QINGCLOUD青云

OpenPitrix 平台中的微服务实践

Ray Xiaosi Zhou

Agenda

- 简介
- 微服详解
  - API 网关
  - 服务发现
  - 数据管理
  - 服务通信
- OpenPitrix

什么是微服务

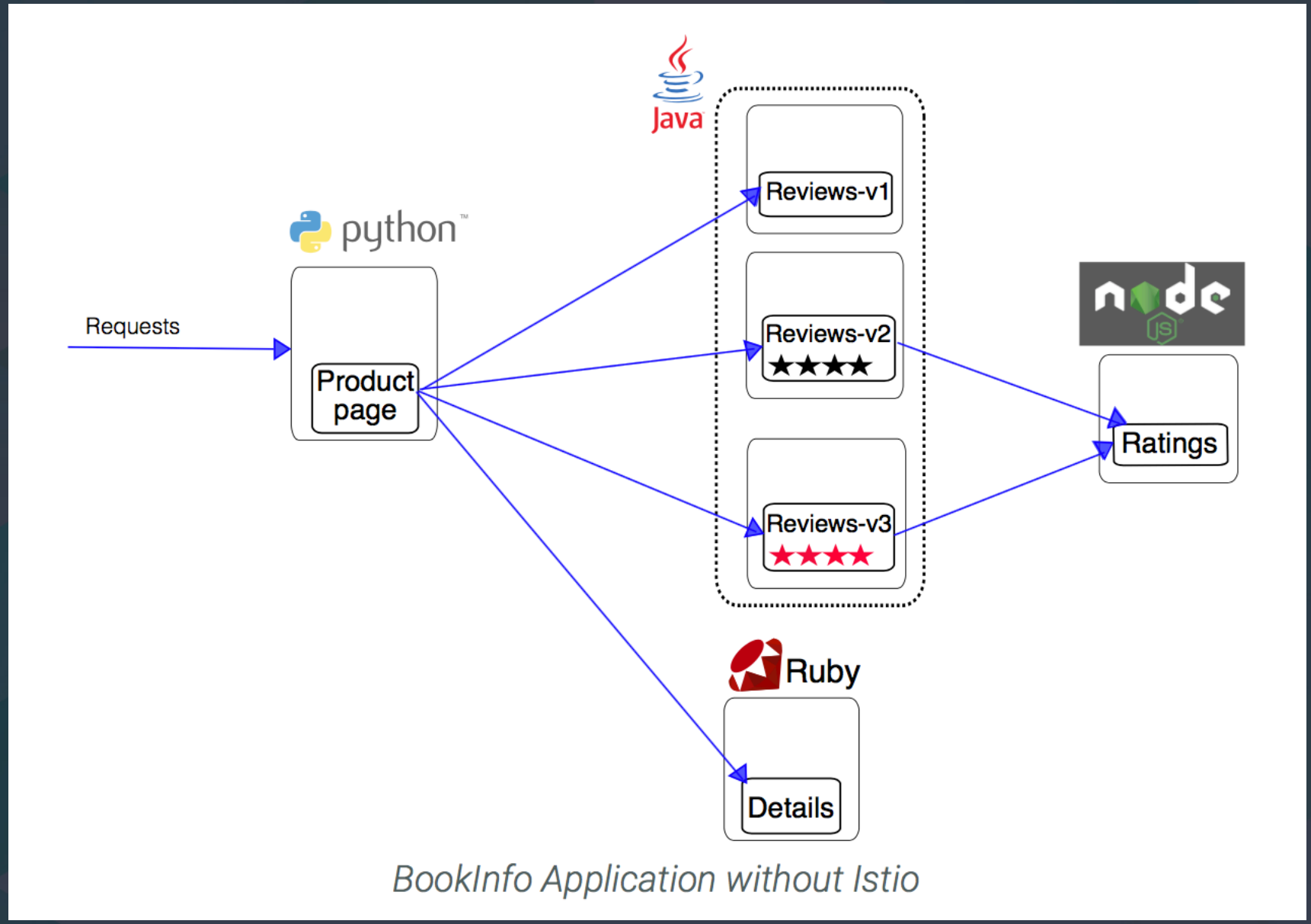
- **Microservices** is a specialization of an implementation approach for service-oriented architectures (SOA) used to build flexible, independently deployable software systems. The microservices approach is a first realisation of SOA that followed the introduction of DevOps and is becoming more popular for building continuously deployed systems.

  — 摘自wikipedia

什么是微服务

- An approach to developing a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API. These services are built around business capabilities and independently deployable by fully automated deployment machinery. There is a bare minimum of centralized management of these services, which may be written in different programming languages and use different data storage technologies.

示例



https://istio.io

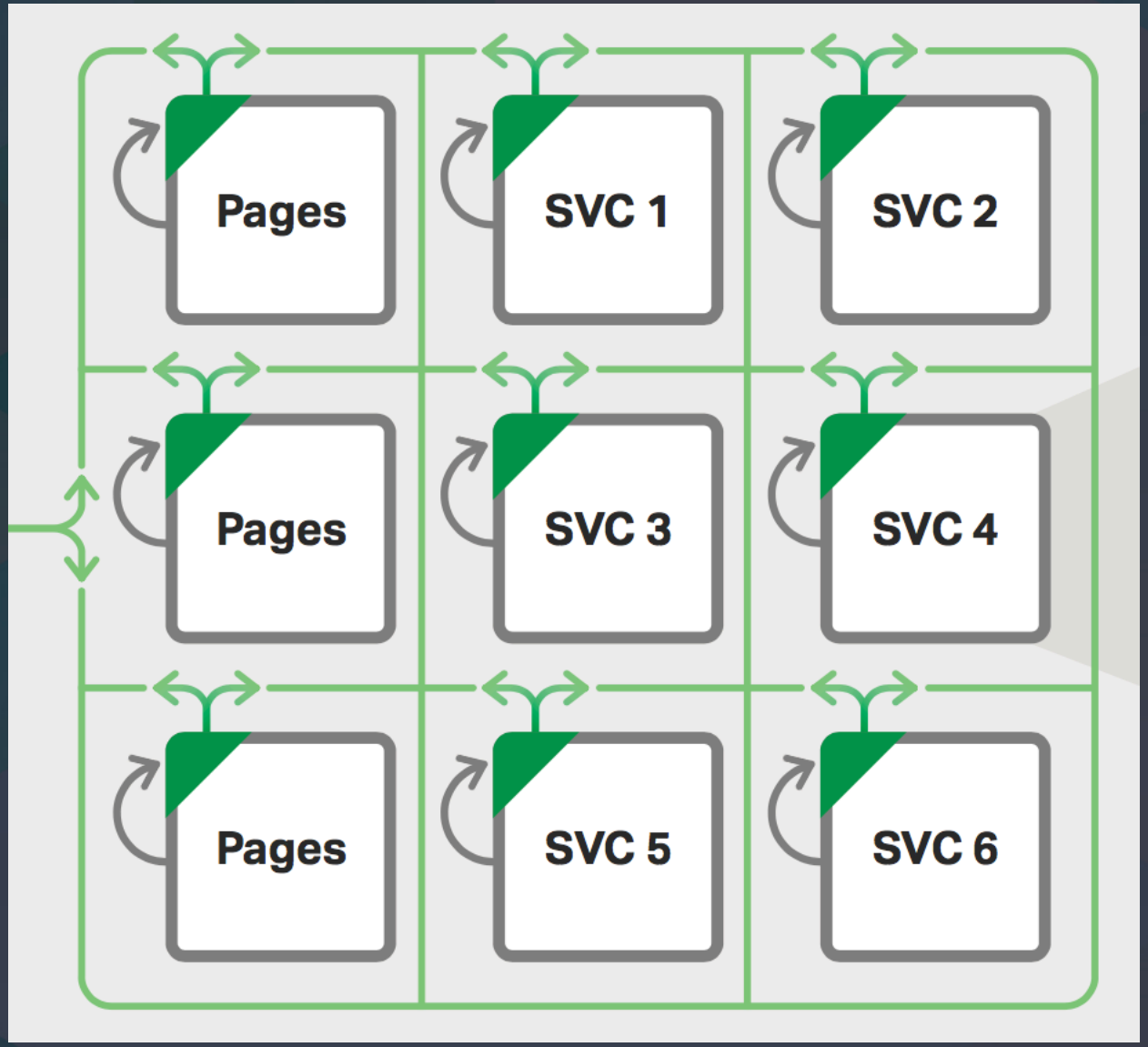
优点

- 复杂的系统(monolithic application)简单化
- 独立开发及部署
- 隔离性
- 弹性和伸缩性

挑战

- 数据库设计与开发
  - Database per service
  - 最终一致性
- 服务间通讯
  - 分布式
  - service model: proxy, router mesh, fabric
  - service mesh
- 测试
- 部署及治理

Fabric Model



From Nginx

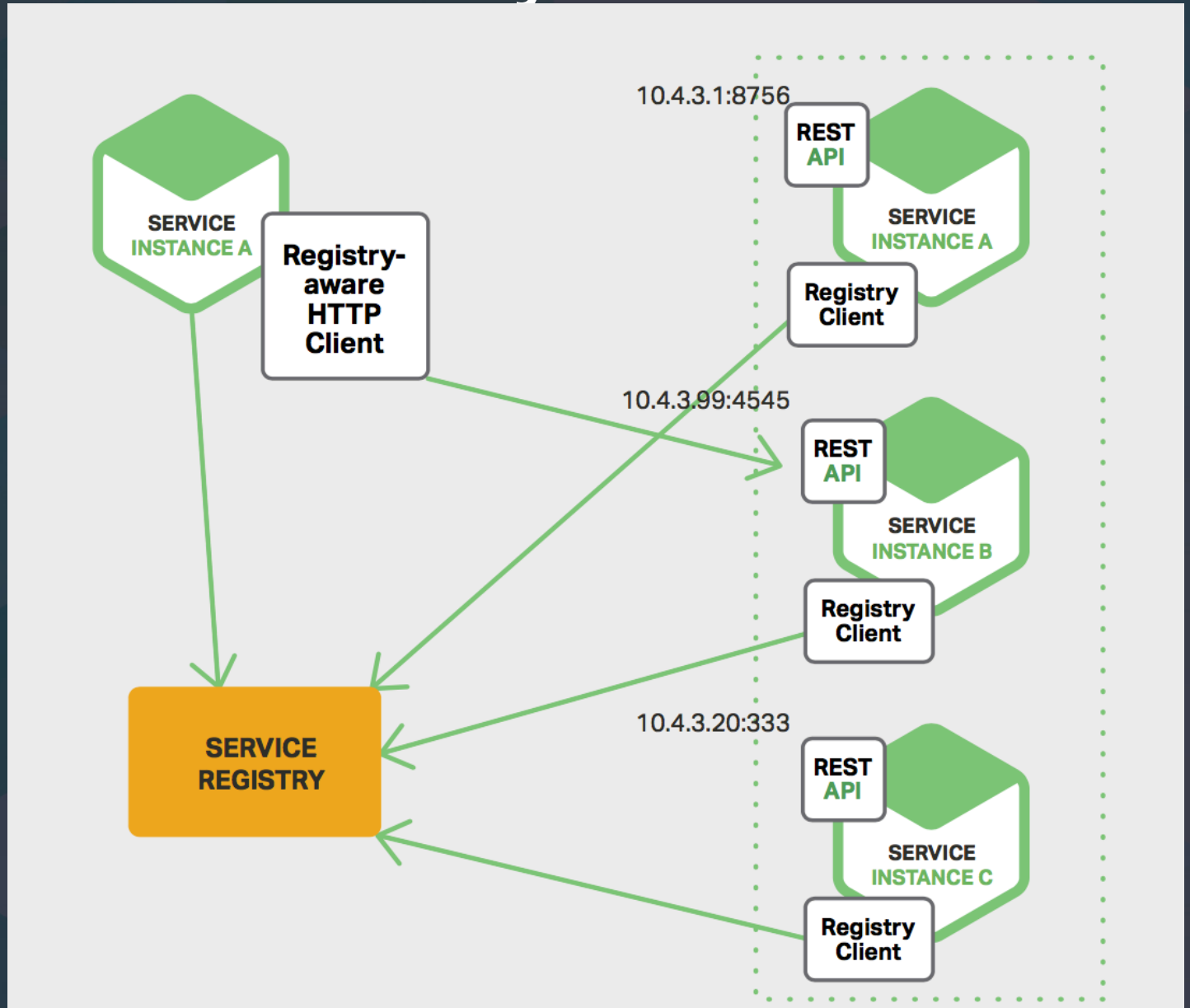
API 网关

- A server that is the single entry point into the system
- Facade pattern
- HTTP/HTTPS + REST
- 内部服务聚合层

服务发现

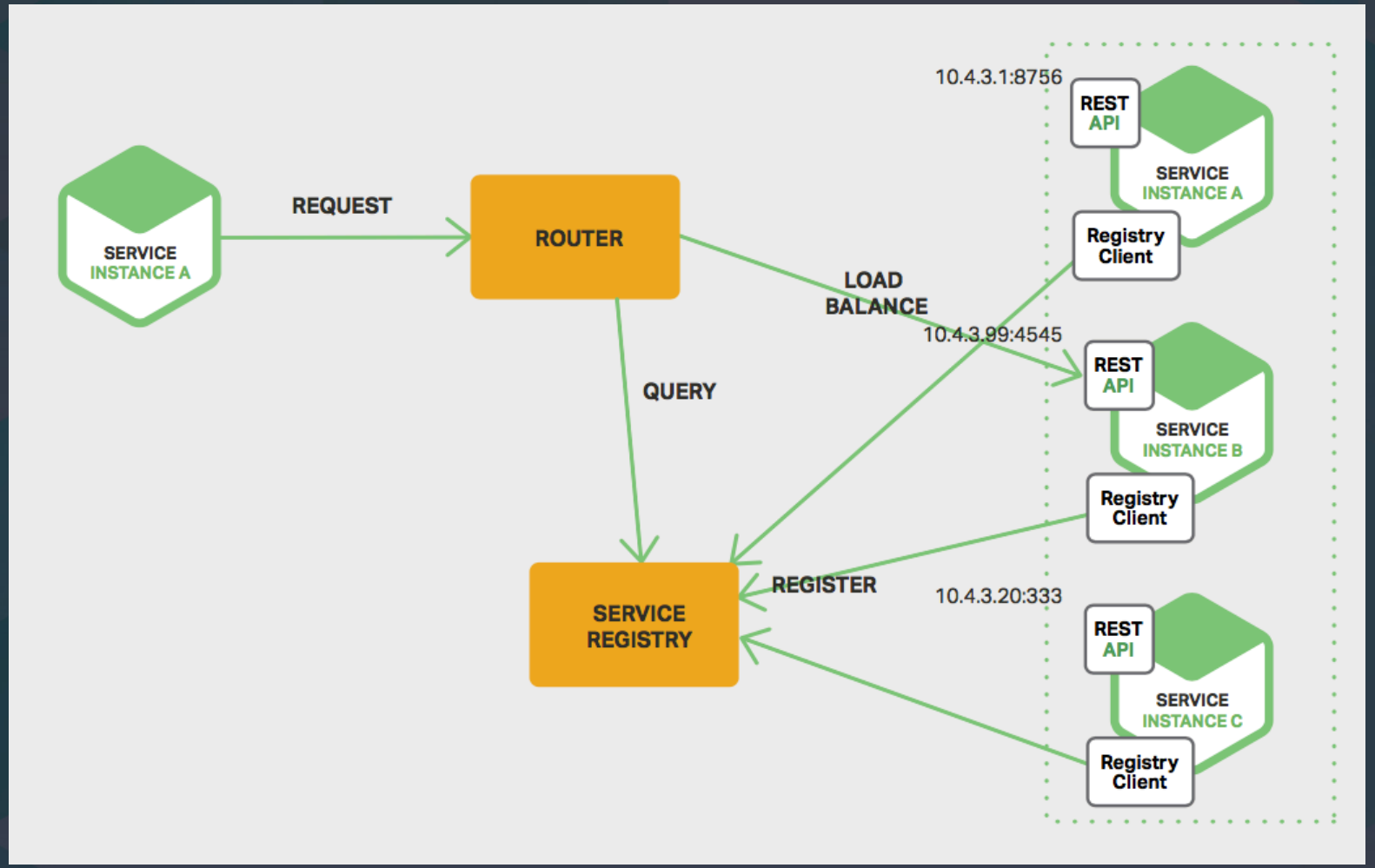
- 为什么需要服务发现
  - 云上服务节点IP地址会发生变化
  - 同一服务后端节点个数会发生变化
- 基于客户端服务发现 (Client-side Discovery)
- 基于服务器端服务发现 (Server-side Discovery)
- 服务注册

Client-side Discovery



From Nginx

Server-side Discovery



From Nginx

数据管理

- 单体应用
  - 单一数据库：ACID，SQL
- 微服务应用
  - 每个微服独享自己的数据库
  - 服务之间只能通过API访问，不能直接访问其它服务的数据库
  - 不同服务可以采用不同的数据库如关系型、NoSQL、图数据库等
  - 跨服务交易：Event-driven，ACID model —> BASE model

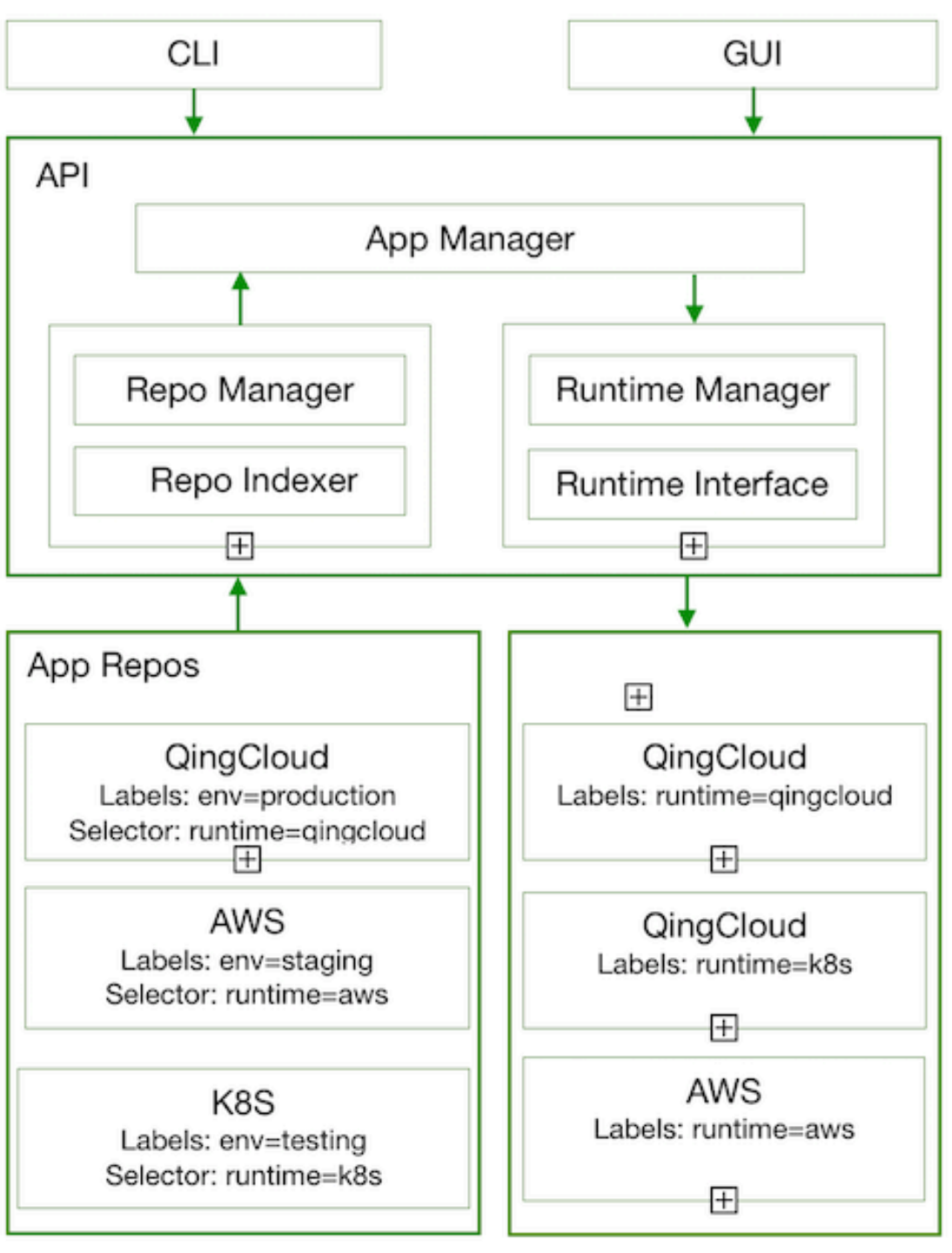
服务间通信

- 单体应用：method/function call
- 微服务
  - 分布式
  - IPC 机制: 一对一，一对多；同步，异步
  - API first
  - Version-based API
  - 异常处理：熔断，降级，超时处理，fallback等

OpenPitrix

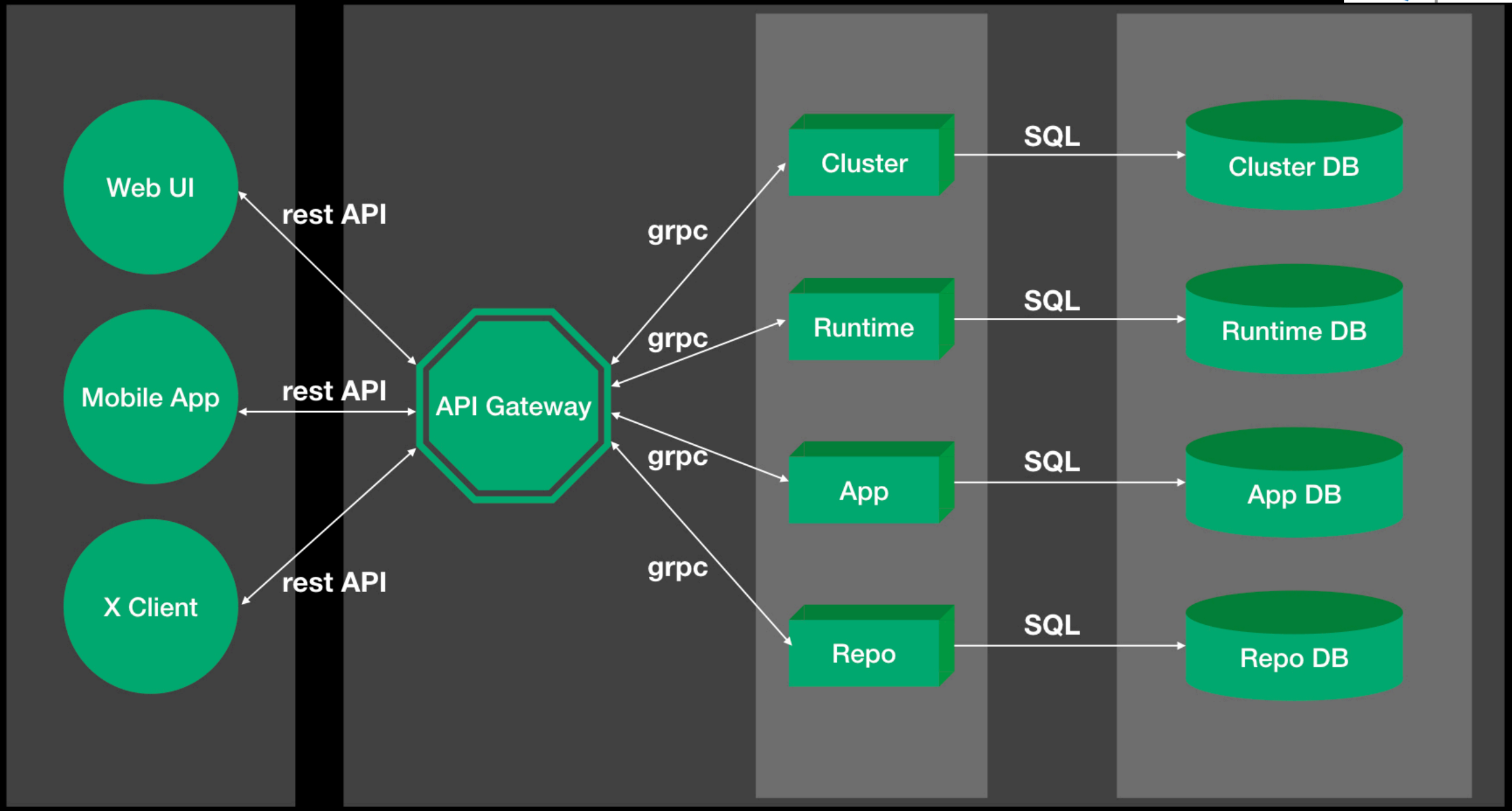
- 一个开放的平台，致力于在多个云环境中(青云QingCloud、AWS、kubernetes等）开发和部署应用程序，从而能够让应用程序无缝的运行在各个云环境中。
- Pitrix = PaaS + IaaS + Matrix。同时它也有 PI （希腊语中的“π”）的含义，即包含无限应用的巨大矩阵。
- https://github.com/openpitrix/openpitrix

架构图


CLI
GUI
API
App Manager
Repo Manager
Repo Indexer
Runtime Manager
Runtime Interface
App Repos
QingCloud
Labels: env=production
Selector: runtime=qingcloud
AWS
Labels: env=staging
Selector: runtime=aws
K8S
Labels: env=testing
Selector: runtime=k8s
QingCloud
Labels: runtime=qingcloud
QingCloud
Labels: runtime=k8s
AWS
Labels: runtime=aws

微服务设计与实践

- 服务：repo, app, cluster, runtime, api
- api是 API 网关，对外提供REST服务，是其它服务的聚合，通过 grpc通信
- 采用 private tables per service
- https://github.com/openpitrix/openpitrix/blob/master/docs/design/db-design.md
- CI/CD - Kubernetes + Jenkins


Web UI
Mobile App
X Client
rest API
rest API
rest API
API Gateway
grpc
grpc
grpc
grpc
Cluster
Runtime
App
Repo
SQL
SQL
SQL
SQL
Cluster DB
Runtime DB
App DB
Repo DB

Jenkins

Pipelines | Administration | Logout

OpenPitrix

Activity | Branches | Pull Requests

STATUS	RUN	COMMIT	BRANCH	MESSAGE	DURATION	COMPLETED
✓	14	de3d885	master	Replayed #13	1m 30s	18 hours ago
✗	13	de3d885	master	Replayed #11	5s	18 hours ago
✗	12	e0990b3	master	Branch indexing	4s	a day ago
✓	11	de3d885	master	pkg/service.pb: regenerate go code a... 2 commits	1m 32s	2 days ago
✓	10	7fd2287	master	pkg/cmd/{api/app/cluster/repo/runti... 4 commits	37s	2 days ago
✓	9	a072445	master	add cluster IP for mysql when deployment Open...	46s	3 days ago
✗	8	de26d94	master	pkg/cmd/{app/cluster|/repo/runtime... 6 commits	33s	3 days ago
✗	7	d0dd65a	master	build: add custom docker build environment for ...	1m 28s	5 days ago

Branch: master 1m 30s Changes by chaishushan

Commit: de3d885 18 hours ago Replayed #13

Steps Deploy

./devops/scripts/deploy-k8s.sh — Shell Script 2s

```
[openpitrix_master-LQHVK77BILTYVA4GB63ZUXS3XGONH73O2MQI3M2UYSMOWFKFCTQQ] Running shell script
+ ./devops/scripts/deploy-k8s.sh
Error from server (AlreadyExists): secrets "mysql-pass" already exists
service "openpitrix-api" configured
deployment "openpitrix-api" configured
service "openpitrix-app" configured
deployment "openpitrix-app" configured
service "openpitrix-cluster" configured
deployment "openpitrix-cluster" configured
service "openpitrix-repo" configured
deployment "openpitrix-repo" configured
service "openpitrix-runtime" configured
deployment "openpitrix-runtime" configured
service "openpitrix-mysql" configured
persistentvolumeclaim "mysql-pv-claim" configured
deployment "openpitrix-mysql" configured
```

- https://12factor.net/
- https://stackoverflow.com/questions/4127241/orchestration-vs-choreography
- http://searchmicroservices.techtarget.com/tip/Four-mistakes-organizations-make-when-adopting-DevOps?utm_medium=EM&asrc=EM_NLN_83952570&utm_campaign=20171013_Four%20classic%20DevOps%20mistakes&utm_source=NLN&track=NL-1806&ad=917084&src=917084

Thank you.