Modern .NET Software Architecture

Where are we today?

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1. TicTacTech
2. A Brief History of Software Engineering
3. Microservice Characteristics
4. Microservice Examples
5. Inside TicTacTech
6. Summary
On Android I had problems with Chrome, but it works great with Opera!?
A Brief History of Software Engineering
A Look Around Today

Google Trend „Microservices“
A Look Around Today

Google Trend „SOA“

Interesse im zeitlichen Verlauf

01.01.2004 01.10.2007 01.07.2011 01.04.2015
A Look Around Today

Google Trend „Microservices“ versus „Service Oriented Architecture“
A Brief History of Software Engineering

1940
- Mark 1

1970
- The UNIX Philosophy (DOTADIW)

1978
- The UNIX

1989
- {OOP}

1996
- SOA

2000
- RESTful Services

2001
- Agile Manifesto

2002
- The Cloud

2003
- DDD

2005
- "Micro-Web-Services"

2007
- DevOps

2011
- Microservices

2013
- Reactive Manifesto

09.09.2016

WWW

WWW
DENNIS RITCHIE & KEN THOMPSON

Inventors of UNIX.

A.M. TURING AWARD 1973

acm
„Do one thing and do it well“

- Make each program do one thing well
- Expect the output of every program to become the input to another
- Design software and systems to be tried early, don‘t hesitate to throw away
- Use and make tools.
The Reactive Manifesto

https://www.reactivemanifesto.org/
Microservice Characteristics
The Evolution of Software Architecture
The Evolution of Software Architecture
The Evolution of Software Architecture
Microservice Characteristics

- Small and self-contained, owns its datasource, owned by 1 team
- Easy to replace, individually deployable and disposable
- Organized around capabilities
- Implemented with „what fits best“
- „Smart endpoints and dumb pipes“
- Designed for failure

http://martinfowler.com/articles/microservices.html/
N-Tier / X-Layer ➔ Microservice
Microservice Examples
Microservice Example 1: Microsoft Azure

ESB Reality

The reality of the "Bus" is a Hub n-way cluster with centralized repository

Challenges: Scale-Out, Connectivity, HA/Geo/DR, Repository Complexity, Cost

Case-Study Windows Azure

- Feature Services
- Shared Backend Services
- Independent Teams
- Shipping Features/Fixes Daily
- 8+ Core Datacenter Facilities
- Countless Feature Clusters
- External Partner Integration

- Thousands of very diverse customer workloads

Clemens Vasters: Utopia ESB

Microservice Example 2

«MicroMonolith - Top anti-patterns of distributed systems»
- Michal Franc

NDC Oslo 2016
https://vimeo.com/171704583
Microservice Example 3

«A High-Performance Solution to Microservices UI Composition»

NDC Oslo 2016
https://vimeo.com/171927597
Inside TicTacTech
Architectural Overview

- **Logged-In**
  - HTML - JS
  - Web API
    - `tictactechplayer`
  - Document DB

- **PlayerChanged**
  - HTML - JS
  - Game Events

- **HTML - JS**
  - SignalR
  - Web API
    - `tictactechstats`
    - `tictactechstatsdb`
  - Data Collector

- **SignalR**
  - Reliable Service
  - Reliable Actors

- **Service Bus**
  - Listener

- **Web API**
  - `tictactechplayer`

- **HTML - JS**
  - Game Events

- **Document DB**

- **“Branding Service”**

- **Microsoft Azure ServiceBus**

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Microservice Example 4: TicTacTech

- **PlayerService**
  - ASP.NET Web API
  - Microsoft Azure DocumentDB

- **GameService**
  - Microsoft Azure
  - Service Fabric
  - Reliable Actors

- **StatisticsService**
  - Azure Web Job
  - SignalR
  - Sql Server

- **User Interface**
  - aurelia.io
  - HTML
  - CSS

- **Other**
  - Azure ServiceBus
  - Microsoft Azure
Azure Service Fabric

- Cluster Management
- Stateful Middle Tier
- Runs any EXE
- Specific APIs
  - Reliable Actors
  - Reliable Services
- Rolling Updates
Actors: “Objects done right”
Other Technologies to look at

- Actors
  - AKKA.NET
  - Orleans
- Messaging
  - Server
    - NServiceBus
  - Server to UI
    - Sockets
Microservice Challenges

- UI Composition – How to separate UI parts?
- Complexity
- Logging / Monitoring
- Integration testing
- Deployment
Thank You!

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