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Rachel Laycock
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MICRO-SERVICE ARCHITECTURE

The Anti-Pattern of the Future?

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MICRO-SERVICES

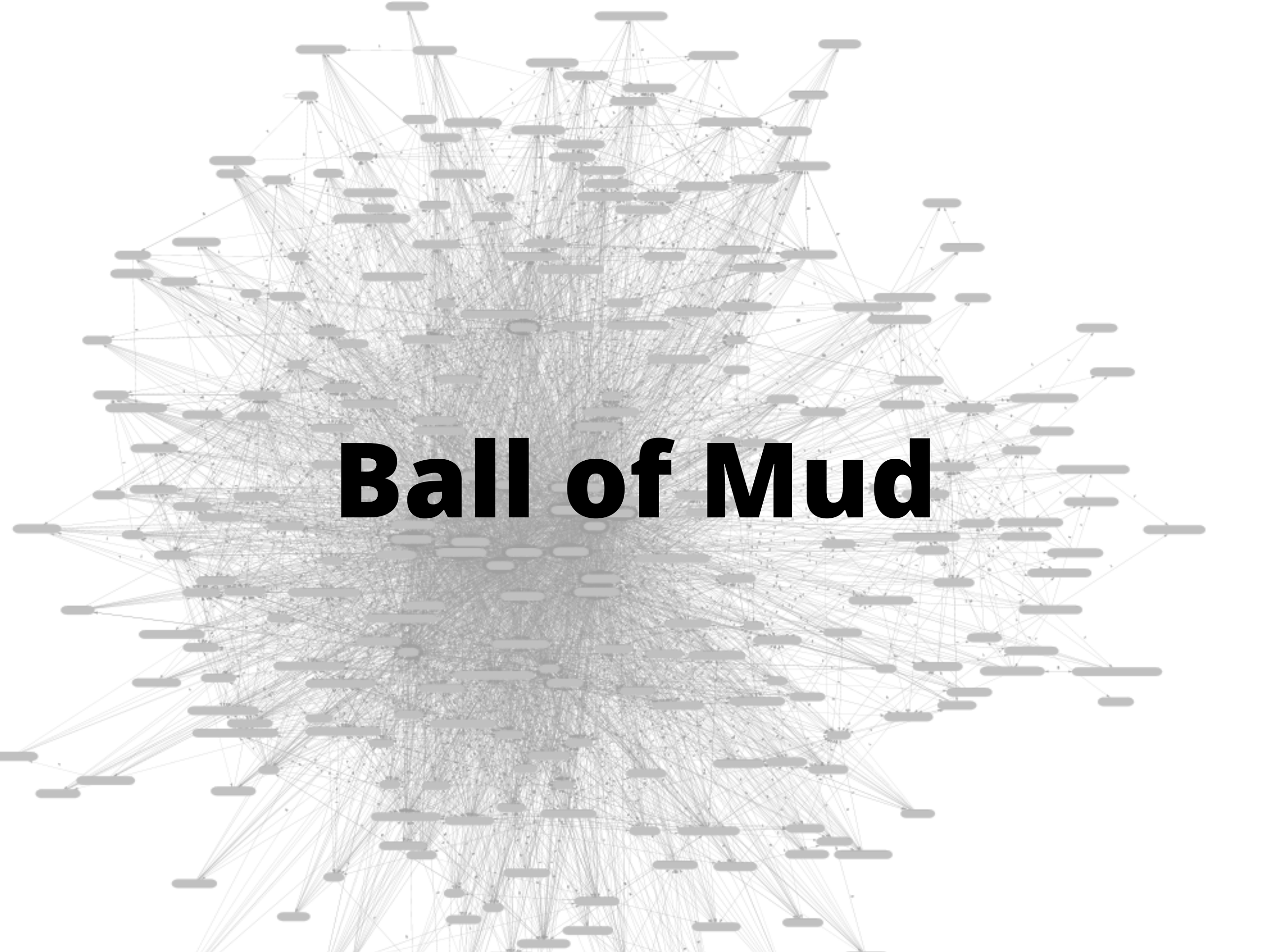
The Anti-Pattern of the Future?

WTF?

MICRO-SERVICES

- What are micro-services?
- Why do we want them? Or maybe not..
- What are the key challenges?
- Are they the anti pattern of the future?

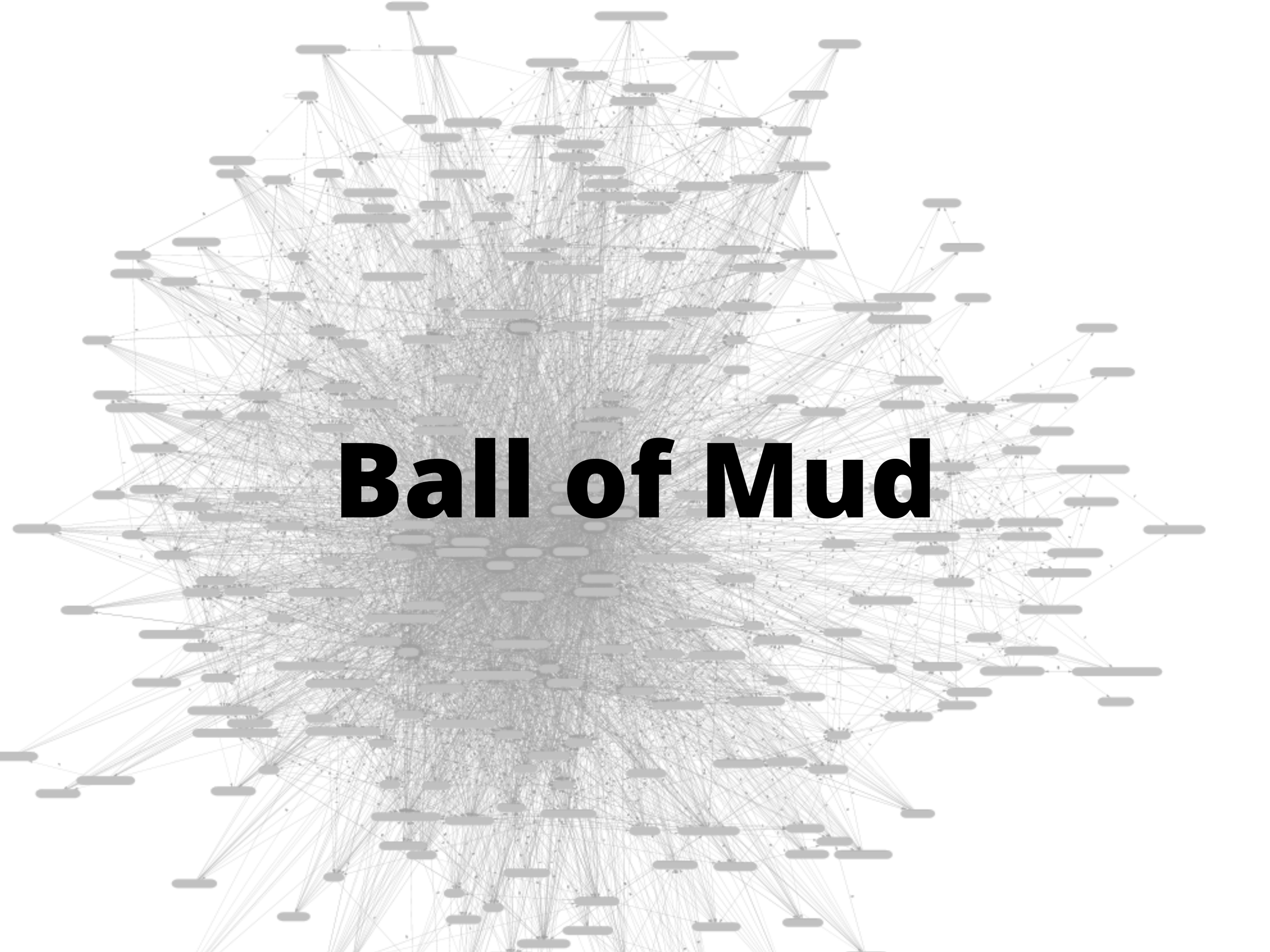
but first...



Ball of Mud

"expediency ***over*** *design"*

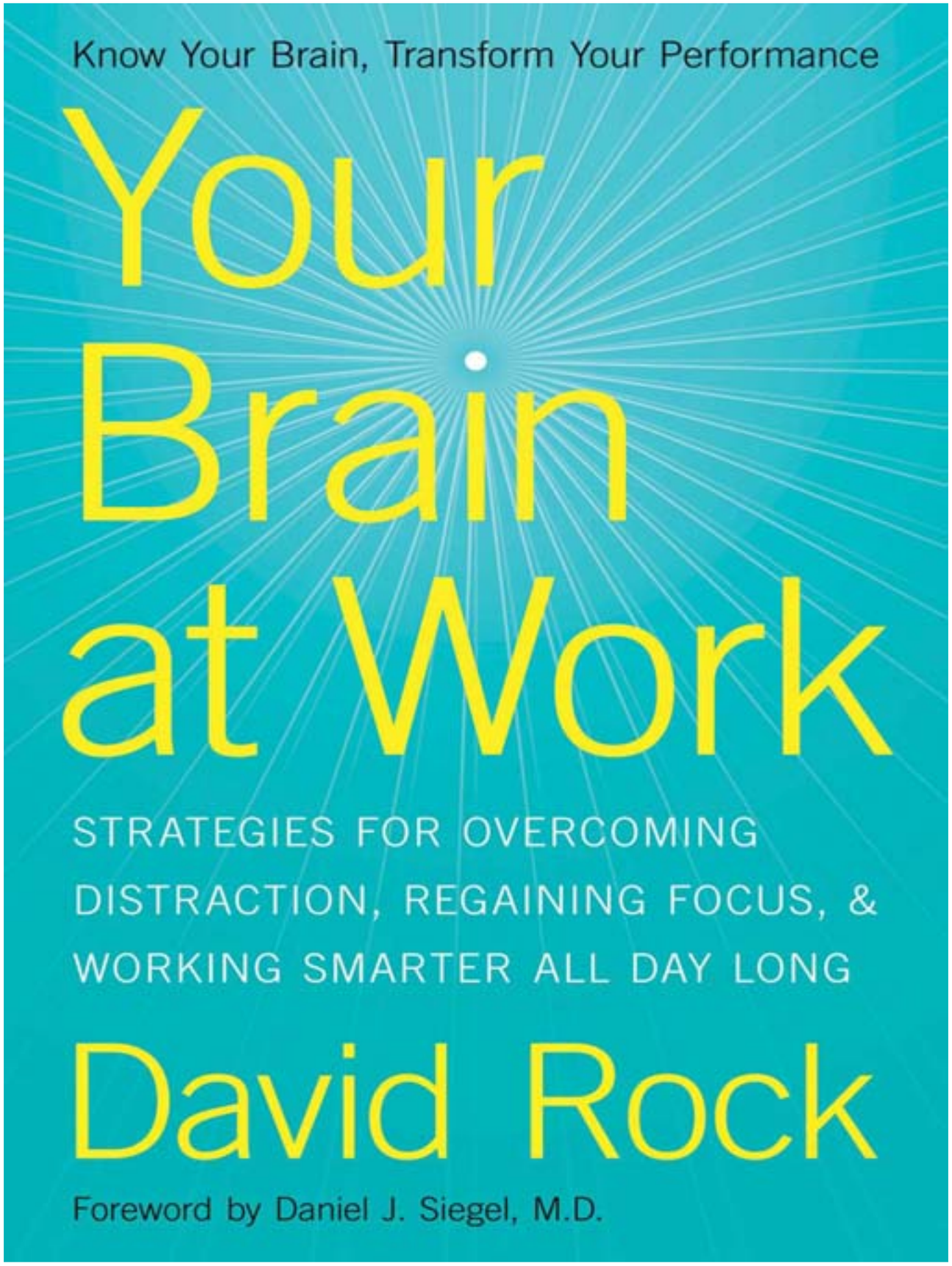
– *Brian Foot & Joseph Yoder*



Ball of Mud


KENWORTH
12
E 95304


Marlboro
Modena
MOTORSPORT



Your Brain at Work

MICRO-SERVICES

- ☐ What are micro-services?
- ☐ Why do we want them? Or maybe not..
- ☐ What are the key challenges?
- ☐ Are they the anti pattern of the future?

MICRO-SERVICES

- **What are micro-services?**

- Why do we want them? Or maybe not..

- What are the key challenges?

- Are they the anti pattern of the future?

THE LIFE OF A SOFTWARE ENGINEER.

CLEAN SLATE. SOLID FOUNDATIONS. THIS TIME I WILL BUILD THINGS THE RIGHT WAY.

MUCH LATER...

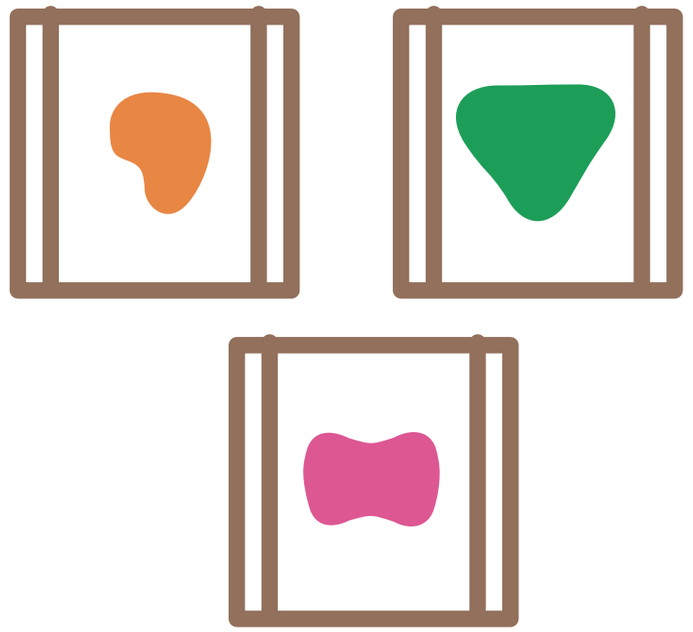
OH MY. I'VE DONE IT AGAIN, HAVEN'T I ?

Marek Sotak
@sotak

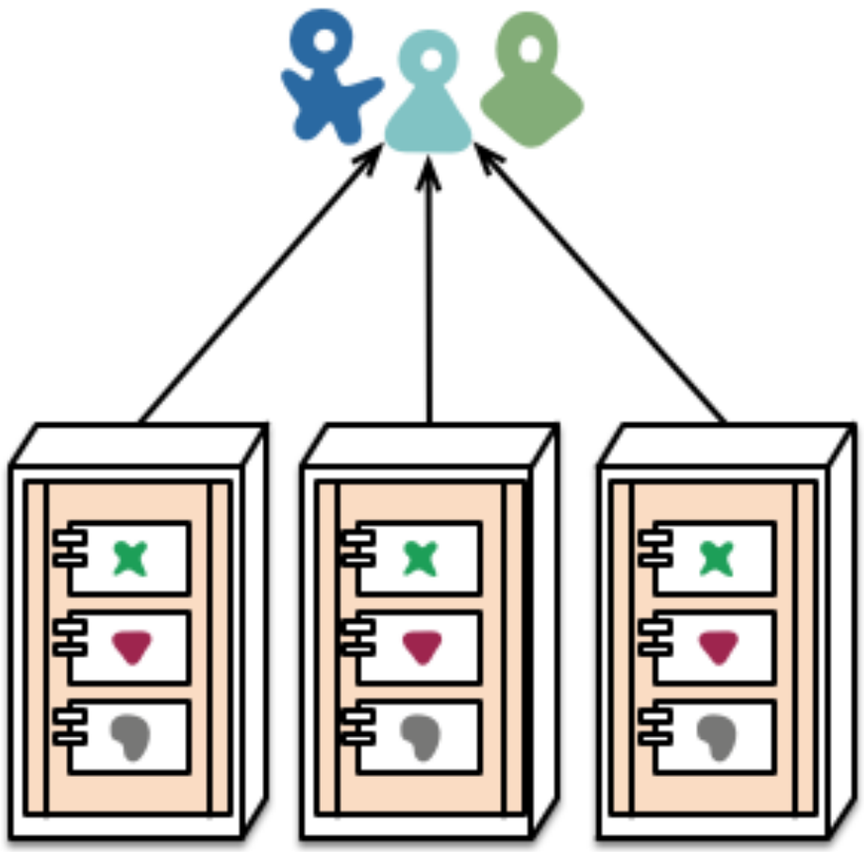
SIMPLE AND LIGHTWEIGHT

A monolithic application puts all its functionality into a single process…

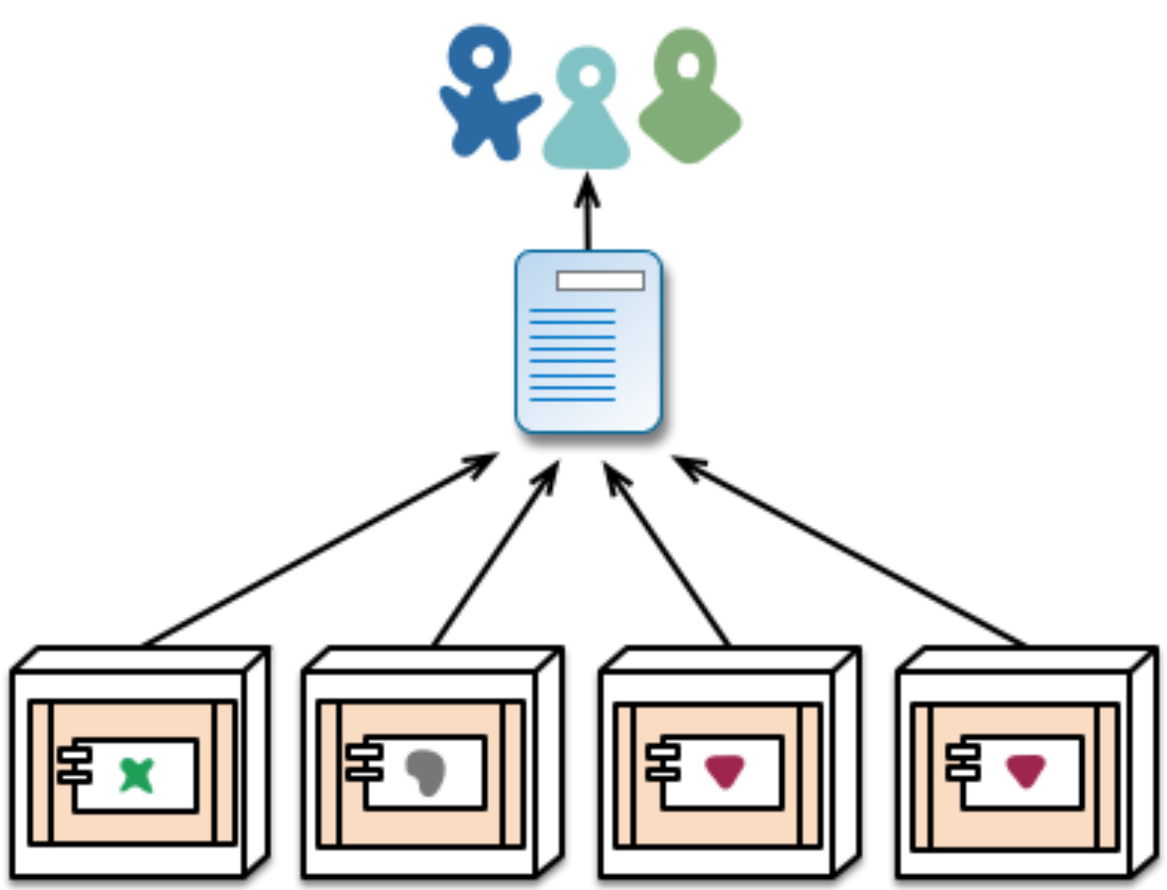
A microservices architecture puts each element of functionality into a separate service…



INDEPENDENT PROCESSES

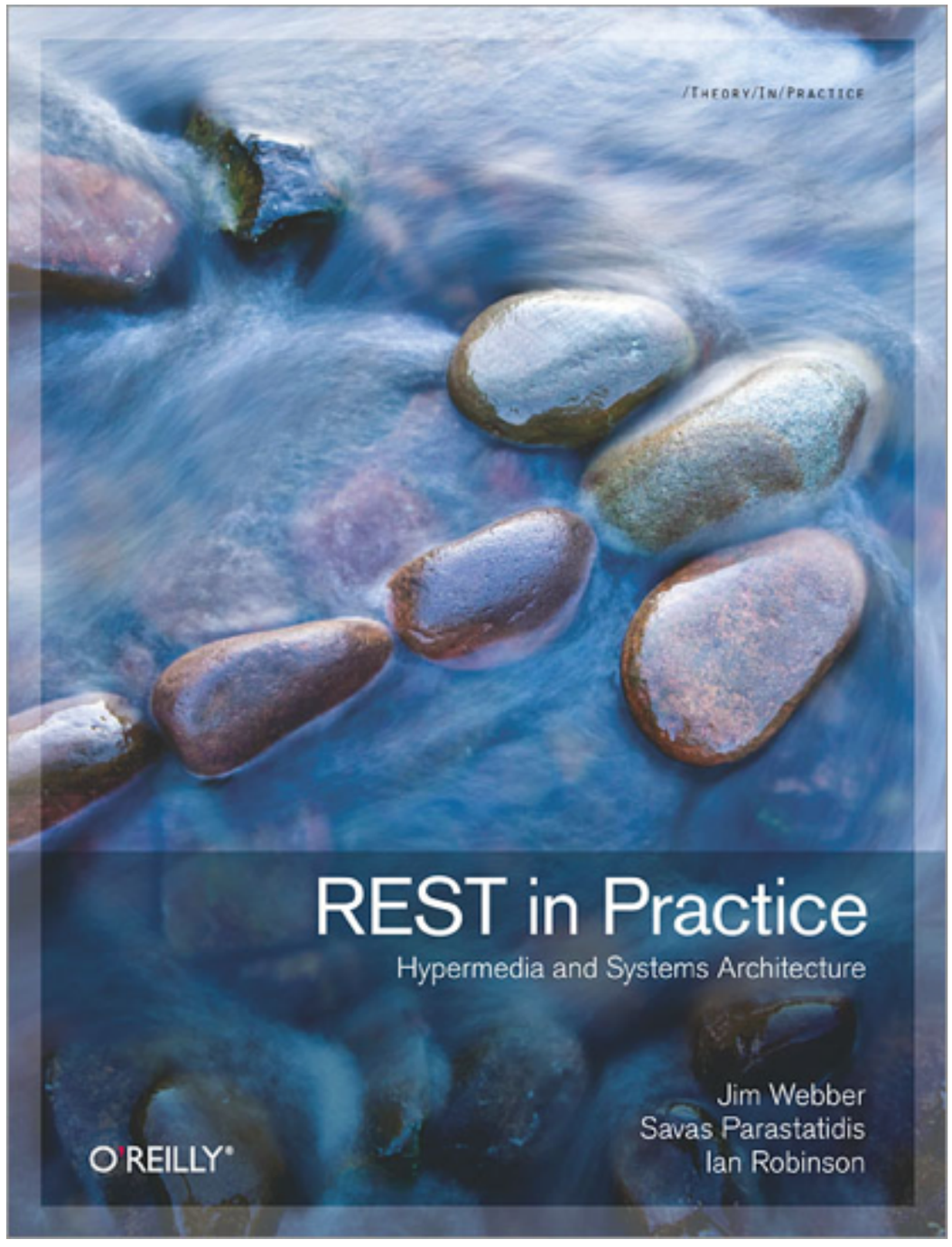


monolith - multiple modules in the same process



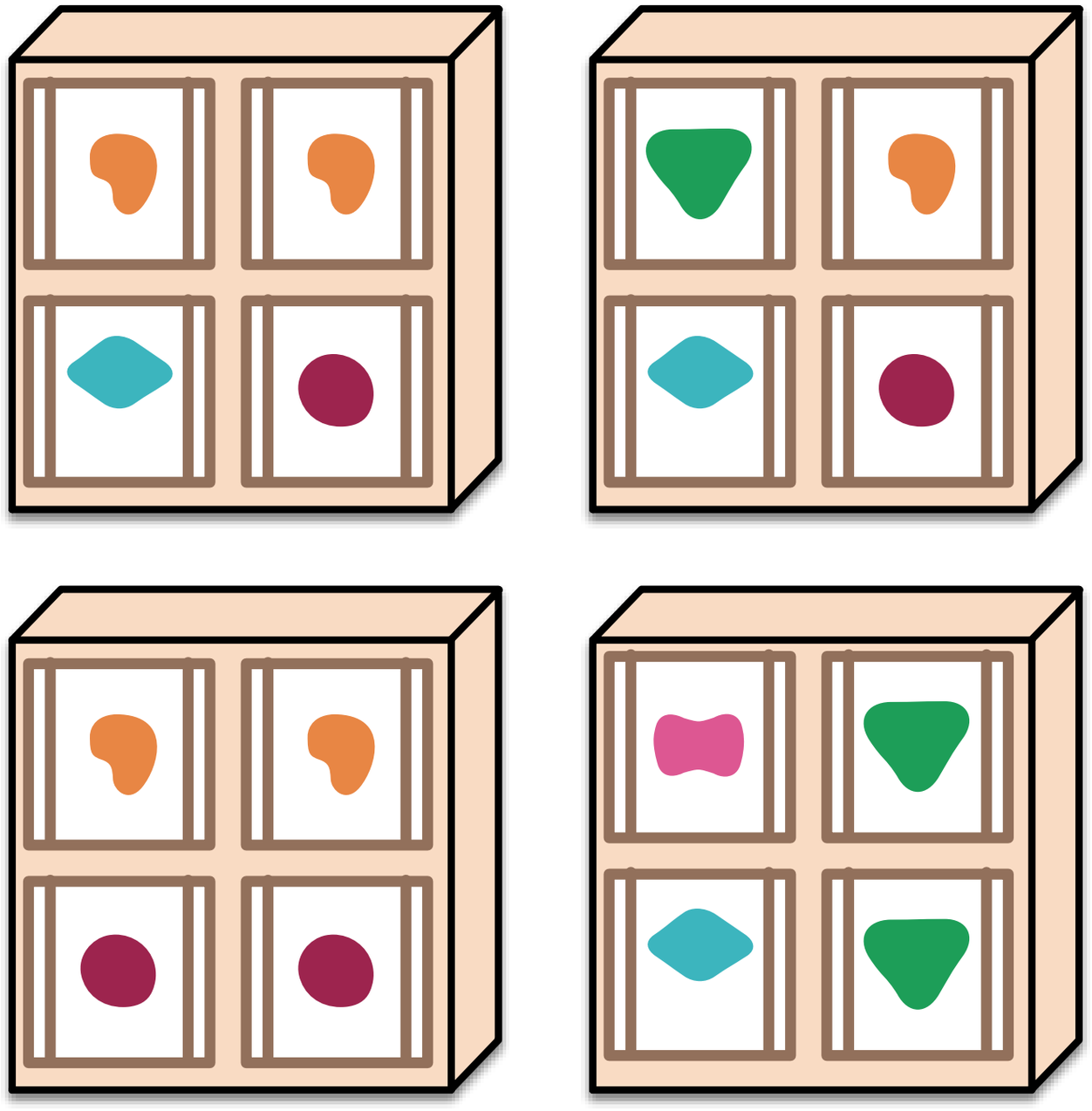
microservices - modules running in different processes

LANGUAGE AGNOSTIC APIS



"be of the web"

DECOUPLED



MICRO-SERVICES

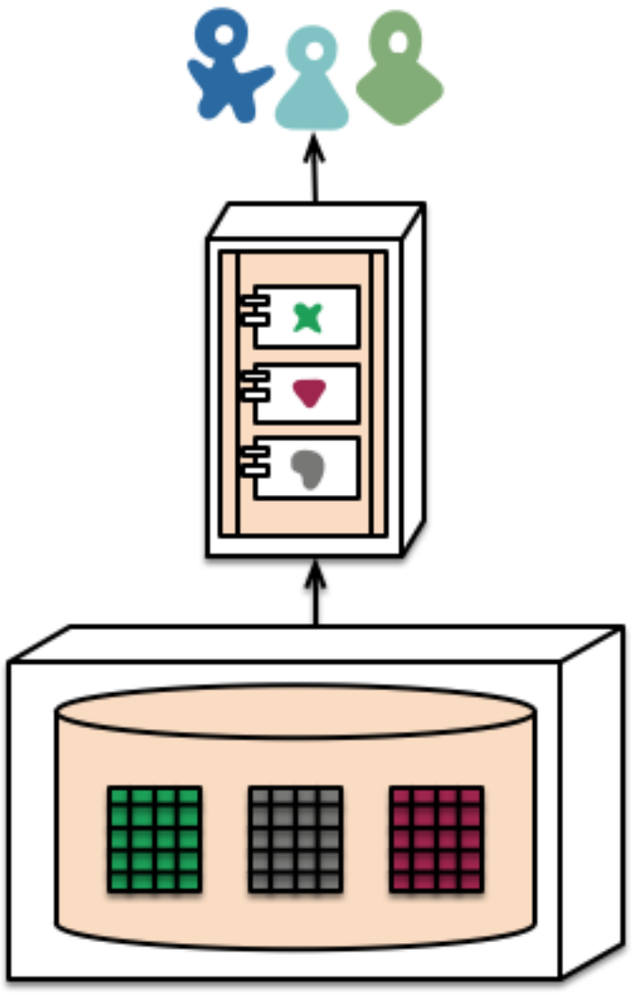
- What are micro-services?

- **Why do we want them? Or maybe not..**

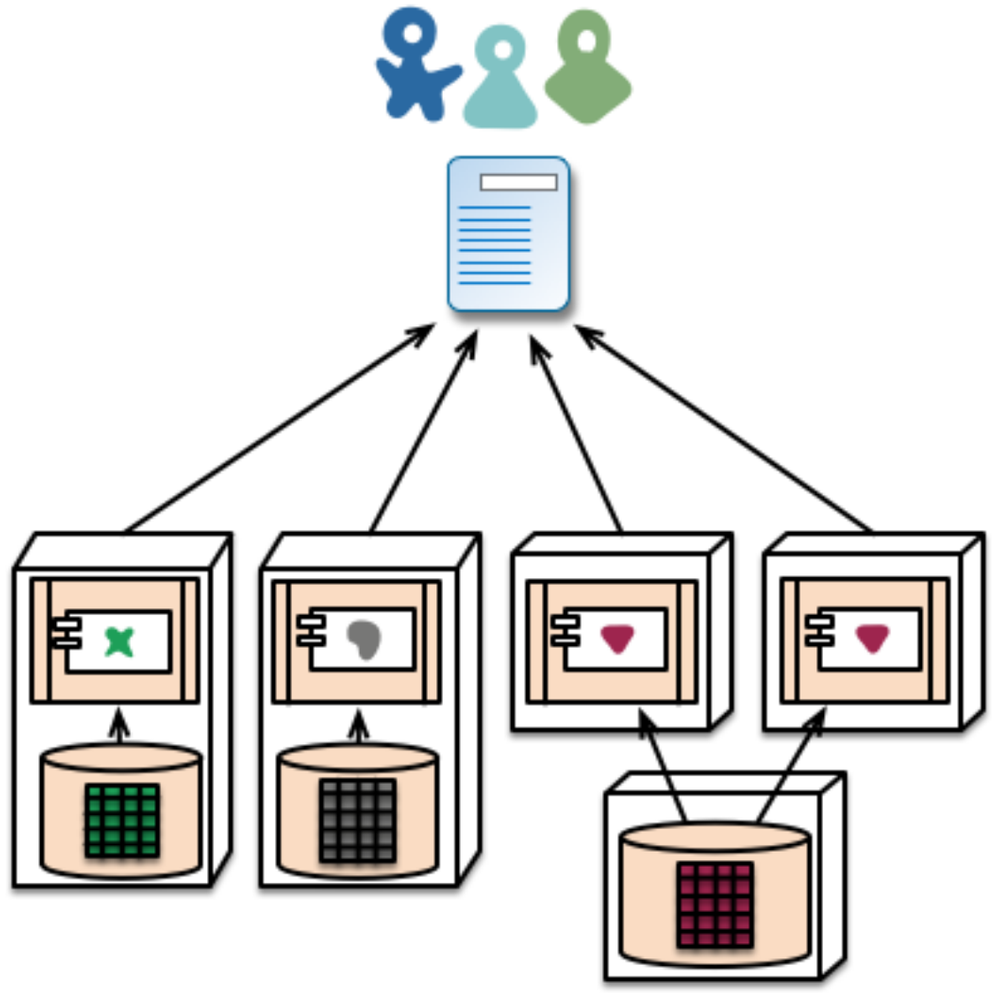
- What are the key challenges?

- Are they the anti pattern of the future?

The right tool for the job

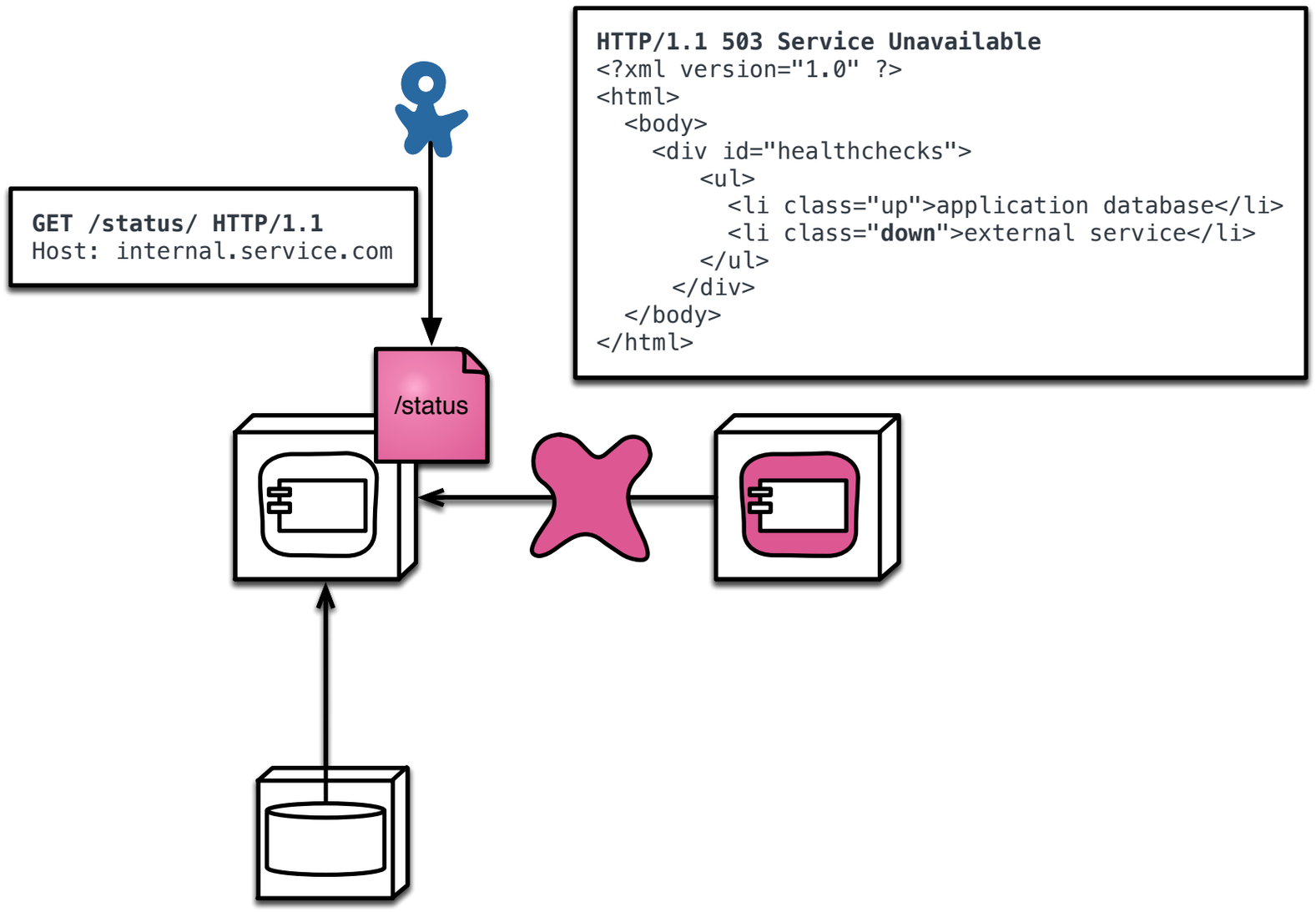


monolith - single database



microservices - application databases

RESILIENCE


GET /status/ HTTP/1.1
Host: internal.service.com
HTTP/1.1 503 Service Unavailable
<?xml version="1.0" ?>
<html>
<body>

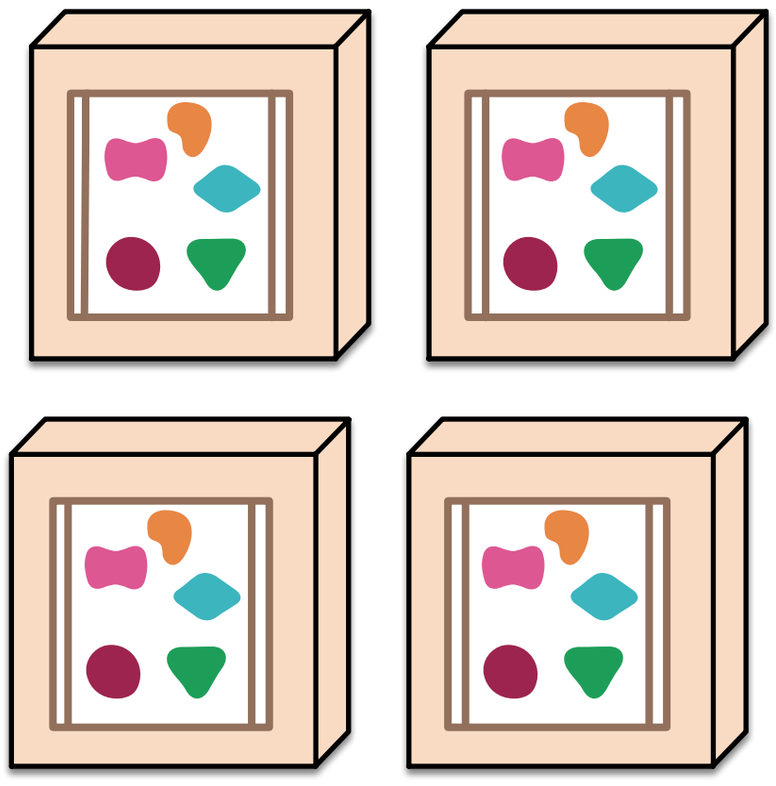
<li class="up">application database
<li class="down">external service

</body>
</html>
/status

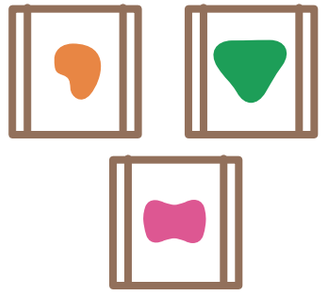
SCALING

A monolithic application puts all its functionality into a single process...

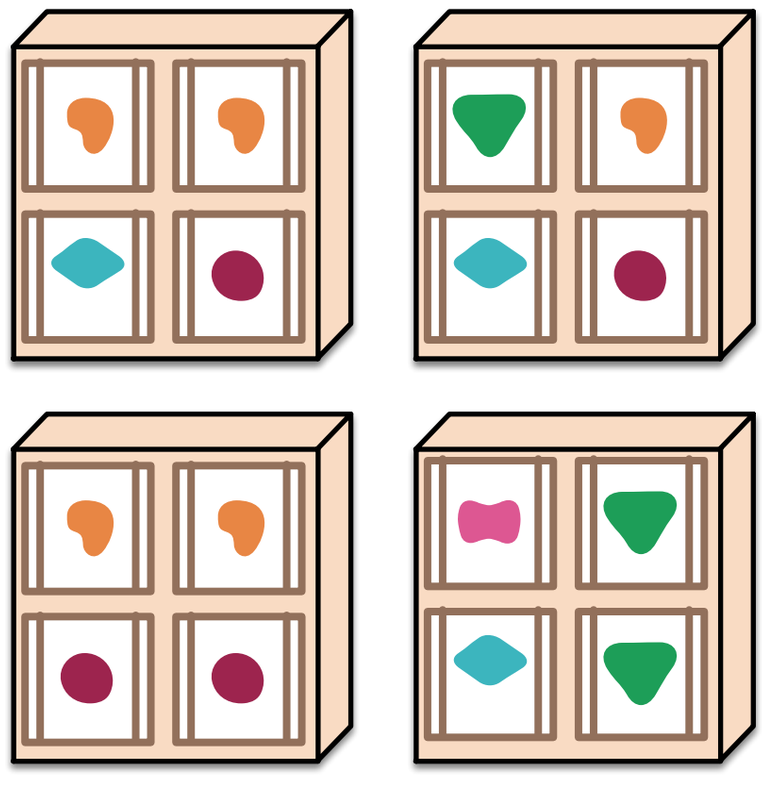
... and scales by replicating the monolith on multiple servers



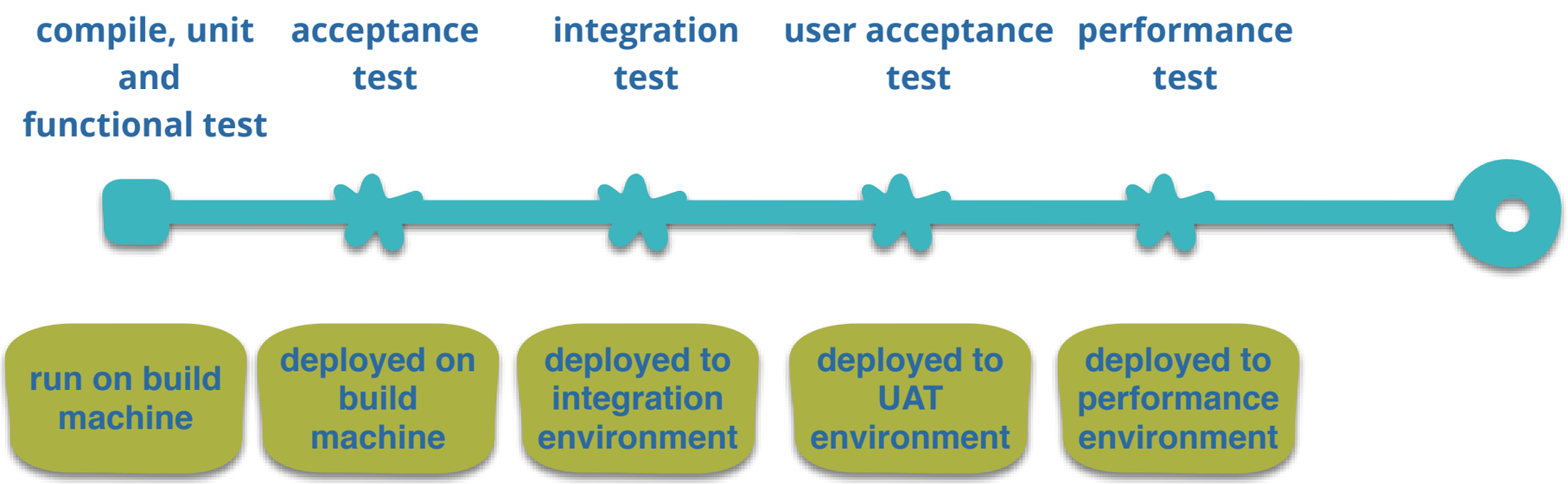
A microservices architecture puts each element of functionality into a separate service...



... and scales by distributing these services across servers, replicating as needed.



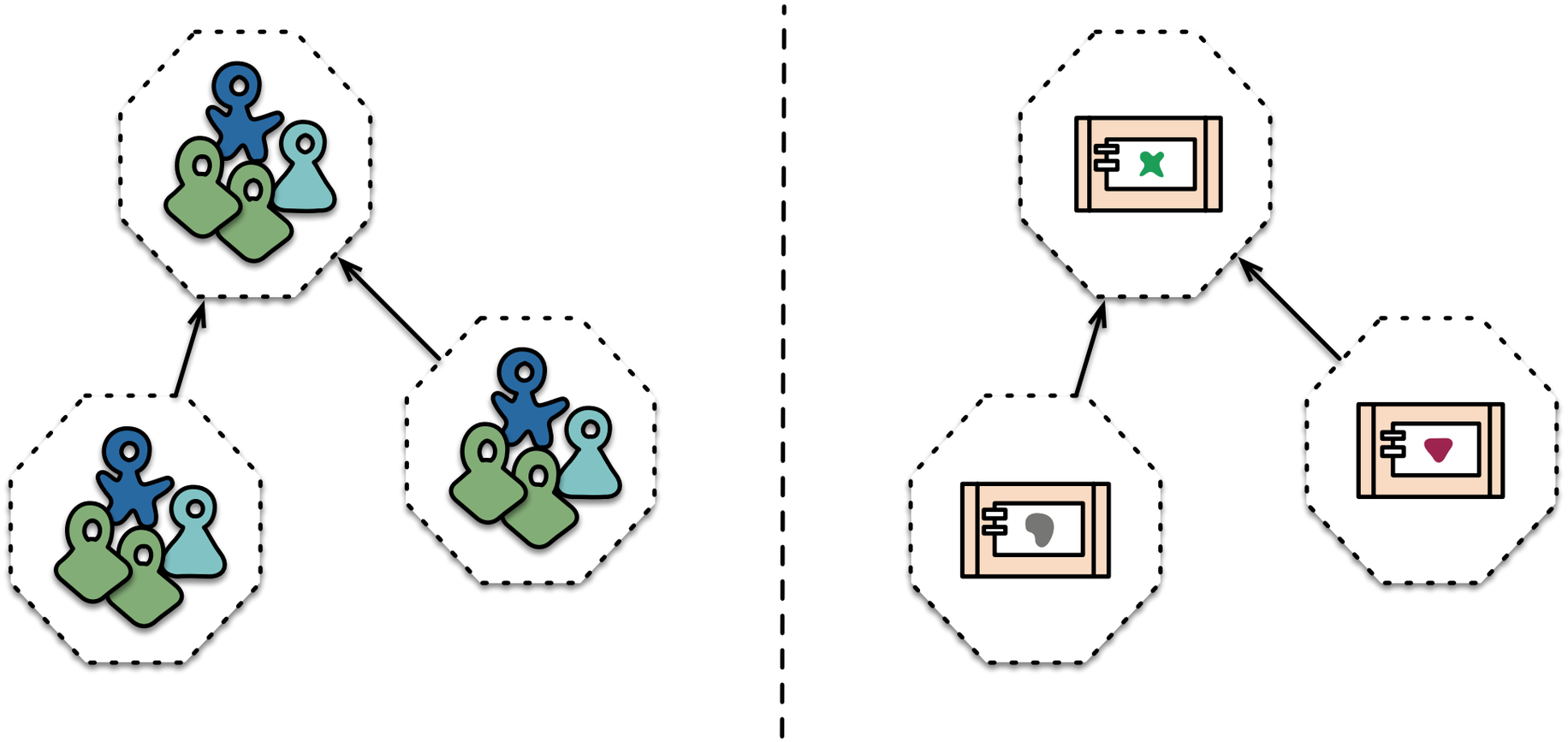
DEPLOYMENT


compile, unit and functional test
acceptance test
integration test
user acceptance test
performance test
deploy to production
run on build machine
deployed on build machine
deployed to integration environment
deployed to UAT environment
deployed to performance environment

Conway's law

"organisations which design systems ... are ***constrained to designs which are copies of the communication structures*** *of these organisations"*

Conway's law

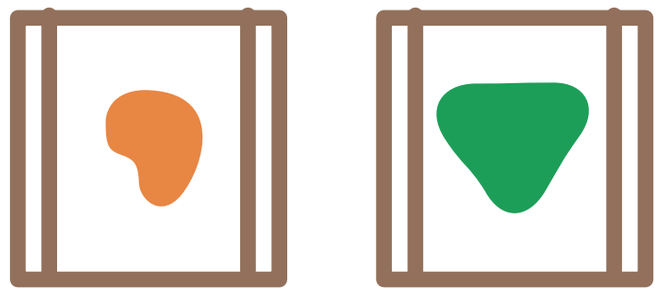


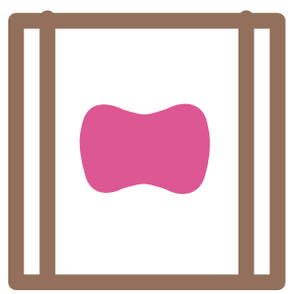
Cross-functional teams...

... organised around capabilities
Because Conway's Law

REPLACEABLE SERVICES

A microservices architecture puts each element of functionality into a separate service…





Preparing for the unknown

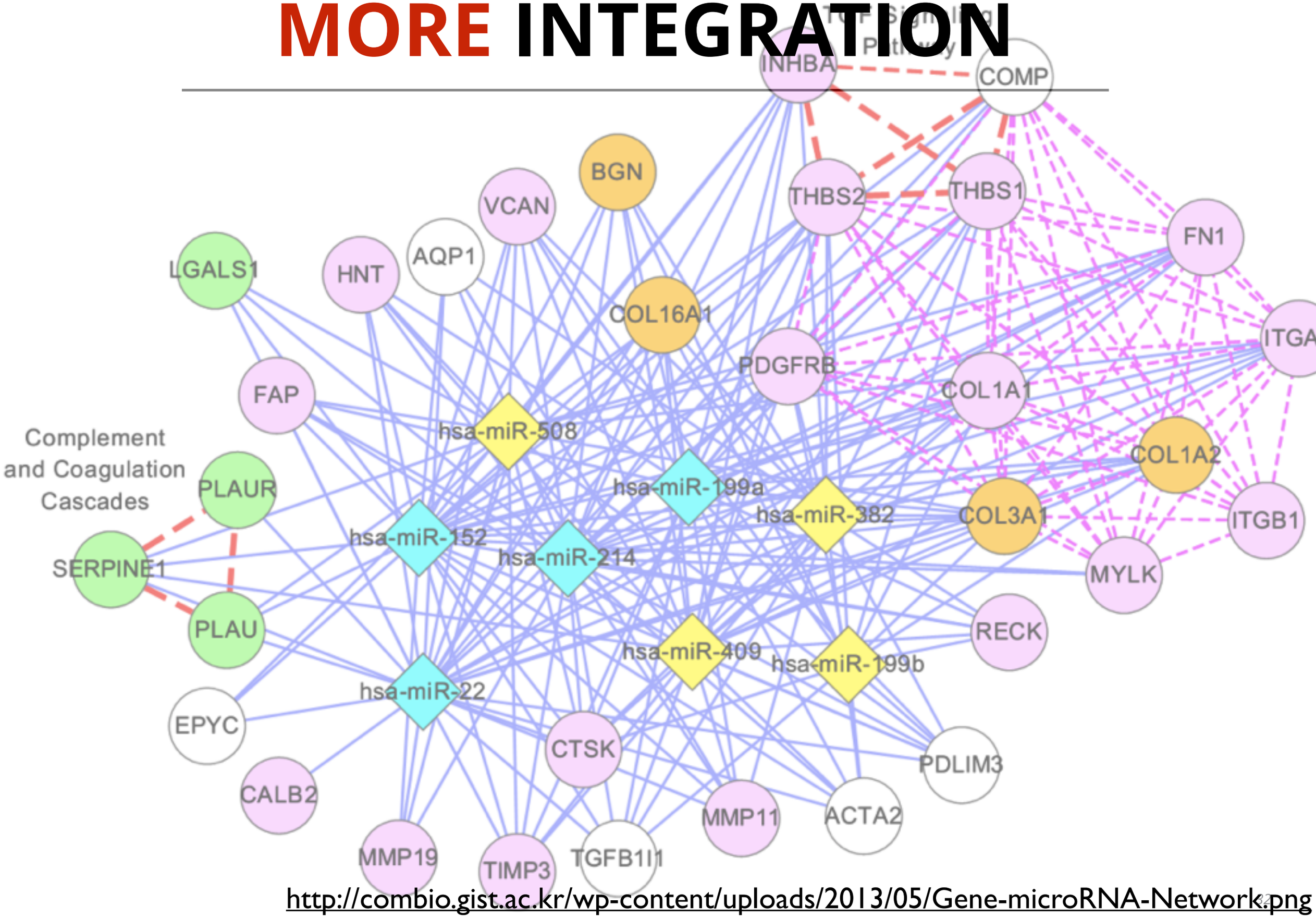
*“With great **power**…”*

Cognitive

complexity

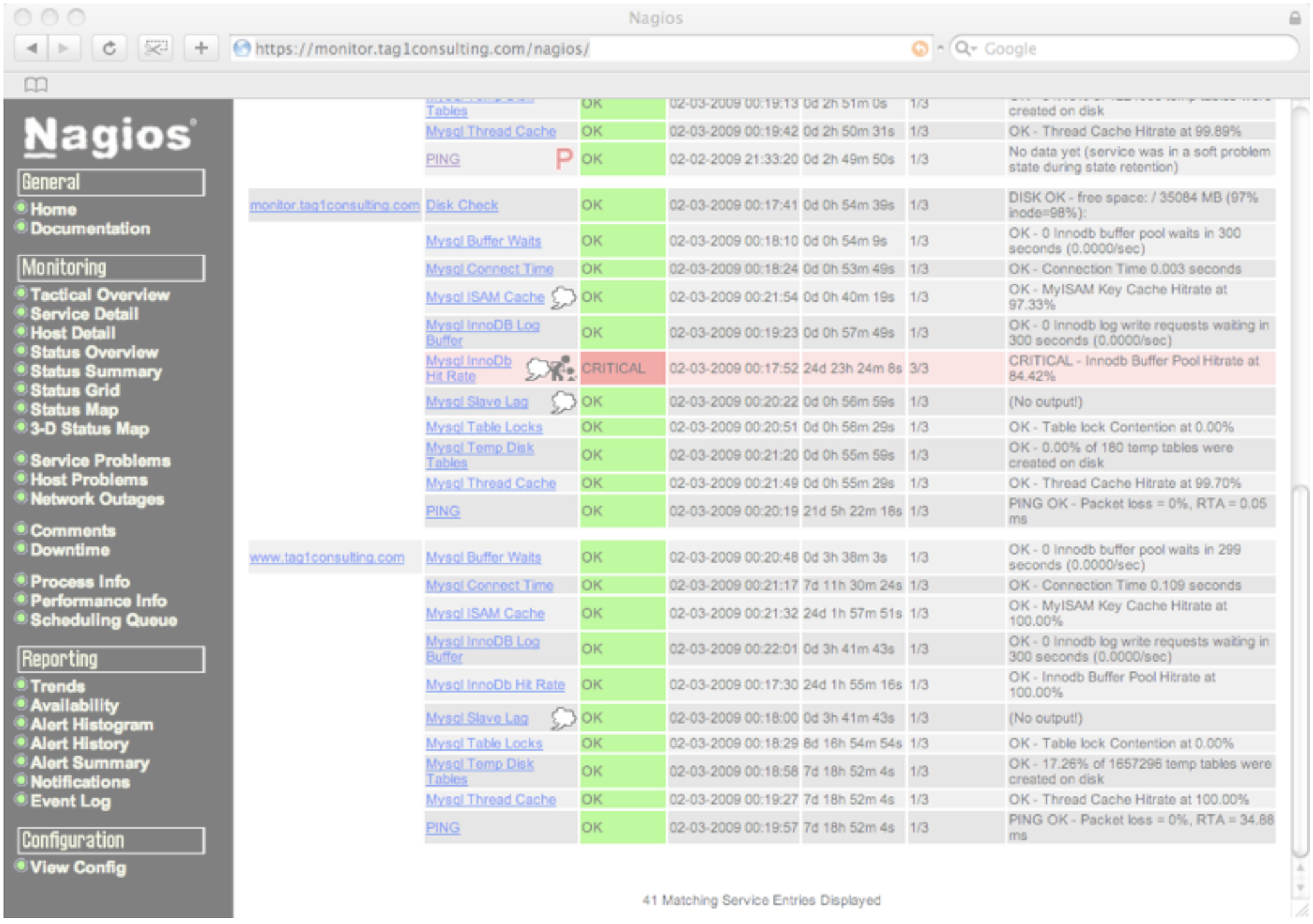
http://beyondplm.com/2012/04/23/plm-and-the-death-of-complexity/

MORE INTEGRATION



http://combio.gist.ac.kr/wp-content/uploads/2013/05/Gene-microRNA-Network.png

MONITORING AND TESTING



DUPLICATED CODE

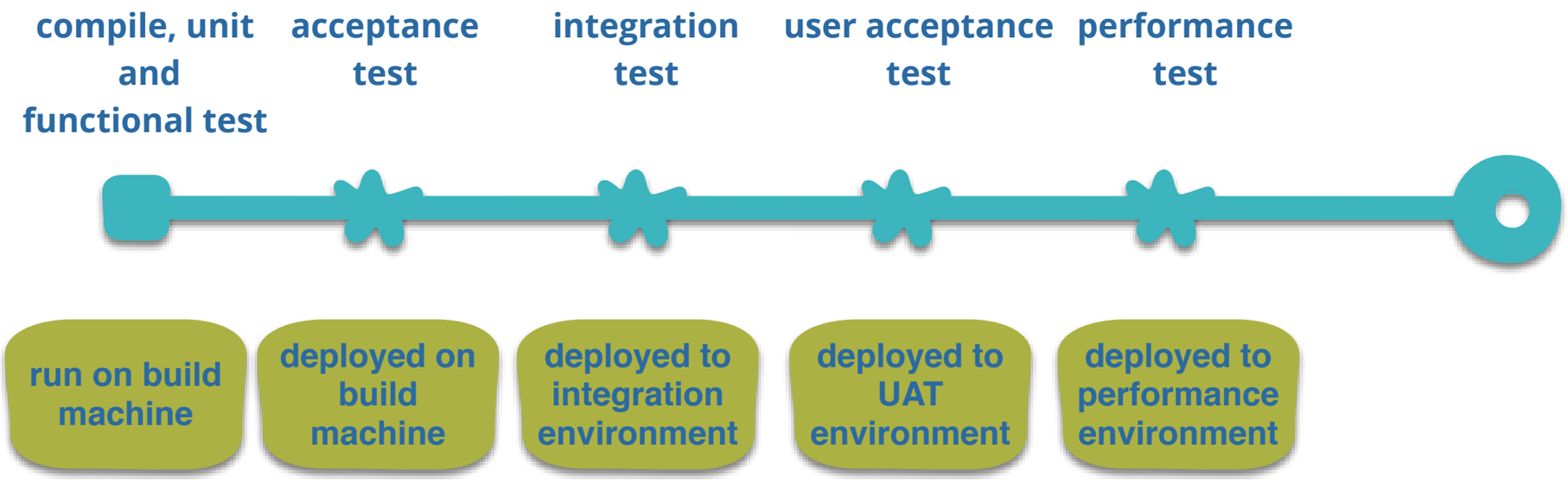
DUPLICATED CODE EVERYWHERE

More configuration management

http://www.clker.com


FSB

Deployment


compile, unit and functional test
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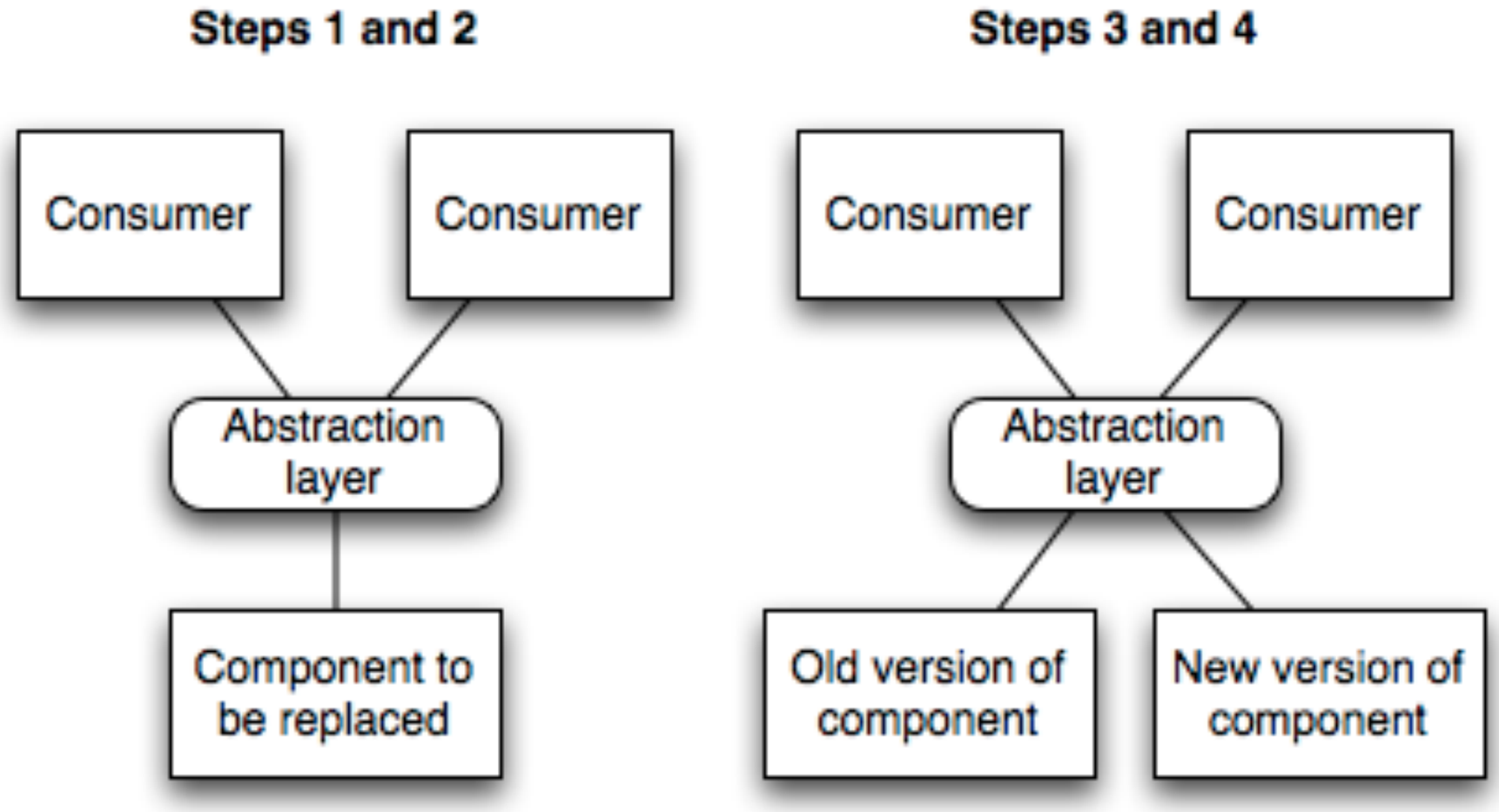
MICRO-SERVICES

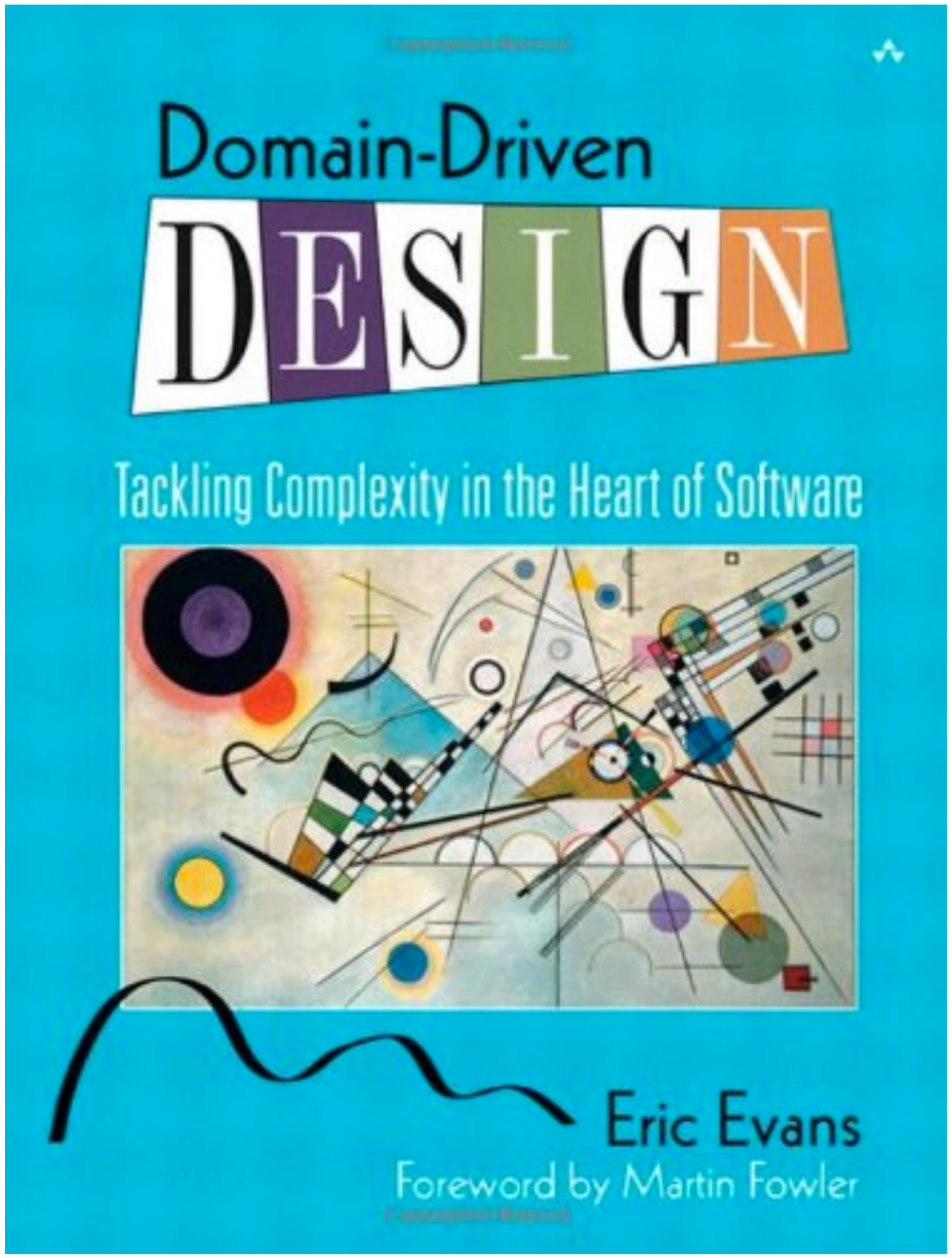
- What are micro-services?
- Why do we want them? Or maybe not..
- **What are the key challenges?**
- Are they the anti pattern of the future?

1. FINDING SEAMS



http://continuousdelivery.com/wp-content/uploads/2011/05/branch_by_abstraction.png

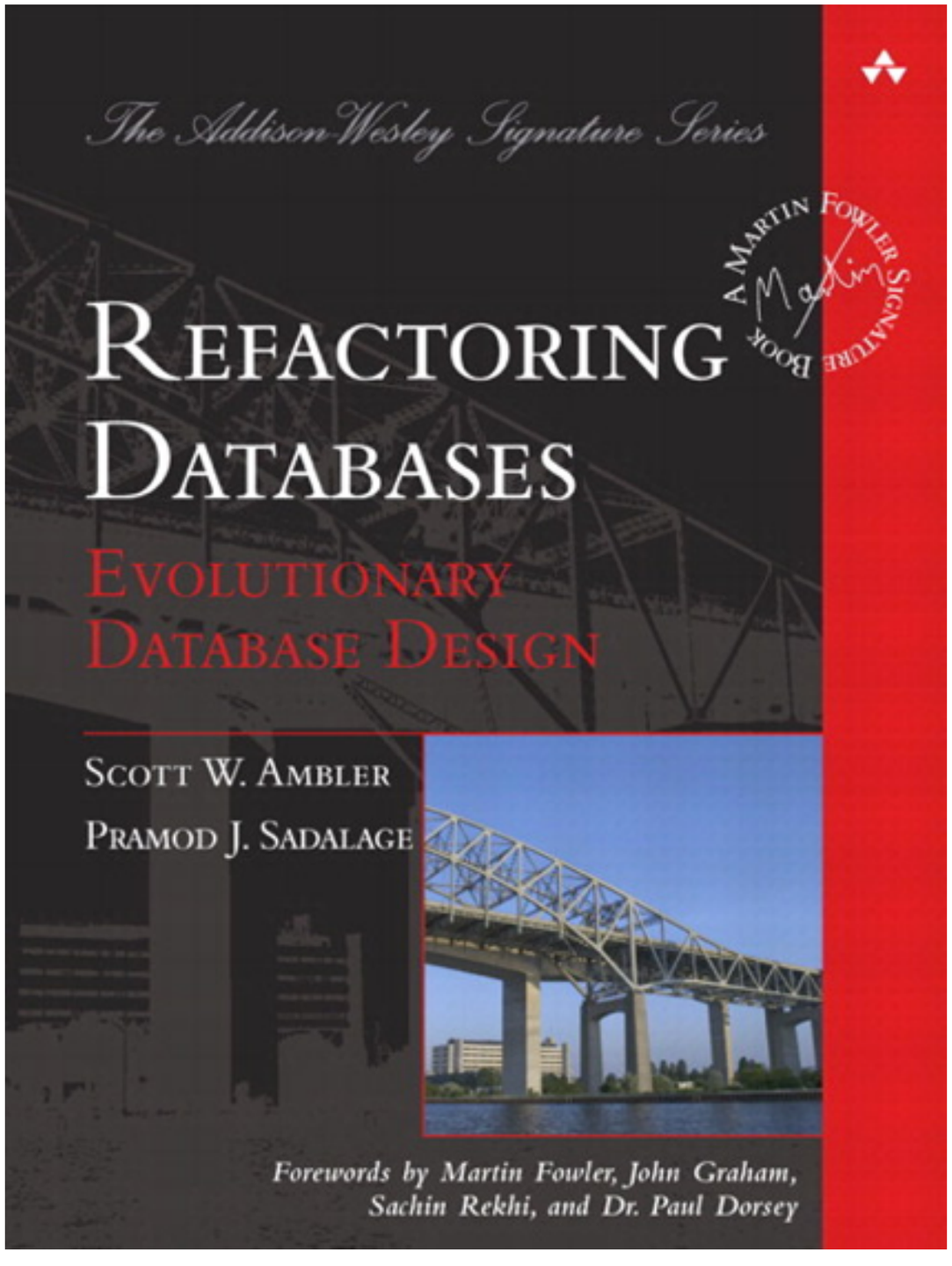
BOUNDED CONTEXT



Domain Driven Design

2. DATA

CHANGING DATA



Refactoring Databases

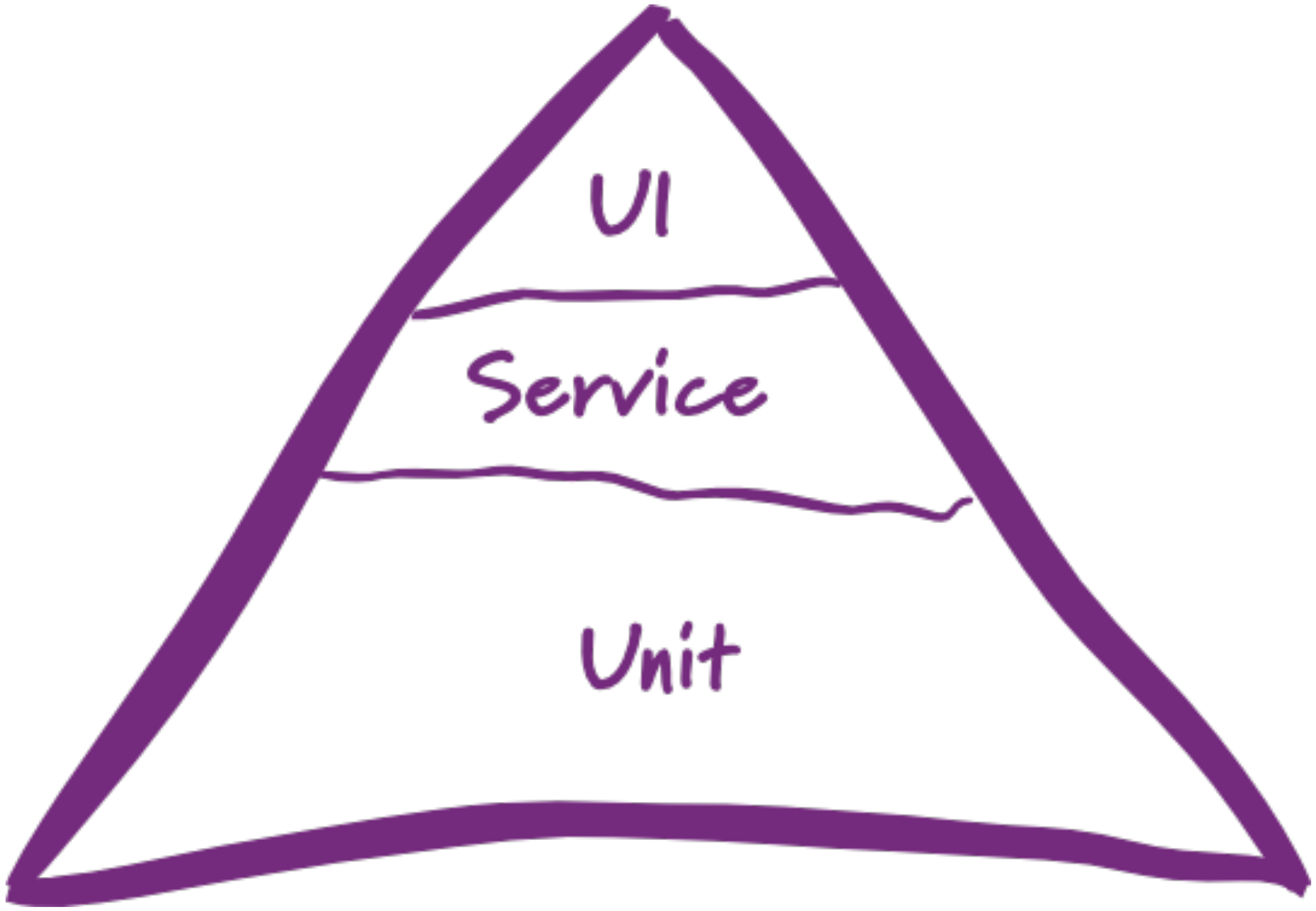
*"One **True** Customer"*

http://devlicio.us/blogs/casey/archive/2009/05/14/commercial-suicide-integration-at-the-database-level.aspx

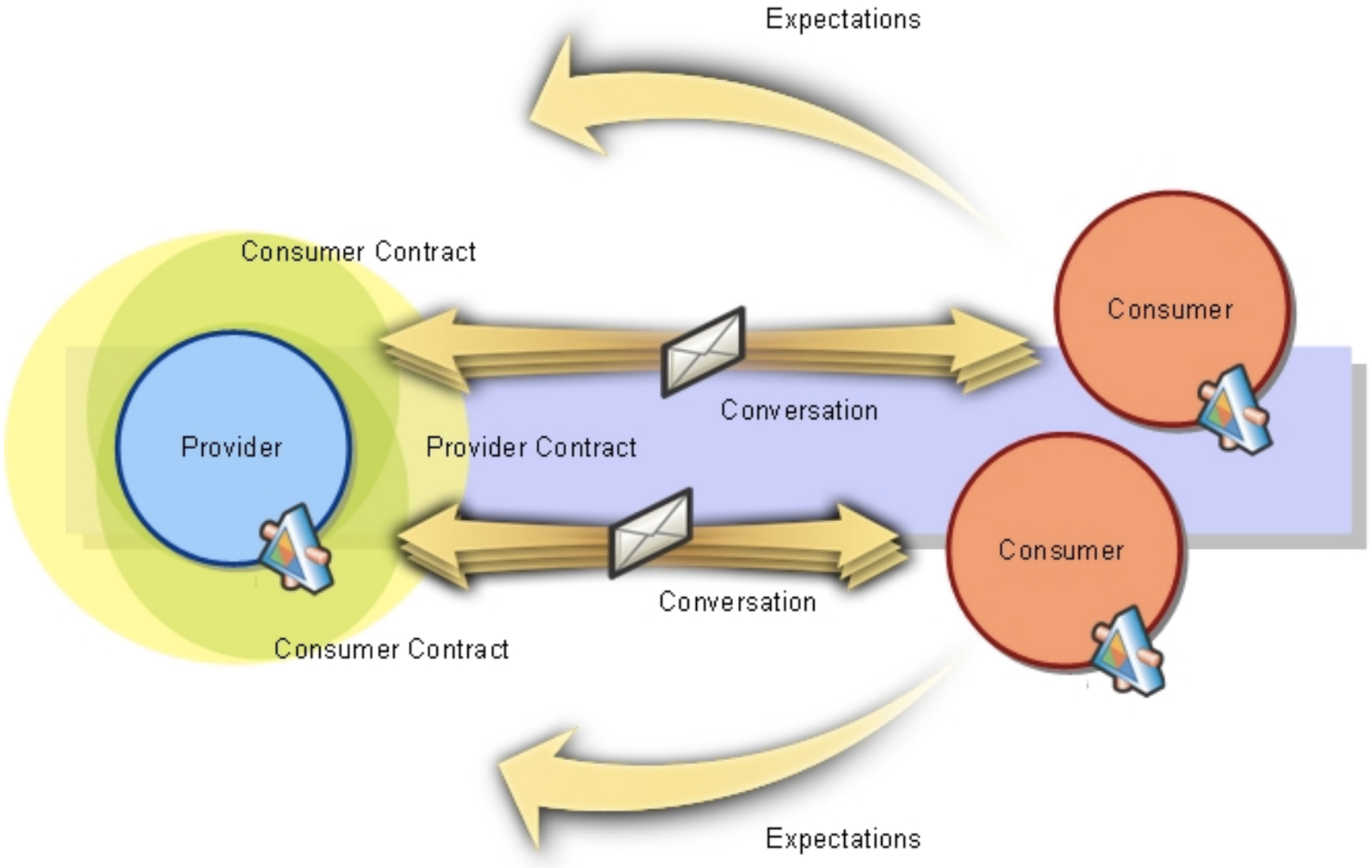
"coz reporting"

http://devlicio.us/blogs/casey/archive/2009/05/14/commercial-suicide-integration-at-the-database-level.aspx

3. TESTING

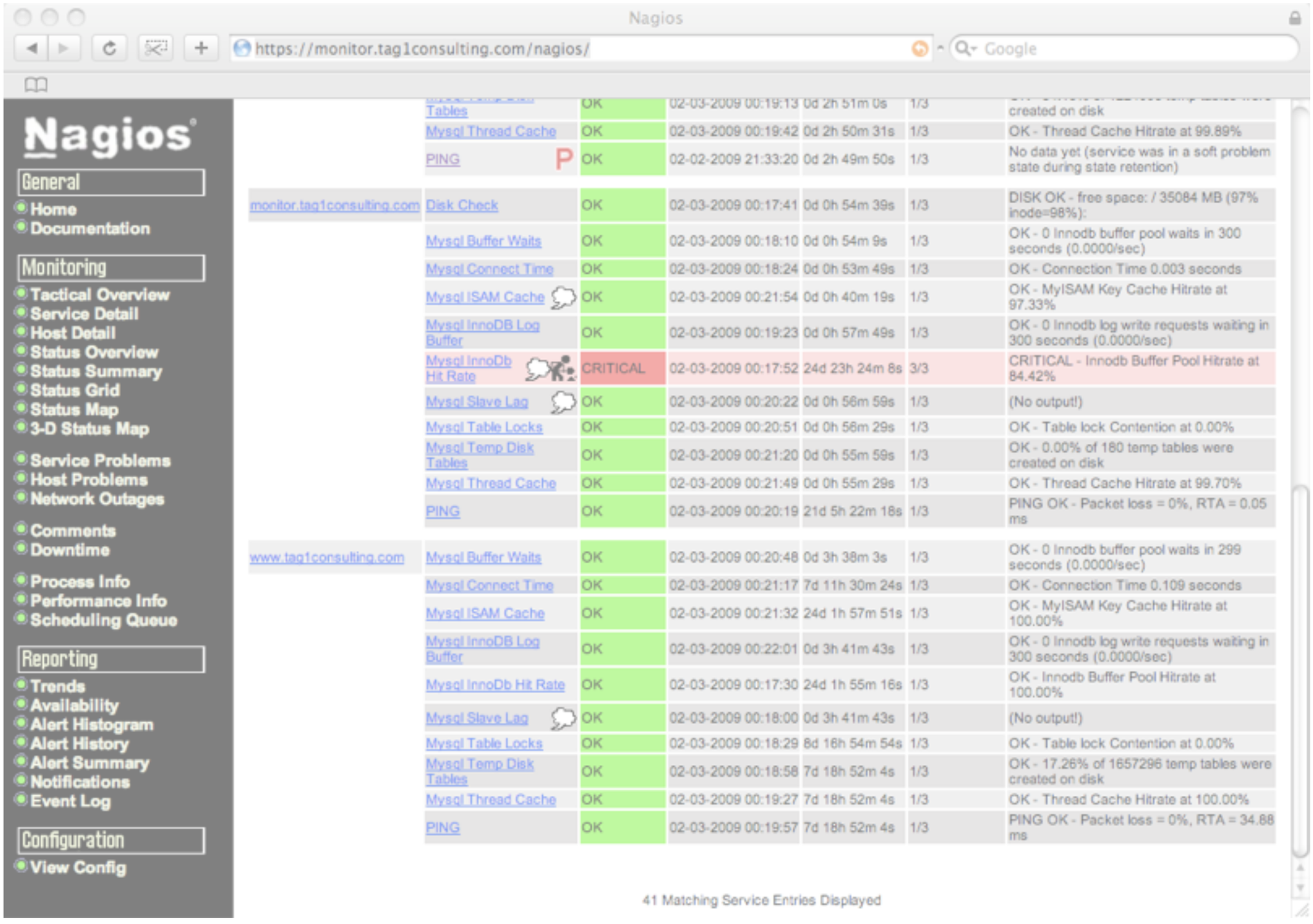


CONSUMER DRIVEN CONTRACTS



http://martinfowler.com/articles/consumerDrivenContracts.html

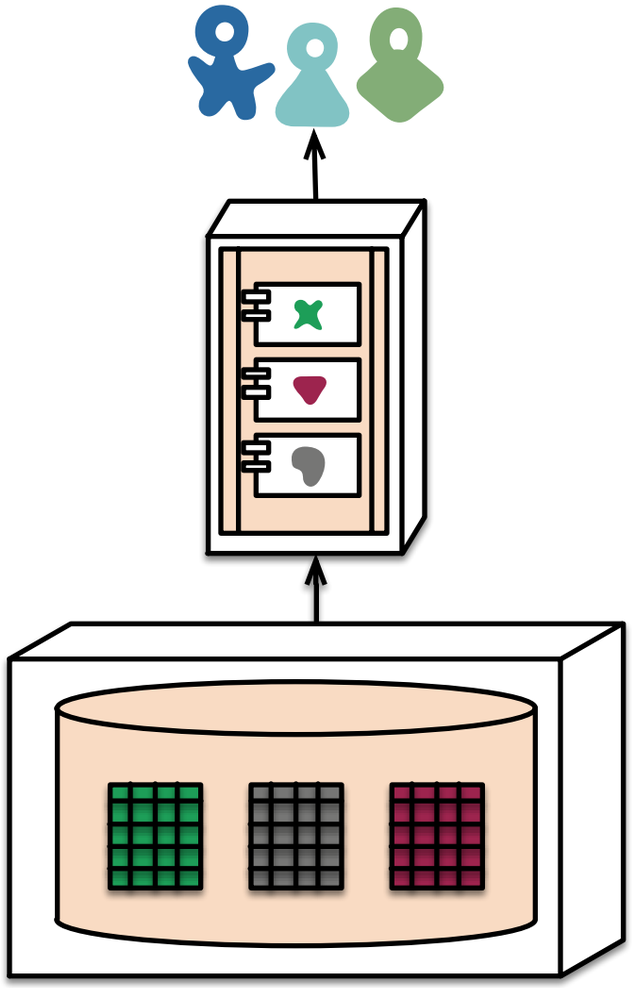
MONITORING


Nagios
https://monitor.tag1consulting.com/nagios/
Google
Nagios
General
Home
Documentation
Monitoring
Tactical Overview
Service Detail
Host Detail
Status Overview
Status Summary
Status Grid
Status Map
3-D Status Map
Service Problems
Host Problems
Network Outages
Comments
Downtime
Process Info
Performance Info
Scheduling Queue
Reporting
Trends
Availability
Alert Histogram
Alert History
Alert Summary
Notifications
Event Log
Configuration
View Config
Tables OK 02-03-2009 00:19:13 0d 2h 51m 0s 1/3 created on disk
Mysql Thread Cache OK 02-03-2009 00:19:42 0d 2h 50m 31s 1/3 OK - Thread Cache Hitrate at 99.89%
PING OK 02-02-2009 21:33:20 0d 2h 49m 50s 1/3 No data yet (service was in a soft problem state during state retention)
monitor.tag1consulting.com Disk Check OK 02-03-2009 00:17:41 0d 0h 54m 39s 1/3 DISK OK - free space: / 35084 MB (97% inode=98%):
Mysql Buffer Waits OK 02-03-2009 00:18:10 0d 0h 54m 9s 1/3 OK - 0 Innodb buffer pool waits in 300 seconds (0.0000/sec)
Mysql Connect Time OK 02-03-2009 00:18:24 0d 0h 53m 49s 1/3 OK - Connection Time 0.003 seconds
Mysql ISAM Cache OK 02-03-2009 00:21:54 0d 0h 40m 19s 1/3 OK - MyISAM Key Cache Hitrate at 97.33%
Mysql InnoDB Log Buffer OK 02-03-2009 00:19:23 0d 0h 57m 49s 1/3 OK - 0 Innodb log write requests waiting in 300 seconds (0.0000/sec)
Mysql InnoDb Hit Rate CRITICAL 02-03-2009 00:17:52 24d 23h 24m 8s 3/3 CRITICAL - Innodb Buffer Pool Hitrate at 84.42%
Mysql Slave Lag OK 02-03-2009 00:20:22 0d 0h 56m 59s 1/3 (No output!)
Mysql Table Locks OK 02-03-2009 00:20:51 0d 0h 56m 29s 1/3 OK - Table lock Contention at 0.00%
Mysql Temp Disk Tables OK 02-03-2009 00:21:20 0d 0h 55m 59s 1/3 OK - 0.00% of 180 temp tables were created on disk
Mysql Thread Cache OK 02-03-2009 00:21:49 0d 0h 55m 29s 1/3 OK - Thread Cache Hitrate at 99.70%
PING OK 02-03-2009 00:20:19 21d 5h 22m 18s 1/3 PING OK - Packet loss = 0%, RTA = 0.05 ms
www.tag1consulting.com Mysql Buffer Waits OK 02-03-2009 00:20:48 0d 3h 38m 3s 1/3 OK - 0 Innodb buffer pool waits in 299 seconds (0.0000/sec)
Mysql Connect Time OK 02-03-2009 00:21:17 7d 11h 30m 24s 1/3 OK - Connection Time 0.109 seconds
Mysql ISAM Cache OK 02-03-2009 00:21:32 24d 1h 57m 51s 1/3 OK - MyISAM Key Cache Hitrate at 100.00%
Mysql InnoDB Log Buffer OK 02-03-2009 00:22:01 0d 3h 41m 43s 1/3 OK - 0 Innodb log write requests waiting in 300 seconds (0.0000/sec)
Mysql InnoDb Hit Rate OK 02-03-2009 00:17:30 24d 1h 55m 16s 1/3 OK - Innodb Buffer Pool Hitrate at 100.00%
Mysql Slave Lag OK 02-03-2009 00:18:00 0d 3h 41m 43s 1/3 (No output!)
Mysql Table Locks OK 02-03-2009 00:18:29 8d 16h 54m 54s 1/3 OK - Table lock Contention at 0.00%
Mysql Temp Disk Tables OK 02-03-2009 00:18:58 7d 18h 52m 4s 1/3 OK - 17.26% of 1657296 temp tables were created on disk
Mysql Thread Cache OK 02-03-2009 00:19:27 7d 18h 52m 4s 1/3 OK - Thread Cache Hitrate at 100.00%
PING OK 02-03-2009 00:19:57 7d 18h 52m 4s 1/3 PING OK - Packet loss = 0%, RTA = 34.88 ms
41 Matching Service Entries Displayed

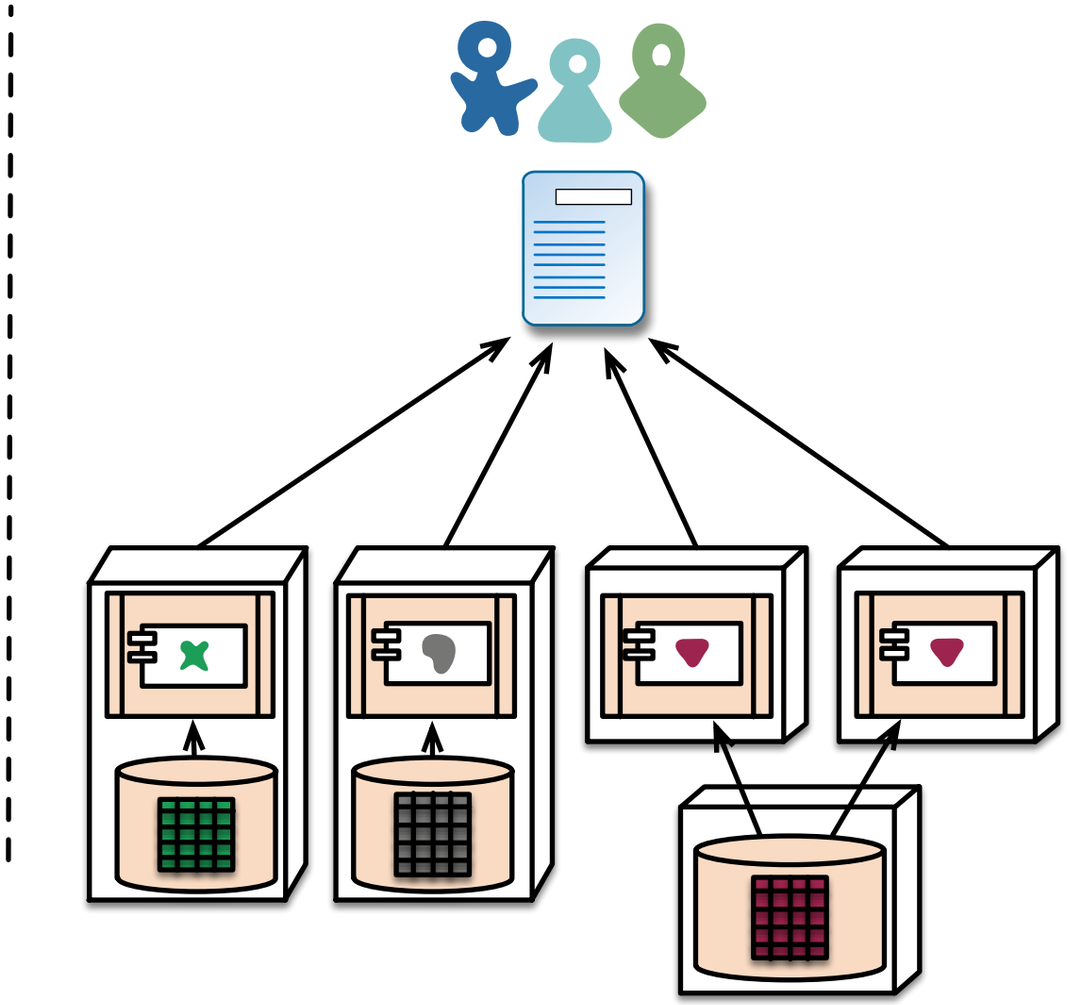
MICRO-SERVICES

- What are micro-services?
- Why do we want them? Or maybe not..
- What are the key challenges?
- **Are they the anti pattern of the future?**

THE MONOLITH BACKLASH



monolith - single database



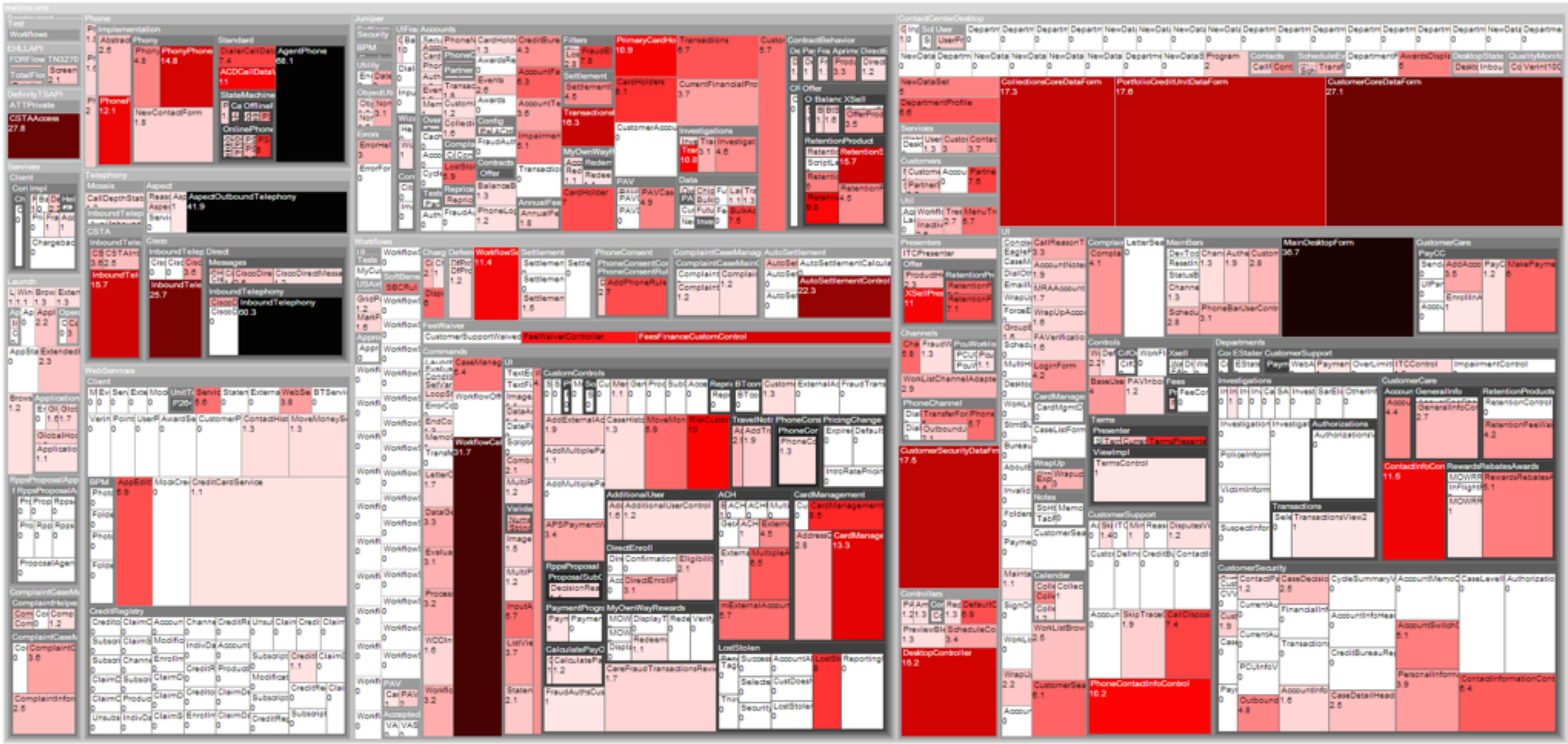
microservices - application databases

MATURITY

http://37.media.tumblr.com/tumblr_lp1ys7Qava1qe6m28o1_1280.png

1. LAST RESPONSIBLE MOMENT

2. ARCHITECT FOR EVOLVABILITY

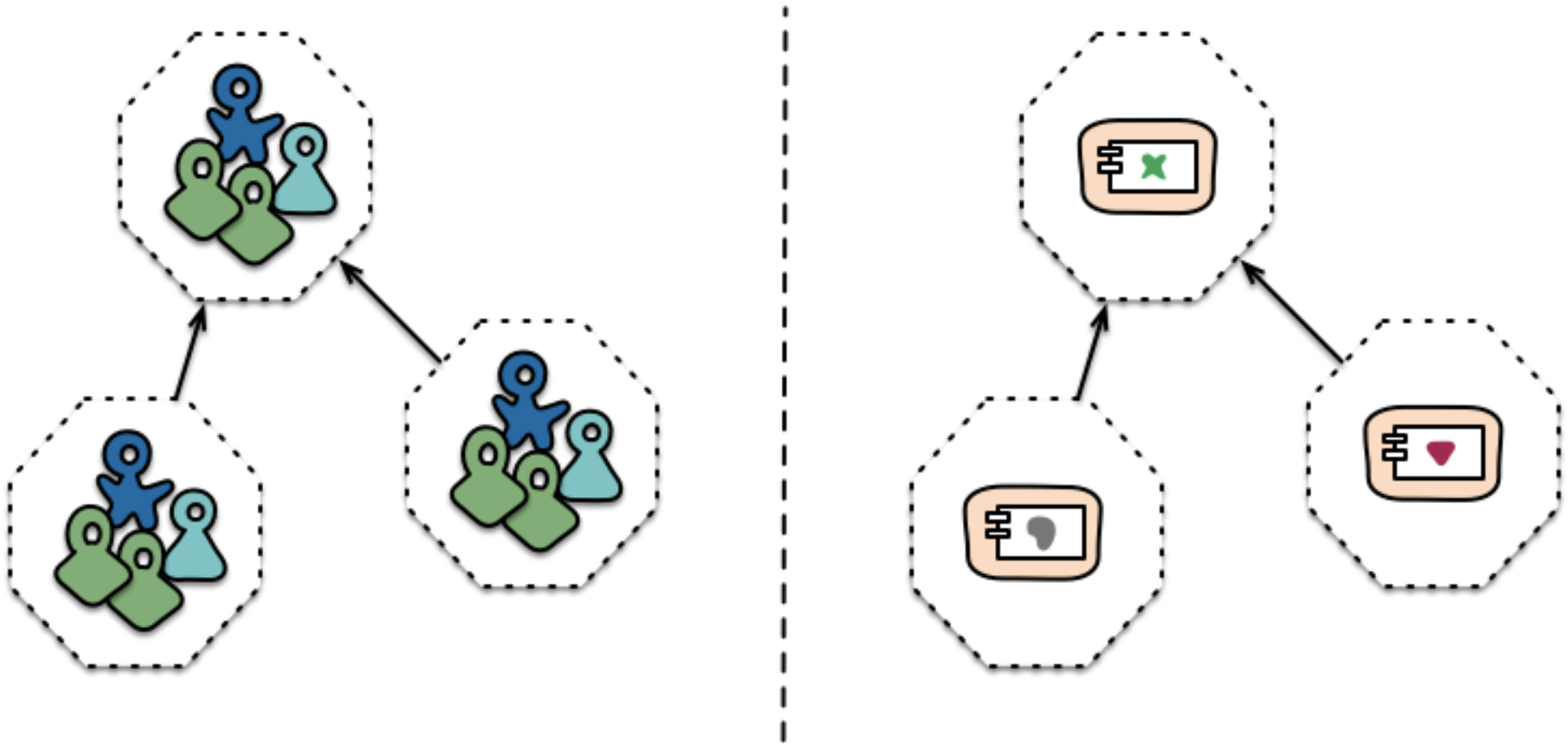


3. POSTEL'S LAW

"Be conservative in what you send, be liberal in what you accept"

4. ARCHITECT FOR TESTABILITY

5. CONWAY'S LAW



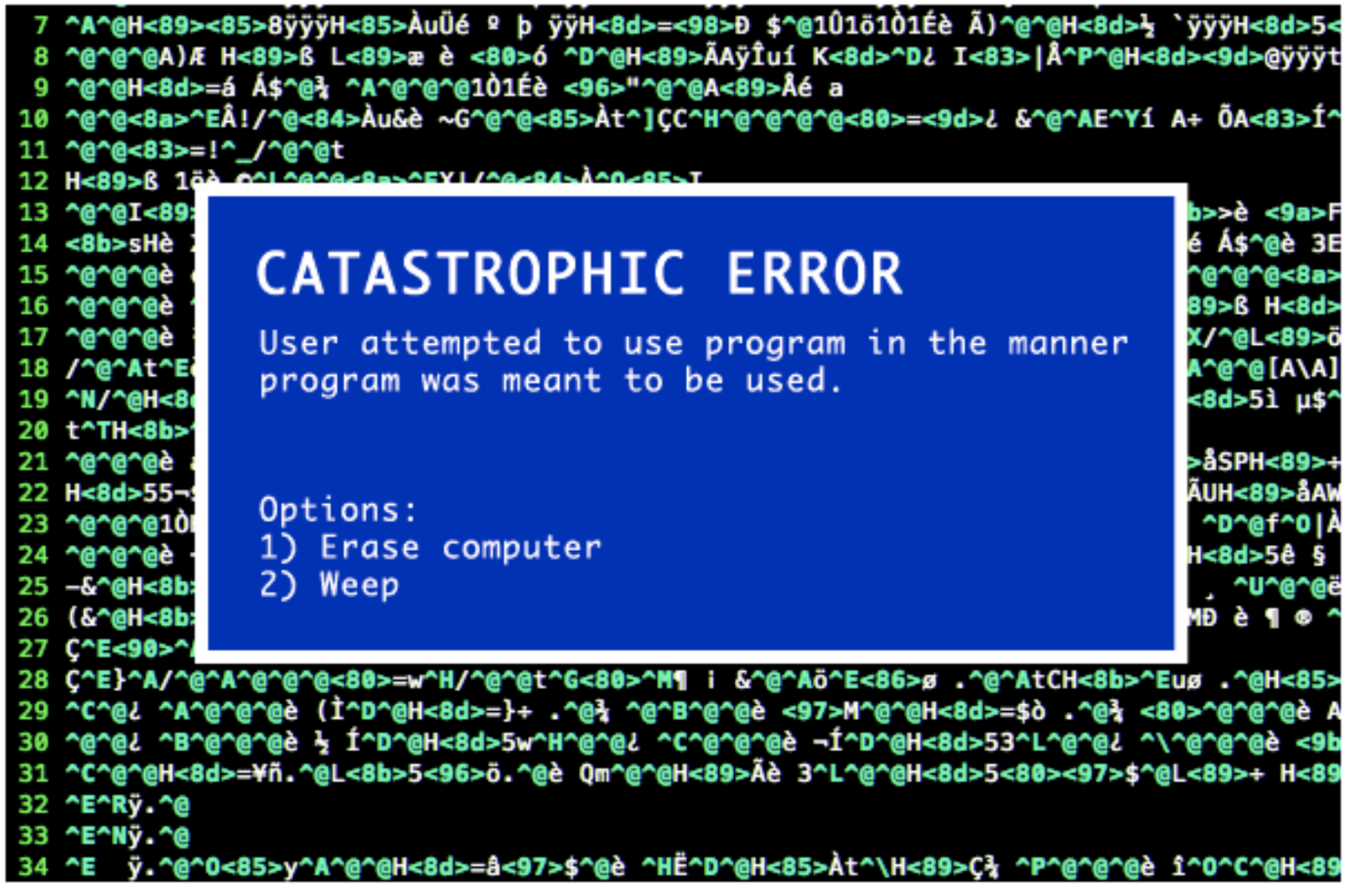
Cross-functional teams...

... organised around capabilities
Because Conway's Law

http://stilldrinking.org/programming-sucks

Programming Sucks

Composed on the 27th of April in the year 2014, at 12:52 PM. It was Sunday.



THANK YOU!

Rachel Laycock
@rachellaycock

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ThoughtWorks®

Resources

Books:

- Continuous Delivery - Jez Humble, Dave Farley
- Working Effectively with Legacy Code - Michael Feathers
- Domain Driven Design - Eric Evans
- Your Brain at Work - David Rock
- Refactoring Databases - Scott W Ambler & Pramod Sadalage
- Building Microservices - Sam Newman

Articles/Blogs:

- Ball of Mud: http://www.laputan.org/mud/
- Demming - http://leanandkanban.wordpress.com/2011/07/15/demings-14-points/
- Coding Horror: http://www.codinghorror.com/blog/2007/11/the-big-ball-of-mud-and-other-architectural-disasters.html
- http://devlicio.us/blogs/casey/archive/2009/05/14/commercial-suicide-integration-at-the-database-level.aspx
- Evolutionary Architecture and Emergent Design: http://www.ibm.com/developerworks/java/library/j-eaed1/index.html
- Microservices: http://www.infoq.com/presentations/Micro-Services and http://yobriefca.se/blog/2013/04/29/micro-service-architecture/ and http://davidmorgantini.blogspot.co.uk/2013/08/micro-services-what-are-micro-services.html
- http://martinfowler.com/articles/microservices.html
- http://highscalability.com/blog/2014/4/8/microservices-not-a-free-lunch.html