Microservices: How to make your application scale

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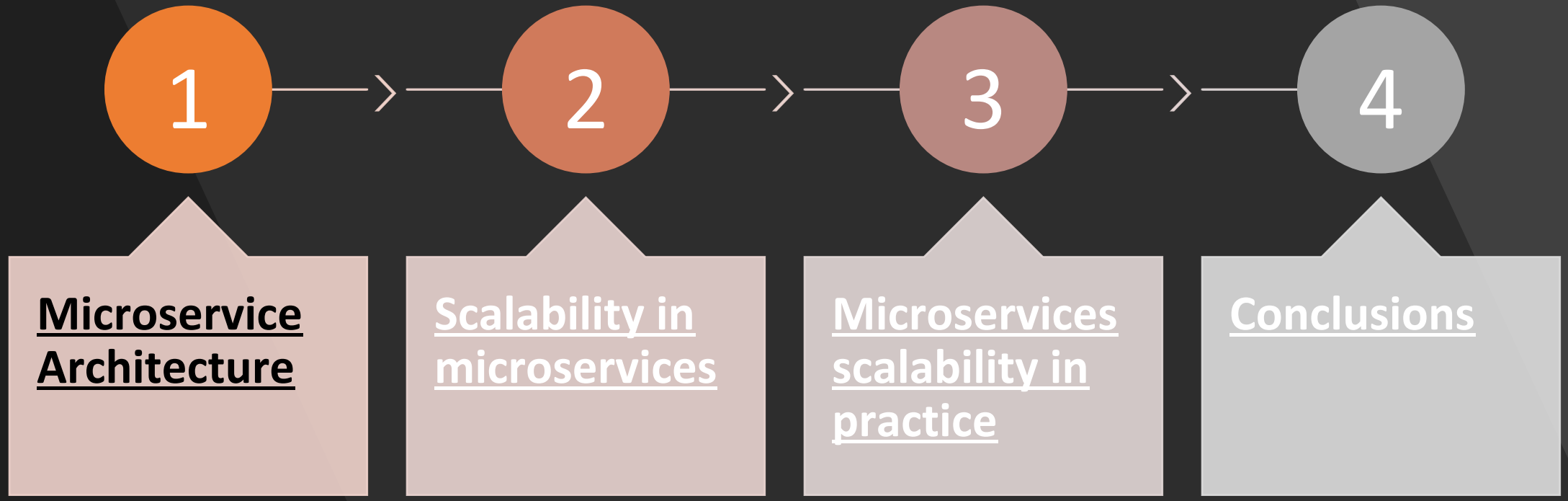
Agenda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Microservice Architecture
Scalability in microservices
Microservices scalability in practice
Conclusions

1: Microservice Architecture

Microservices

Inspired by **SOA**

Developed around **business capabilities**

Each microservice implements a limited amount of functionality and runs its own process

Uses lightweight **communication** mechanisms

Supports pervasive distribution and scalability

What does this all mean?

- A Microservice is not just “a very small service”
- There is not a predefined “size limit” that define whether a service is a microservice or not
- Indeed “microservice” is a somehow misleading definition
  - Or better there is not definition at all, or not a unique one

Distinctive Characteristics

- **Size** : The size is comparatively small wrt. a typical service
  - Focus on providing only a **single business capability**
  - Benefits in terms of service maintainability and extendibility

- **Bounded context :** related functionalities are combined into a single business capability, which is then implemented as a service

- **Independency** : Each service is operationally independent from other, and the only form of communication between services is through their published interfaces

SOA vs. Microservices

- In SOA Services are not required to be **self-contained** with data and UI
  - No focus on **independent deployment** units and its consequences

- Focused on enabling **business-level programming** through **business processing engines** and languages such as BPEL and BPMN

2: Microservices scalability

Microservices scalability (1)

Portability

- Containers technologies
- Horizontally scaling

https://www.docker.com/

Elasticity

- Natural for the clouds
- Dynamically scaling

Microservices scalability (2)

Availability

- Ease of replication
- Updates and evolution on the fly

Robustness

- Fault tolerance over independent processes and containerization
- Logical vs physical environment

3: Microservices scalability in practice

Language-based

- The fine granularity of microservices moves the complexity of applications from the implementation of services to their **coordination**

- **Communication, interfaces, and dependencies are central to the development of microservice applications**

- Such concepts should be available as ***first class entities*** in a language that targets microservices

Programming language for microservices

- Four concepts are identified to be ***first class entities*** in a programming language for microservices
  - **Interfaces**
  - **Ports**
  - **Workflows**
  - **Processes**

- **Jolie** (Java Orchestration Language Interpreter Engine) includes all of them

Jolie Programming Language

- A language for microservice
  - Imperative with standard constructs such as **assignments**, **conditionals** and **loops**
  - Constructs dealing with distribution, communication and services
  - Variables are trees to for easy marshal/unmarshal (XML)
  - Separation of concerns between **behaviour and deployment** information

- Jolie takes inspiration from **WS-BPEL** and **CCS**
  - transfers these ideas into a full-fledged programming language

Applications

Netflix (Chaos Monkey)

Pioneers who moved from monolith to microservices to ensure scalability

IoT and Smart Buildings

Easy to separate the logic into small components

4: Conclusions

Microservices and scalability, summary

1

Microservices architecture is **more complex** than one based on monoliths

- The cost of growing and scaling easily

2

The future is certainly not challenge-free

- Security issues
- Quality of packages and correctness
- Computational capabilities

3

No silver bullet

- Multiple independent entities introduce extra overhead for deployment, administration, monitoring, and security
- Sometimes microservices are not the solution

Additional References

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