The Cool and the Cruel of MicroService - Das große ASF MicroService Puzzle

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About me

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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 and spec lead
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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 perfcectly 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**

JavaEE vs SOA vs MicroService vs ...

- **Is this really a 'vs'?**
- **Or is is 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**
  - rock solid data lifecycle
- **JSF Apps run since 10++ years**
  - and are still maintainable...

JSON-P & JSON-B

- **Apache Johnzon**
- **Generate and Read JSON (JSON-P)**
- **transfer Java Objects <-> JSON (JSON-B)**

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
  - various MicroProfile specification implementations

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?