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Microservices - Introduction

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SE ZG583, Scalable Services

Lecture No. 4

What is Monolithic Architecture?



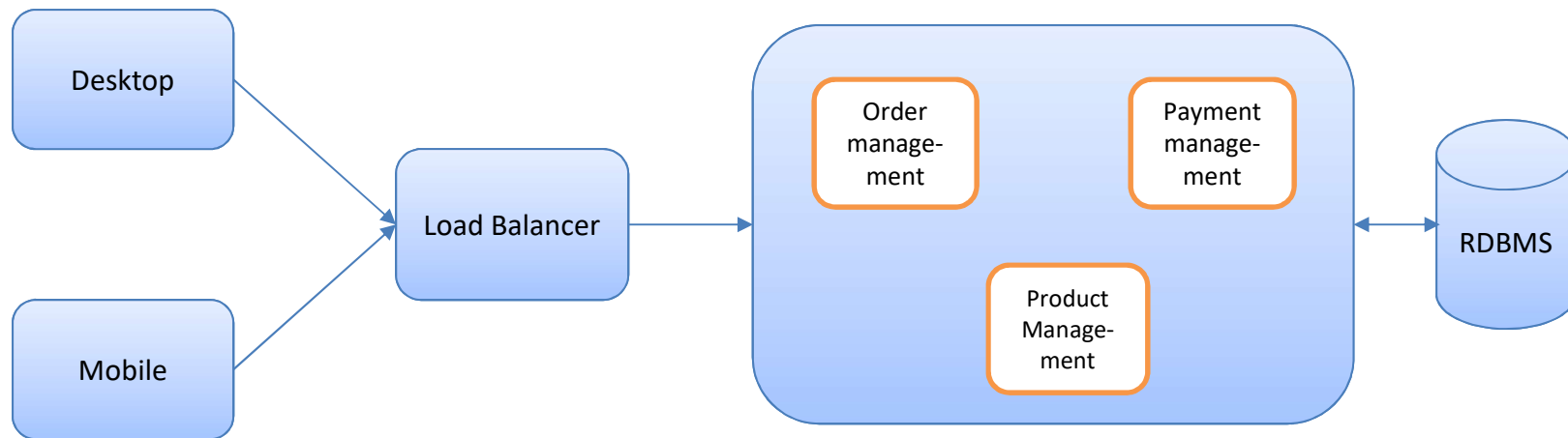
- Monolith means composed all in one piece.
- They're typically complex applications that encompass several tightly coupled functions.
- When all functionality in a system had to be deployed together, we consider it a **monolith**.



Example Architecture



Online shopping



Disadvantages of Monolith



- It becomes too large in size with time and hence, difficult to manage.
- Slow development and deployment
- Adoption of a new technology is very difficult and expensive

Need for Microservices

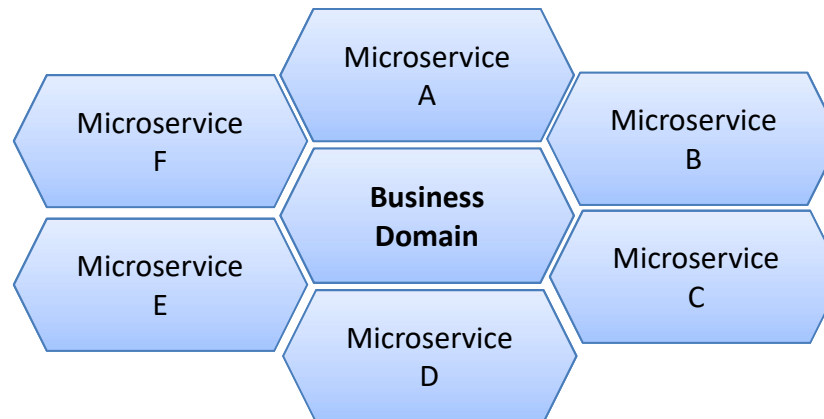


- Why is there a need to convert a fully functional monolithic application to Microservices ?
- Is the conversion worth the pain and effort?
- Should I be converting all my applications to Microservices?

What is Microservices?



- Microservices are independently deployable services modeled around a business domain.
- They communicate with each other via networks,
- Each microservice can focus on a single business capability

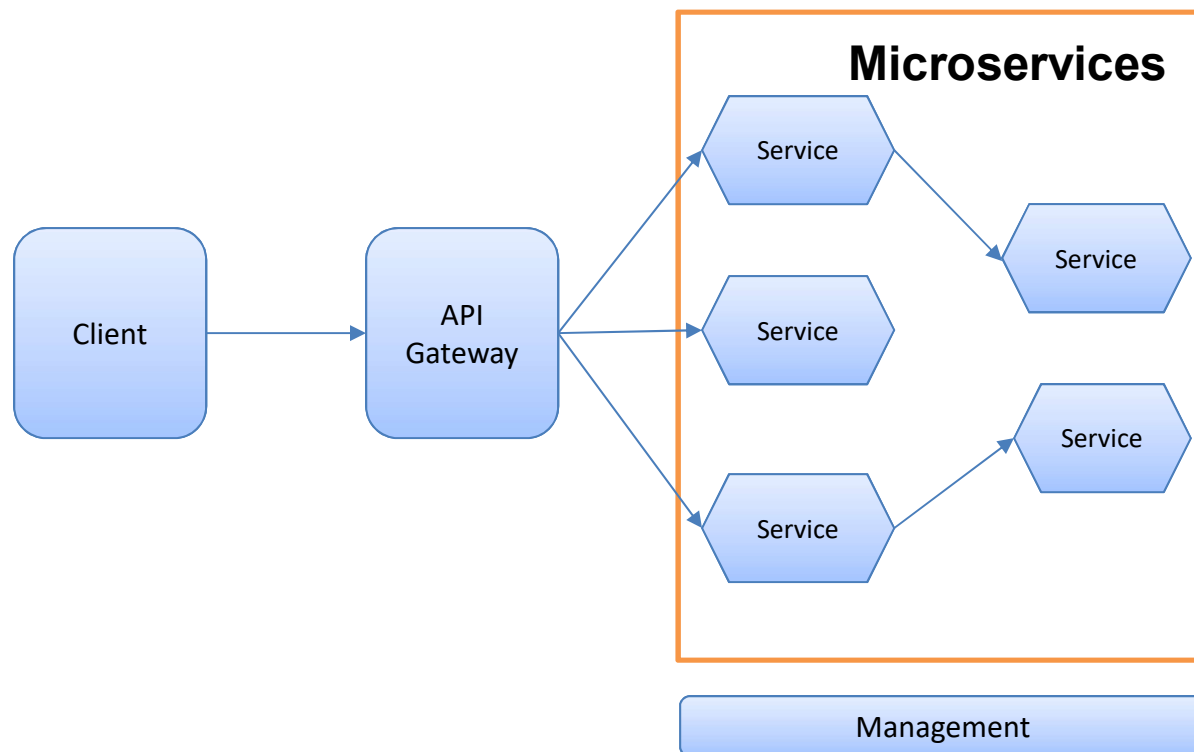


Main characteristics of microservices



- Small, and Focused on Doing One Thing Well
- Autonomous
- Loosely coupled

Example Architecture



SOA



- SOA, or service-oriented architecture, defines a way to make software components reusable via service interfaces.
- These interfaces utilize common communication standards in such a way that they can be rapidly incorporated into new applications without having to perform deep integration each time.

SOA Vs Microservices



- SOA is an enterprise-wide concept.
- Microservices architecture is an application-scoped concept

SOA Vs Microservices



Communication

- In a microservices architecture, each service is developed independently, with its own communication protocol.
- With SOA, each service must share a common communication mechanism called an enterprise service bus

SOA Vs Microservices



Data Duplication

- Providing services in SOA applications get hold of and make changes to data directly at its primary source, which reduces the need to maintain complex data synchronization patterns.
- In microservices applications, each microservice ideally has local access to all the data it needs to ensure its independence from other microservices, and indeed from other applications, even if this means some duplication of data in other systems.

SOA vs Microservices: Which is best for you?



- Both approaches have their advantages, so how can you determine which one will work best for your purposes?
- In general, it depends on how large and diverse your application environment is.



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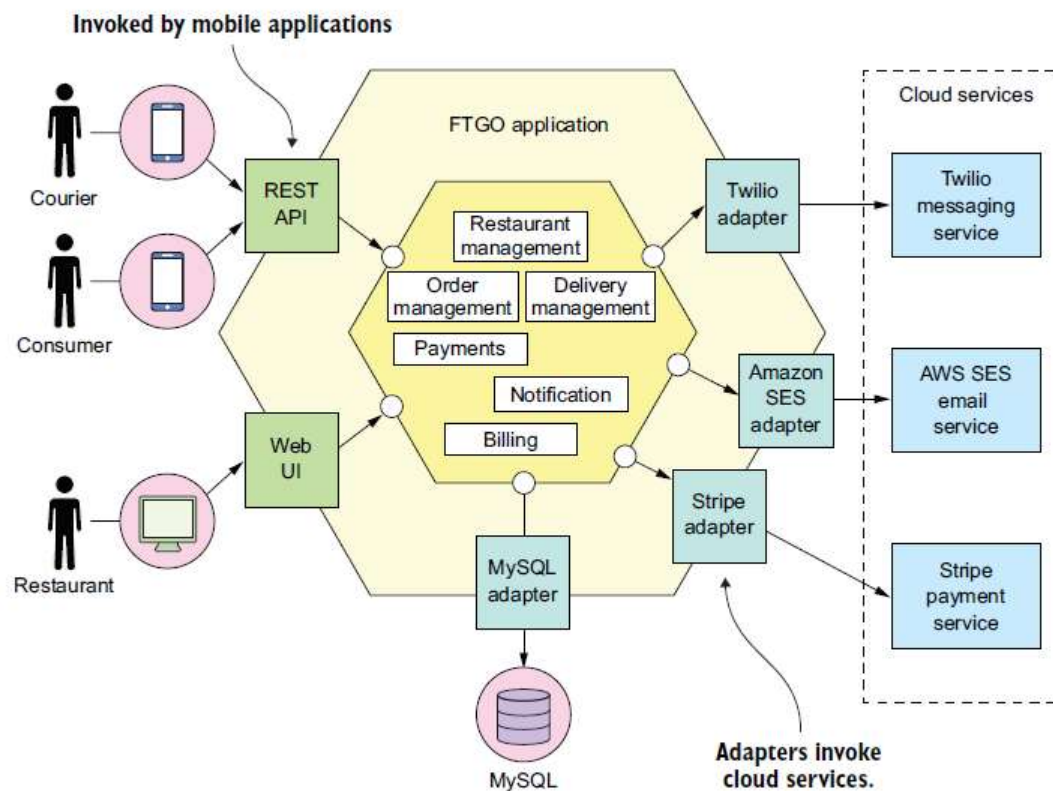
Case Study

FTGO Case Study



- Since its launch in late 2005, Food to Go, Inc. (FTGO) had grown by leaps and bounds. Today, it's one of the leading online food delivery companies in the United States.
- The business even plans to expand overseas, although those plans are in jeopardy because of delays in implementing the necessary features.
- At its core, the FTGO application is quite simple. Consumers use the FTGO website or mobile application to place food orders at local restaurants.
- FTGO coordinates a network of couriers who deliver the orders. It's also responsible for paying couriers and restaurants. Restaurants use the FTGO website to edit their menus and manage orders.
- The application uses various web services, including Stripe for payments, Twilio for messaging, and Amazon Simple Email Service (SES) for email.

Old Architecture of the FTGO application

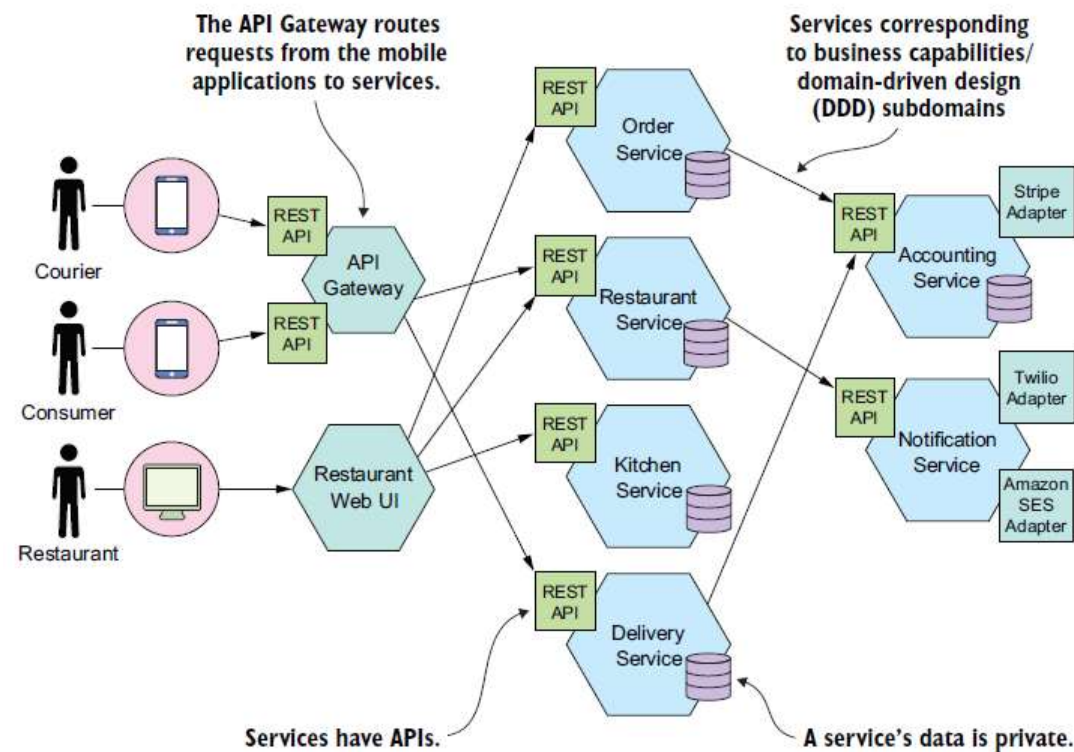


Problems faced in old FTGO architecture



- Complexity
- Slow development
- Scaling is difficult

Microservices Architecture for FTGO



Netflix Case Study

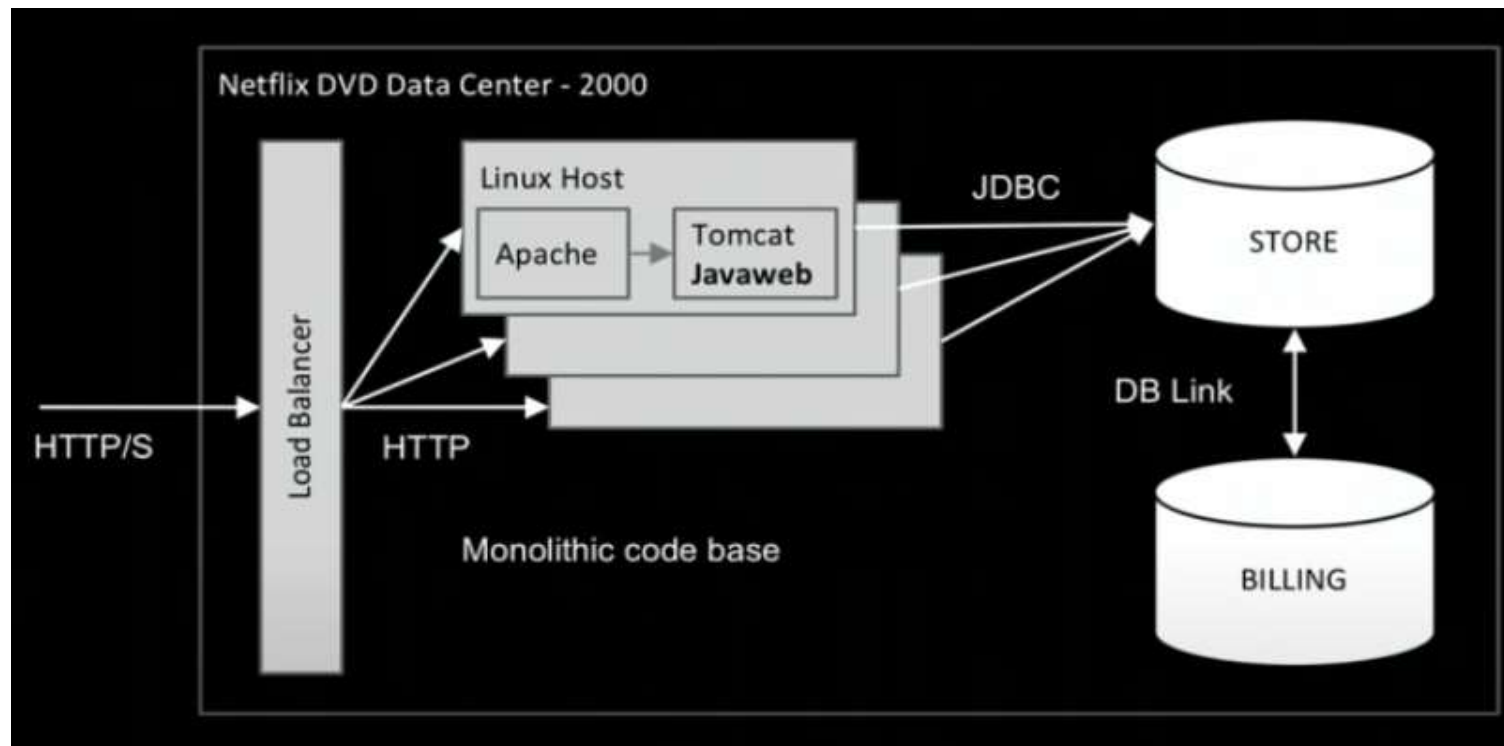


- Netflix launched in 1998. At first they rented DVDs through the US Postal Service. But Netflix saw the future was on-demand streaming video
- In 2007 Netflix introduced their streaming video-on-demand service
- Why are we considering this case study?

How Netflix worked earlier?



Netflix Architecture earlier



Challenges in previous architecture



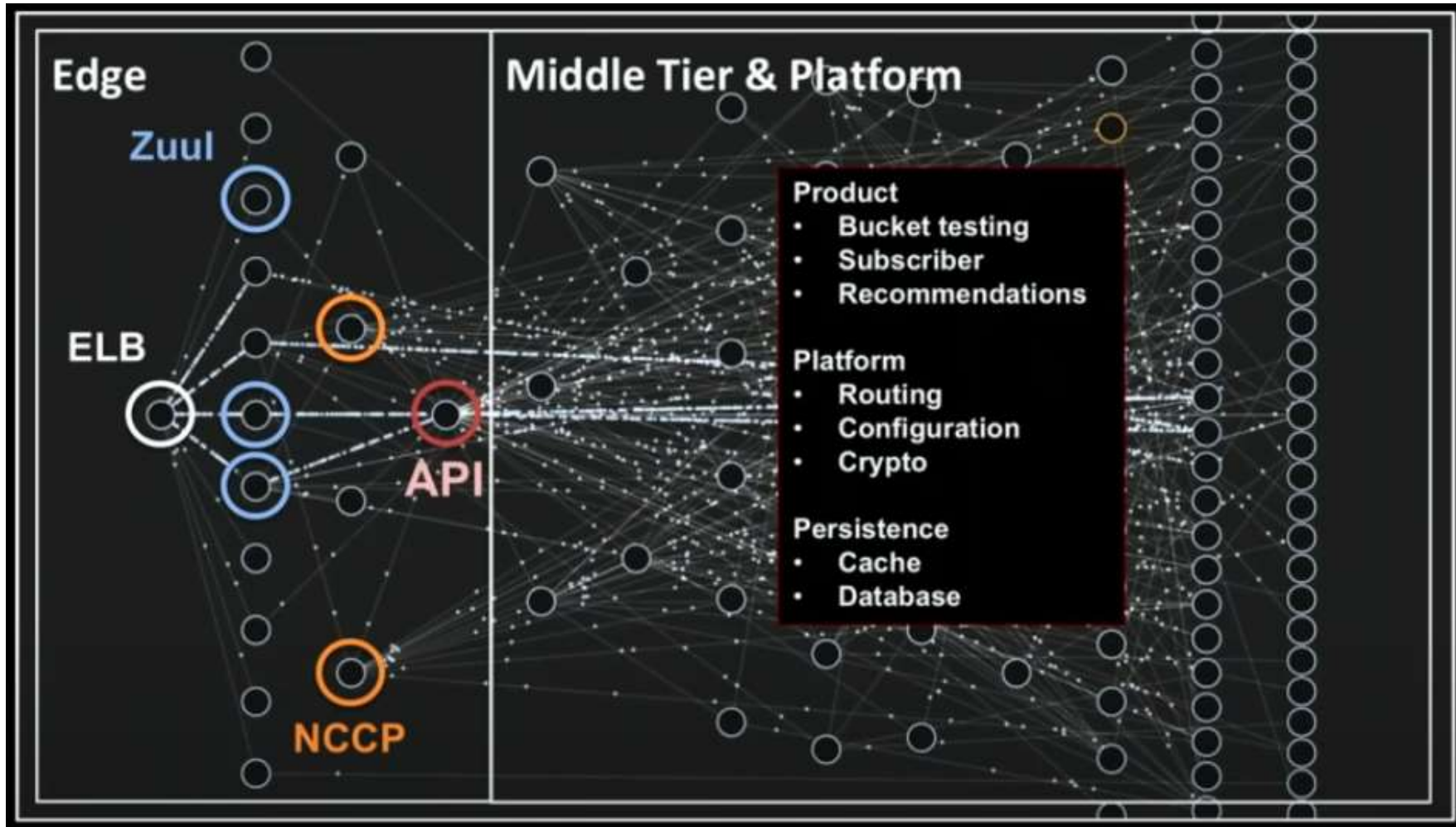
- Monolithic Code base
- Monolithic Database
- Tightly coupled Architecture

What they need in new Architecture?



- Modularity and encapsulation
- Scalability
- Virtualization and Elasticity

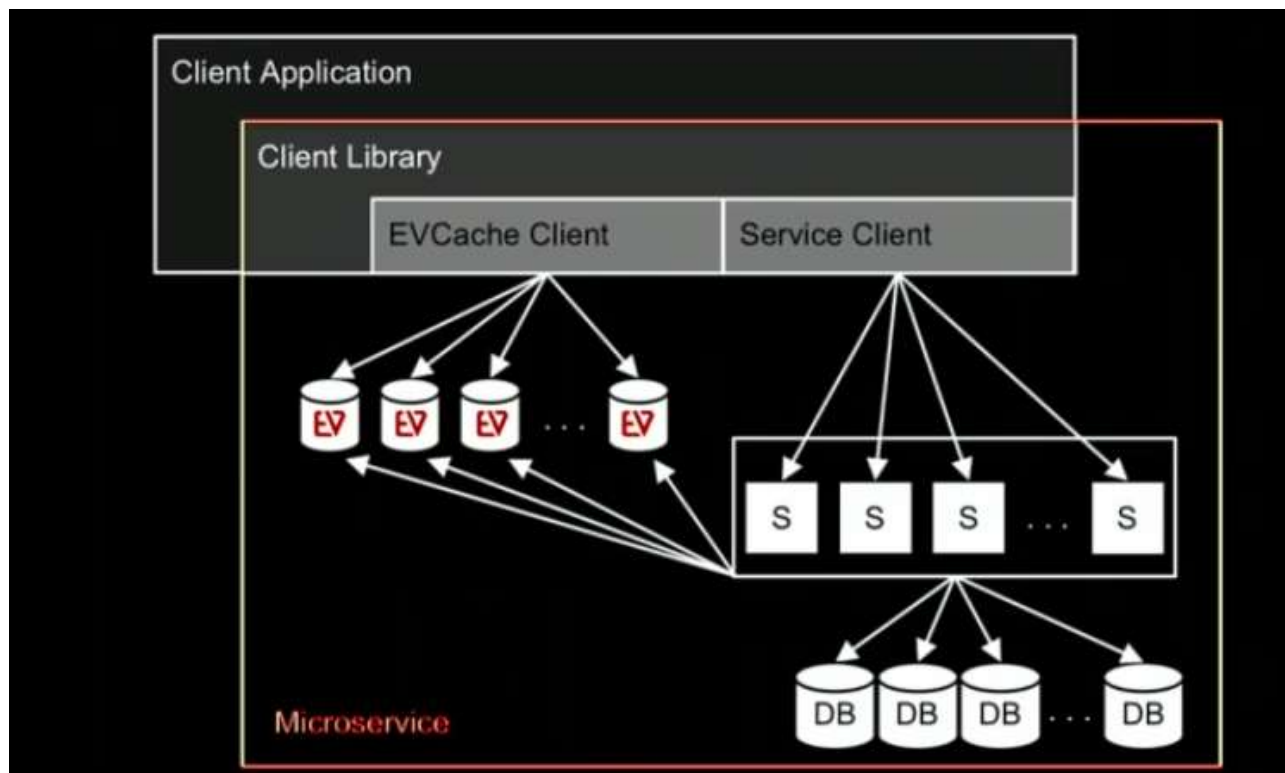
Updated Netflix architecture



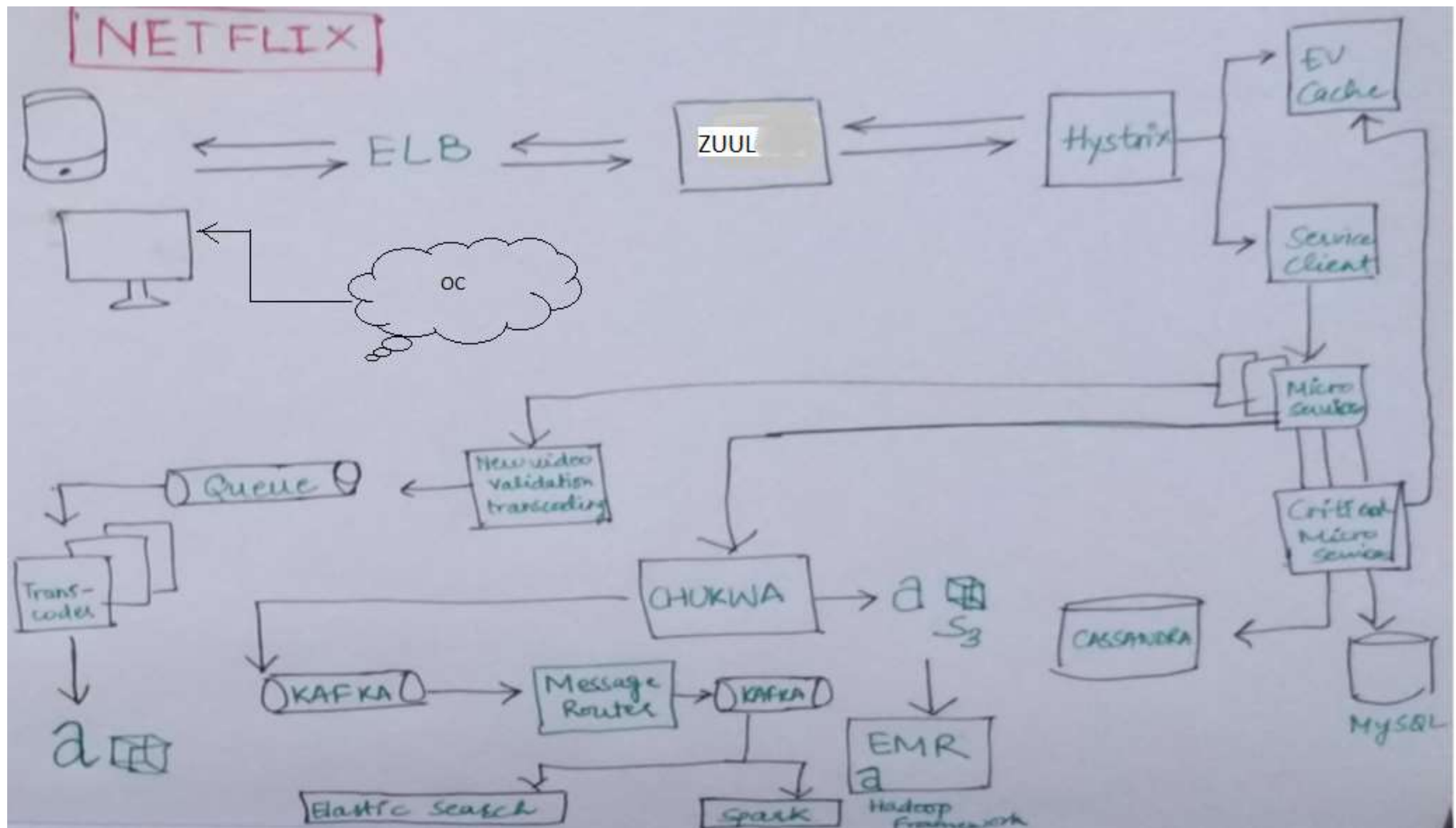
Netflix Approach



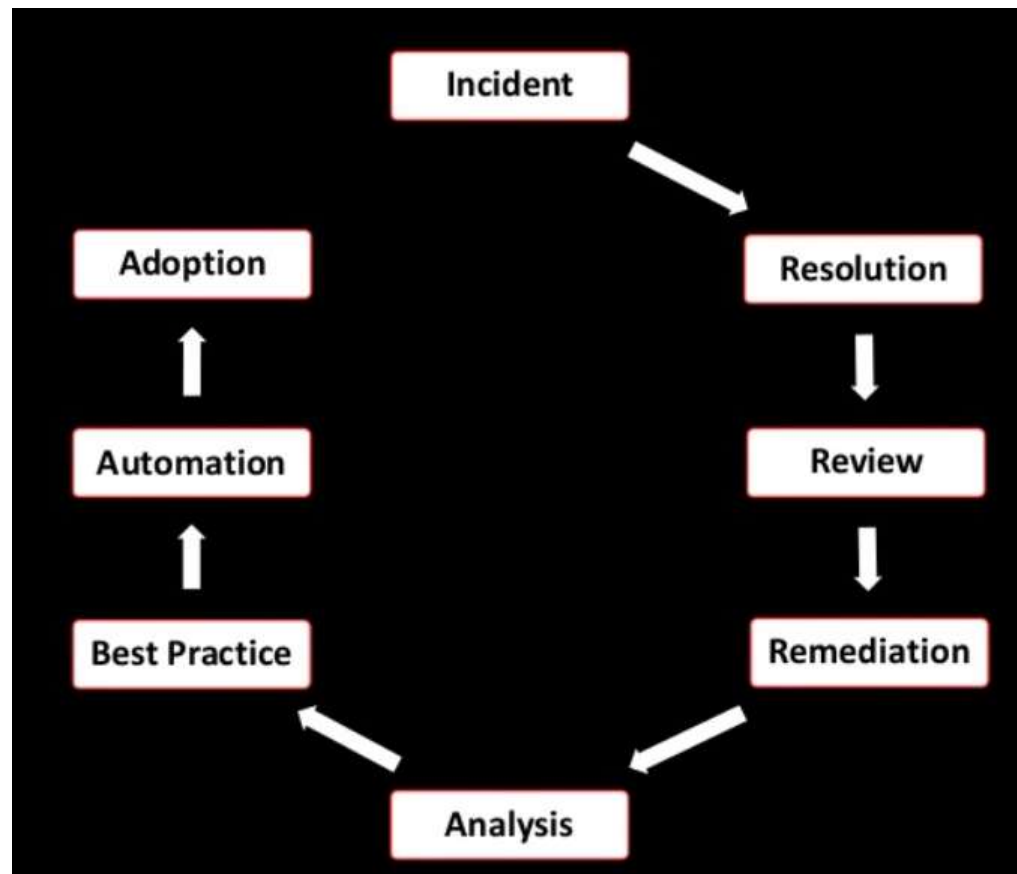
Microservice at Netflix



Latest Netflix Architecture



Netflix follows continuous learning



Self Study



- Uber case study – Read about Domain Oriented Microservices Architecture
- Link: <https://eng.uber.com/>

References



- Research Paper: Challenges When Moving from Monolith to Microservice Architecture, Miika Kalske, Niko Mäkitalo, and Tommi Mikkonen
- Book: Monolith to Microservices by Sam Newman
- Book: Building Microservices by Sam Newman
- Book: Microservices Vs Service Oriented Architecture by Mark Richards
- Book: Microservices Patterns by Chris Richardson
- Link: <https://www.ibm.com/cloud/blog/soa-vs-microservices>
- Link: <https://www.slideshare.net/adrianco>
- Talks about Netflix by Josh Evans