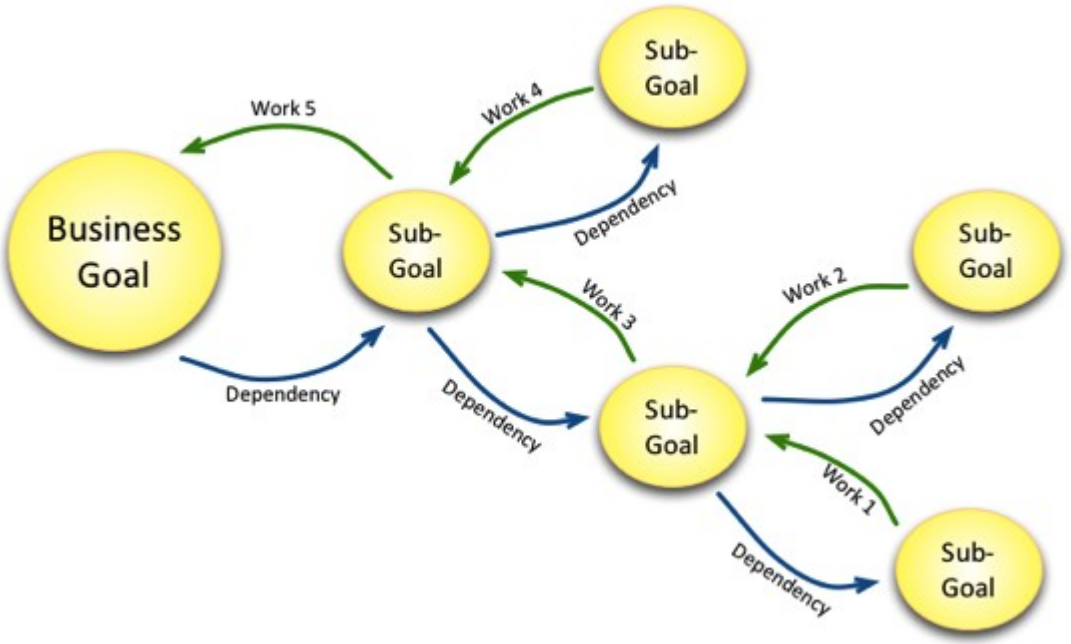


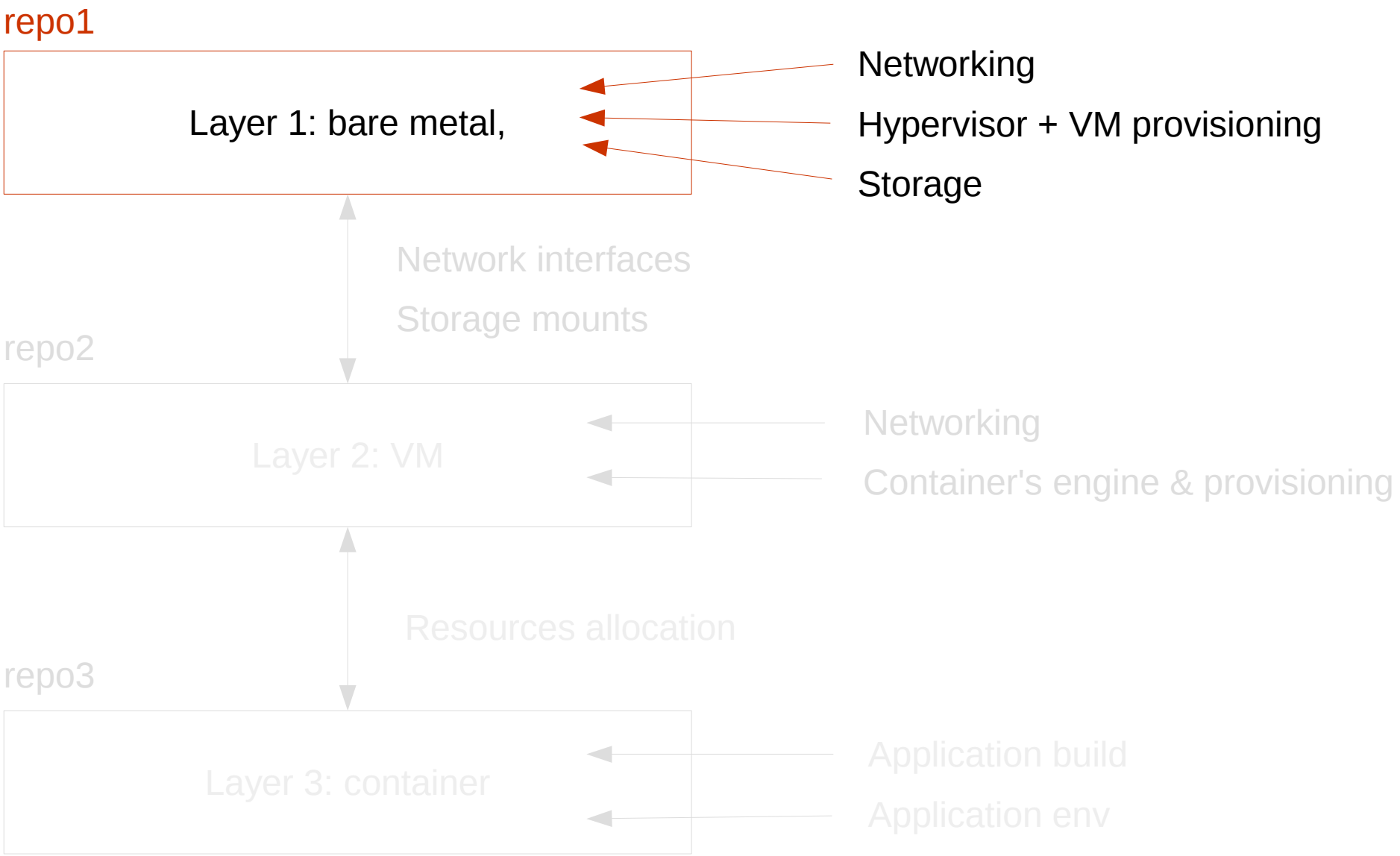
Mikado Method for the win!

→ before any work and rollbacks..

→ remember: monitoring & tests are your friends!

→ think about testing strategy – think heatmaps!

Ansible & infra layers



Much simpler w/one, flat network (for small envs)!

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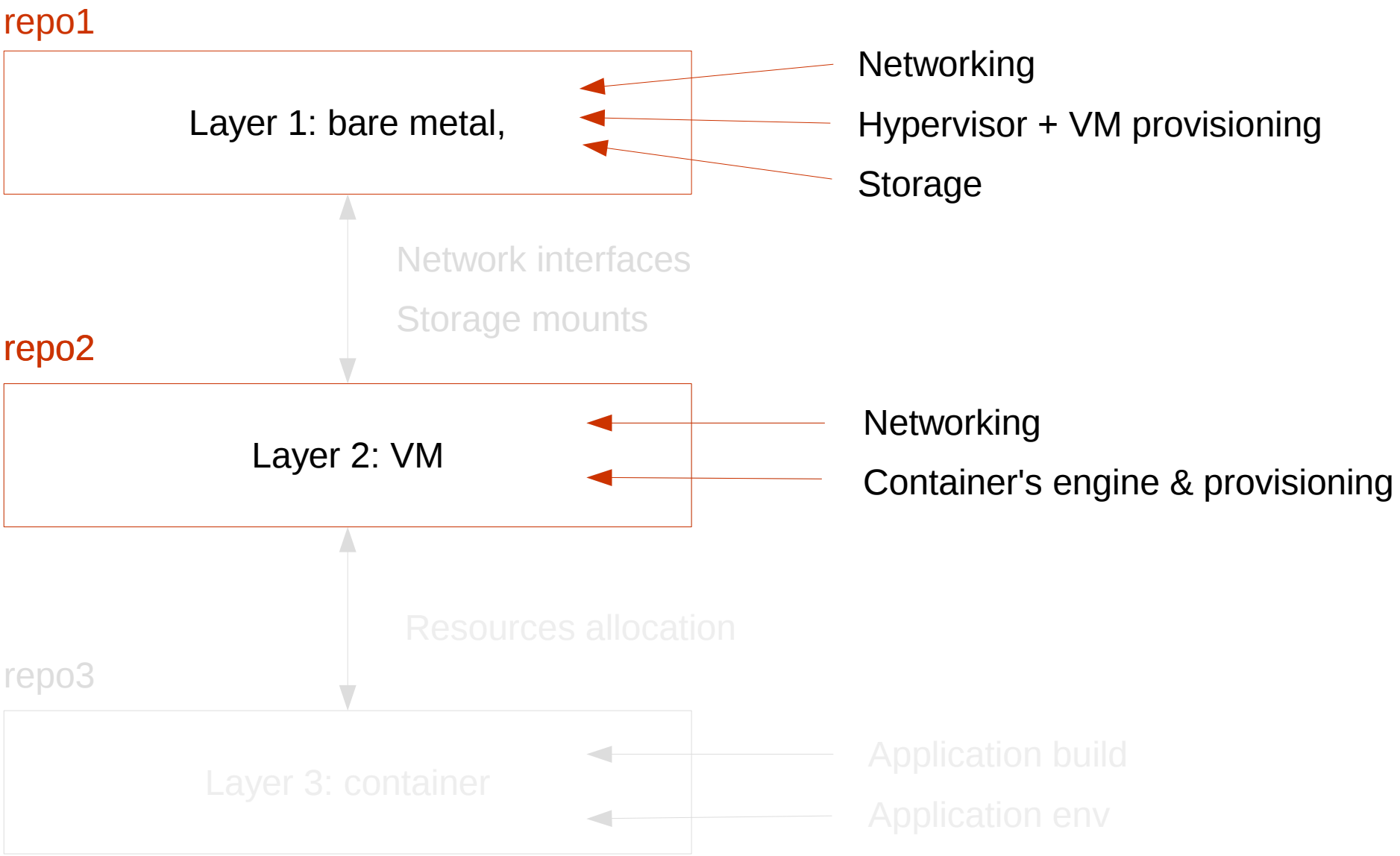

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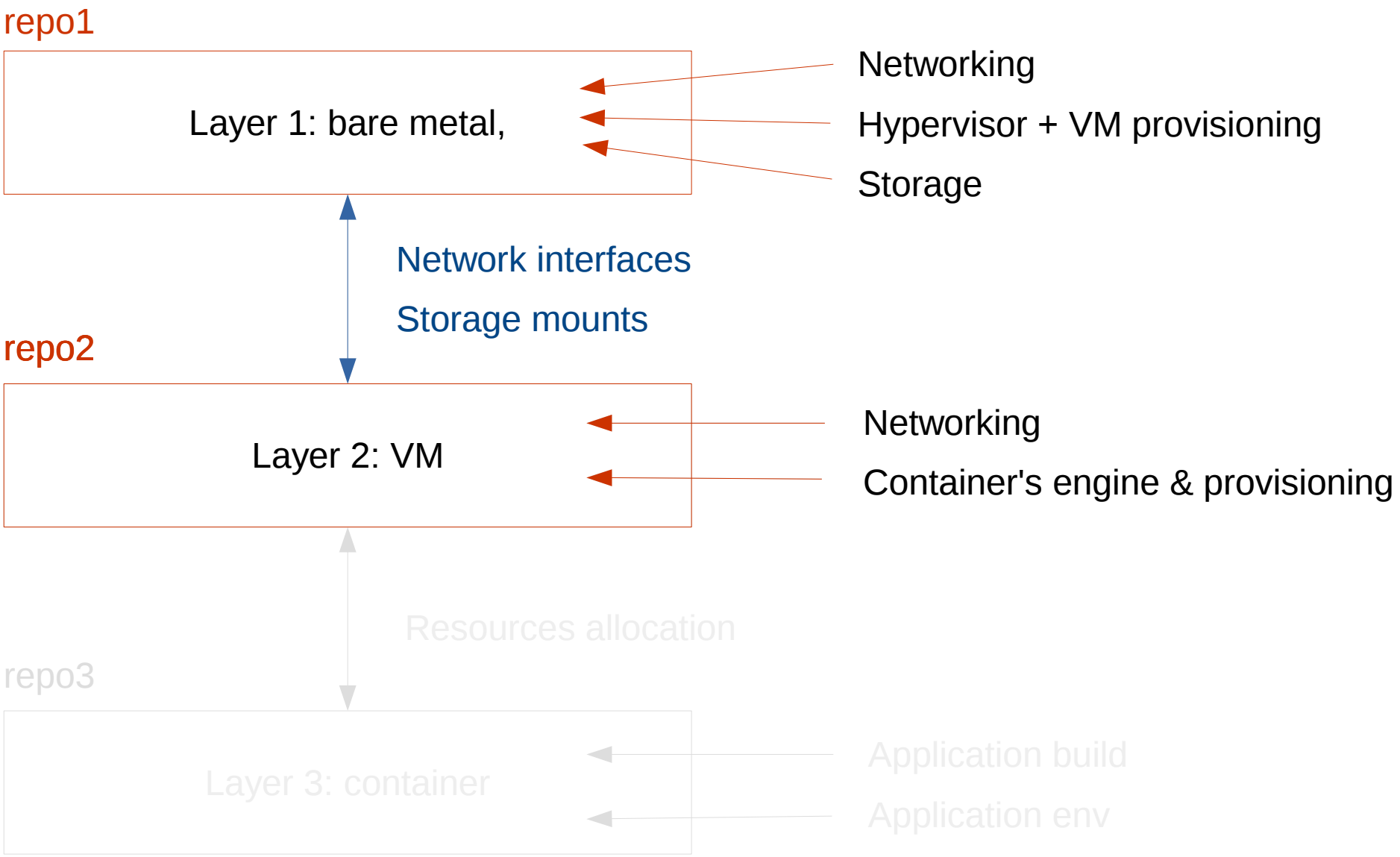

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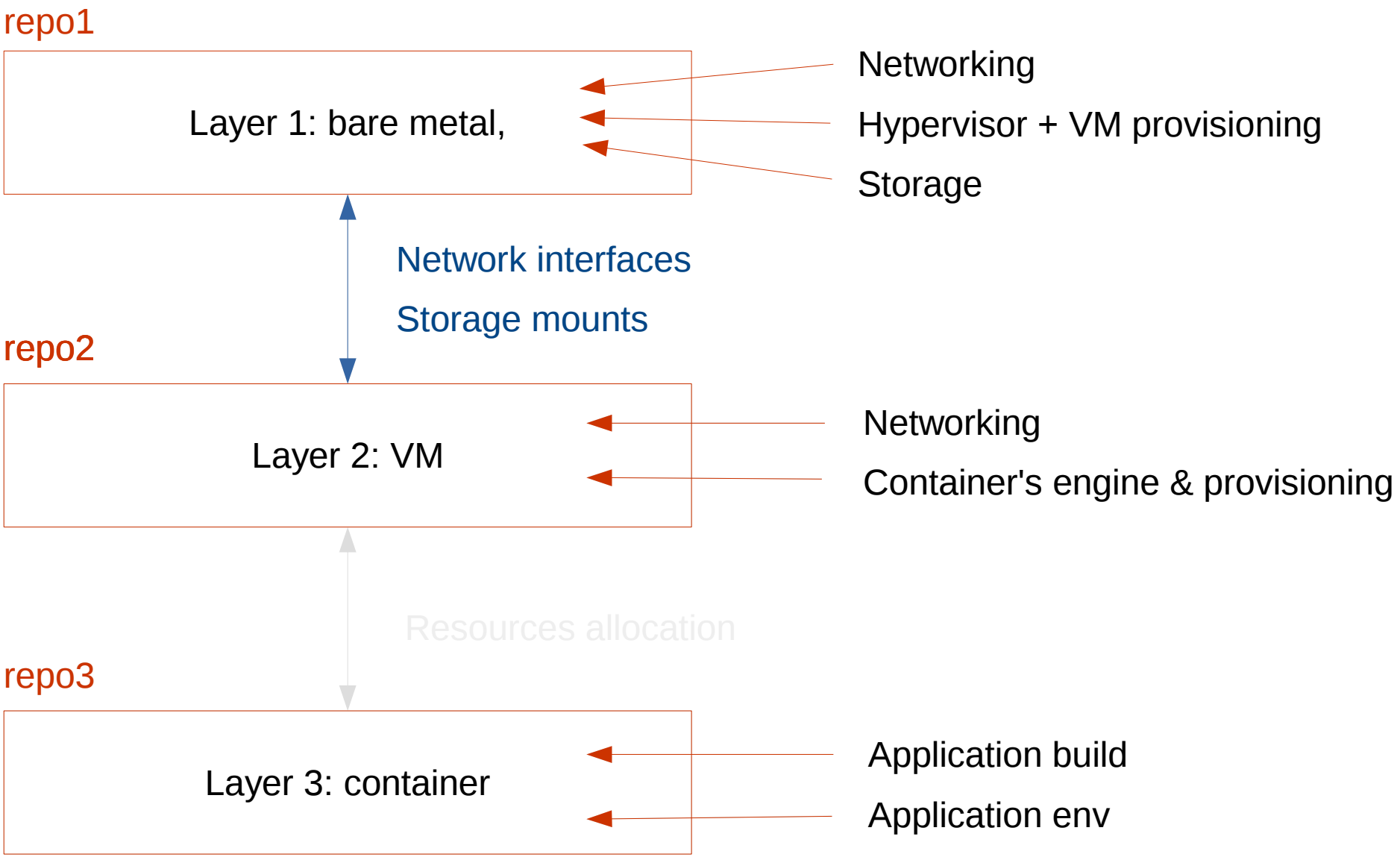

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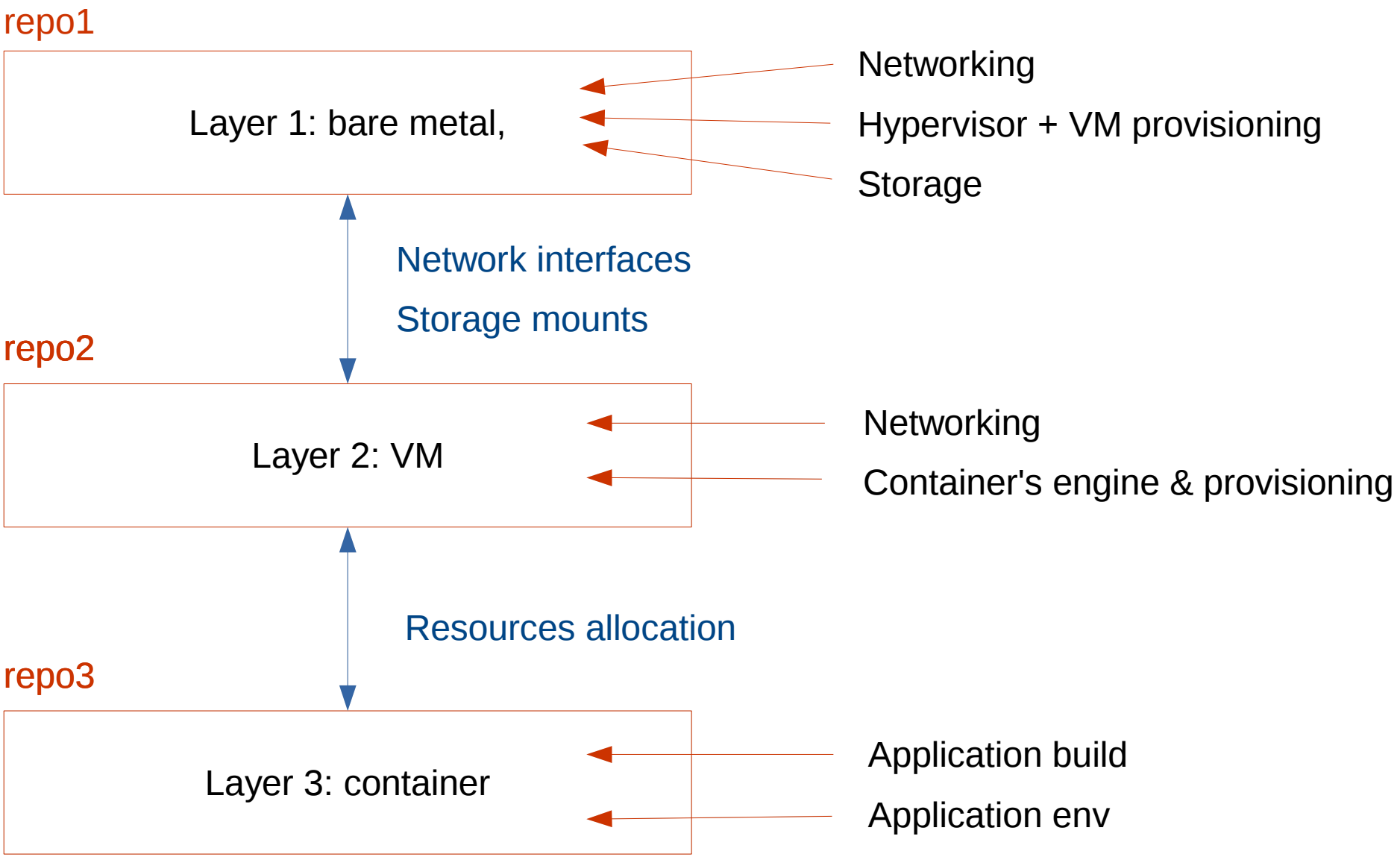

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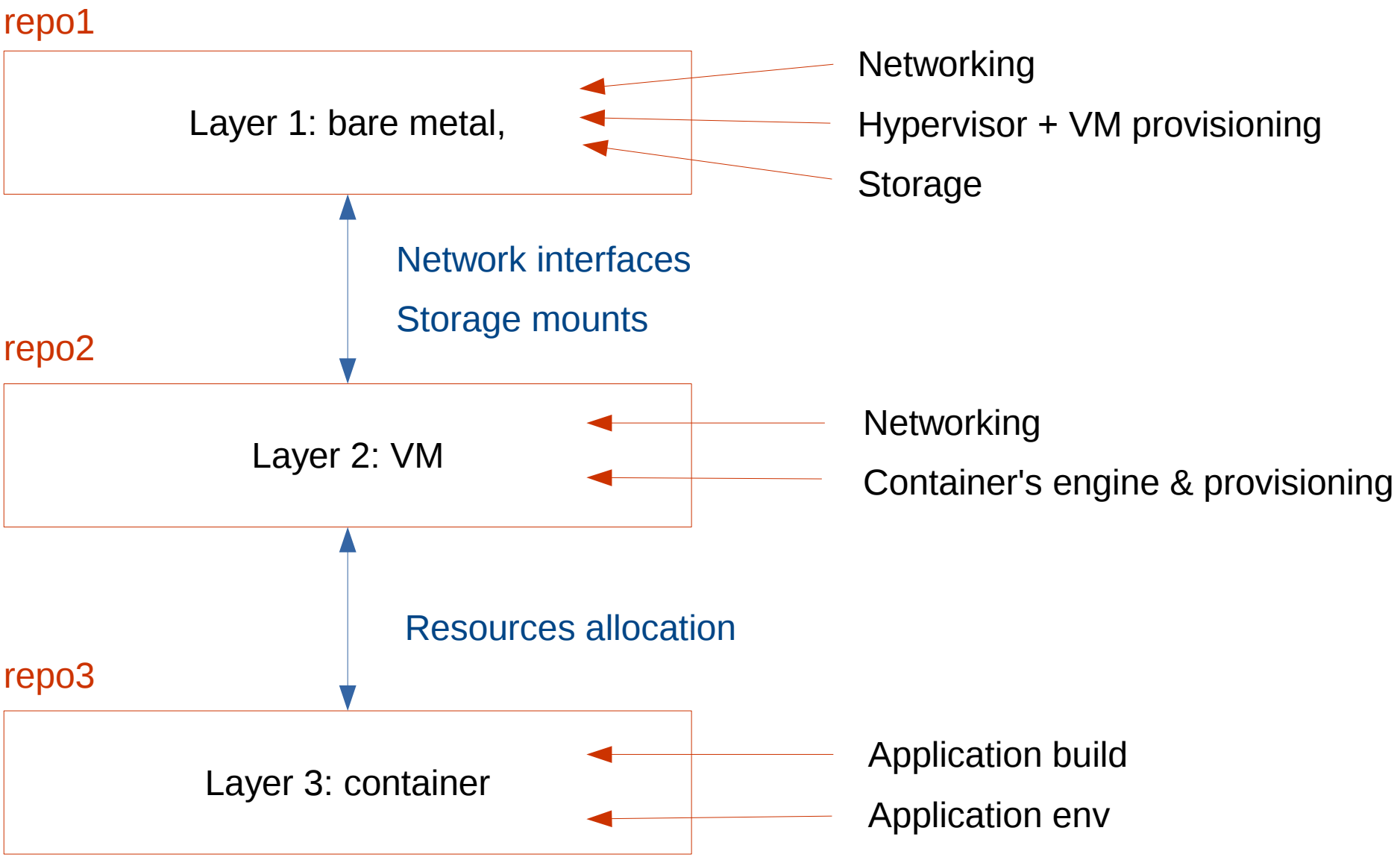

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SmartStack

→ automated service discovery and registration framework

→ ideal for SOA architectures

→ ideal for continuous integration & delivery

→ solves “works on my machine” problem

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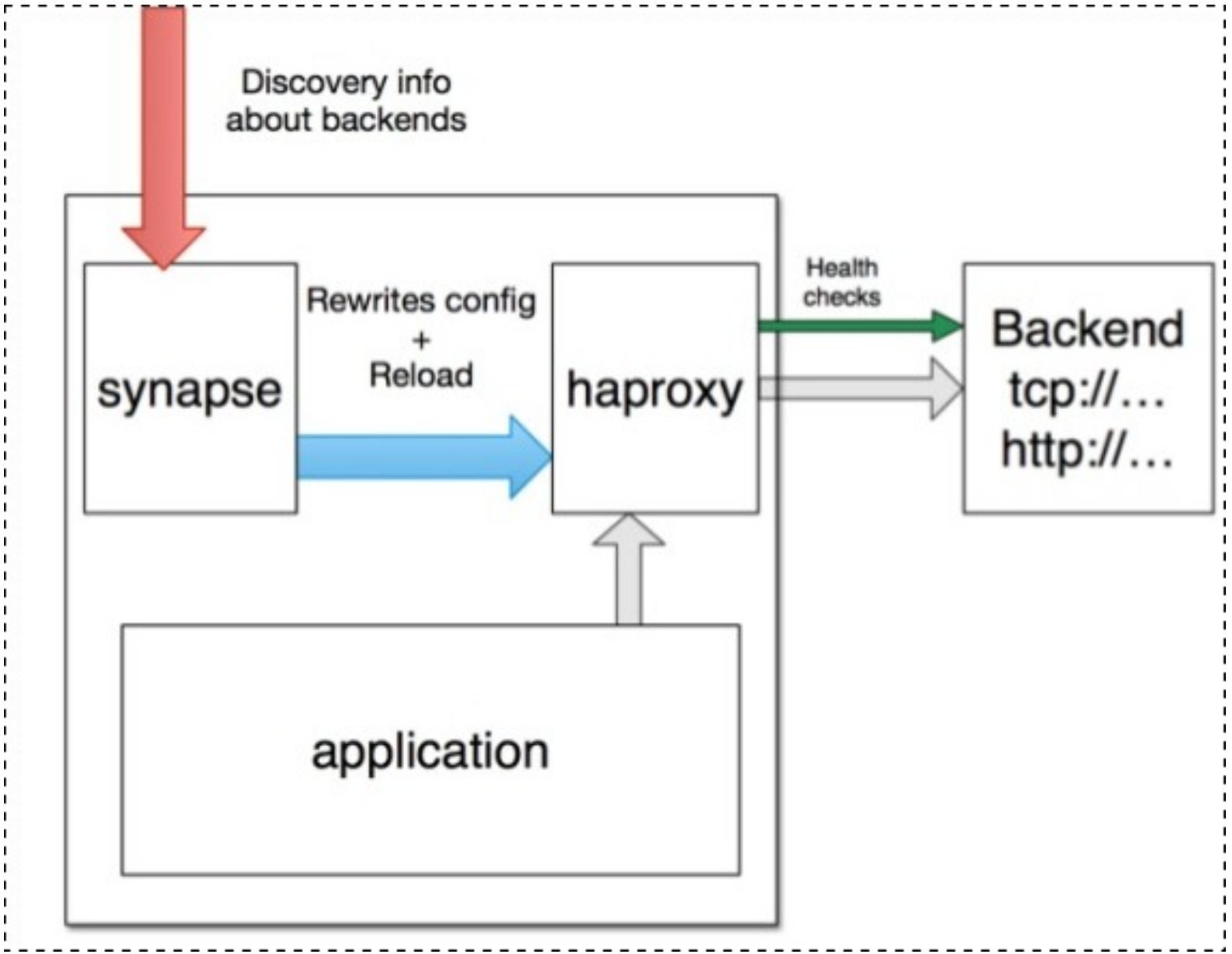
haproxy + nerve + synapse + zookeper = smartstack

SmartStack

Synapse

→ discovery service (via zookeeper or etcd)
→ installed on every node
→ writes haproxy configuration
→ application doesn't have to be aware of this
→ works same on bare / VM / docker
→ https://github.com/airbnb/nerve

SmartStack


Discovery info
about backends
synapse
Rewrites config
+
Reload
haproxy
Health
checks
Backend
tcp://...
http://...
application

SmartStack

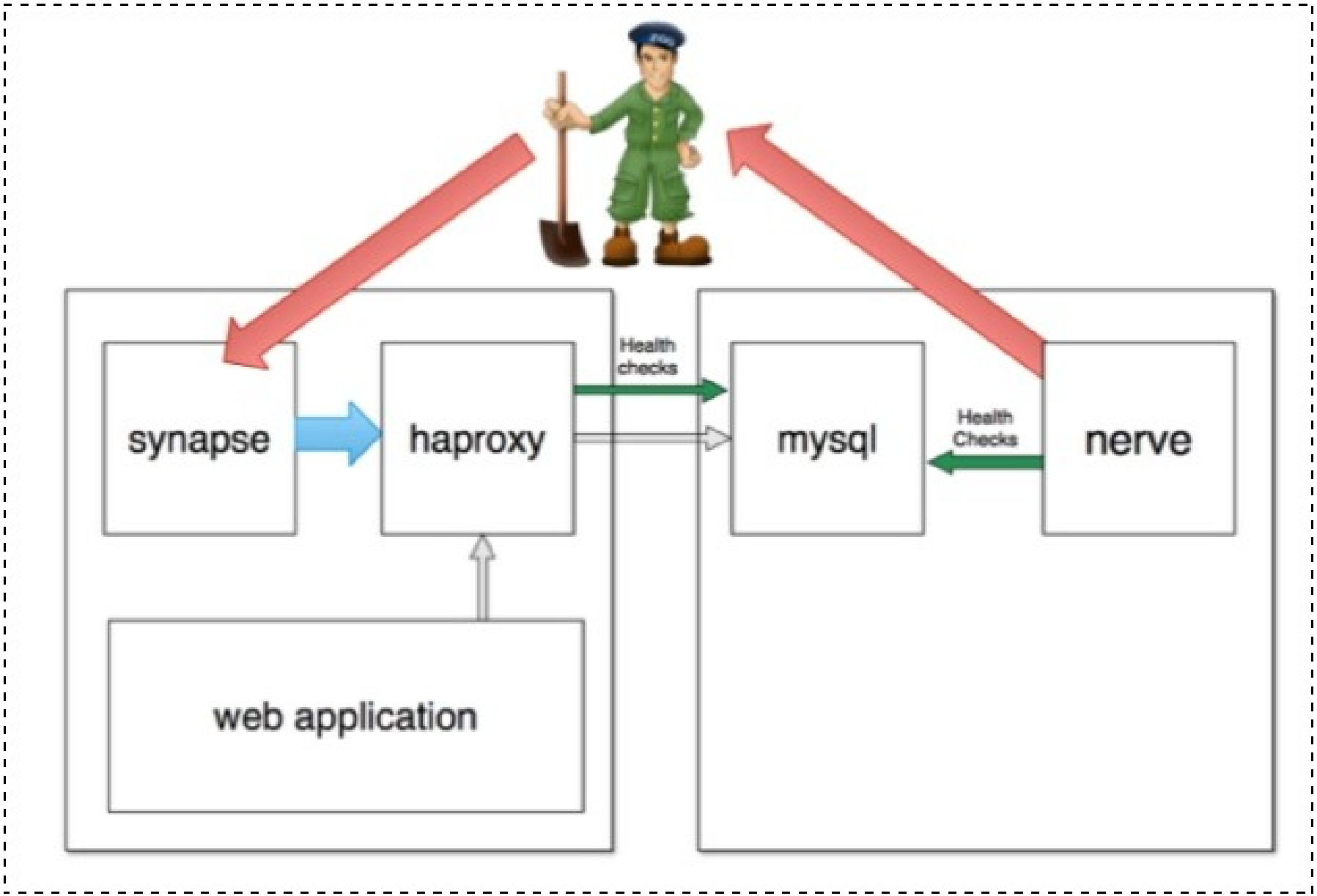
Nerve

→ health checks (pluggable)

→ register service info to zookeper (or etcd)

→ https://github.com/airbnb/synapse

SmartStack


synapse
haproxy
Health checks
mysql
Health Checks
nerve
web application

SmartStack

Smartstack + Docker = <3

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but also remember about Consul
(come to #dockerkrk 2 meetup!)

questions?

Archaeological workshop

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→ nmap, tcpdump, lsof, strace, sysdig, sar

→ cgroups throttling on-the-fly

Do we have time for demo?

Hardware: disks?

→ RAID5 vs RAID10

→ Howto RAID over 1 disk ;)

→ Cheap SSD drives?

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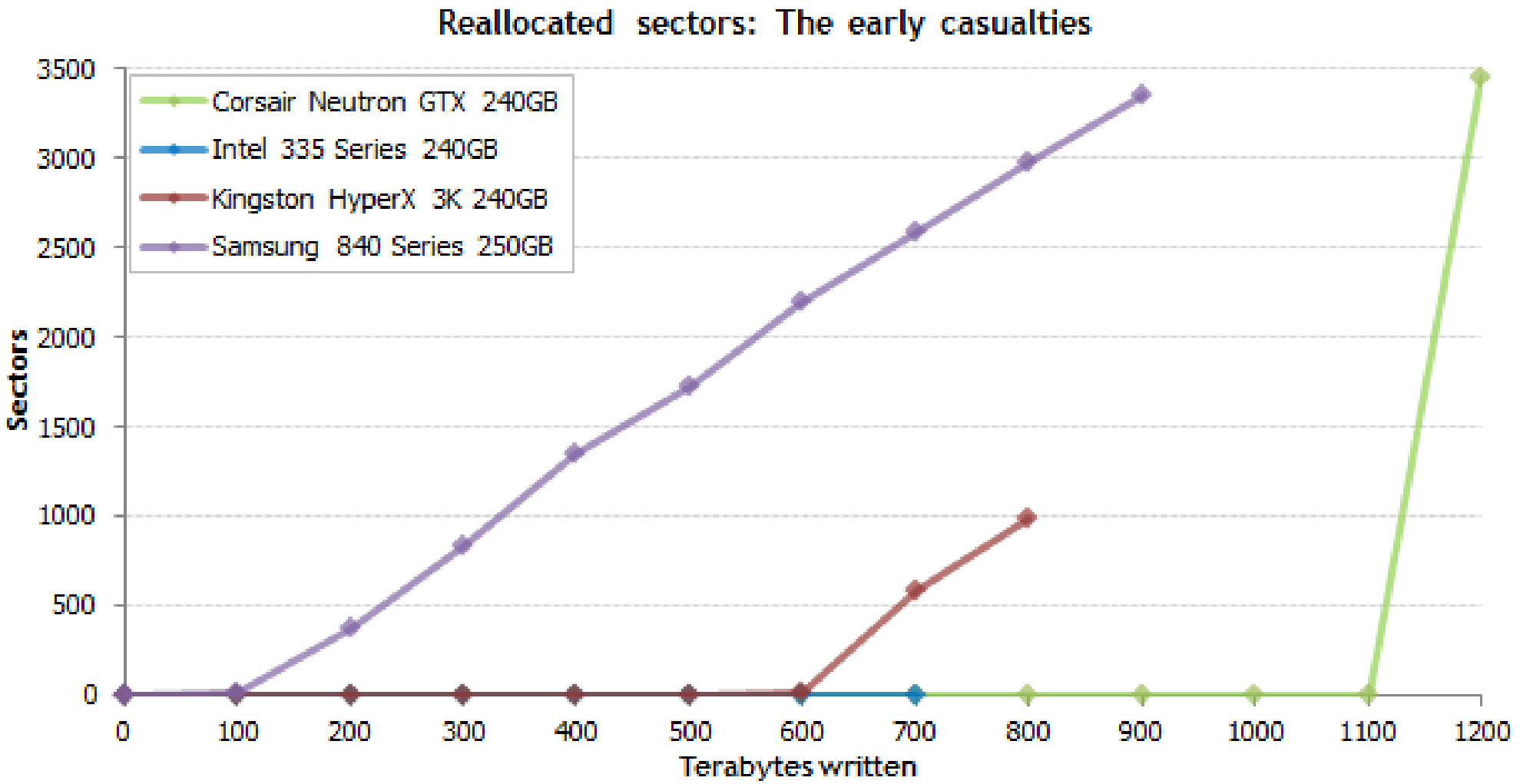
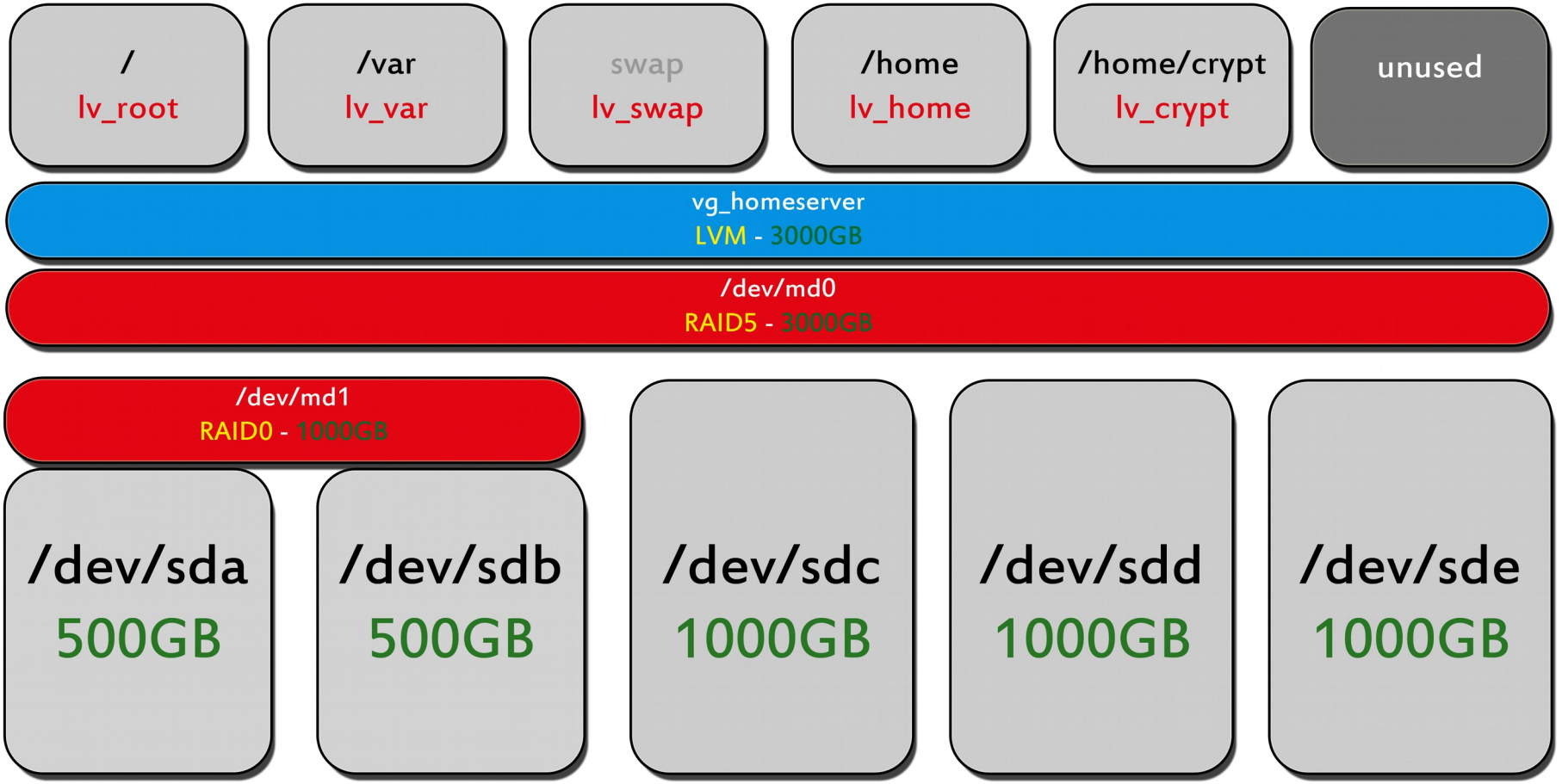


http://techreport.com/review/27909/the-ssd-endurance-experiment-theyre-all-dead

Why use LVM?

→ indexation (capacity, inodes check)

→ capacity planning / iops per mount



Under the dome
(of failure driven pipeline)

Maciej Lasyk

4developers – Warsaw

2015-04-20