



Advanced Software Engineering FOSS 1/2 The cool and the cruel of MicroServices

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About me

- **Mark Struberg**
- **25 years in the industry**
- **Apache Software Foundation member**
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- **RISE GmbH employee**
- **TU-Wien / INSO researcher**
- **Committer / PMC for Apache OpenWebBeans, MyFaces, TomEE, Maven, OpenJPA, BVal, Isis, DeltaSpike, JBoss Arquillian, ...**
- **Java JCP Expert Group member**
- **MicroProfile Spec Author**
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Agenda

- **General Considerations**
- **What is a MicroService?**
- **What is JavaEE?**
- **Showcase a few Apache projects**

General Considerations

The destructive mini-me

- **There are people who always see the bright side**
- **And people who always see the downsides!**

The Weapon of Choice

- **"If you have a hammer, every problem seems to be a nail"**
- **"Es gibt für jede Schraube den passenden Hammer!"**
- **"Use the right tool for the right job"**
- **Every design decision has pros and cons!**
 - There is no solution which perfectly fits all your problems
 - Example: centralised vs de-centralised systems, App evolution in waves: HOST -> server/client PCs -> HTML webapps -> AJAX -> native phone apps -> microservices ->?
- **Know your weapons!**
- **Know your problems!**

MicroServices

If MicroServices are the answer

- ... what was the question or problem causing it?
- **Monoliths**
 - extremely recursive inner dependencies
 - No clear separation of concerns
 - No clear inner design ("take whatever you need")
 - Not easy to scale
 - Hard to roll outs

What is a 'MicroService'?

- <https://smartbear.com/learn/api-design/what-are-microservices/>

Essentially, microservice architecture is a method of developing software applications as a suite of independently deployable, small, modular services in which each service runs a unique process and communicates through a well-defined, lightweight mechanism to serve a business goal.

How big is a MicroService

- **MicroServices are 'small, independent systems'**
 - but how big is 'small'?
 - What is the size of a typical MicroService
- **How big is a JavaEE server in contrast?**
 - Apache TomEE: 35MB
 - Apache Meecrowave: 9MB

Independent Services

- **Are MicroServices really independent of each other?**
- **How about versioning?**
- **How to detect if a feature is unused?**
- **Independent Data**
 - A MicroService is self contained - including it's data
- **Independent Programming Language and Frameworks**
 - At least when using REST
 - Not that easy with messaging

Data Consistency and Transactions

- **XA requires fast connections**
 - does not really work over MicroServices
- **Eventual consistency**
- **Compensations**
- **Persistent Messaging**

Netflix does all that?

- **NO, of course not!**

Fallacies of Distributed Computing

- **As postulated by Peter L. Deutsch (Sun Microsystems):**
 - The network is reliable.
 - Latency is zero.
 - Bandwidth is infinite.
 - The network is secure.
 - Topology doesn't change.
 - There is one administrator.
 - Transport cost is zero.
 - The network is homogeneous.

Testing the ball of mud

- **Testing Distributed Applications is no easy task**
- **3 strategies**
 - Massive Integration Testing
 - Mocking the hell out of your project
 - Capture & Replay

The takeaway?

Useful MicroService tricks

- **Monoliths have the same problems when talking with other systems!**
 - No XA, need to store steps separately or use a state machine (process engine, status in the DB, Compensations, etc)
 - Circuit Breakers
 - Bulkheads
- **Separate high-volume/low consistency areas from important areas**
- **Split your whole problem in distinct parts with their own Database (Conway's Law)**
 - Those parts don't need to be 'micro' though!

Application Layering

- **Also works with Monoliths**
- **TODO Die Zwiebel!**

JavaEE vs SOA vs MicroService vs ...

- Is this really a 'vs'?
- Or is it more like fitting parts?

JavaEE

Apache Java EE Parts

- **Full Profile**
- **WebProfile**

Servlets: Apache Tomcat

- **55% market share overall**
- **Alternatives: Undertow, Eclipse Jetty**
- **Non-HTTP:**
 - Socket Servers: Apache MINA, JBoss Netty
 - Messaging

CDI: Apache OpenWebBeans

- **A fast and small CDI container**
- **Modular built**
- **Base for many servers**
- **Meecrowave as sub project**

JSF: Apache MyFaces

- **Server Side Rendering**
 - Alternative: Java Script based rendering on the client.
Angular, React, Vue.js
- **Well suited for form driven apps**
 - sophisticated data lifecycle
- **JSF Apps run since 10++ years**
 - and are still maintainable...

JSON-P & JSON-B

- **Apache Johnzon**

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Apache Geronimo

- **Attention: NOT the Geronimo Server!**
 - that one is retired and EOL...
- **Many useful EE components**
 - geronimo-specs
 - xBean
 - geronimo-config
 - transaction manager
 - javamail

Apache TomEE

- **Web Profile Server**
- **Full Profile Server**
- **Small and Fast**
- **Based on Apache Tomcat**
 - lightweight like Tomcat
 - full featured like commercial servers

How to contribute

- **Pick a project**
- **Become familiar with the topic**
- **Start reading the mailing list**
 - you can also read the archives via markmail, nabble, etc
 - <http://lists.apache.org>
- **Check out the Source Code**
- **Use the project!**
- **Start reporting bugs...**
- **... and ship patches.**

The 'Apache Way'

- **Goals**

- Reduce barriers to project participation
- Improve quality
- Achieve consensus and resolve conflicts
- Balance needs of corporate interest with needs of individual contributors

Questions?