

A large, glowing blue planet in the upper right corner of the slide. The letters 'MAD' are written in a bold, blue, stylized font across the center of the planet. The background is a dark space with various colorful streaks and shapes, including a yellow comet-like streak and a blue streak.

微服务架构开发及平台演进

讲师：薛军

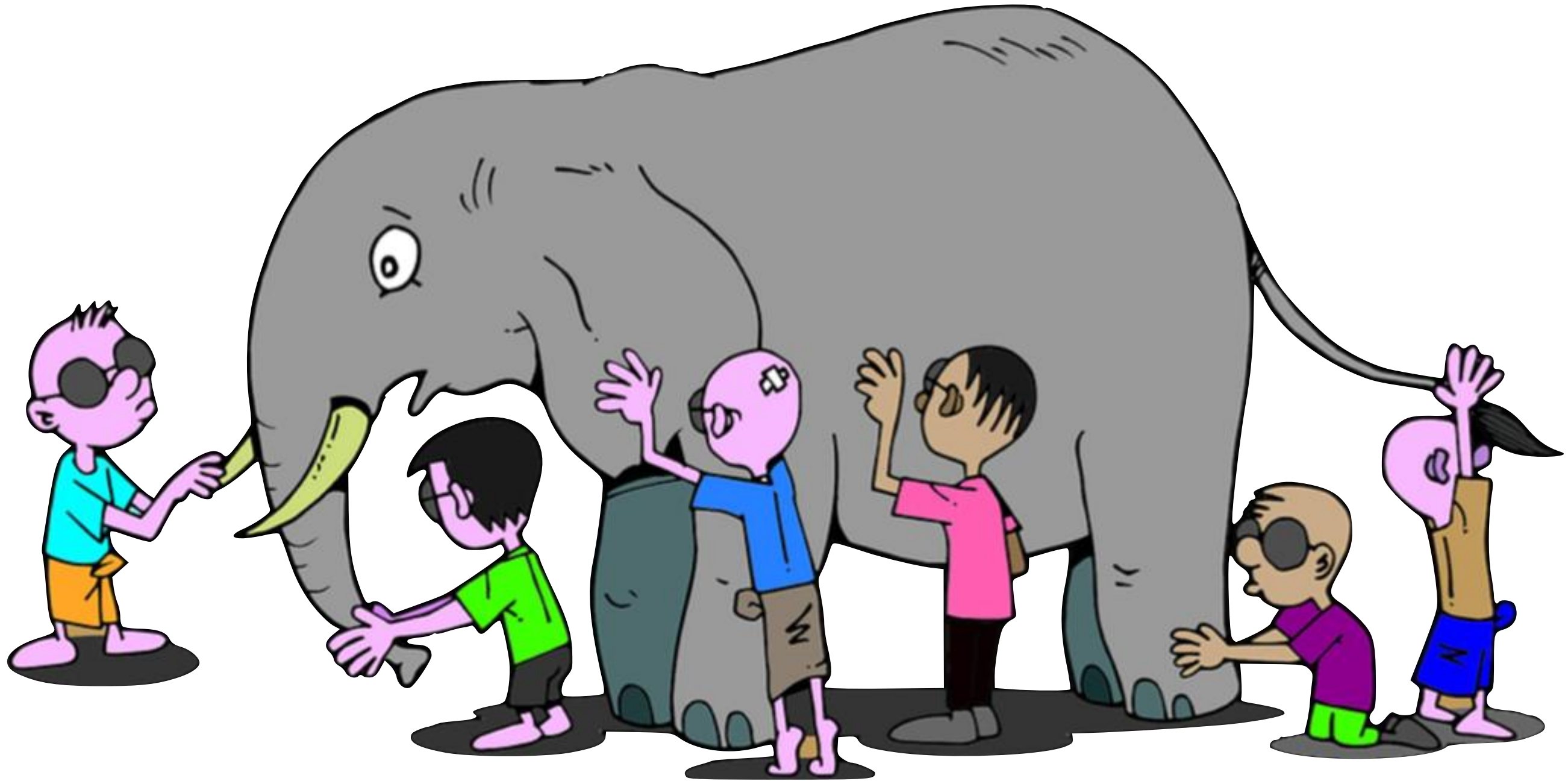
——“无论是微服务还是无服务器架构，逆向思考才能帮助我们拨开迷雾，理解本质”



当我们谈微服务的时候，我们在谈论什么？

达成统一的认知

你眼中的“微服务”



企业为什么需要微服务？

<https://startwithwhy.com/>



WHAT

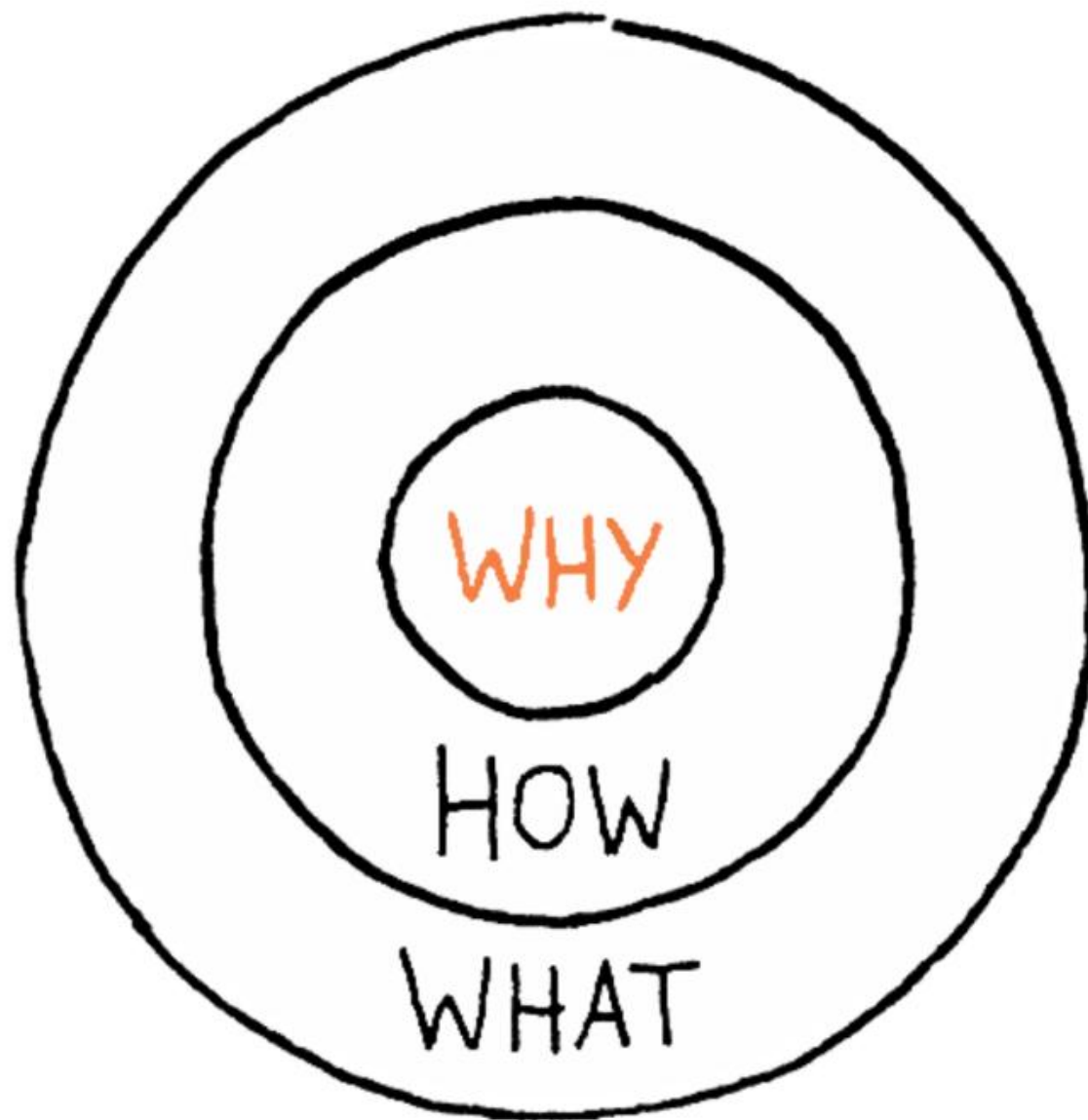
Every organization on the planet knows WHAT they do. These are products they sell or the services

HOW

Some organizations know HOW they do it. These are the things that make them special or set them apart from their competition.

WHY

Very few organizations know WHY they do what they do. WHY is not about making money. That's a result. WHY is a purpose, cause or belief. It's the very reason your organization exists.



解决方案

VS

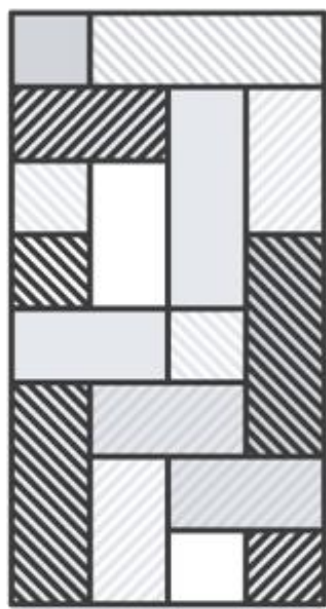
问题

从单体到微服务转型的必然

众多的微服务 + 小团队 (2 pizza teams)



一个紧密耦合的庞大应用+竖井式团队



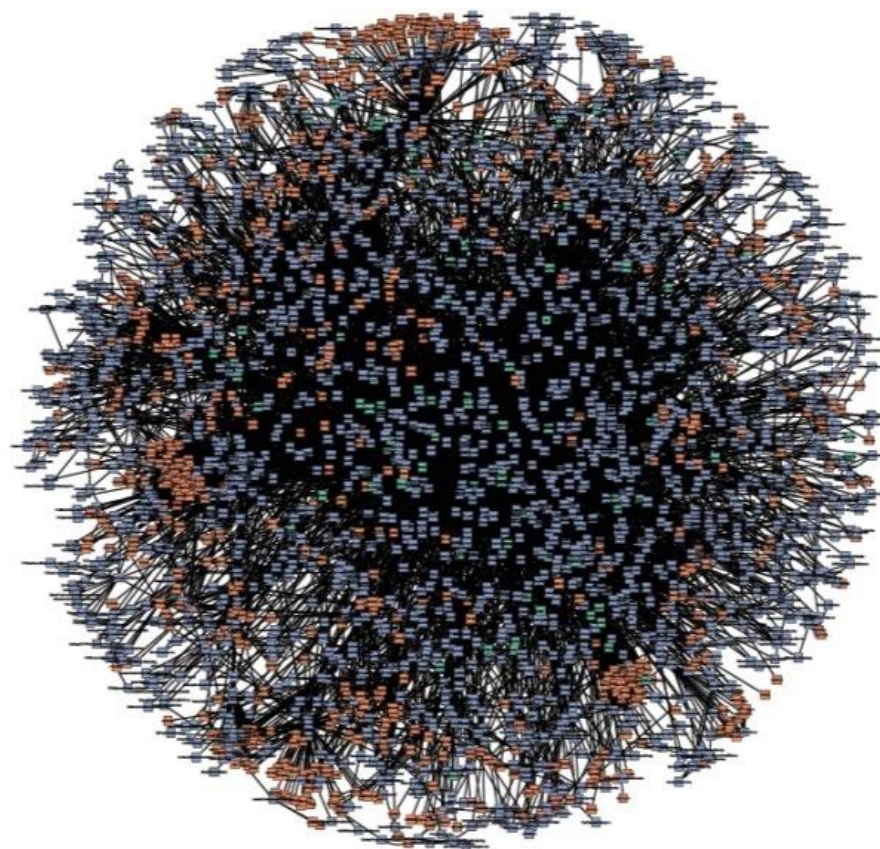
2001

改不动

慢，贵

“创新乏力”

重复建设



+



2009

微服务成功背后的企业机制、文化和组织支撑



新闻稿

Amazon Campus
Amazon.com confidential

Amazon Campus Launches First Multi-Channel Student Store at the University of California Berkeley
www.amazon.com/Campus & berkeley.amazon.com

SEATTLE-(BUSINESS WIRE) – August 31st, 2014 – Since returning to school for the Fall semester, Berkeley students have experienced a fresh take on the college bookstore experience at the University of California Berkeley. The Amazon-run online Student Store brings Amazon to the campus and offers a number of additional benefits that students can now pay for any purchase on Amazon. The Amazon Student Store is available on the Amazon Learning Management System or directly on Amazon. One-Day Shipping on textbooks sent to the campus. Shipping to campus on millions of additional products.

"I've been an Amazon Student member for two years now. I've been ordering everything from Amazon. It's a great experience. I've been ordering everything from Amazon. It's a great experience. I've been ordering everything from Amazon. It's a great experience."

Students can access these campus-specific payment options - typically available only through the Amazon Student Store when they visit berkeley.amazon.com to Amazon within the Berkeley Learning Management System.

In place of a traditional campus bookstore, Amazon provides a space that features a package pick up desk, text books, and more. "Getting my textbooks used to be a pain. Now it's so easy. I've been ordering everything from Amazon. It's a great experience. I've been ordering everything from Amazon. It's a great experience."

常见问题

Amazon Campus
Amazon.com confidential

Hi: Student Customer FAQs

Q4: What do I get when Amazon is on my campus? Students get a number of benefits when Amazon is on campus. By activating the co-branded experience on Amazon, students receive Free One Day shipping on textbooks to campus addresses, access to custom textbook selection, the ability to pay with their university ID card, and the ability to pick up Amazon.com orders at pick up points on campus. On campus, all students will have access to an Amazon Student Lounge.

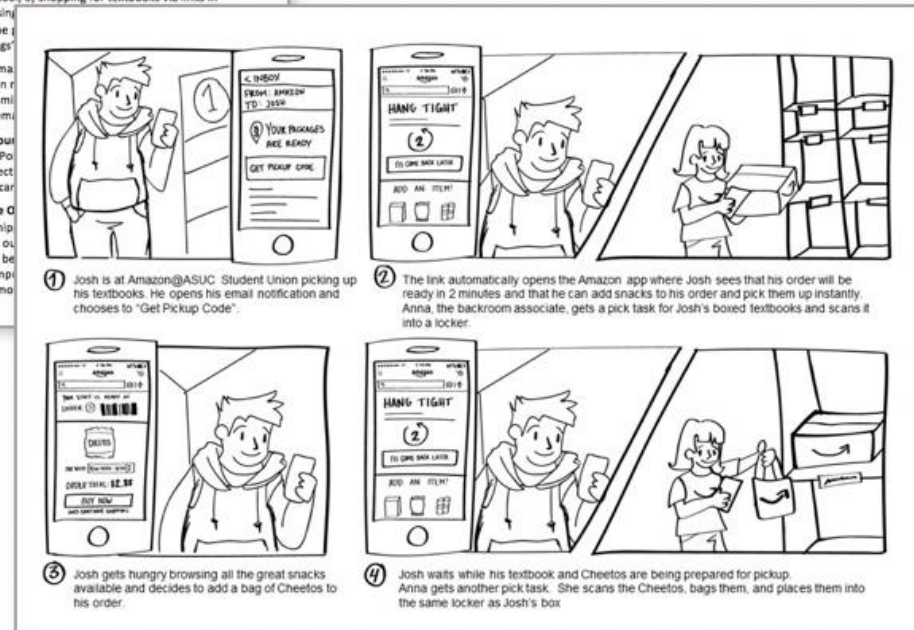
Q5: How do I activate the co-branded experience? Students at client universities will have four methods for opting into the co-branded experience: 1) visiting the co-branded subdomain directly by typing the URL (berkeley.amazon.com) in their browser, or clicking an external link, 2) joining the Amazon Student program and selecting their school, 3) shopping for textbooks via links in their school's Learning Management System, 4) clicking on a Student Store merchandising link. If customers have opted in, they will see a persistent co-branded toolbar on the top of the Amazon.com website. Customers can turn the experience off at any time by navigating to the 'Account Settings' page.

Q6: What do I get if I sign up for Amazon Student when Amazon is on my campus? Amazon Student provides a number of benefits to customers "on demand" at the Student Lounge because we do not have a Point of Sale at the school. Benefits include Free Two-Day shipping on Prime eligible items, unlimited instant streaming access to the Kindle Owners' Lending Library. The cost of a Student membership will remain the same.

Q7: Why aren't there any 'grab and go' items available for purchase at the Student Lounge? Amazon Student provides a number of benefits to customers "on demand" at the Student Lounge because we do not have a Point of Sale at the school. However, we intend to offer this in the future for a small select number of items. Customers may order items displayed in the Lounge by using the bar code scanner.

Q8: Why is Free One Day shipping limited to campus addresses? Why don't I get Free One Day shipping on millions of other eligible products? By working directly with a university, Amazon is able to reduce costs associated with shipping to pass on to all students at the school via Free One Day shipping for textbooks, and to offer One Day shipping on millions of other eligible products. However, in order to provide these benefits to the geography in which we offer this benefit to those zip codes served from our on-campus fulfillment centers, members always receive Free Two-Day shipping on Prime eligible items, to campus or mobile.

图例



机制

- 逆向工作法流程
- 安灯拉绳 (Andon cord)
- 错误纠正

架构

- 微服务架构
- 松耦合应用
- 自服务平台 - 没有门卫

文化

- 人：我们雇佣建造者、创新者、创业者
- 信念：亚马逊领导力准则

组织

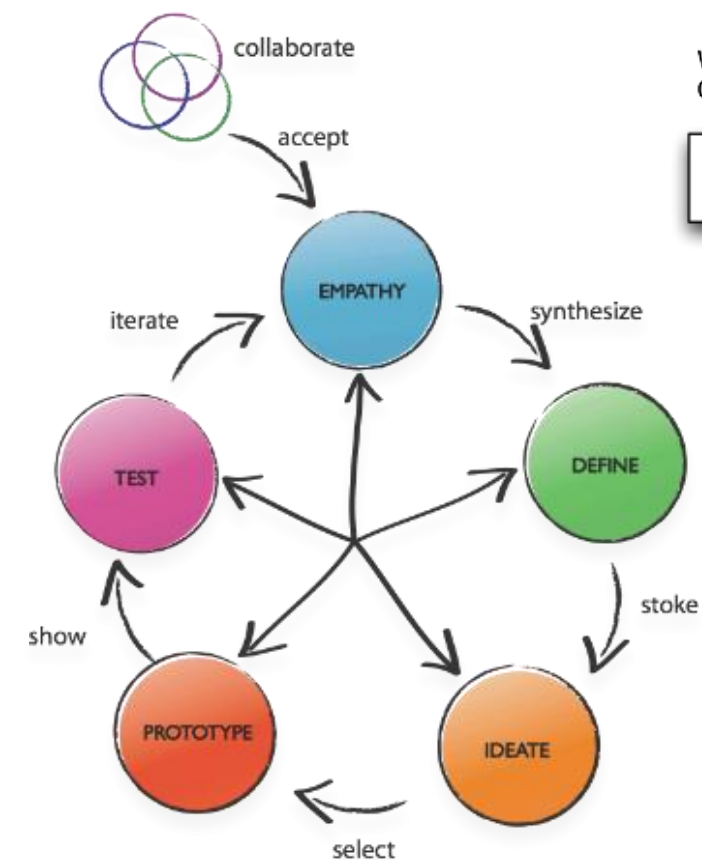
- 试验
- 双披萨团队

AWS Invention

AWS re:Invent



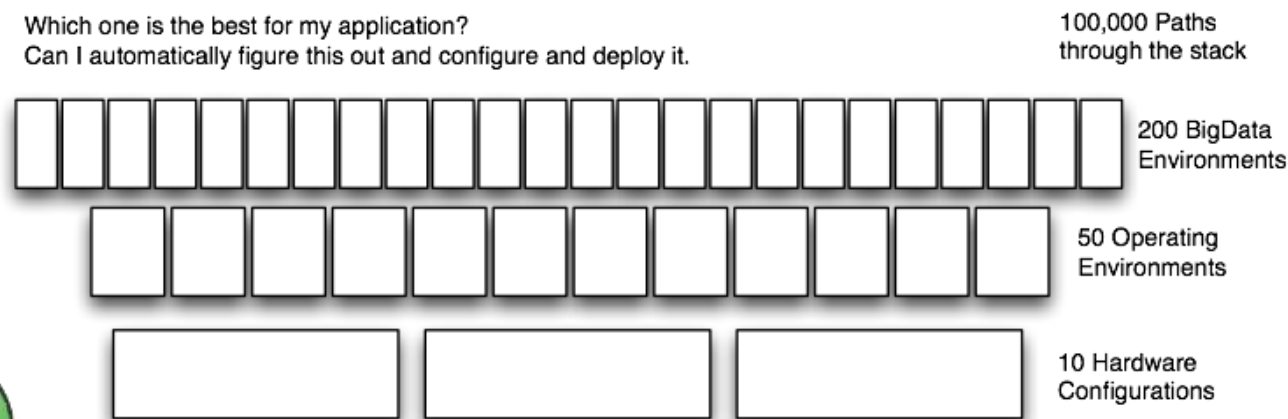
从三个维度进一步解读微服务



设计思维

逆向工作法

Which one is the best for my application?
Can I automatically figure this out and configure and deploy it.



优良架构方法

演进式迭代
领域架构
数据架构
事件驱动

应用商店	管理工具	分析	DevOps 工具	人工智能	IoT	移动服务	企业应用	游戏
商业应用	监控	海量数据查询						
DevOps 工具	审计日志	Elasticsearch						
BI 工具	服务目录	BI 分析						
安全	Server Management	Hadoop/Spark	Private Git Repositories	机器学习	物联网/设备管理	规则引擎	文档共享	
网络和存储	资源配置管理	实时数据流	持续交付	机器学习	本地计算与设备同步	通知推送	邮件服务	
SaaS 订阅	资源优化	工作流管理	持续交付	机器学习	设备影子	翻译、部署、管理 APIs	虚拟桌面	
操作系统	资源模板	托管搜索服务	翻译、测试、and Debug	文字转语音	设备入口	设备测试	Application Streaming	
	自动化管理 - Chef	托管 CI	部署管理	图像识别	注册服务	身份管理	备份服务	
								3D 游戏引擎管理
迁移管理	Application Discovery	应用迁移	数据注册	数据注册	服务注册			
混合部署	数据集成	网络集成	Identity Federation	Resource Management	VMware on AWS	Devices & Edge Systems		
应用服务	转码	Step Functions	消息队列					
安全	身份认证与授权管理	密钥管理	Active Directory	DBaaS 数据湖	Application Analysis	证书管理	WAF	
数据库	Aurora	MySQL	PostgreSQL	Oracle	SQL Server	MariaDB	数据库	NoSQL
存储	对象存储	归档	数据湖	块存储	托管文件存储			
计算	虚拟机	Simple Servers	Web 应用	自动扩展	批处理	容器服务	Event-driven Computing	
网络	vpc	专有网络	全球 CDN	负载均衡	可扩展 DNS			
基础设施	区	可用区	接入点					

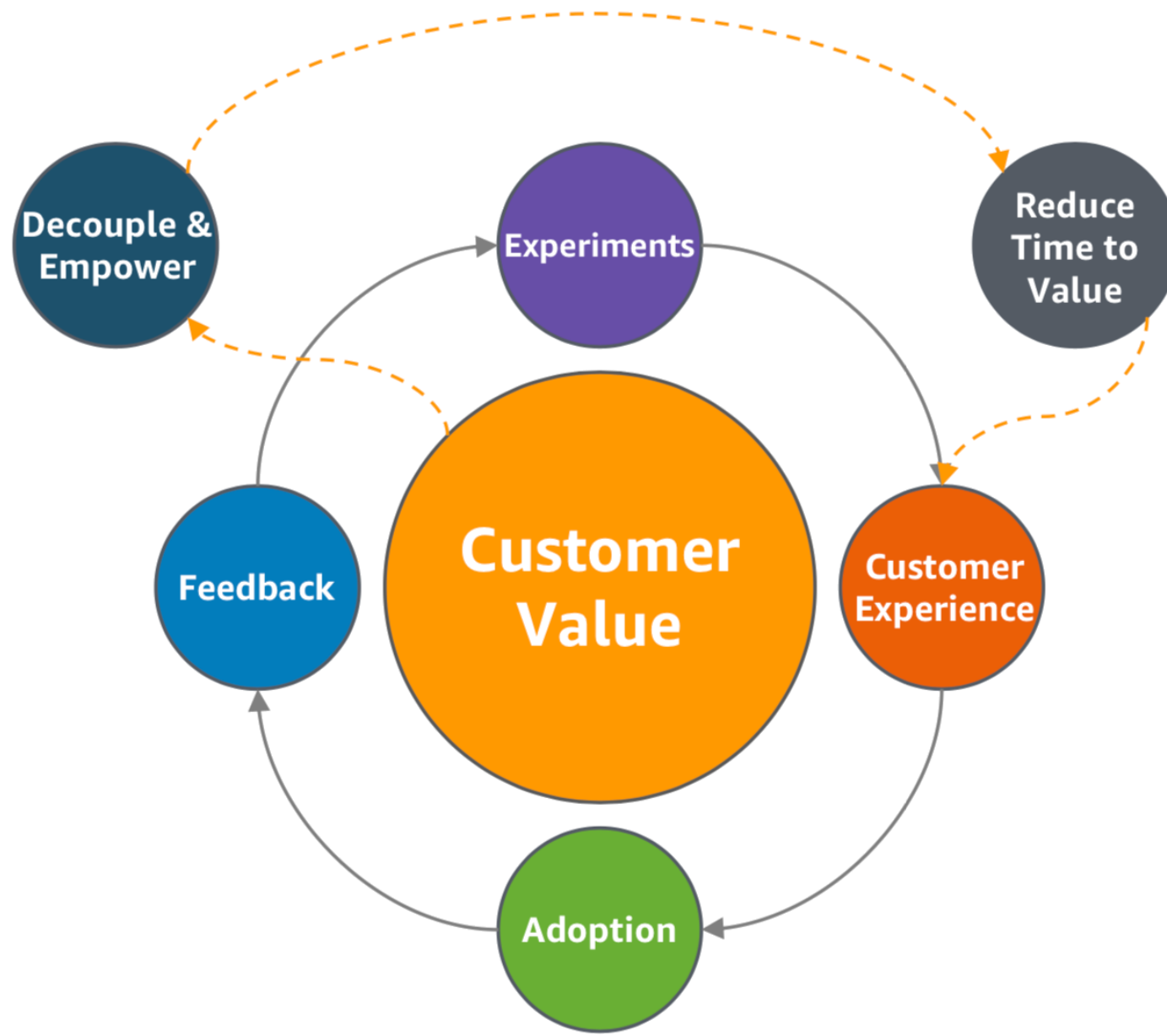
云交付和持续运营

技术平台
“零” 运维
AI 运维

设计思维：从客户出发，逆向工作法

建造者，创业者，创新者或产品经理视角

Amazon 逆向工作法 - 客户驱动价值创新



聚焦：

如何从客户角度分析、拆解问题域？

如何利用快速原型法从客户反馈驱动客户价值飞轮？

AWS 数字化创新工作坊

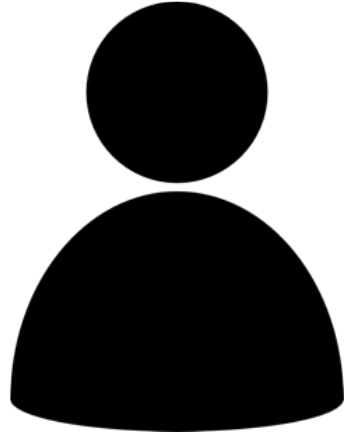


逆向工作的 5 个问题



- 谁是 **客户**?
- 客户的问题或**机遇**是什么?
- 客户最重要的**效益**是什么?
- 你怎么知道客户 **需要** 或 **想要**什么?
- 客户会有什么样的 **体验**?

从客户出发



事实

你的目标客户的真实信息

痛点

你的目标客户的痛点是什么？

行为

客户当前解决痛点、达成目标的行为

目标

客户在努力实现什么目标？

问题域分析产出物：六页纸陈述



新闻稿

- 聚焦客户需求
- 引述客户发言是关键
- 穿越到未来: 远见卓识
- 避免拗口的专业术语
- 简单清晰地描述



常见问题

- 包括客户常见问题和利益相关者常见问题
- 包括难以回答的问题
- 提前分享新闻稿以收集问题



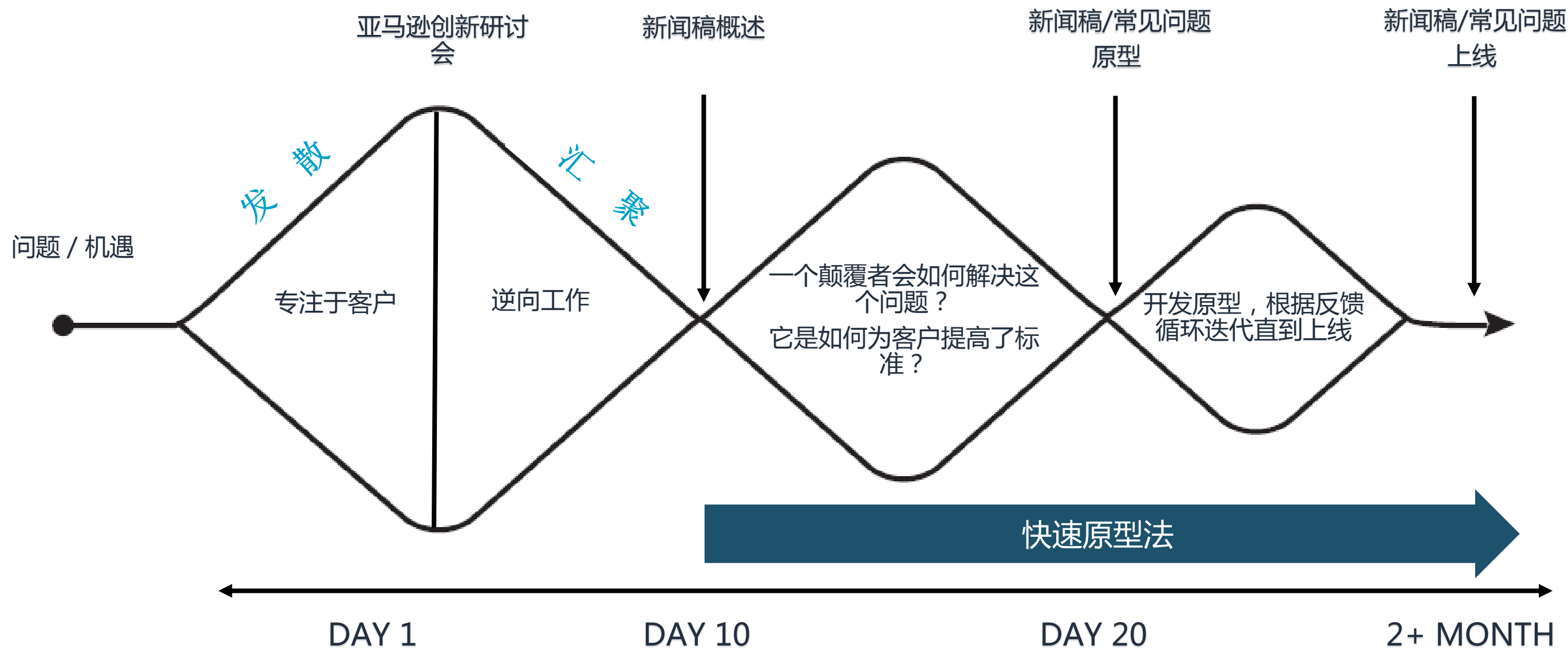
图例

- 粗略的想法 – 粗略的图画
- 精确性与想法的成熟度匹配
- 不要害怕有争议性
- 创造讨论

下一步：快速原型构建正向反馈环



针对某个特定的业务挑战，尝试通过一个双披萨团队，产生创新想法、快速试验和验证



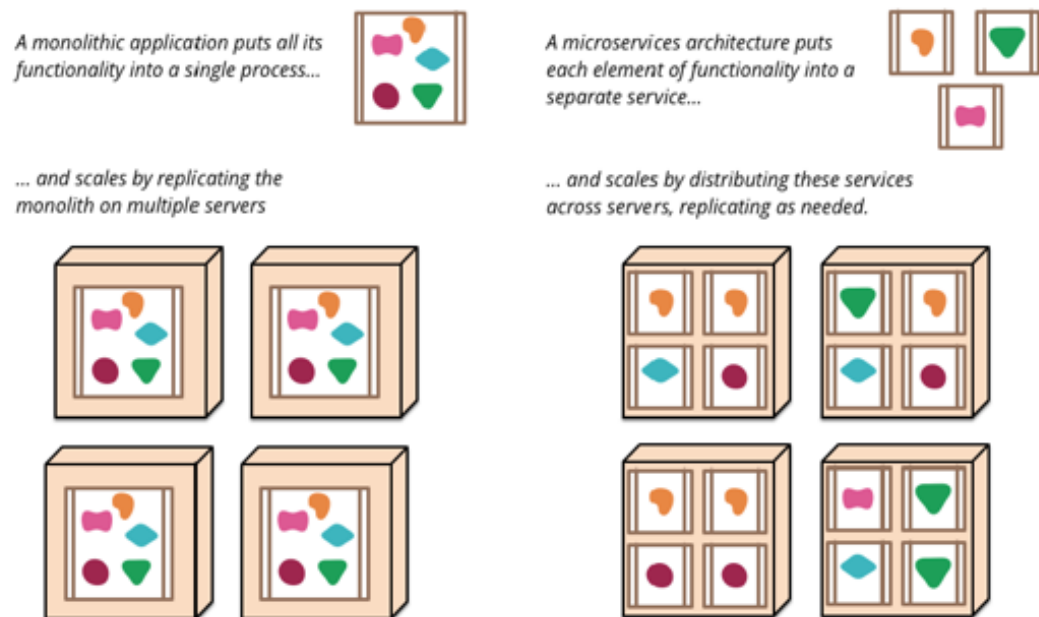
优良架构方法指导微服务架构演进

架构和技术落地视角

微服务架构兴起



微服务是小的、自治的服务一起工作。



黄金法则: 你能在不改变任何情况的前提下对服务进行更改并且自动部署它吗?

将那些因相同原因而改变的事物聚集在一起，将那些因不同原因而改变的事物分开，**单一责任原则**

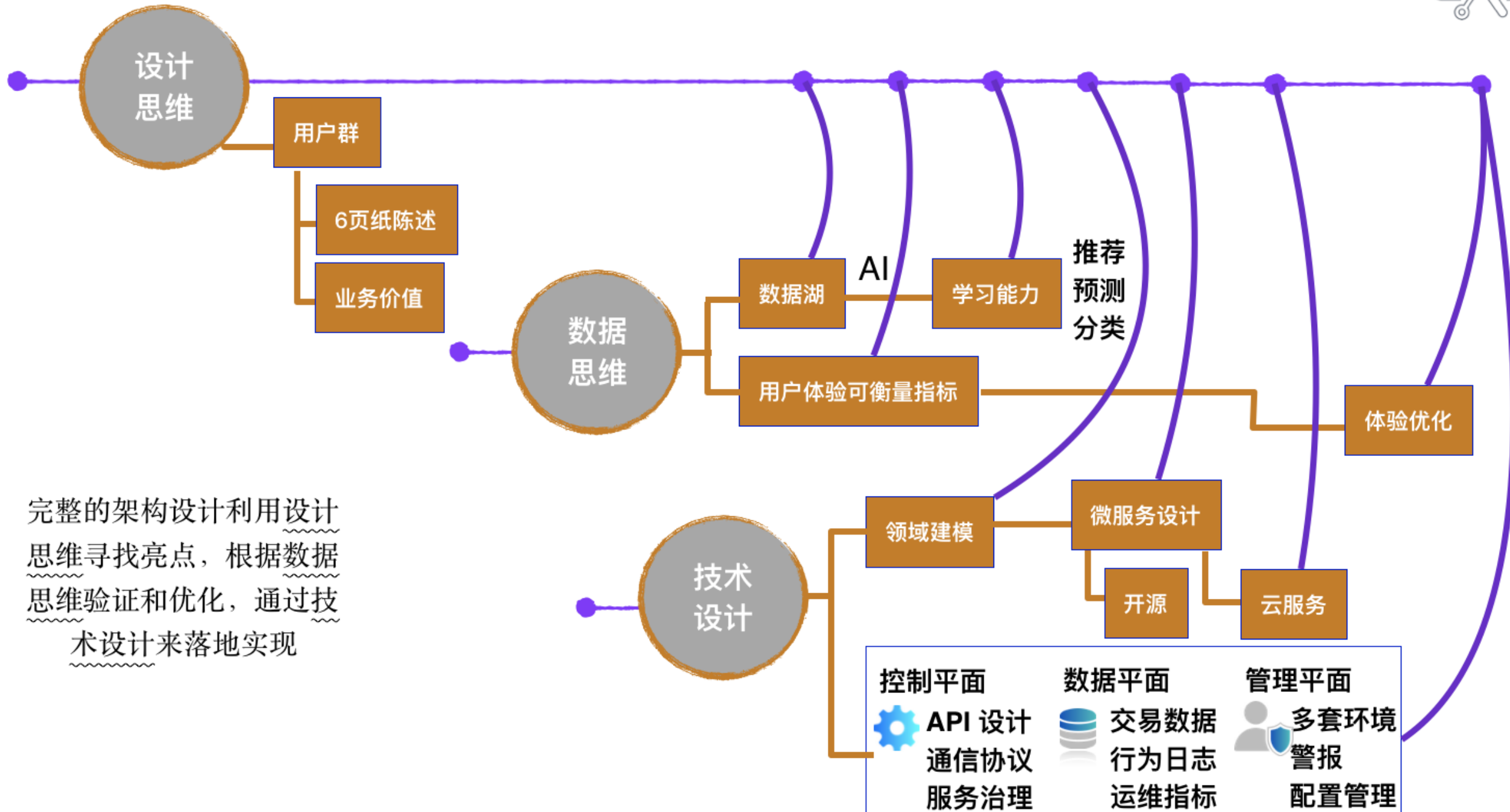
微服务架构的优势

- 技术异构性
- 恢复能力
- 按照服务扩展
- 易于部署/部分部署
- 与DevOps紧密整合
- 提高扩展性、可用性和容错性
- 与组织架构一致
- 与业务领域联系更紧密

微服务架构设计



人员
业务
治理
平台
运营
安全

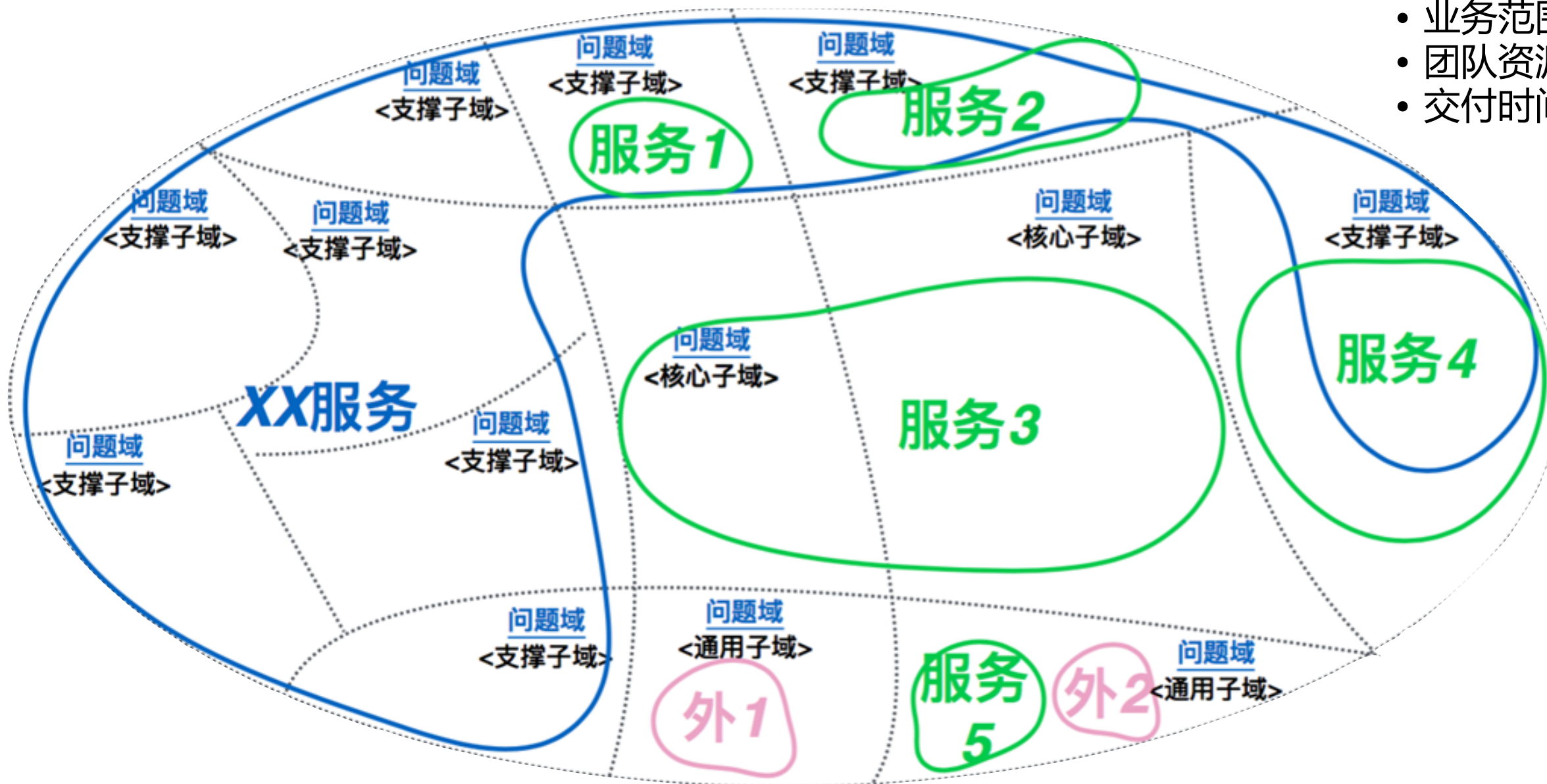


领域建模到服务拆分-定义服务边界



服务边界约束：

- 业务范围（高内聚）
- 团队资源（2个披萨团队）
- 交付时间（冲刺迭代，快速上线）



微服务和2个披萨团队



- 我们称之为“Service Team”
- 决策权交给各个服务（而不是集中决策）
 - 产品开发计划（Roadmap）
 - 开发工作
 - 运维和客户支持工作
 - 以产品功能划分服务 (You build it, you run it.)
- 服务之间只能通过API交互（不可以直接访问或修改其他服务的数据）
- 面向失效的设计
- 基础架构自动化
- 不断演进（Evolutionary Design）

康威定律：设计系统的组织，其产生的设计和架构等价于组织间的沟通结构



单个微服务实现的参考架构：端口适配器

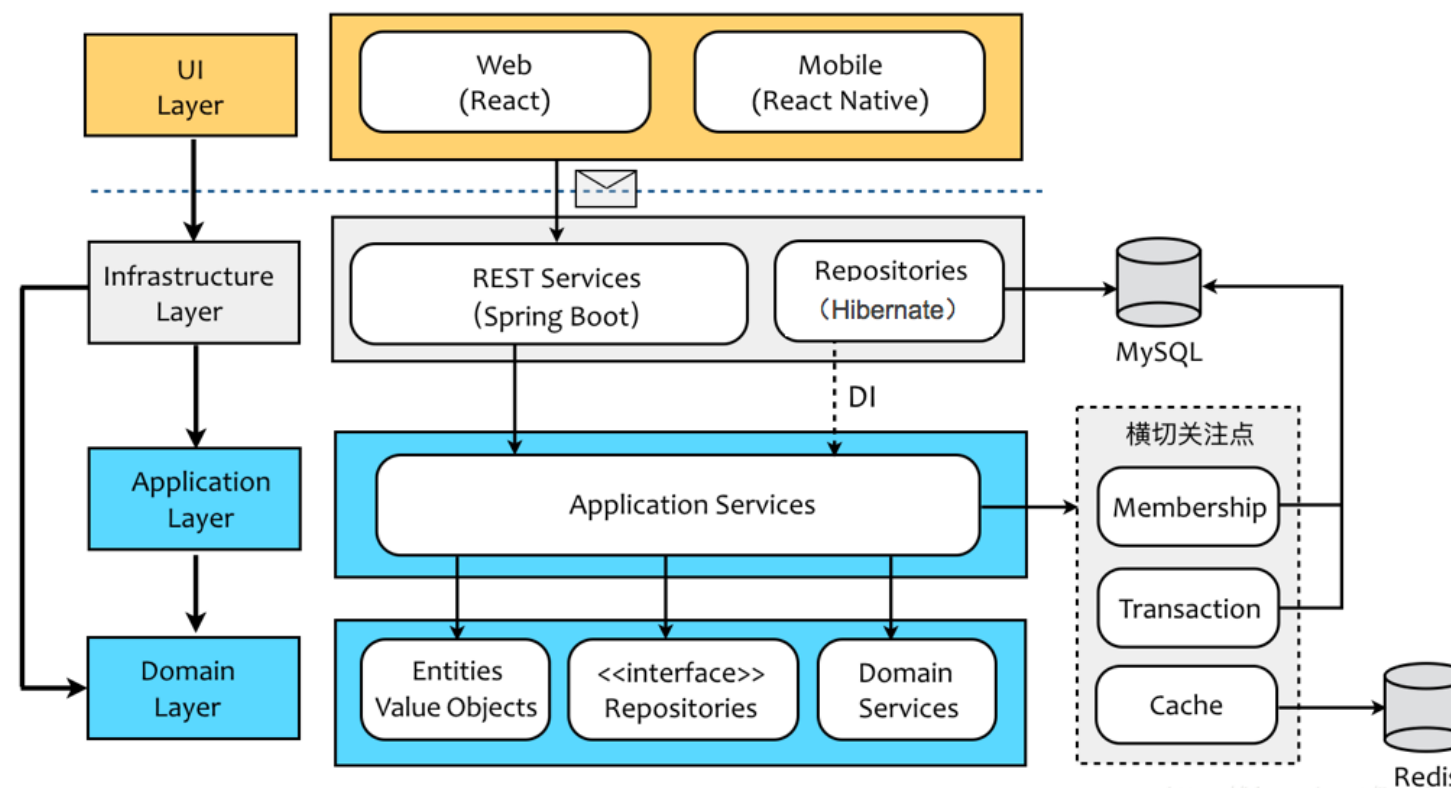
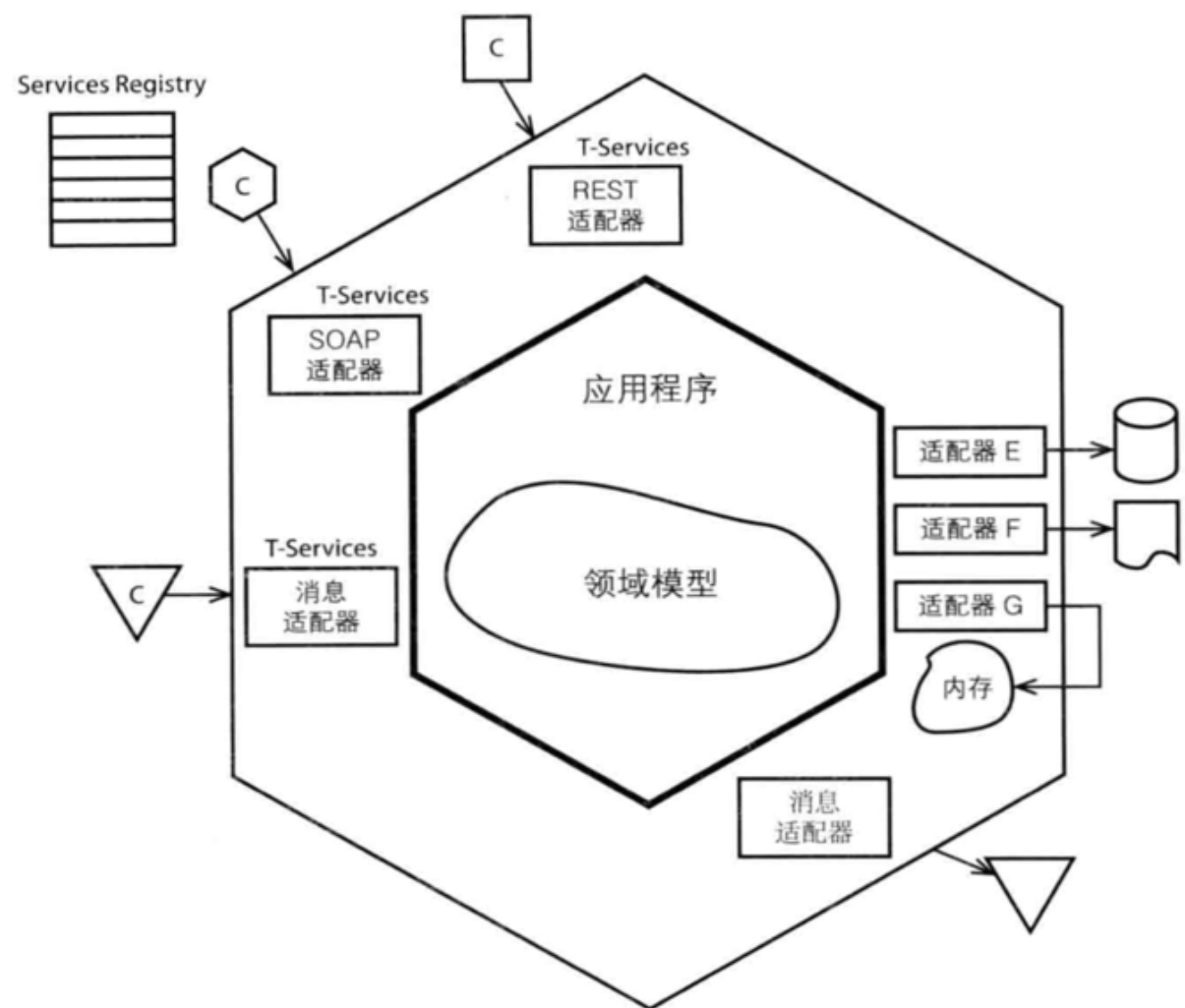
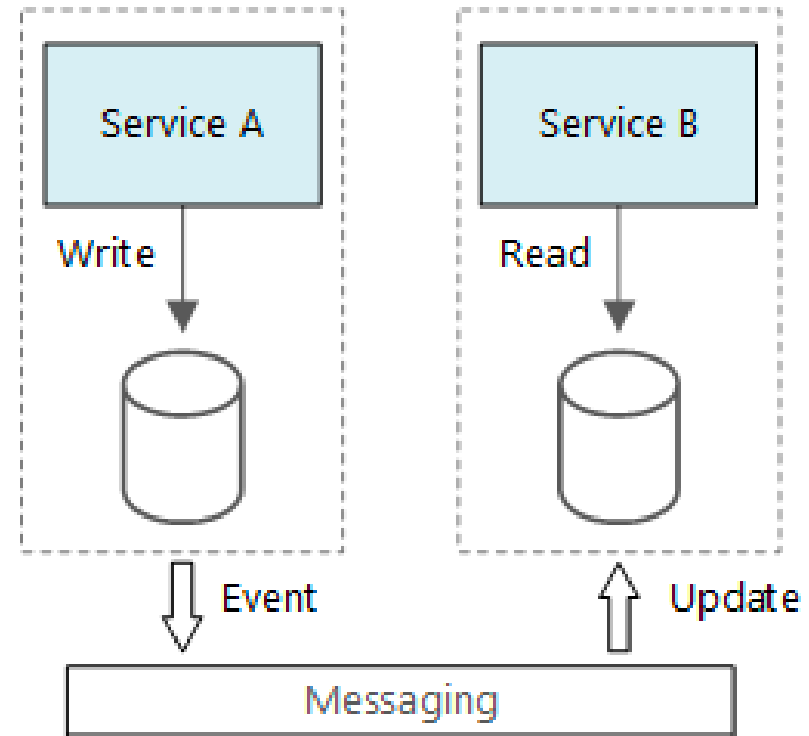
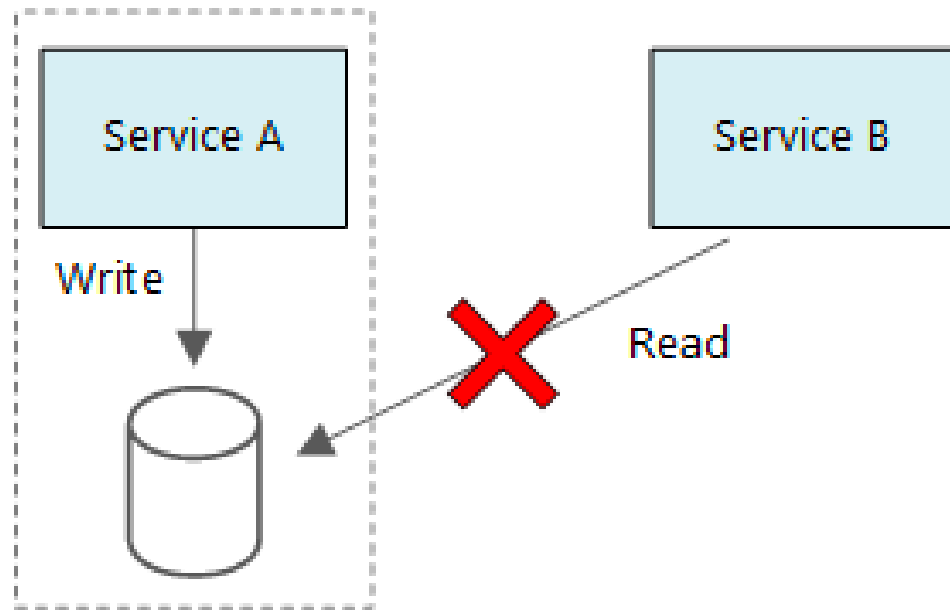


图4.5 一个支持SOA的六边形架构，其中包括REST、SOAP和消息服务。

微服务：自治、内聚、松耦合，分布式

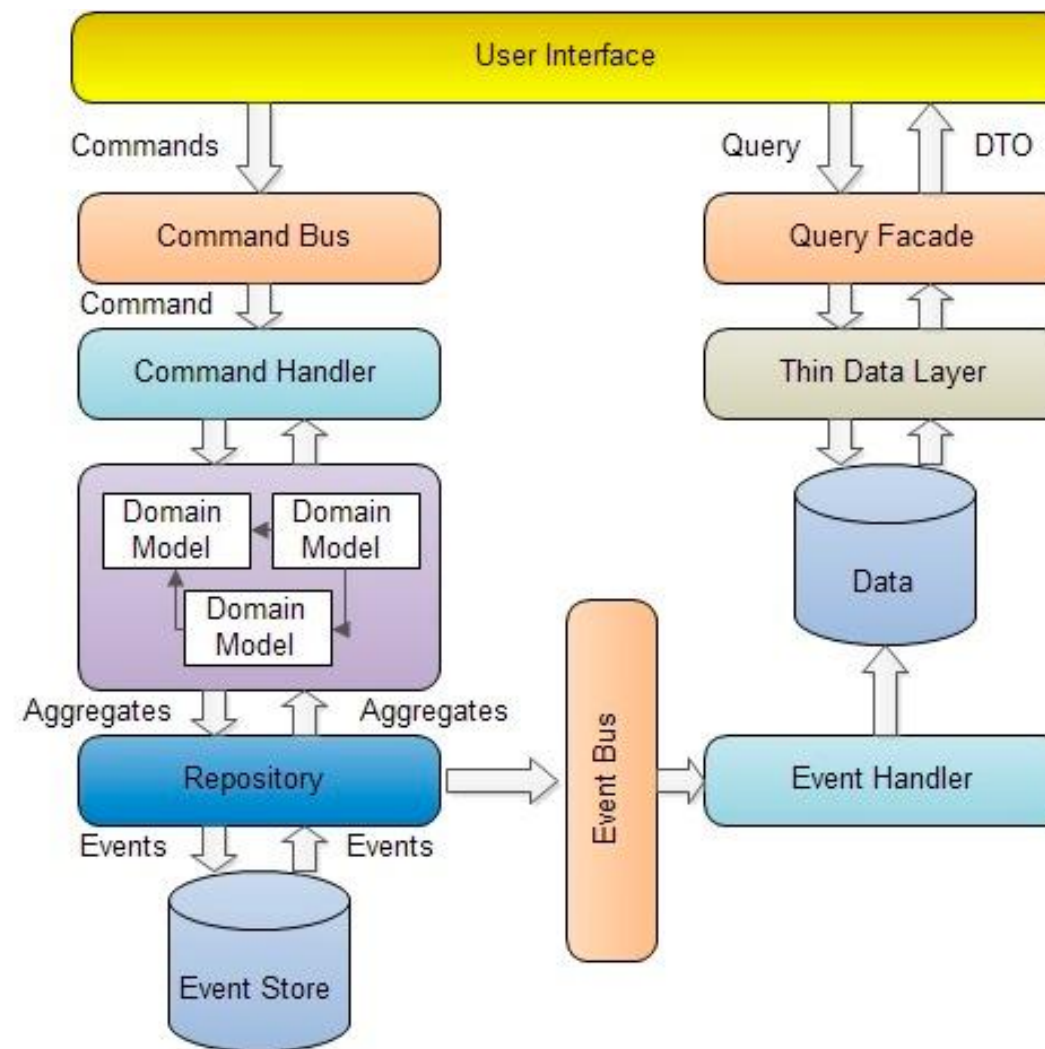
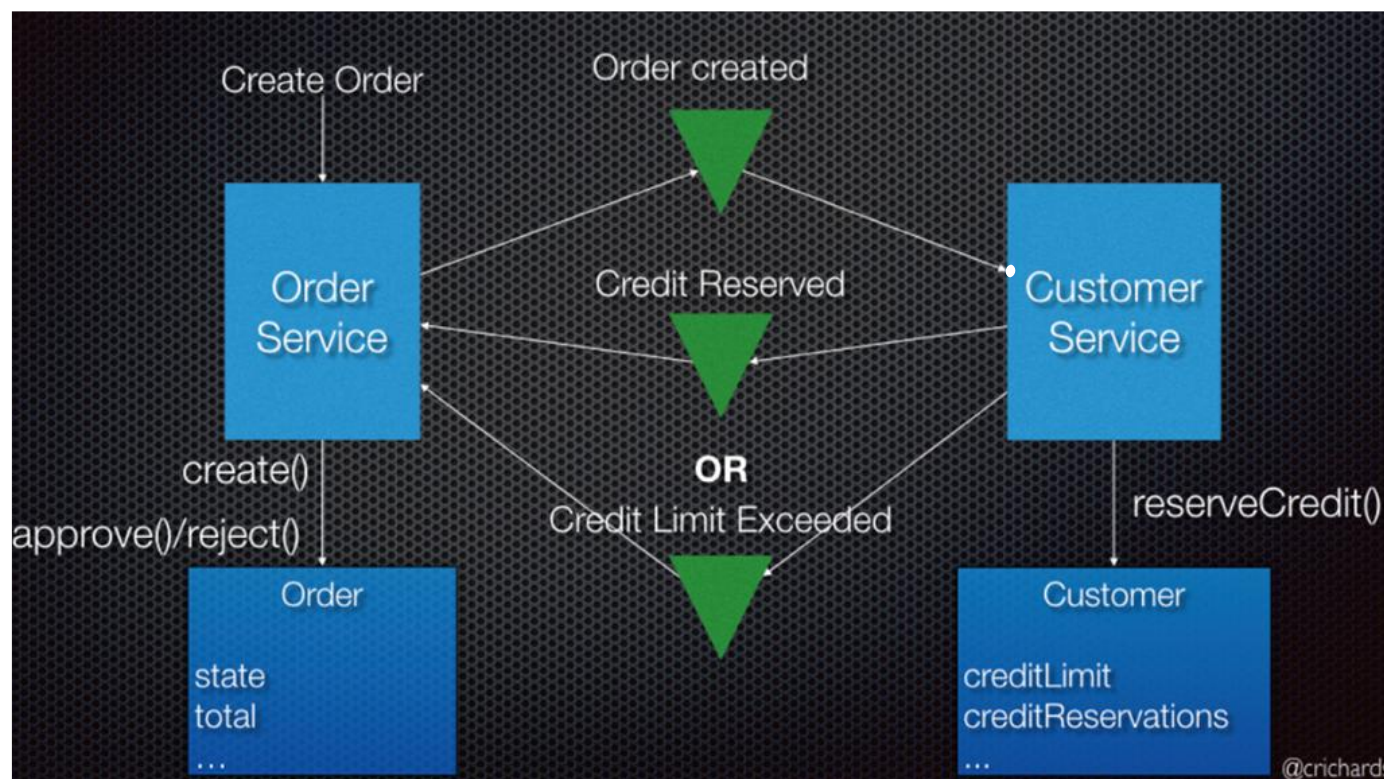
微服务数据架构



多个微服务协作实现一个业务需求



读写分离
事件驱动，最终一致
CQRS：命令和查询分离



微服务架构之服务通信 IPC



协议

- HTTP 1.1 or 2.0
 - REST API
 - JAVA RMI
 - Hessian
 - Thrift
 - gRPC
- IDL
- Text: Json/XML
- Binary:
- Avro,
 - Protocol Buffer

同步



请求/响应

—

• 寻址

• 序列化和反序列化

• 网络传输

异步

- MQTT
- JMS
- AMQP
- STOMP

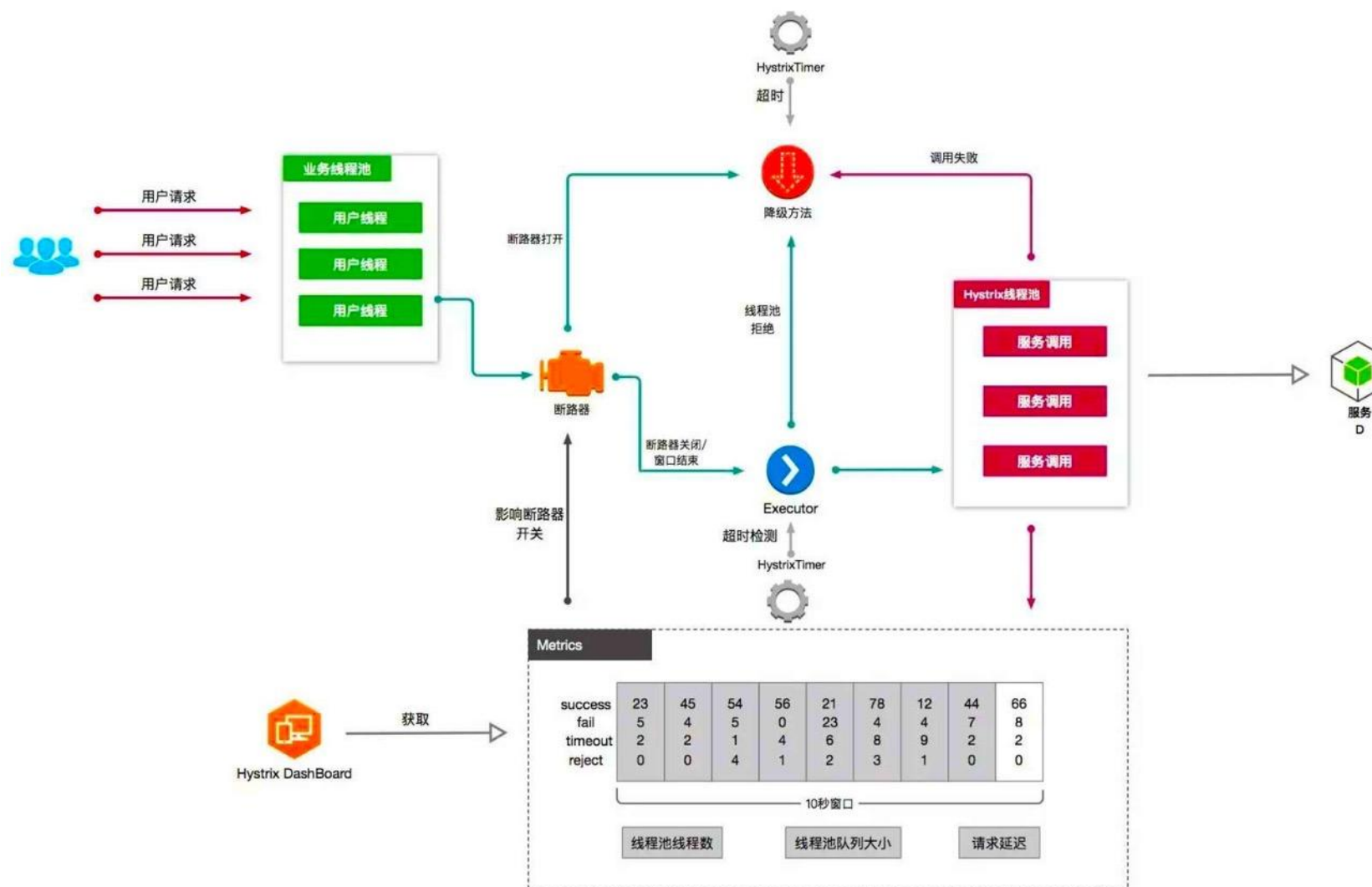
通知
请求/异步响应

发布/订阅
发布/异步响应

微服务架构之通信异常处理



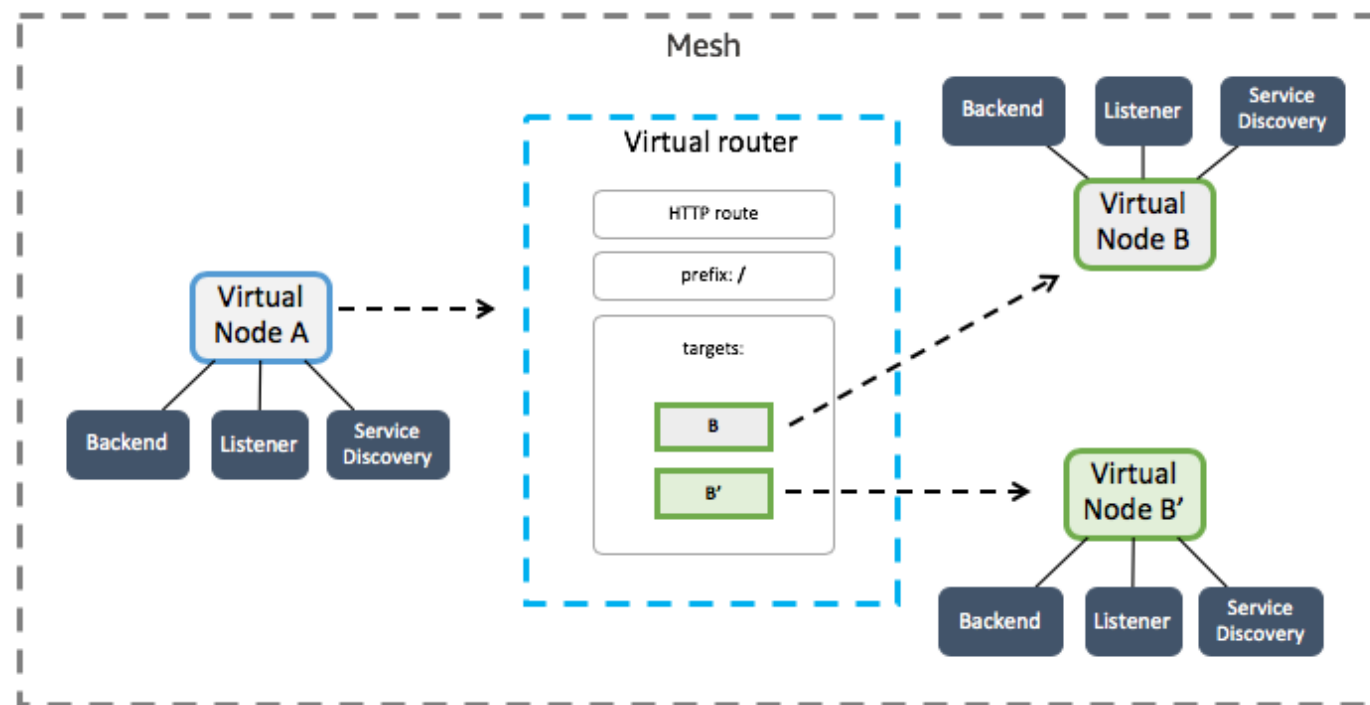
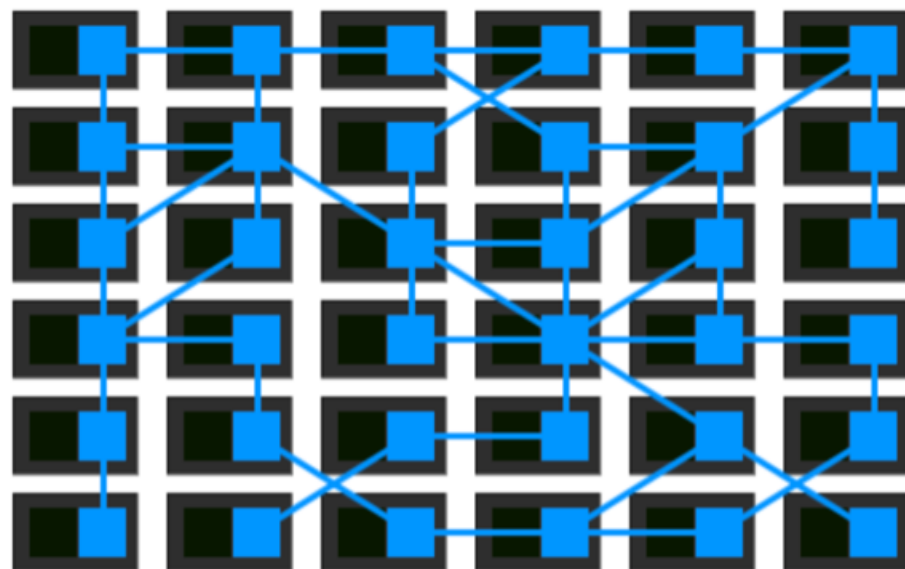
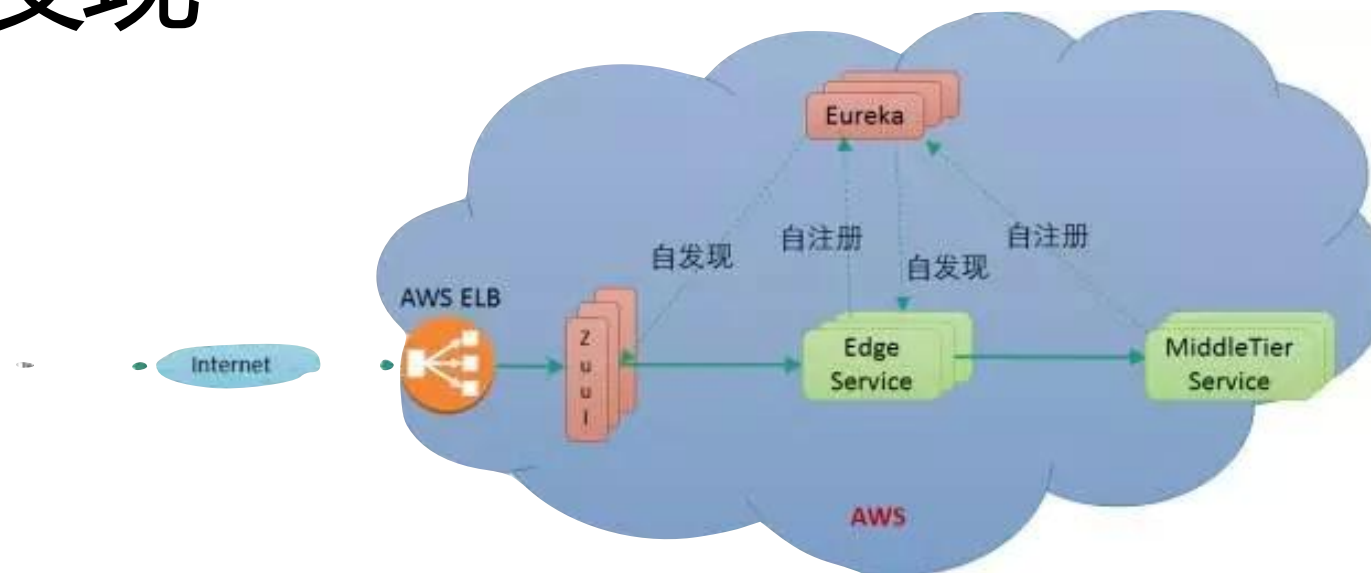
- 快速失败
- 流量限制
- 指数回退方式重试
- **断路器模式 (Circuit Breaker Pattern)**
- 幂等
- 提供回滚: 当一个请求失败后可以进行回滚逻辑。例如, 返回缓存数据或者一个系统默认值。



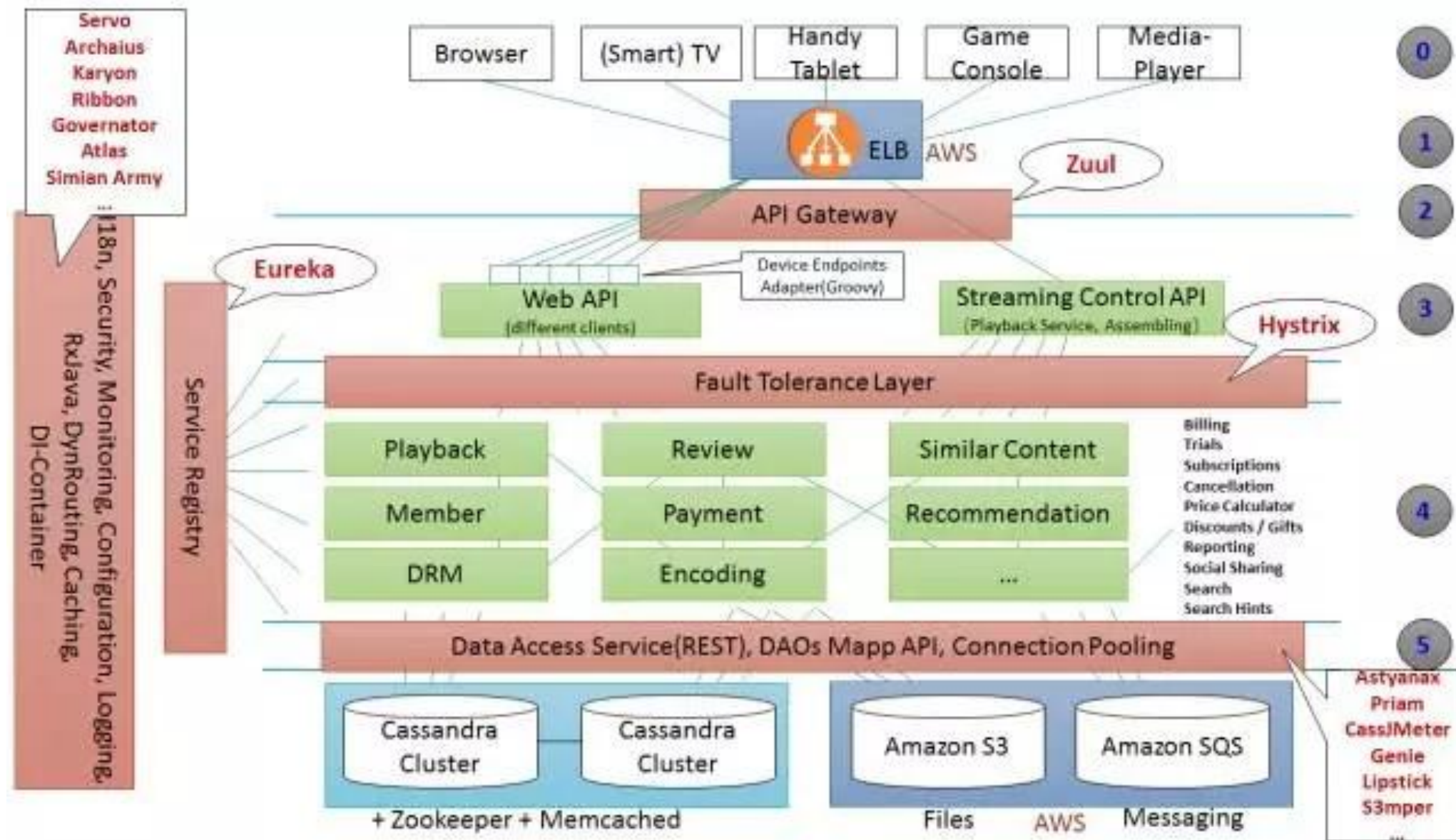
微服务架构之服务注册发现



- 注册表
- 自注册 vs 第三方注册
- 客户端服务发现 vs 服务器端服务发现
- **Service Mesh (服务网格)**



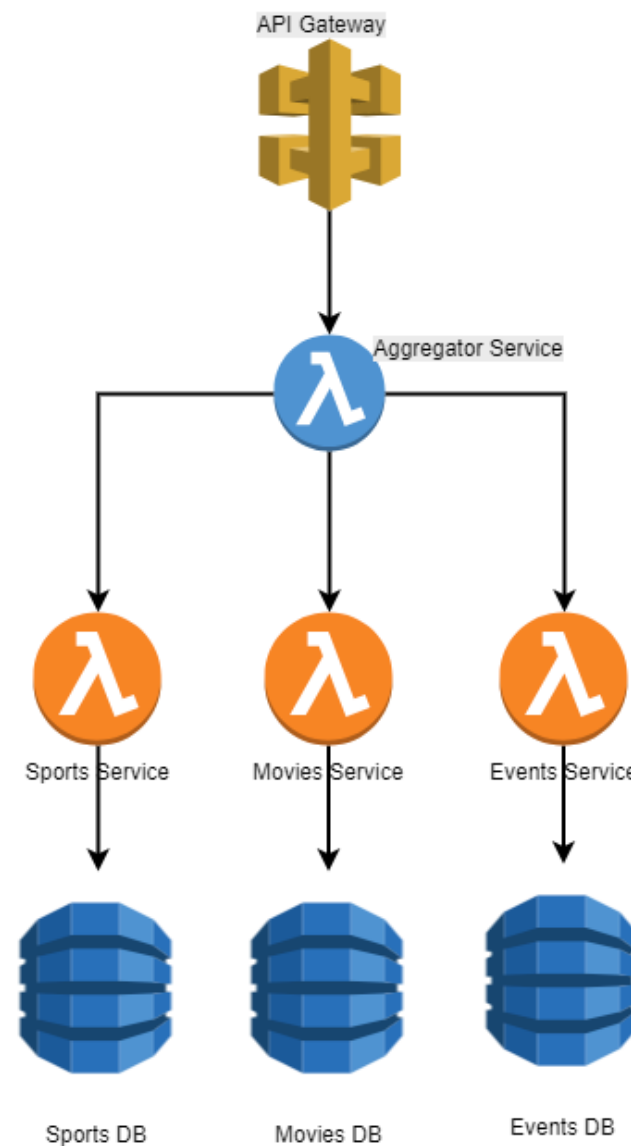
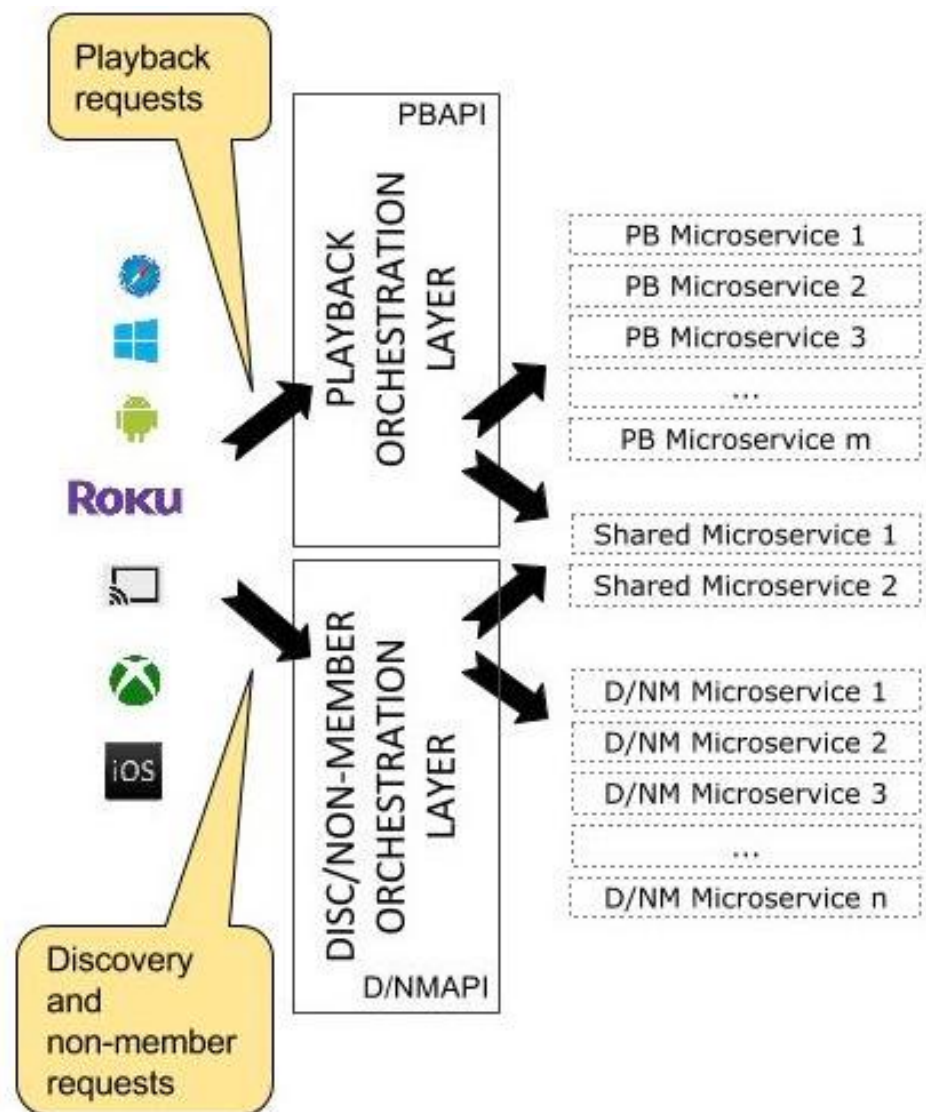
微服务架构之 API 分层



服务分层：

- API Gateway 模式
- 智能路由
- 服务注册发现机制
- 实例注册发现机制

微服务架构之 API 编排和聚合

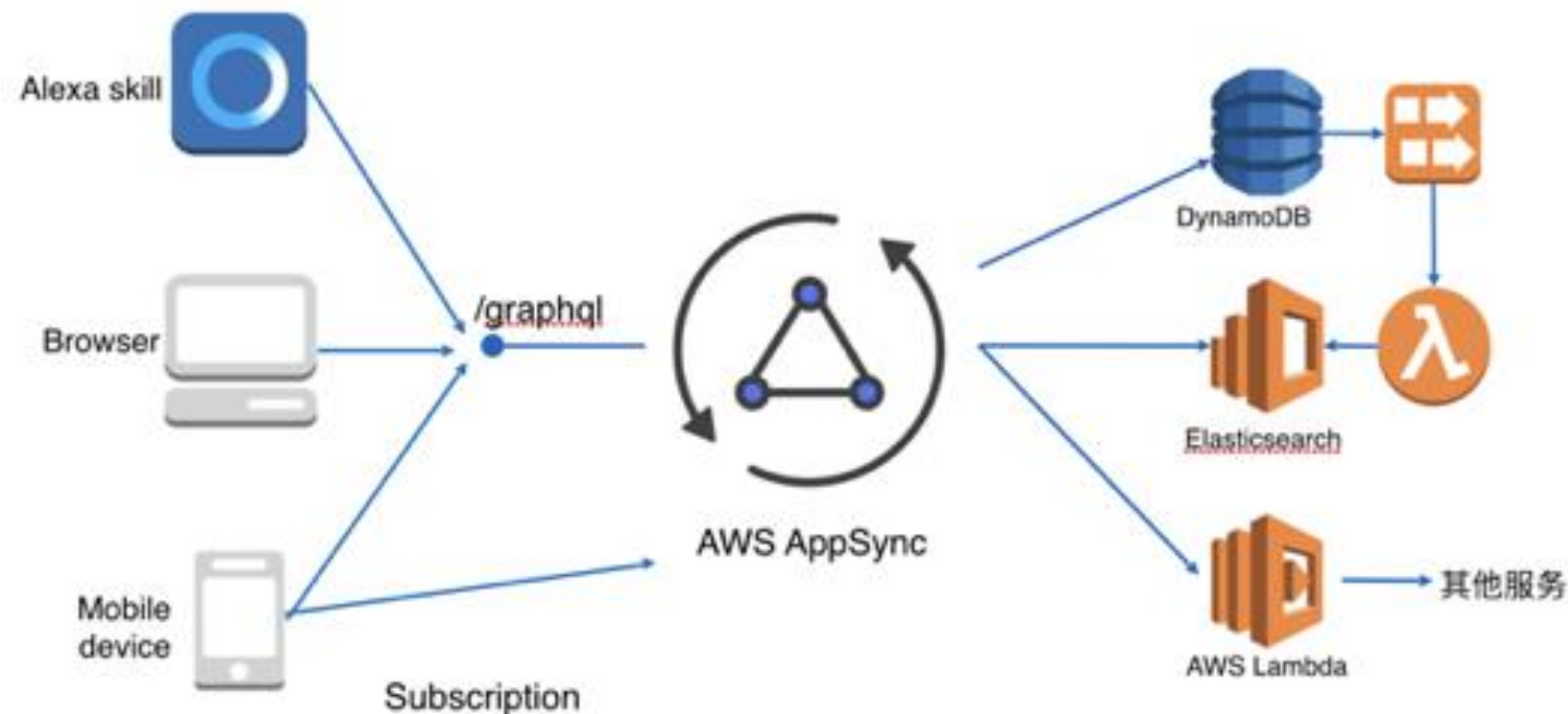
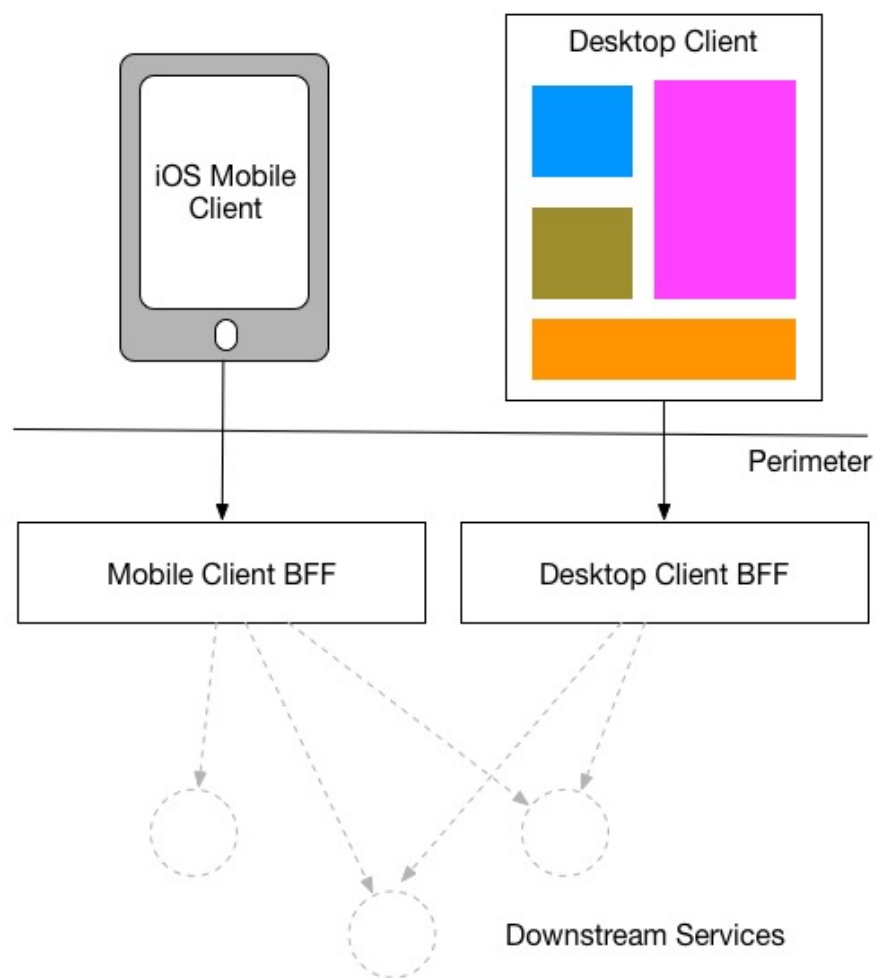


API 编排和聚合：

- 响应式编程 RxJava
- Lambda：Service Of Service
- CQRS：查询和命令关注点分离

Source: Netflix tech blog

微服务架构之 API 编排和聚合



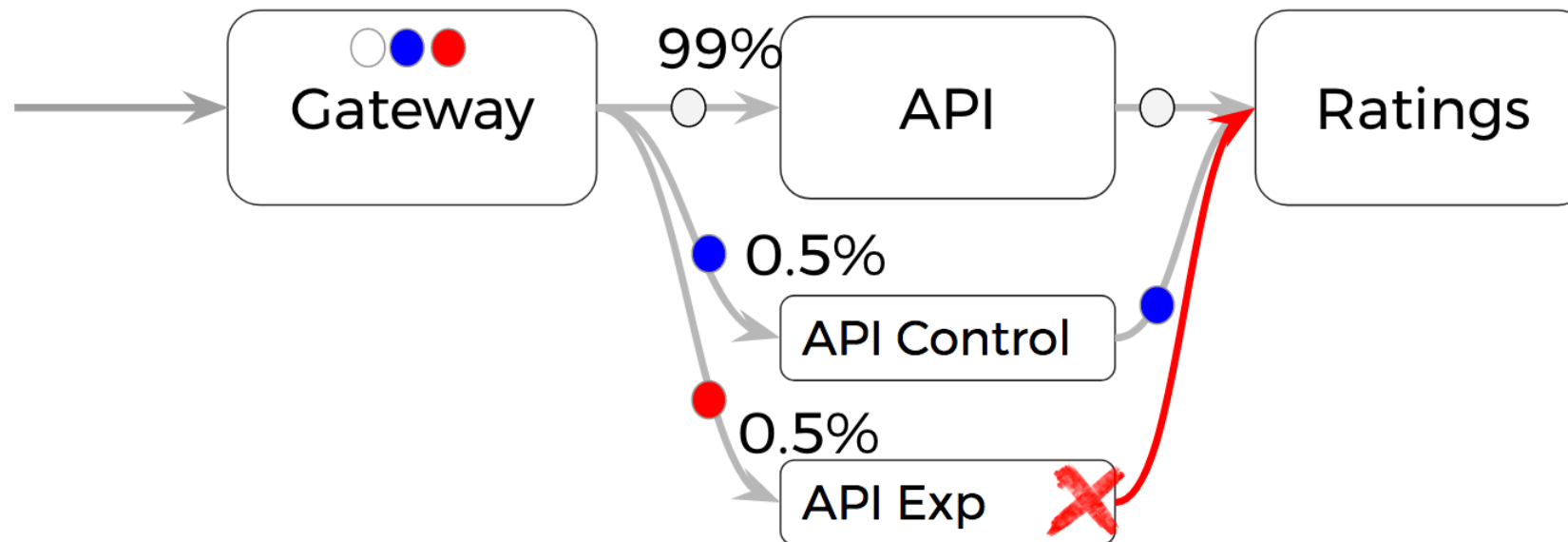
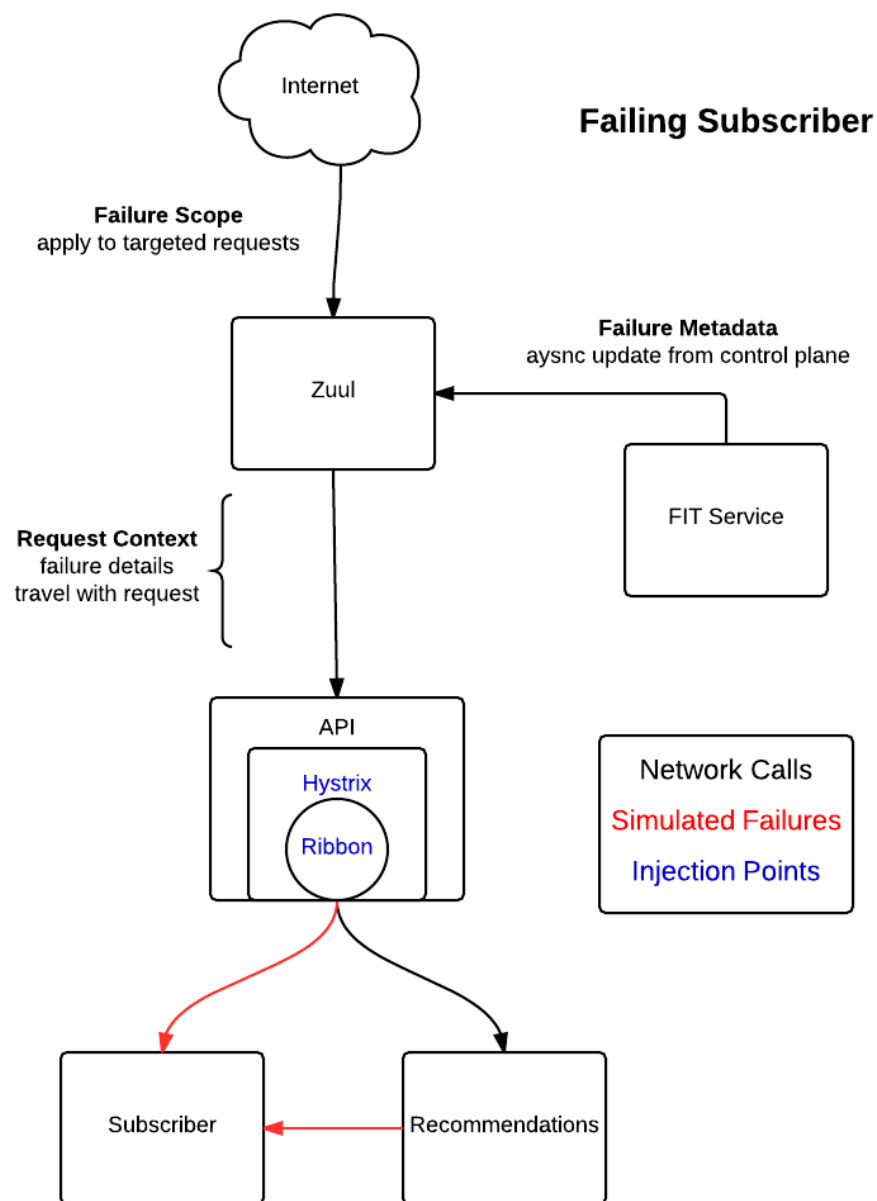
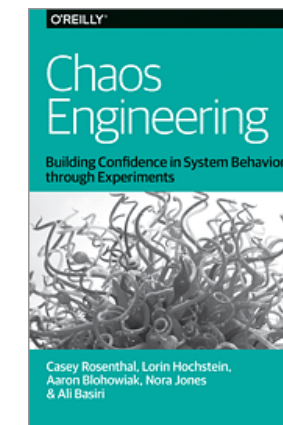
API 编排和聚合：

- GraphQL 对于前端应用的优化

Source: <https://samnewman.io/patterns/architectural/bff/>

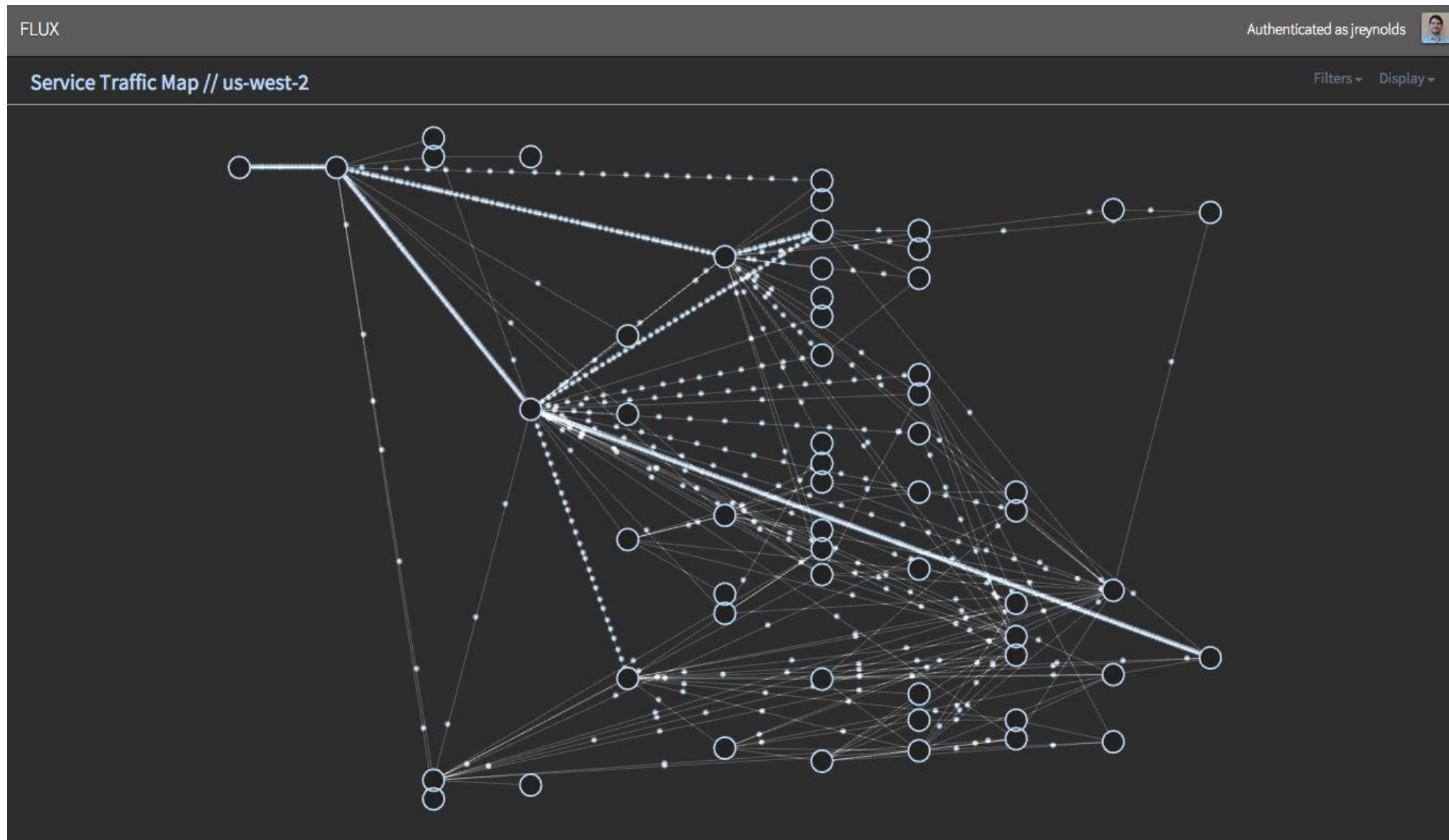
微服务架构之可靠性测试

www.principlesofchaos.org



失效注入测试 (FIT , Failure Injection Testing)

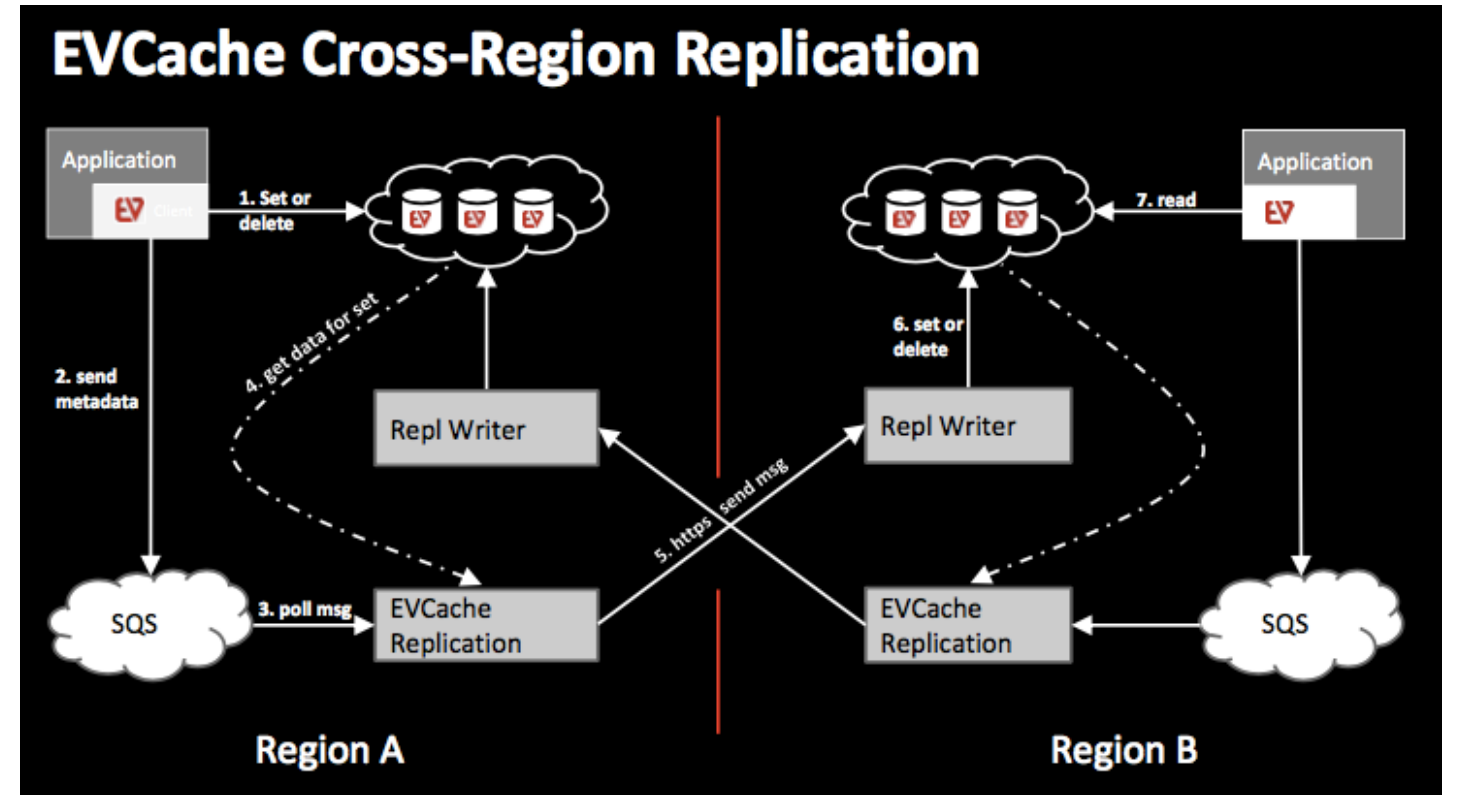
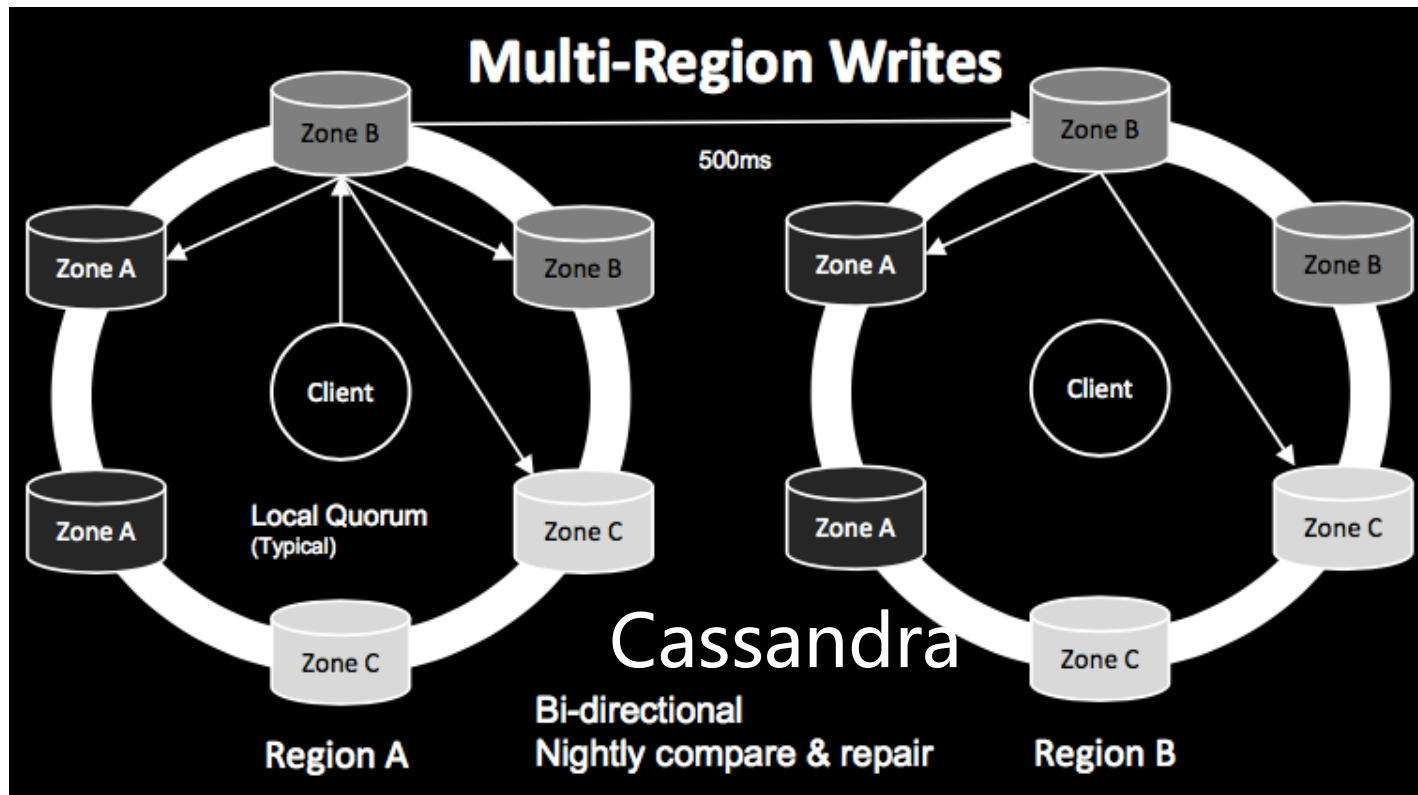
微服务架构之规模化管理



混沌工程及微服务系统 洞察能力：

- 实时数据
- 指标：流量、延迟、服务健康度等
- Edge侧的请求情况
- 有能力深入服务间调用情况
- 服务依赖关系

微服务架构之跨区域数据同步



<https://medium.com/netflix-techblog/global-cloud-active-active-and-beyond-a0fdfa2c3a45>



**一个可以工作的复杂系统
总是被发现是从
一个可以工作的简单系统
演进而来**

AWS 优良架构框架-不断优化和迭代



AWS Well-Architected

<https://wa.aws.amazon.com>

操作
最佳实践



安全



可靠性



性能和效率



成本优化



微服务 “良好架构” 原则



不要猜测容量需求

以实际生产环境规模执行测试

使用自动化简化构建实验

允许逐步完善架构

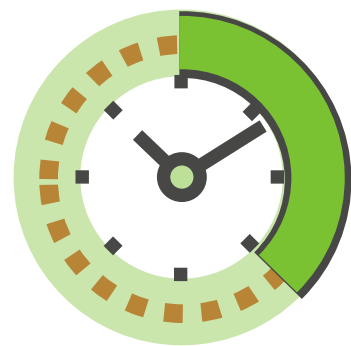
使用数据驱动你的架构

使用演练改进

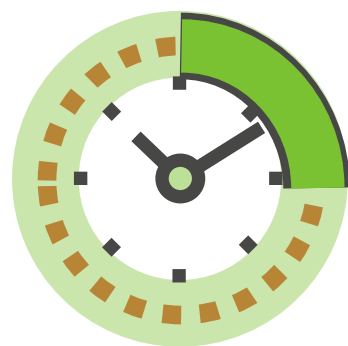
云交付：从开源出发到云原生

持续交付和运营视角

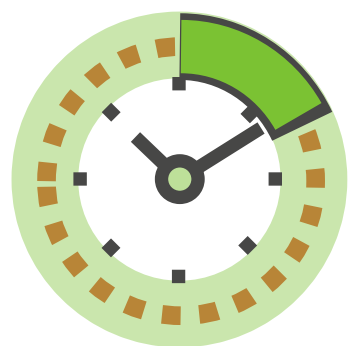
时间都花到哪去了?



业务项目
39%



非计划工作
24%



变更
20%



IT项目工作
19%



拯救世界的时间







Let's Build on AWS & Reinvent the Architecture


不断创新发展的云服务 为企业用户带来后发优势


微服务复杂性功能需求下沉到平台



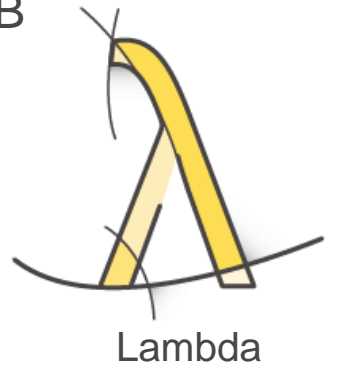
 Amazon Kinesis

 Amazon DynamoDB

 Amazon SQS

 Amazon SNS

 AWS Step Functions



AWS App Mesh

 API Gateway



AWS Cloud Map

 Cognito User Pools



AWS X-Ray



Amazon CloudWatch



SpringCloud
Netflix OSS 

从类库继续下层到平台服务

无服务器架构是企业微服务的未来

云原生微服务架构：
你写的所有代码都是关于
业务逻辑的

开源优先，微服务的容器化改造

无服务器的微服务架构-FaaS+事件驱动



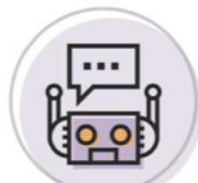
Web Applications



Backends



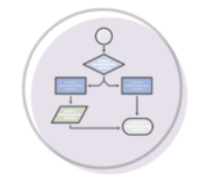
Data Processing



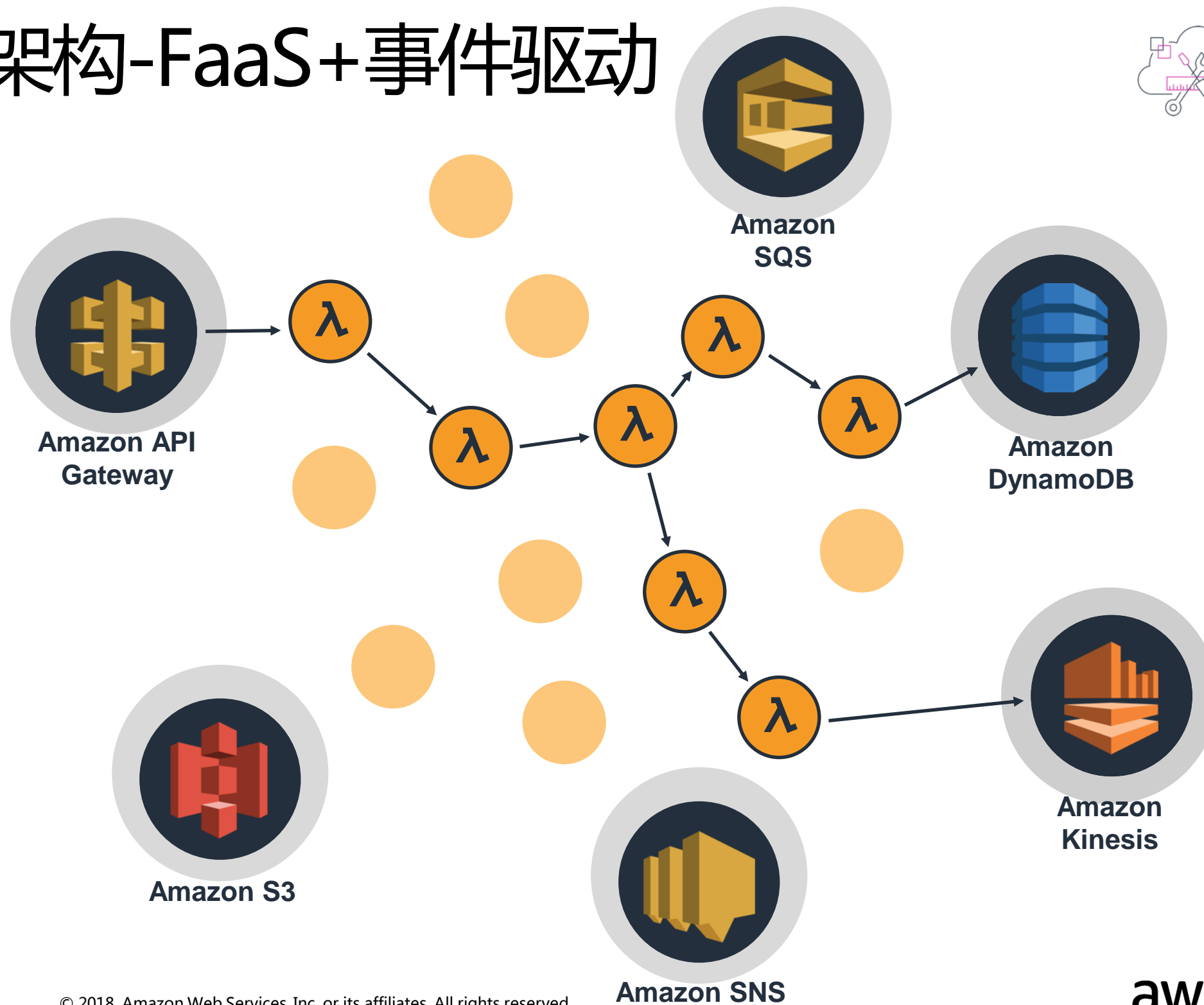
Chatbots



Amazon Alexa

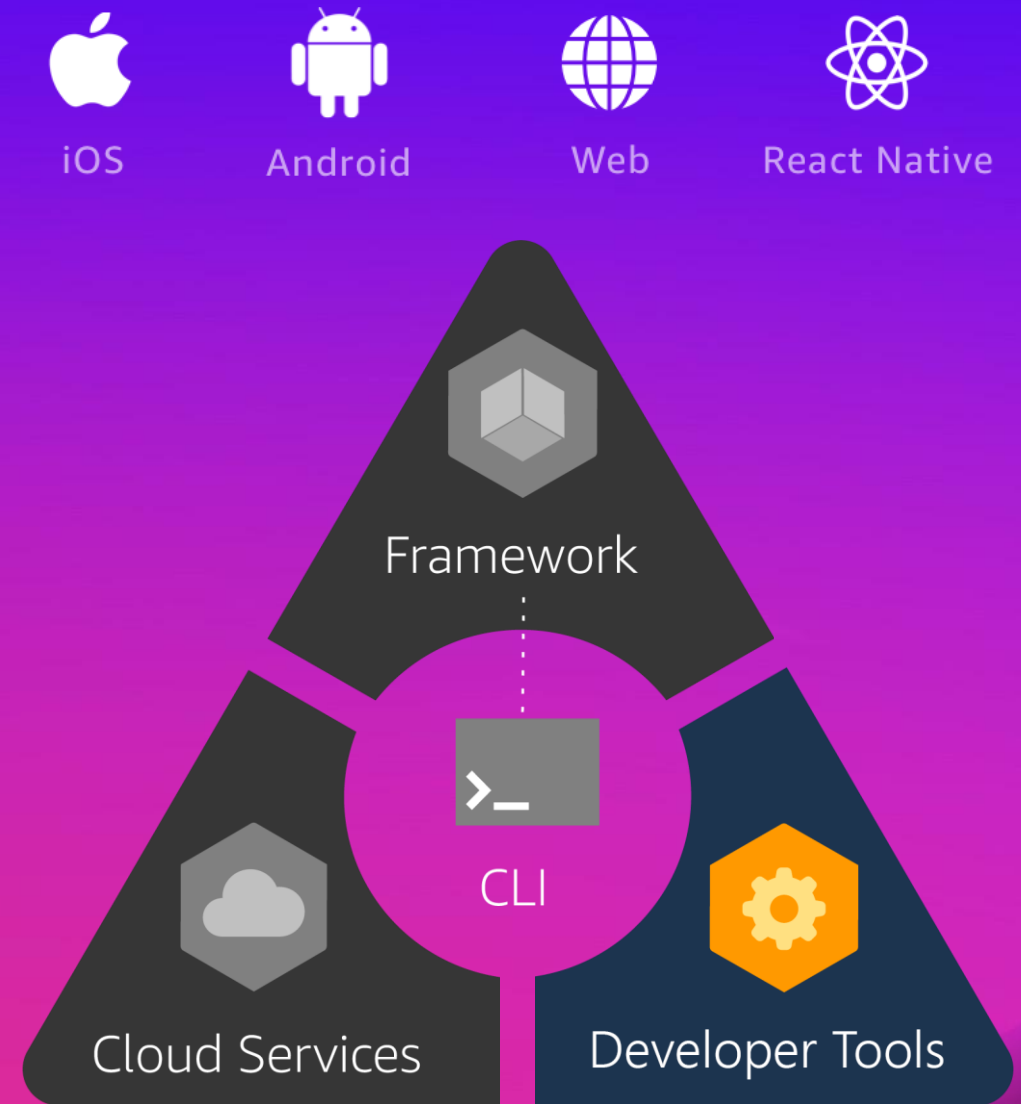


Autonomous IT



Developing Mobile and Web Apps on AWS

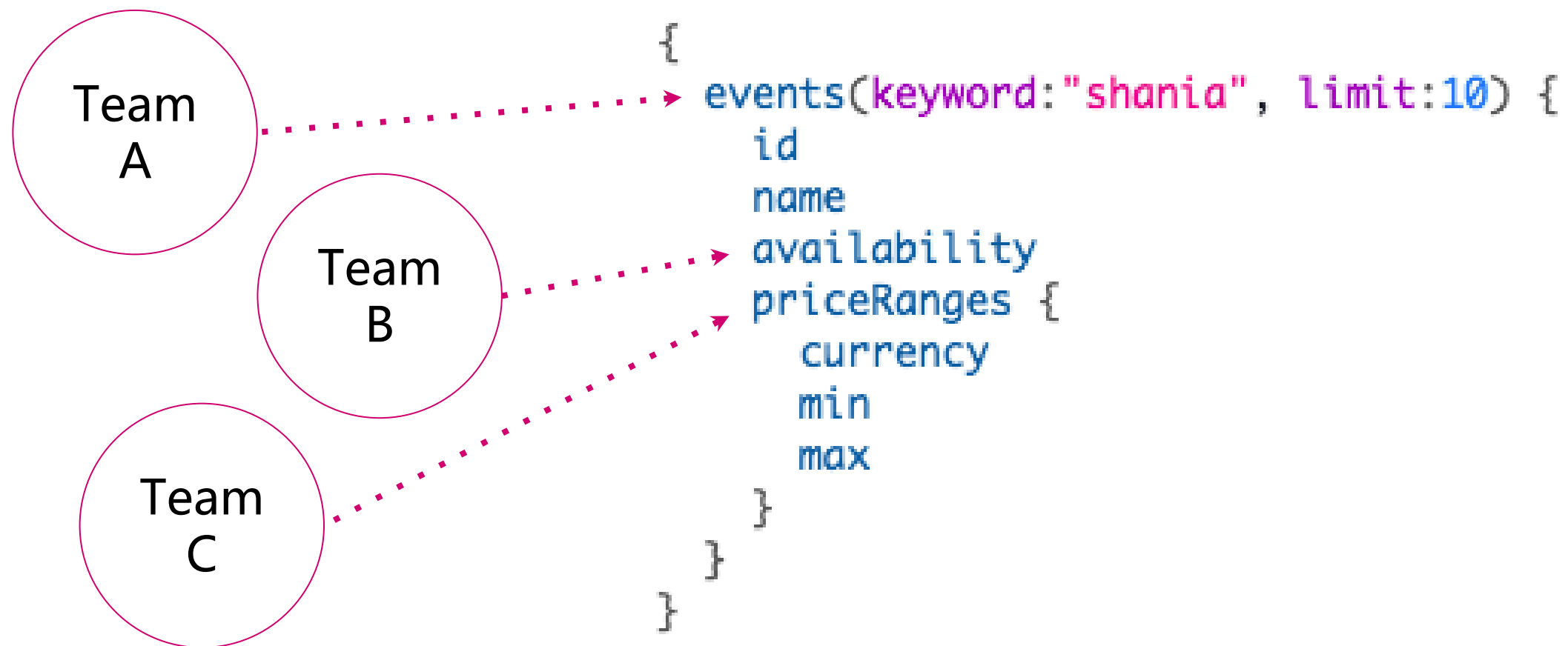
简便快捷开发者体验



团队协作挑战



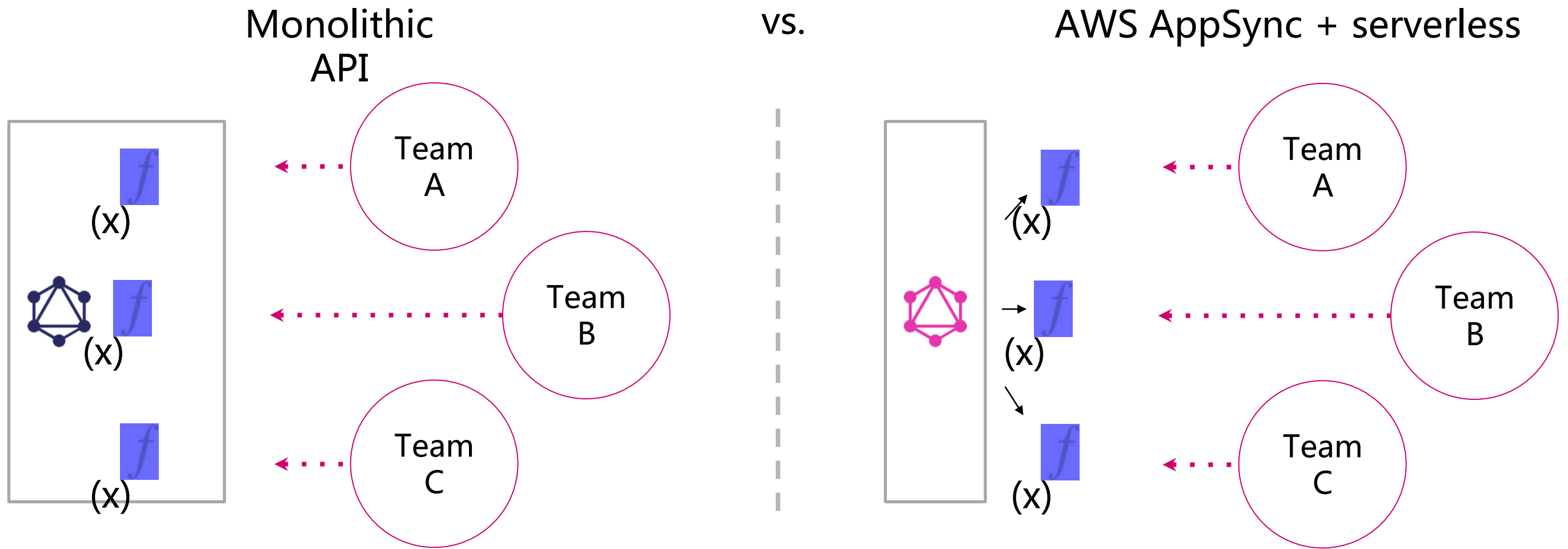
不同的微服务团队如何协作完成一个综合的业务需求？



无服务器架构中的团队协作改进



GraphQL (AppSync) + 无服务器架构可以非常棒的促进多开发团队协作



无服务器微服务架构 - 企业21 世纪现代应用架构



APPLICATION PRIMITIVES – COMPUTE AND DATASTORES



Amazon S3



AWS Lambda



AWS Fargate



Amazon DynamoDB



Amazon Aurora Serverless



Amazon Kinesis

APPLICATION INTEGRATION



Amazon SNS



Amazon API Gateway



AWS Step Functions



Amazon MQ

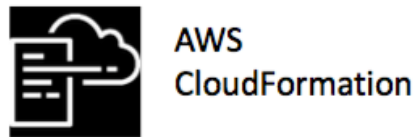


Amazon SQS



AWS Appsync

DEVELOPER TOOLS



AWS CloudFormation



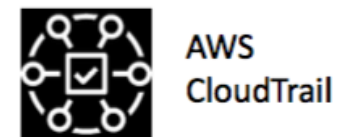
AWS Cloud9



AWS CodePipeline



AWS Config



AWS CloudTrail



Amazon CloudWatch

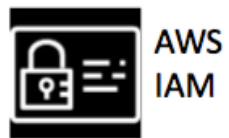


AWS X-Ray

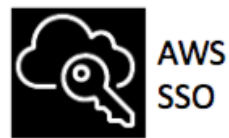


AWS Serverless Application Repository

SECURITY AND ADMINISTRATION



AWS IAM



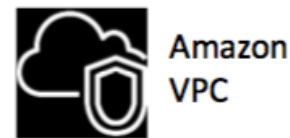
AWS SSO



Amazon GuardDuty



Amazon Inspector



Amazon VPC



AWS WAF



AWS Shield



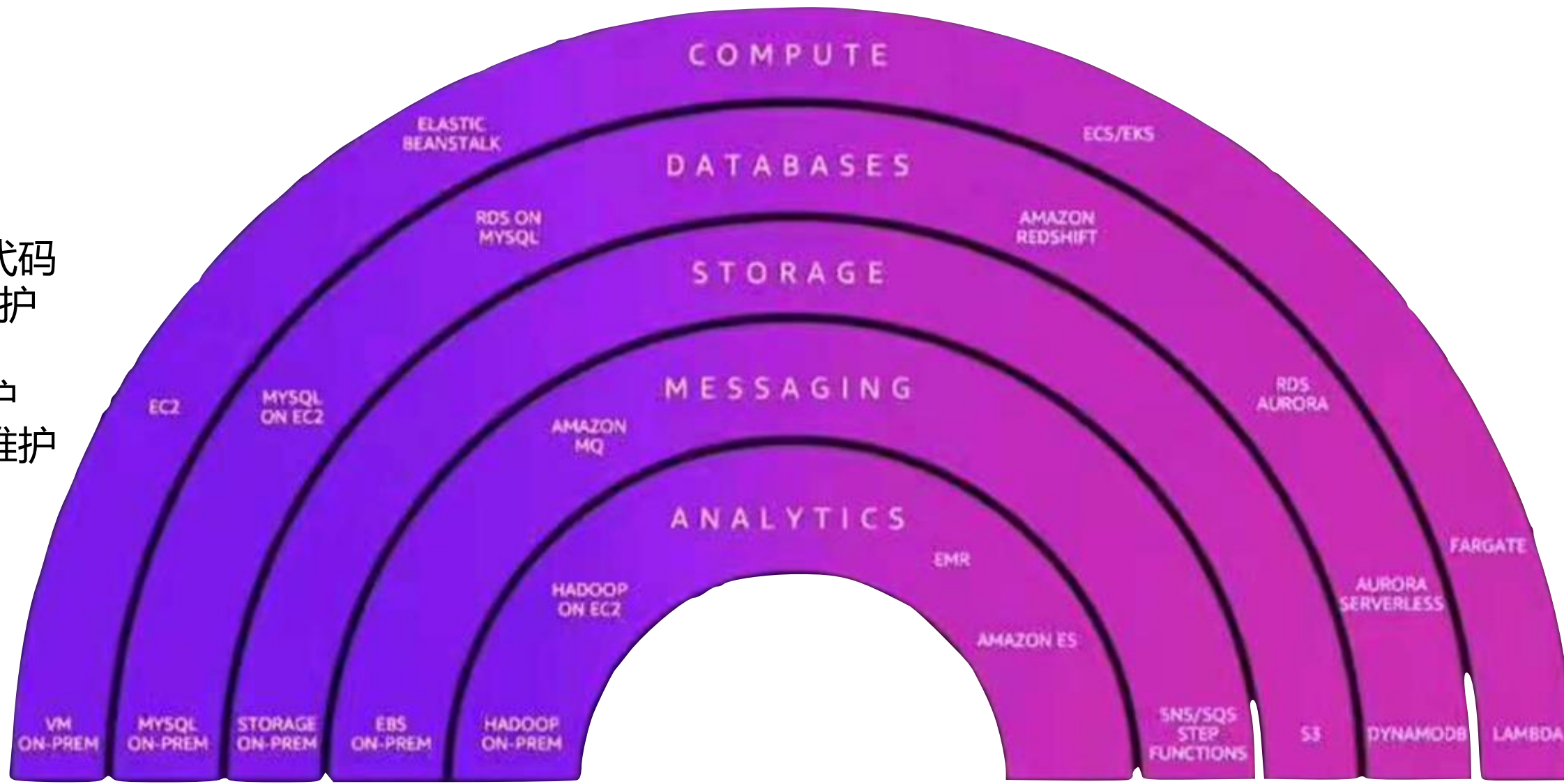
Amazon Cognito

无服务器架构让你更聚焦业务



基础设施即代码
操作系统维护
网络
数据库维护
中间件安装维护
升级
部署
扩展

繁杂的底层
运维工作



事件响应流程
混沌工程
和开发人员一样写代码
应用安全
成本优化

更有价值的
Ops工作





总结

总结



- 当我们谈论微服务的时候，不仅仅是技术实践问题，要敢于问 “Why”
- 从客户出发，利用设计思维找创新点，数据思维来验证优化，技术思维进行落地
- 从简单架构开始，并对照优良架构方法不断迭代
- 从开源出发到云原生，无服务器微服务架构是企业架构未来

Thank you!