Centralized vs. Decentralized Service Oriented Architecture

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Agenda

• “Modern” Service Oriented Architecture
• Governance Concerns
• Discussion
• Wrap-up
MODERN SOA

(Let’s make sure we’re all talking about the same things)
What is Modern SOA?

Microservices!
What are microservices?

A loosely coupled SOA with bounded contexts.

via Adrian Cockcroft
What are microservices?

Services are independently updateable

A loosely coupled SOA with bounded contexts.

via Adrian Cockcroft
What are microservices?

Services are independently updateable

A **loosely coupled** SOA with **bounded contexts**.

Services’ models are explicitly defined and apply within a specific context.

via Adrian Cockcroft
Loosely Coupled SOA

• Communication via messages
• Independently deployable, updateable units
• Typically use REST and HTTP
Bounded Context

• Service is internally consistent within context of a clearly defined boundary
• Domain boundary as API
• Inside the boundary is 100% private to external services
Bounded Context

http://martinfowler.com/bliki/BoundedContext.htm
How Big is a Microservice?

• Size a function of
  • Team maturity, cost, desired agility, domain

• Cockroft’s Rule of Thumb
  • Can complete a service in two weeks or less
  • Completed = coded, tested, and in production
  • Fits in “one or two developers’ heads”
More on Microservices…

Paulo Merson, CMU
MODERN SOA GOVERNANCE
(There’s more than one way to skin a cat.)
Microservices are great where there is consistency in approach; too much variation and you're drowning in cognitive overload.
Ben Lakey @benlakey · Apr 30
@philip_pfo @tastapod What if you only maintain a few of those microservices, rather than every single one of them at your company?

Dan North @tastapod · Apr 30
@benlakey @philip_pfo That's exactly the problem. Without consistency you have the risk of random emergent behaviour and zero governance.

Ben Lakey @benlakey · Apr 30
@tastapod @philip_pfo I get where you are coming from, but at the same time I wonder if there needs to be overarching governance.

https://twitter.com/philip_pfo/status/726173974376386560
Twitter

via Adrian Cockcroft
Hail O

via Adrian Cockcroft
Gilt

via Adrian Cockcroft
“Microservices Architecture”

A normal software architect’s reaction
SPAGHETTI

SPAGHETTI EVERYWHERE
This is not the only pattern.

Point:
1. There are patterns.
2. It’s useful to think at different granularities of abstraction

http://github.com/adrianco/spigo
govern

verb | govern | \'gə-vərn\n
1. to officially control and lead (a group of people)
2. to control the way that (something) is done
3. to control or guide the actions of (someone or something)

From Merriam Webster
What is SOA Governance?

The process of establishing the chain of responsibilities and communications, policies, measurements, and control mechanisms that allow people to carry out their responsibilities in SOA projects.

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Governance Promotes Desired Qualities

- Security
- Availability
- Reusability
- Agility
- Consistency
- Predictability
- Performance
- Maintainability

- Satisfy service level agreements
- Decrease implementation costs
How fast can we go?

Number of Services

Time / Cost to Deploy a Feature
How fast can we go?

Contestation

Number of Services

Time / Cost to Deploy a Feature

33
How fast can we go?

Number of Services

Time / Cost to Deploy a Feature

Contention

Coordination Cost

Number of Services
How fast can we go?

Time / Cost to Deploy a Feature

Number of Services

Contention

Potential Delivery Velocity

Coordination Cost
How fast can we go?

The right governance approach:
- Minimize coordination costs
- Reduce system contention

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<thead>
<tr>
<th>Number of Services</th>
<th>Time / Cost to Deploy a Feature</th>
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Diagram showing:
- Contention
- Potential Delivery Velocity
- Coordination Cost

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What knobs can we tune with governance?
Key Enablers for Success

Process
- Delivery Speed
- Autonomy
- Responsibility
- Ownership

Culture

Tools
- Self-service
- Low delivery friction
- Avoid accidental complexity
- Automation
- Quality
- Developer Led

https://github.com/michaelkeeling/SATURN2015-Microservices-Workshop
<table>
<thead>
<tr>
<th>Key Technology Concerns</th>
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<tr>
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<td>Configuration</td>
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<td>Service Discovery</td>
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<td>Operations</td>
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<td>Development</td>
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## Different choices, different properties

<table>
<thead>
<tr>
<th>Category</th>
<th>Tooling</th>
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<tr>
<td>Common Tooling</td>
<td>Animator</td>
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<td>Configuration</td>
<td>Archius</td>
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<tr>
<td>Service Discovery</td>
<td>Eureka, Prana</td>
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<td>Routing</td>
<td>Zuul, Netty, Ribbon</td>
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<td>Observability</td>
<td>Hystrix, Pytheas</td>
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<tr>
<td>Data Storage</td>
<td>MemcacheD, Cassandra</td>
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<tr>
<td>Operations</td>
<td>Manual orchestration with Asgard, deployed on AWS</td>
</tr>
<tr>
<td>Development</td>
<td>JVM, Docker</td>
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DISCUSSION
(The show you came here to see.)
What kind of governance is needed to succeed with SOA?
What approaches to governance would Alexander Hamilton and Thomas Jefferson take in a modern SOA system?
Thomas Jefferson

US “Founding Father”

Declaration of Independence Author

Third president of the USA

Louisiana Purchase

VA Statute of Religious Freedom

Inventor, philosopher, writer, archeologist, architect, …
US “Founding Father”

_Federalist Papers_ author

First Secretary of Treasury

Established National Bank

Father of the US Coast Guard

First political sex scandal in US

Killed by Aaron Burr in a duel
Jefferson: George Fairbanks

Weaker SOA governance

Pro developer choice

Trust developers to have the discipline to do what is right

“The most power should rest in the hands of those most affected by it.”
Strong SOA Governance

General distrust of developers’ abilities to make the right choice

Seeks stability over general liberty (but not to the point of monarchy)

“Liberty and freedom are so essential they cannot be left to the mob to decide.”

Hamilton:
Michael Keeling
You!
Topics

• Technology Choices
• Availability and Reliability
• Configuration Management
• Service Reuse
• Quality
TECHNOLOGY CHOICES
Do you have a standard or let everything grow organically? How important is the choice? Who makes the choices and when?

- Runtimes and frameworks
- Protocols
- Programming languages
- Interface definitions
- Communication mechanisms
AVAILABILITY AND RELIABILITY
Who is responsible for promoting key qualities across the whole system?

- Development practices
- Defect prevention
- Build pipelines
- Deployment and rollback
- Monitoring and detection
CONFIGURATION MANAGEMENT
What is the effect of service version changes? How do you maintain stability over time?

• Version control
• Versioning
• Upgrades and backwards compatibility
• Public vs. “Private”
SERVICE REUSE
A promise of SOA is service reuse. How can this be achieved vs lots of redundant and incompatible services?

- Discovery
- Packaging
- Communication
- Implementation responsibility
- Awareness
QUALITY
Quality: Key Concerns

Is there a shared dev environment? Who ensures that it’s any good? What if it has junk data left behind from half-broken code? Who is responsible if an end-to-end test breaks?

- Dev vs. Stage vs. Production
- Who is responsible for quality?
- API contracts and design standards
- Unit vs. functional vs. end-to-end testing
- Properties testing, monitoring, prediction
CONCLUSIONS AND WRAP-UP
Reduce contention?

or

Reduce coordination?
Focus on Contention

Thomas Jefferson

Focus on Coordination

Alexander Hamilton
Time / Cost to Deploy a Feature

Number of Services

Contention

Coordination Cost
Number of Services

Time / Cost to Deploy a Feature

Contention

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Time / Cost to Deploy a Feature

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Coordination Cost
Thank you!

Check out Michael's book…

Coming soon to the Pragmatic Bookshelf!

Filled with hands-on exercises!

A practical guide to software architecture design!


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