

基于kubernetes的企业级容器云

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2017/04/18

Lenovo™





促进软件开发领域知识与创新的传播



关注InfoQ官方信息
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大会演讲视频信息



扫码，获取限时优惠



全球架构师峰会 2017 [深圳站]

2017年7月7-8日 深圳·华侨城洲际酒店

咨询热线：010-89880682



全球软件开发大会 [上海站]

2017年10月19-21日

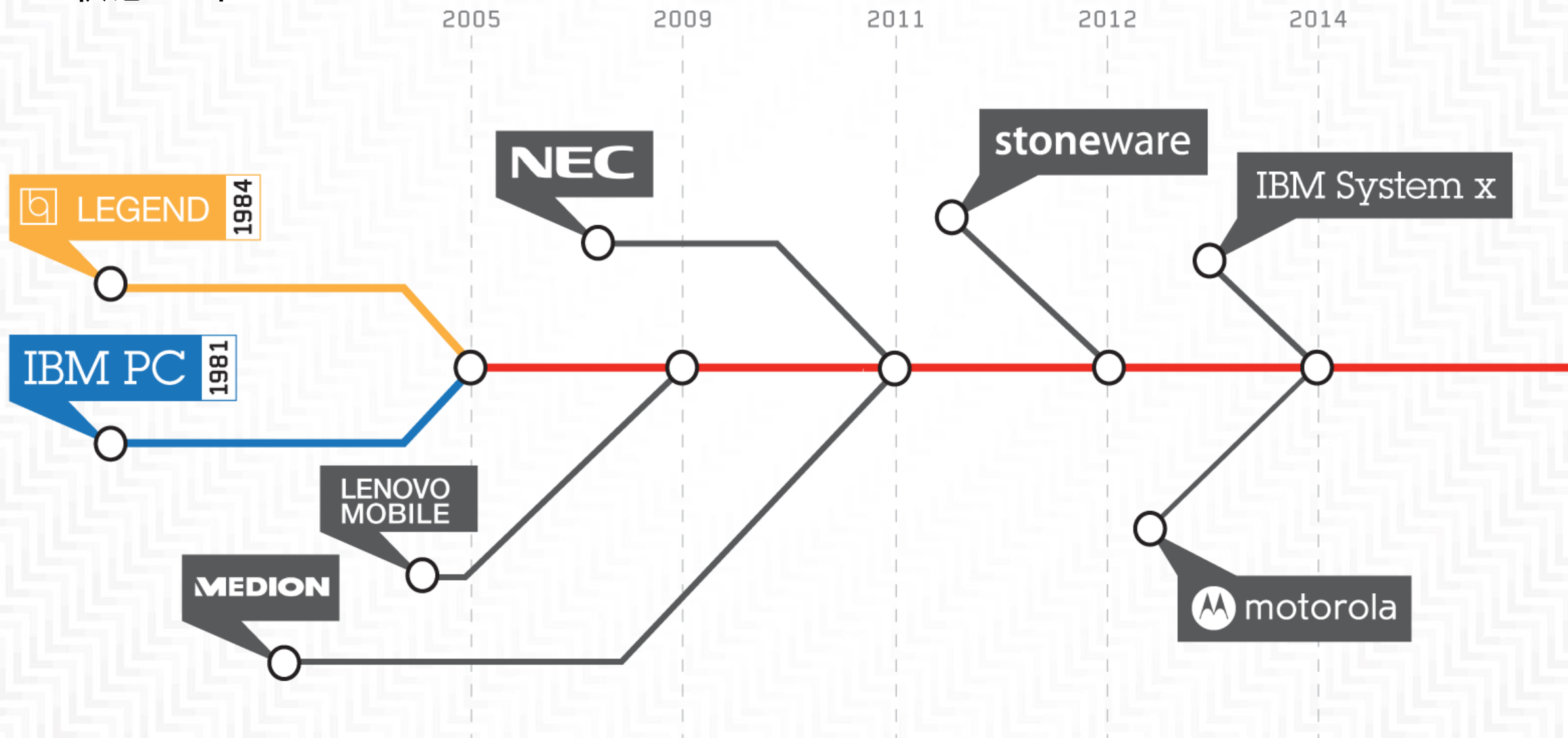
咨询热线：010-64738142

+ 大纲

- 背景和挑战
- 企业级容器云设计与思考
- 让一切自动化
- 监控与日志
- Showcase
- 那些坑，那些事

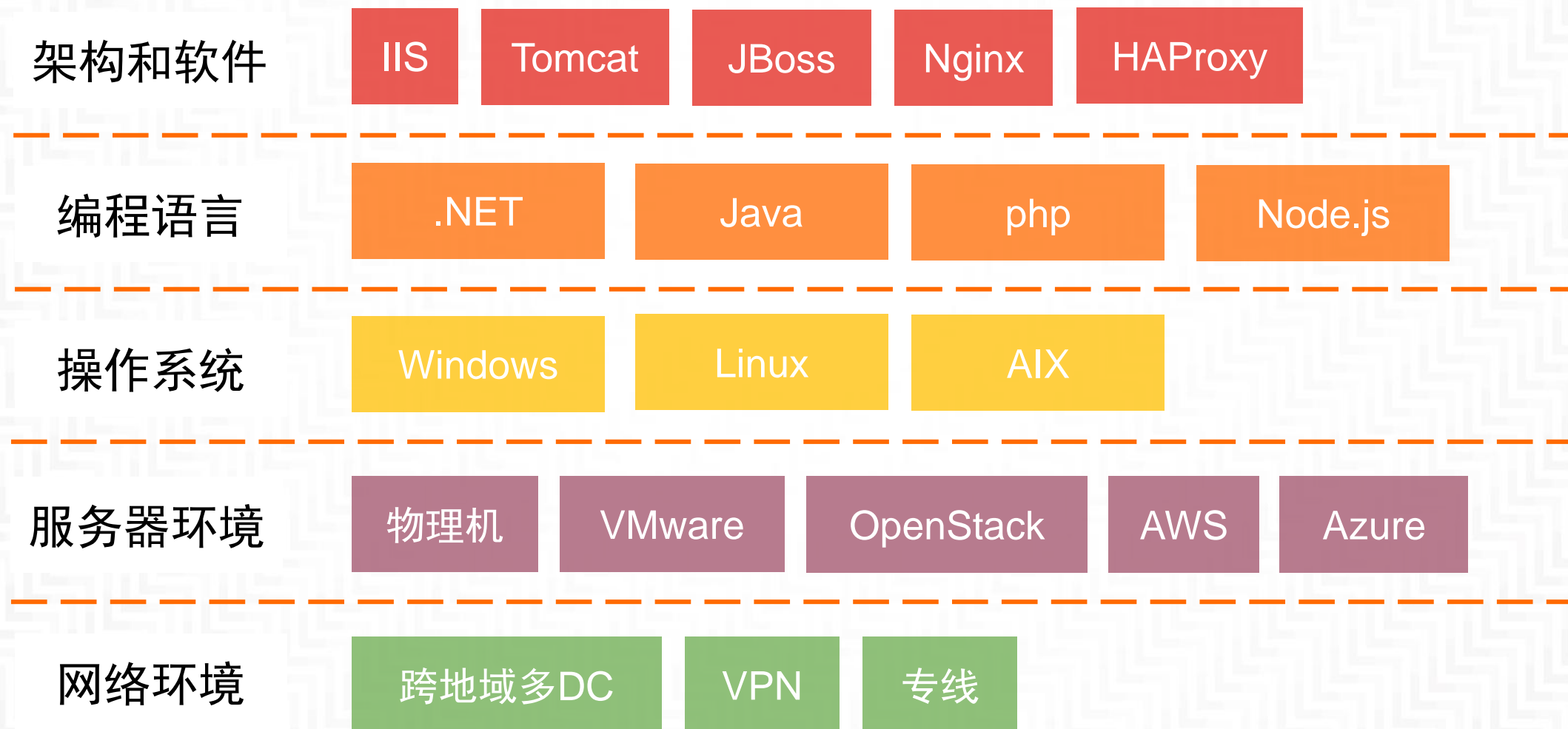
+ 背景和挑战

• 联想30年



+ 背景和挑战

• IT环境复杂



+ 背景和挑战



企业应用多样化

系统架构各异

应用对平台的需求不同

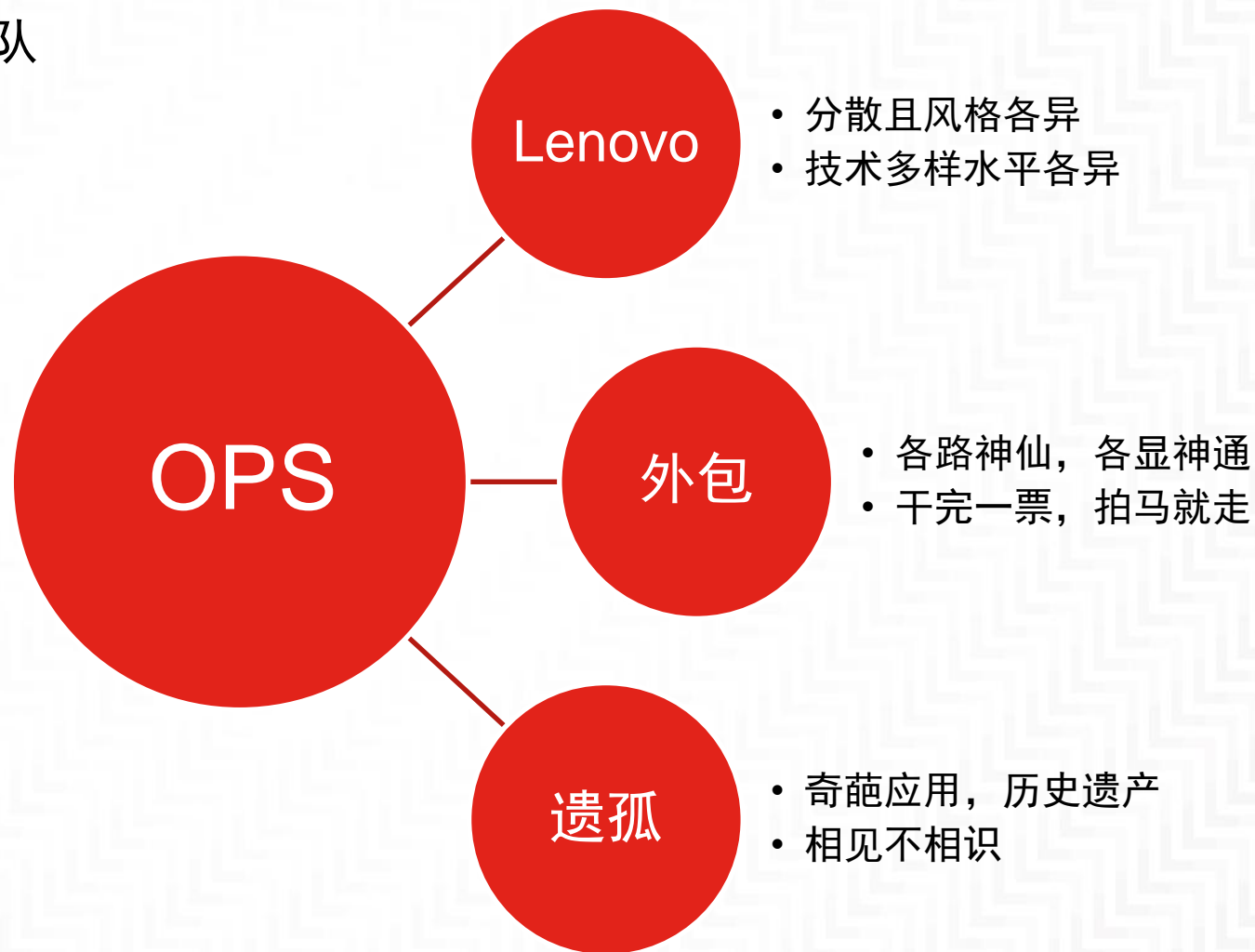
应用的迭代速度不同

应用的开发模式不同

+ 背景和挑战

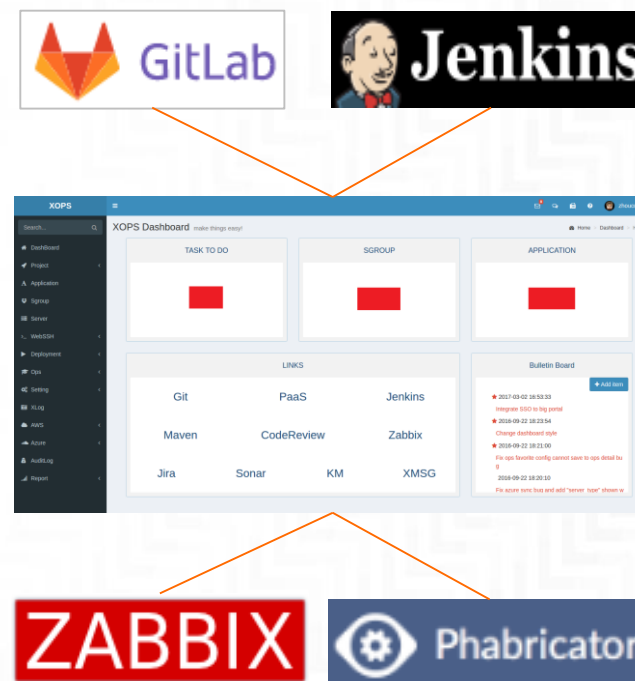
• 组织架构

- 单一运维团队支持N多开发团队
- 人少活多
- 缺乏标准和规范



+ 背景和挑战

• 内部系统演进



+ 企业级容器云设计与思考

• 为何出发？

依然不够自动化

服务割裂，申请流程
人工参与的半自动化



资源使用率低

底层资源使用率低



规范落地困难

系统分散，难以统一



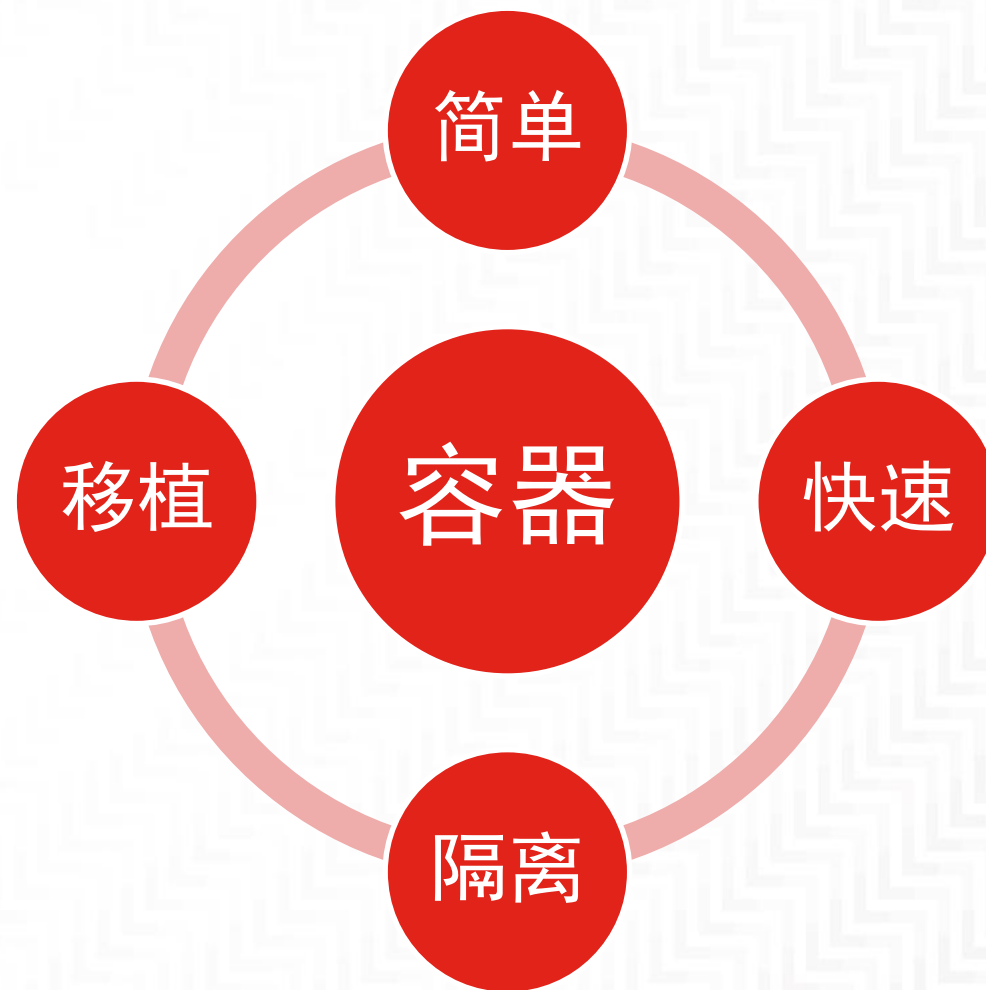
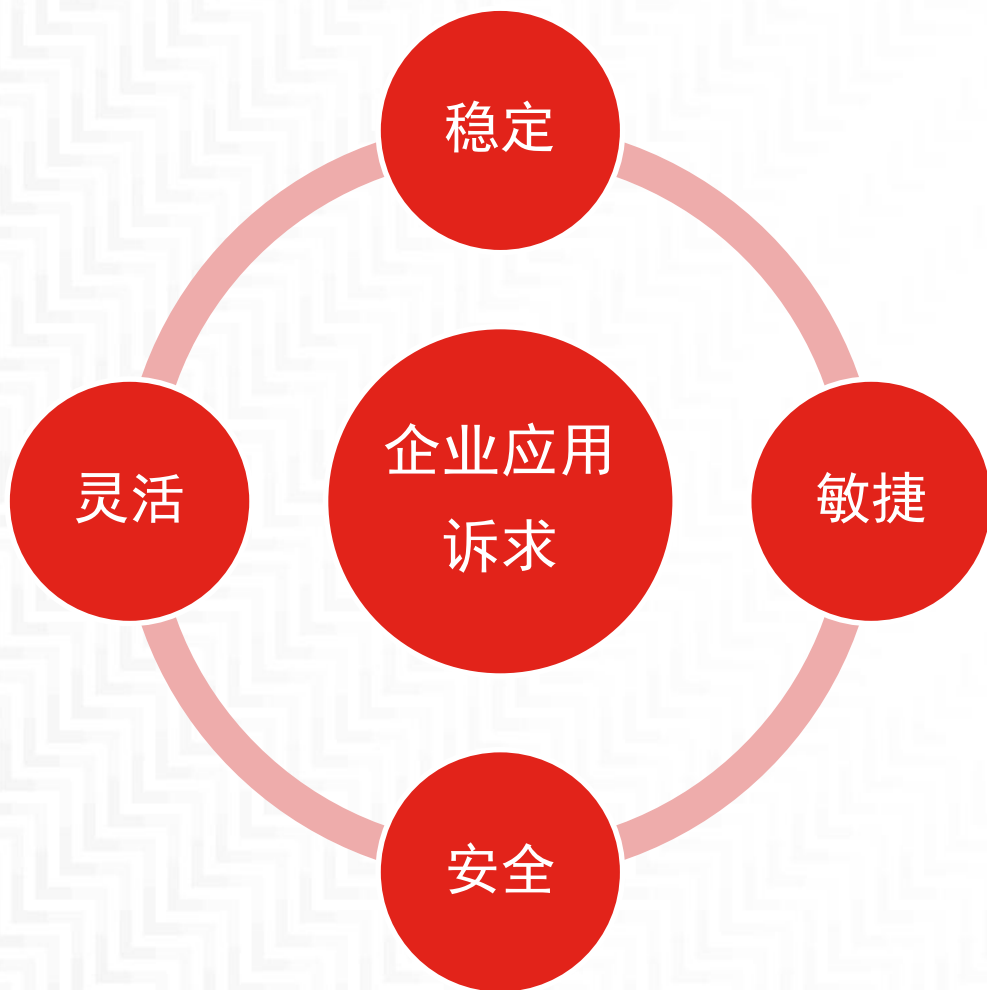
自服务平台

高效协作，加速迭代



+ 企业级容器云设计与思考

- 企业所关心的和容器带给我们的，如何去匹配



+ 企业级容器云设计与思考

• 思考角度



+ 企业级容器云设计与思考

• 平衡术

简单	VS	复杂
开放	VS	安全
规范	VS	自由



+ 企业级容器云设计与思考

- 方案的抉择：购买商业产品 VS 自研



商业产品

简单快速
大厂支持，产品不够成熟
功能多但开发模式需要改变
定制化和扩展成本高
平台问题难以定位和处理
无法满足业务需求



自研



最大程度满足业务需求
技术可控，灵活，响应快速
便于结合公司规范提供自服务
研发投入大
维护成本高

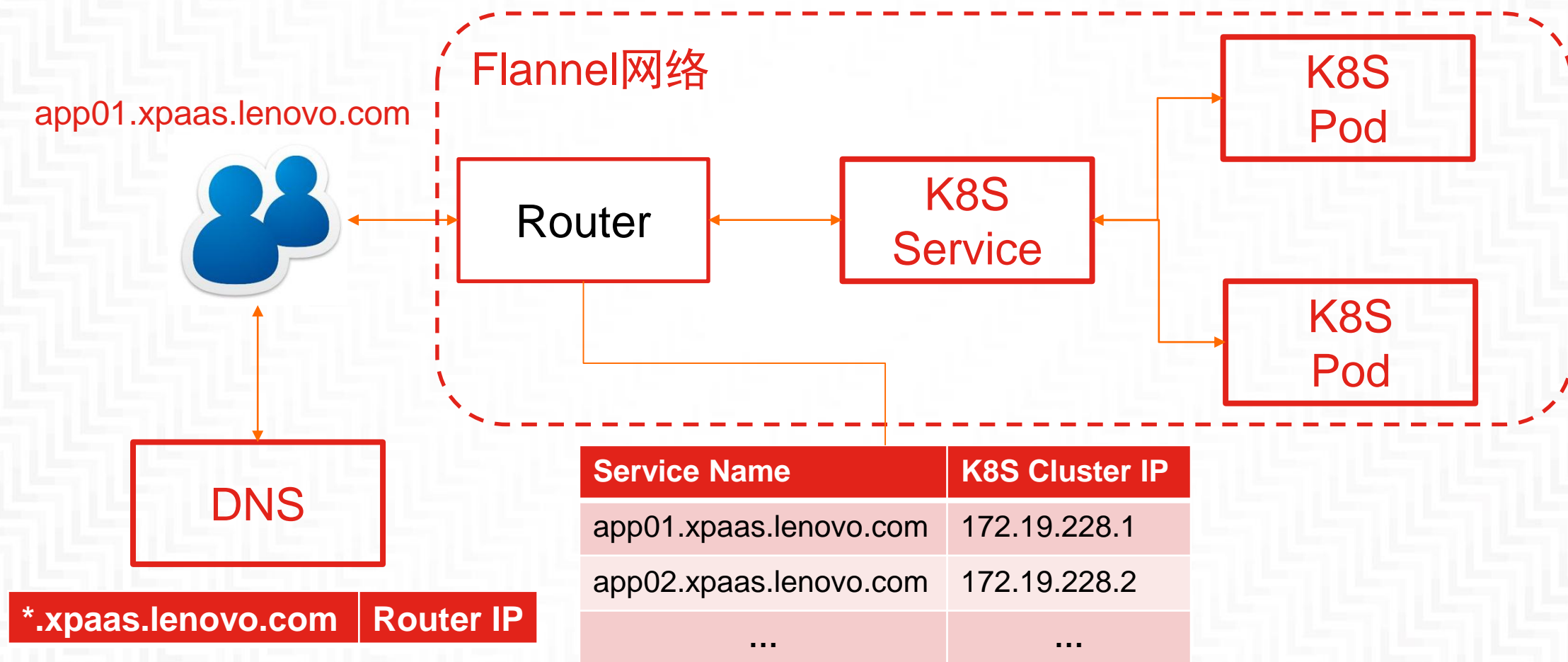
+ 企业级容器云设计与思考

- 技术的抉择



+ 企业级容器云设计与思考

- 网络方案及路由设计—简单，低侵入



+ 企业级容器云设计与思考

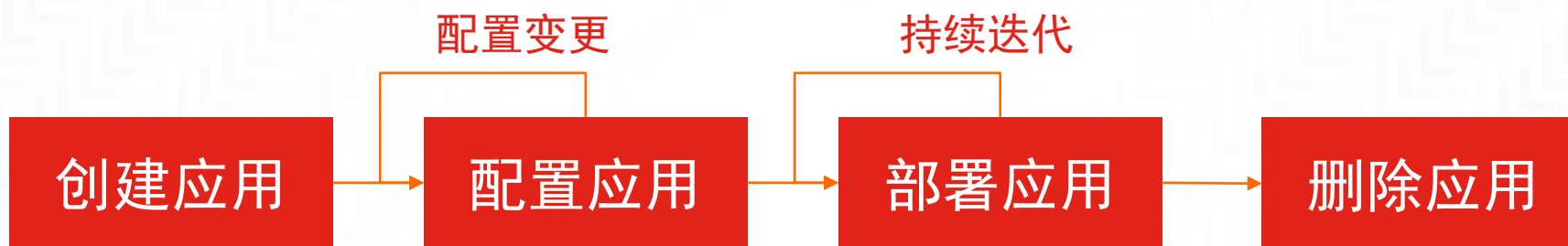
• 存储方案选择



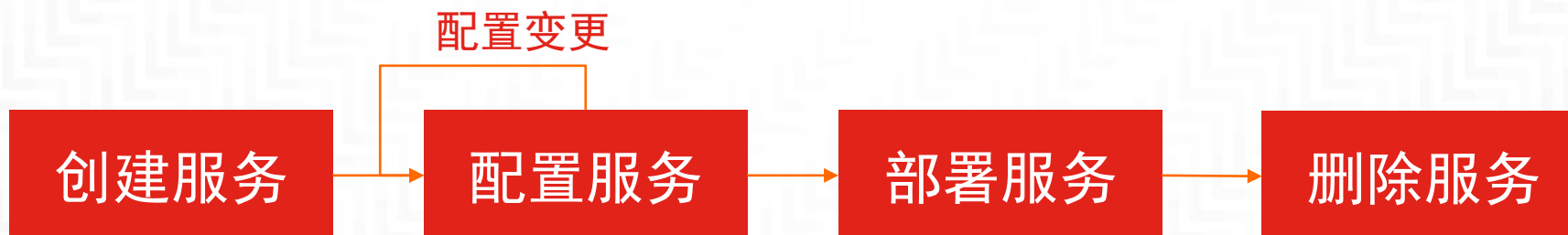
+ 企业级容器云设计与思考

- 核心功能设计：配置简单，部署一键化，自服务

应用部署：频繁变更，持续迭代



服务部署：一次配置，部署成型



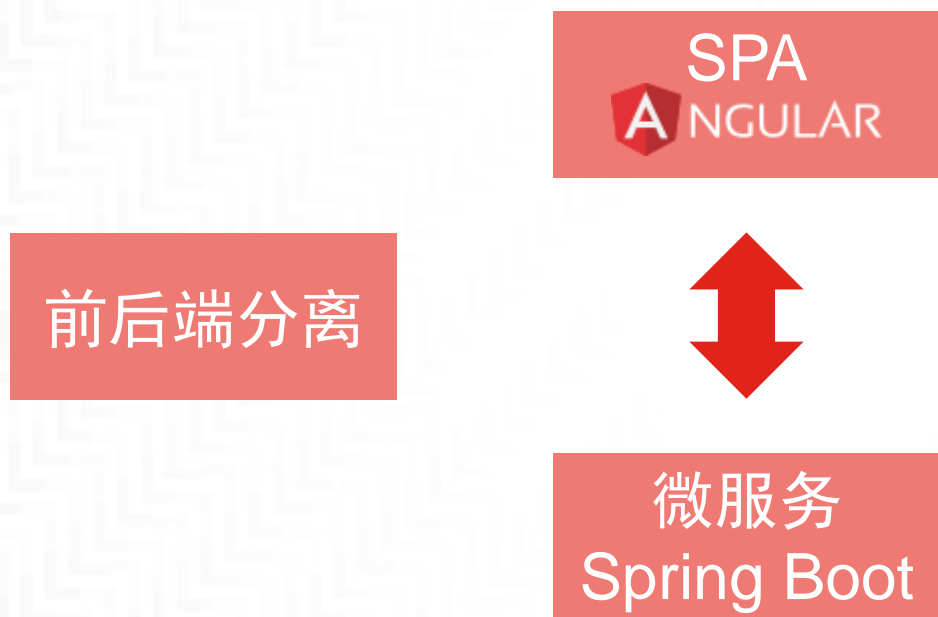
+ 企业级容器云设计与思考

• 部署流程



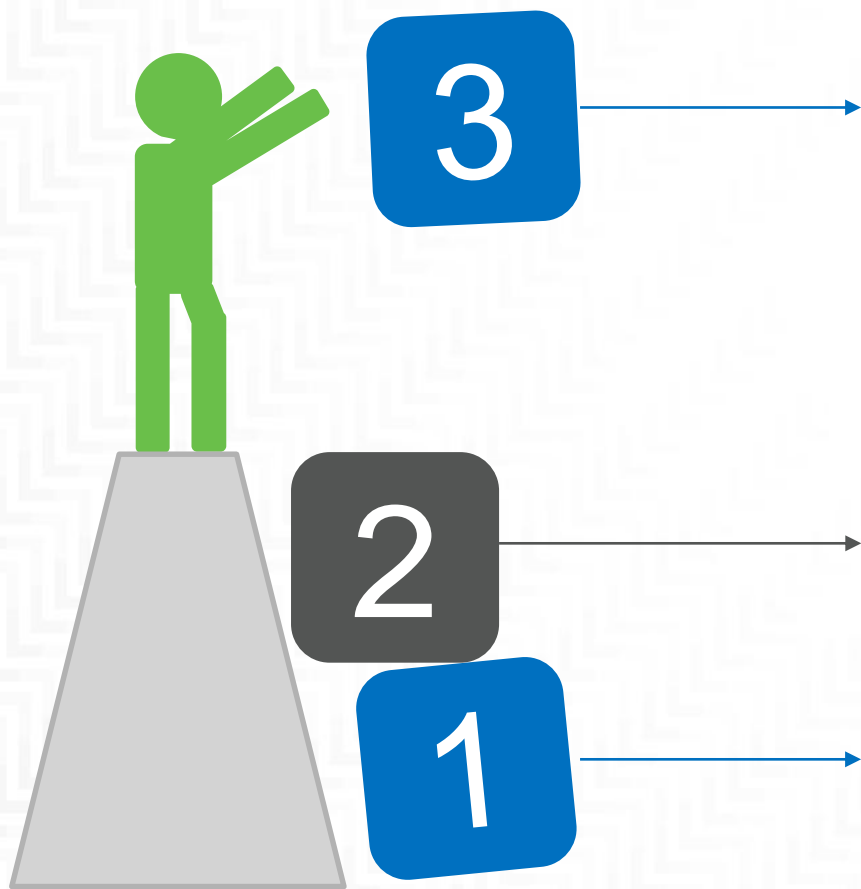
+ 企业级容器云设计与思考

- 其他技术方案和选型



+ 容器云设计--多集群支持的容器云

- What?
 - 多个容器云集群统一管理
- Why?



跨数据中心

多个数据中心统一一个集群技术和管理难度大

混合基础架构

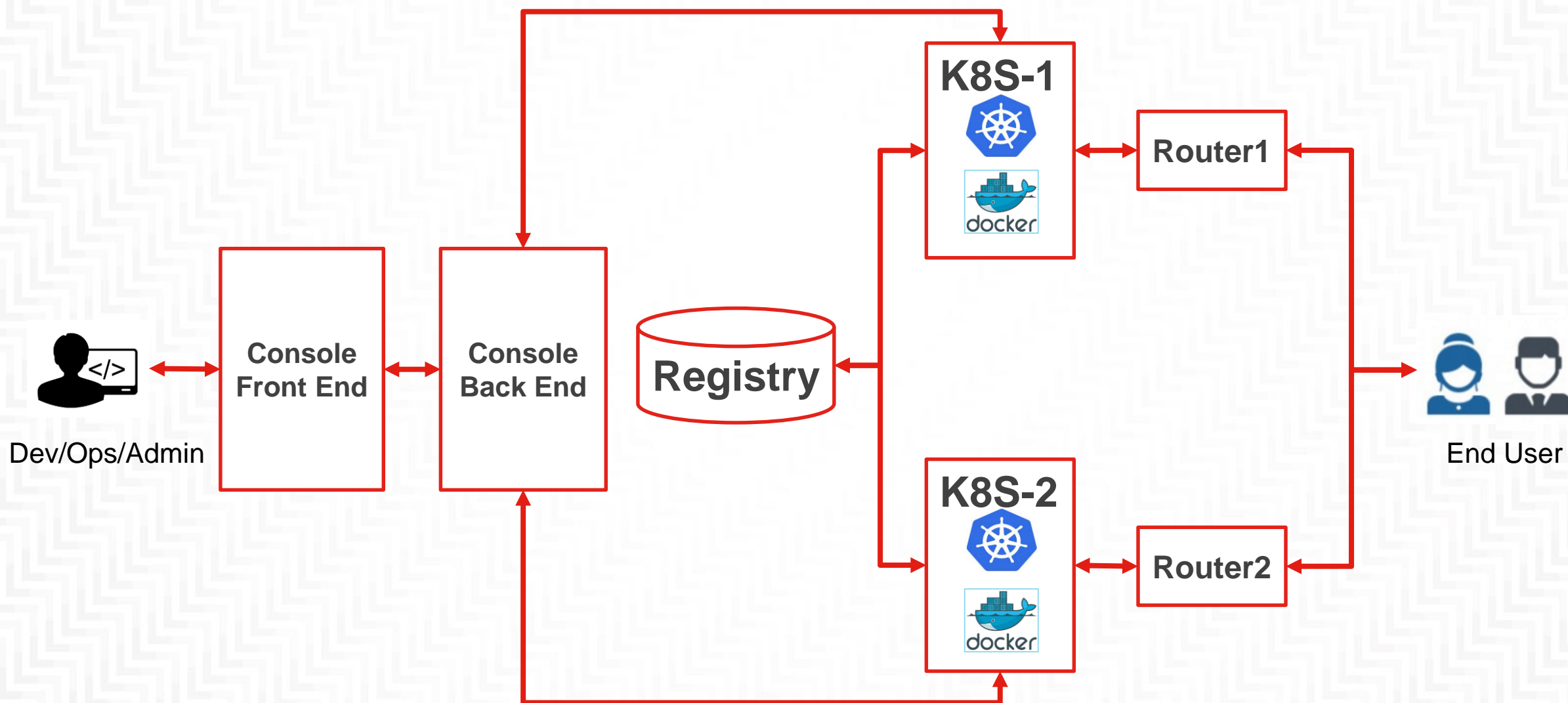
物理机, VMWare, OpenStack, AWS, Azure

统一用户体验

多集群统一管理, 无须切换平台系统

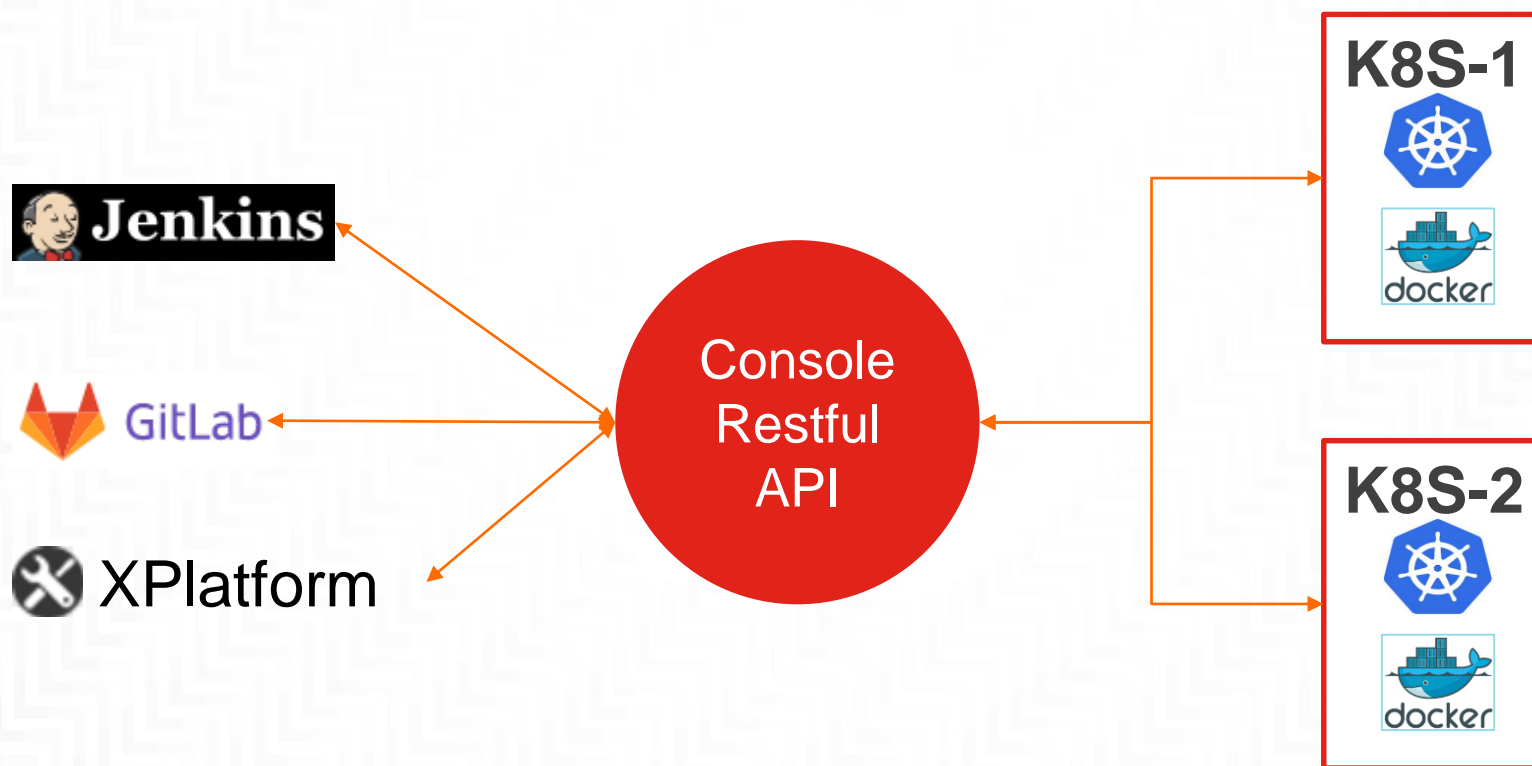
+ 容器云设计--多集群支持的容器云

- 多集群，一平台



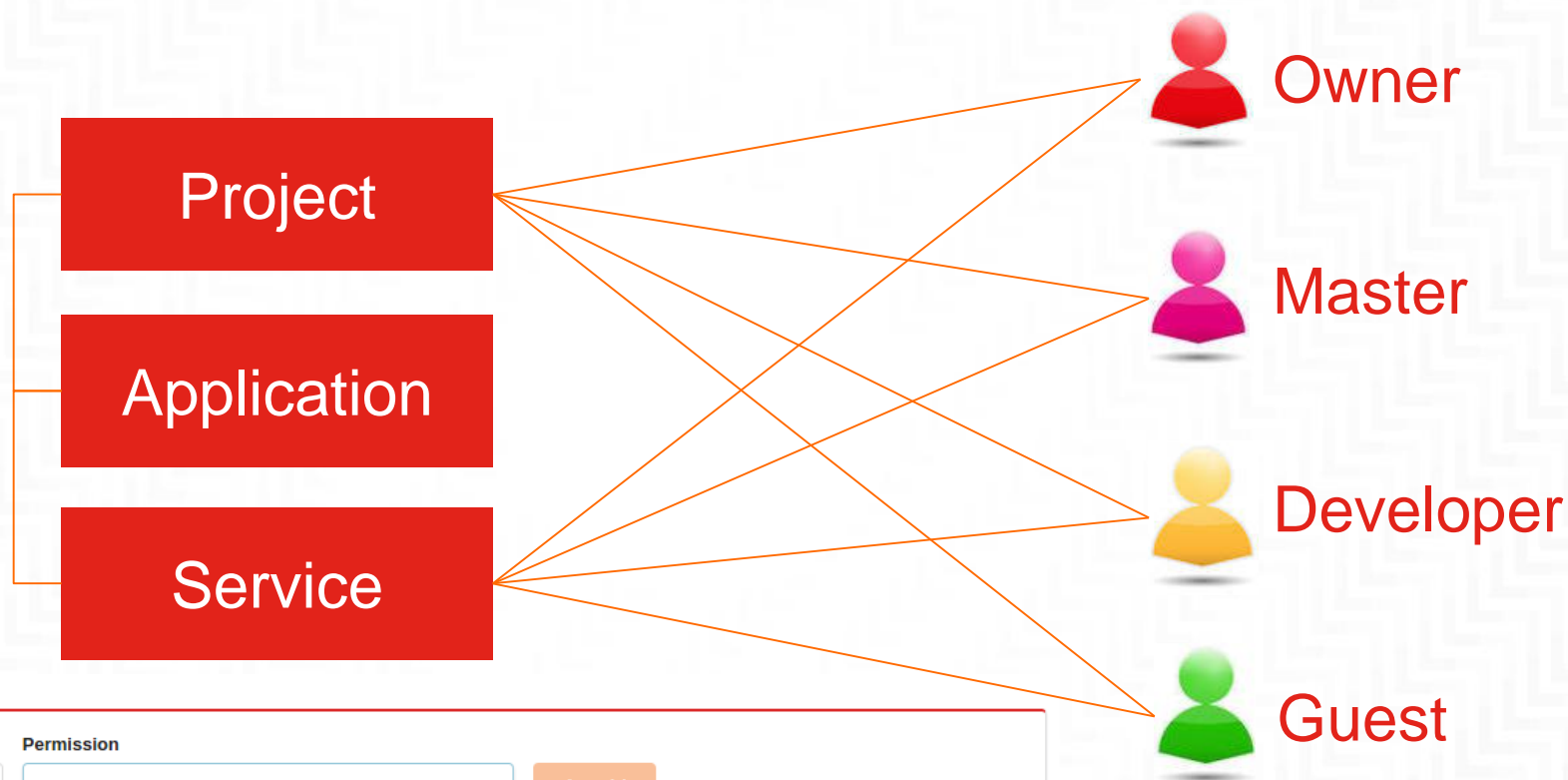
+ 容器云设计-- DevOps的支持与企业权限设计

- 常用DevOps工具的支持，快速融入现有开发体系



+ 容器云设计-- DevOps的支持与企业权限设计

- 良好的权限设计，让自服务变成现实



Home / Project Permission

Users

Select User

Read more about role permissions [here](#)

zhoucq1 It's you

Joined 4 months ago

Permission

Owner

Master

Developer

Guest

+ Add

Owner

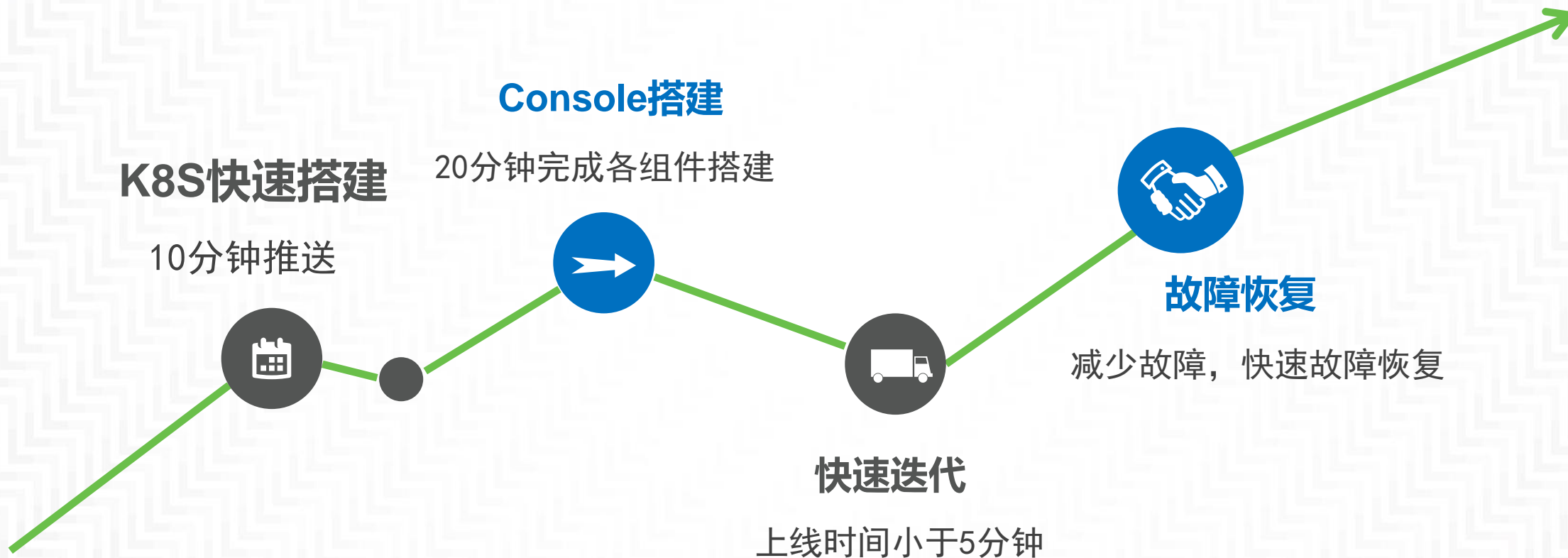
×

+ 让一切自动化--工欲善其事，必先利其器

- 从设计开始之初就把自动化理念融入进来
- 充分利用Docker的优势，加速平台的迭代

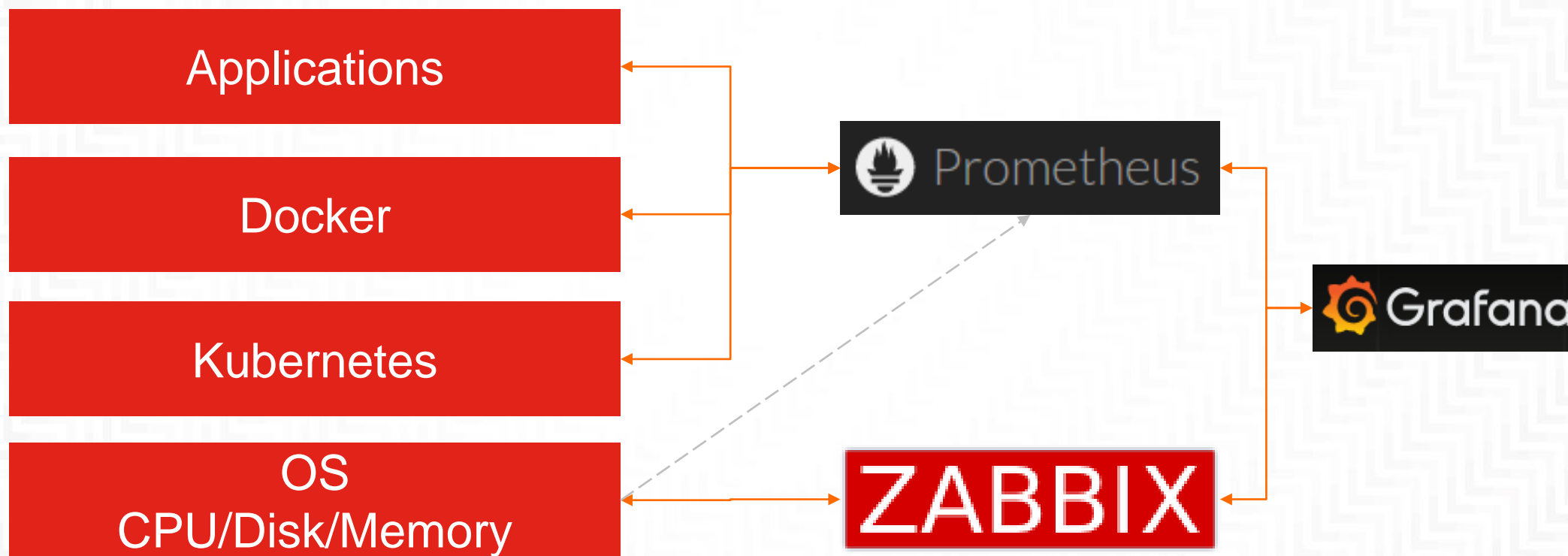


+ 让一切自动化



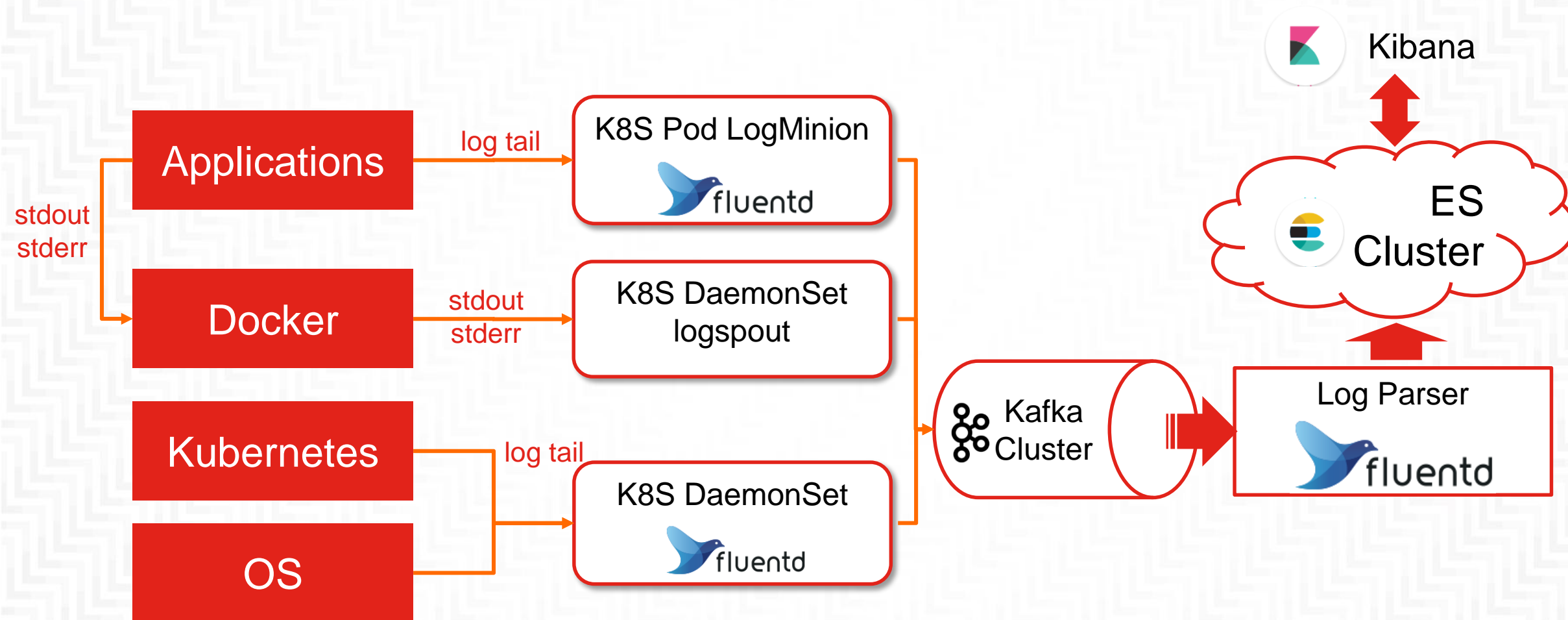
+ 监控与日志

- 监控：传统监控+新监控平台



+ 监控与日志

- 日志平台：多种采集手段并行



+ Showcase

• 部署示例

Earth PaaS

DashboardProjectsApplicationsServicesDeployment

Cluster: CLUSTER-PRD-01zhoucq1

Home / Service Info

myapp

Description:

Statistic

1DEPLOYMENTS

2/2 Pods

Information

Project: user-zhoucq1

Application: MyApp

Landscape: PROD

Created At: 2017/04/10 00:06:12

Updated At: 2017/04/10 00:06:12

Type	Port	Domain
Public	80>HTTP>8080	http://myapp.earth.xpaas.lenovo.com

Pod ListCluster InfoDockerfileDeploymentConfiguration

Pods

Name	Status	Created At	Cluster IP	CPU	Memory	Restart	State	Deployment ID	Option
service-251-2903700986-axa90	Running	2017-04-09T16:07:17Z	172.16.76.26			0	new	deployment-484	≡ ⌵
service-251-2903700986-hm3ud	Running	2017-04-09T16:07:17Z	172.16.91.28			0	new	deployment-484	≡ ⌵

Updated At: 2017/04/10 00:07:15

```
success : true
2017-04-10 00:07:15: {"status": "DONE", "msg": "Build docker image successfully!",
"id": 484, "success": true}
2017-04-10 00:07:15: Start to deploy service to kubernetes...
2017-04-10 00:07:15: Deploy service to kubernetes successfully!
```

+ Showcase

• Scale Out横向扩展

Earth PaaS

DashboardProjectsApplicationsServicesDeployment

Cluster: CLUSTER-PRD-01zhoucq1

Home / Service Info

myapp

Description:

Statistic

1
DEPLOYMENTS

6/6
Pods

Information

Project: user-zhoucq1

Application: MyApp

Landscape: PROD













Created At: 2017/04/10 00:06:12

Updated At: 2017/04/10 00:15:28

Type	Port	Domain
Public	80>HTTP>8080	http://myapp.earth.xpaas.lenovo.com

Pod ListCluster InfoDockerfileDeploymentConfiguration

Pods

Name	Status	Created At	Cluster IP	CPU	Memory	Restart	State	Deployment ID	Option
service-251-2903700986-5vu5t	Running	2017-04-09T16:14:08Z	172.16.91.29			0	new	deployment-484	 
service-251-2903700986-66xes	Running	2017-04-09T16:14:08Z	172.16.21.24			0	new	deployment-484	 
service-251-2903700986-axa90	Running	2017-04-09T16:07:17Z	172.16.76.26			0	new	deployment-484	 
service-251-2903700986-hm3ud	Running	2017-04-09T16:07:17Z	172.16.91.28			0	new	deployment-484	 
service-251-2903700986-p4uzh	Running	2017-04-09T16:14:08Z	172.16.21.23			0	new	deployment-484	 
service-251-2903700986-wnoz5	Running	2017-04-09T16:14:08Z	172.16.76.27			0	new	deployment-484	 

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+ Showcase

- 滚动更新

Earth PaaS

Dashboard

Projects

Applications

Services

Deployment

Cluster: CLUSTER-PRD-01

zhoucq1

[Home](#) / Service Info

myapp

Description:

Statistic

2
DEPLOYMENTS

3/3
Pods



Information

Project: [user-zhoucq1](#)
Application: MyApp
Landscape: PROD
Created At: 2017/04/10 00:06:12
Updated At: 2017/04/10 00:22:28

Type

Port

Domain

Public 80>HTTP>8080 <http://myapp.earth.xpaas.lenovo.com>

Pod List

Cluster Info

Dockerfile

Deployment

Configuration

Pods

Name	Status	Created At	Cluster IP	CPU	Memory	Restart	State	Deployment ID	Option
service-251-2903700986-axa90	Running	2017-04-09T16:07:17Z	172.16.76.26			0	old	deployment-484	
service-251-2903700986-wnoz5	Running	2017-04-09T16:14:08Z	172.16.76.27			0	old	deployment-484	
service-251-3040146939-jeft	Running	2017-04-09T16:21:22Z	172.16.21.23			0	new	deployment-485	
service-251-3040146939-uywgk	Running	2017-04-09T16:18:29Z	172.16.91.30			0	new	deployment-485	



Showcase

- 容器访问

Earth PaaS

DashboardProjectsApplicationsServicesDeployment

Cluster: CLUSTER-PRD-01

zhoucq1

1 x +

```
Welcome to Earth WebSSH!
#####
#       Welcome to Earth PAAS       #
#####
=====
KUBE_COMMAND: exec
KUBE_NAMESPACE: project-30
KUBE_POD: service-251-3040146939-jefrt
=====
root@service-251-3040146939-jefrt:/usr/local/tomcat# ls -lh
total 100K
-rw-r----- 1 root root  56K Aug 31  2016 LICENSE
-rw-r----- 1 root root  1.7K Aug 31  2016 NOTICE
-rw-r----- 1 root root  6.9K Aug 31  2016 RELEASE-NOTES
-rw-r----- 1 root root  16K Aug 31  2016 RUNNING.txt
drwxr-x--- 2 root root  4.0K Sep  7  2016 bin
drwx--S--- 3 root root  4.0K Apr  9 16:21 conf
drwxr-sr-x 3 root staff  18 Sep  7  2016 include
drwxr-x--- 2 root root  4.0K Sep  7  2016 lib
drwxr-x--- 2 root root  4.0K Apr  9 16:21 logs
drwxr-sr-x 3 root staff 144 Sep  7  2016 native-jni-lib
drwxr-x--- 2 root root   29 Sep  7  2016 temp
drwxr-x--- 3 root root   32 Apr  9 16:21 webapps
drwxr-x--- 3 root root   21 Apr  9 16:21 work
root@service-251-3040146939-jefrt:/usr/local/tomcat#
```

service-251-3040146939-jefrt@myapp, Connected at 2017/04/10 00:24:23



Showcase

• 日志查看

Earth PaaS

DashboardProjectsApplicationsServicesDeployment

Cluster: CLUSTER-PRD-01 zhoucq1

Spring Boot

(v1.4.0.RELEASE)

2017-04-09 16:21:28.498

INFO 1 --- [ost-startStop-1]

com.lenovo.earth.ServletInitializer

: Starting ServletInitializer on service-251-3040146939-jefrt with PID 1 (/usr/local/tomcat/webapps/ROOT/WEB

started by root in /usr/local/tomcat)

2017-04-09 16:21:28.503

INFO 1 --- [ost-startStop-1]

com.lenovo.earth.ServletInitializer

: No active profile set, falling back to default profiles: default

2017-04-09 16:21:28.635

INFO 1 --- [ost-startStop-1]

ationConfigEmbeddedWebApplicationContext

: Refreshing org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@2ac50210: startup

date [Sun Apr 09 16:21:28 UTC 2017]; root of context hierarchy

2017-04-09 16:21:30.139

INFO 1 --- [ost-startStop-1]

o.s.web.context.ContextLoader

: Root WebApplicationContext: initialization completed in 1504 ms

2017-04-09 16:21:31.032

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.ServletRegistrationBean

: Mapping servlet: 'dispatcherServlet' to [/]

2017-04-09 16:21:31.035

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.FilterRegistrationBean

: Mapping filter: 'errorPageFilter' to: [/]

2017-04-09 16:21:31.036

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.FilterRegistrationBean

: Mapping filter: 'characterEncodingFilter' to: [/]

2017-04-09 16:21:31.037

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.FilterRegistrationBean

: Mapping filter: 'hiddenHttpMethodFilter' to: [/]

2017-04-09 16:21:31.037

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.FilterRegistrationBean

: Mapping filter: 'httpPutFormContentFilter' to: [/]

2017-04-09 16:21:31.037

INFO 1 --- [ost-startStop-1]

o.s.b.w.servlet.FilterRegistrationBean

: Mapping filter: 'requestContextFilter' to: [/]

2017-04-09 16:21:31.525

INFO 1 --- [ost-startStop-1]

s.w.s.m.m.a.RequestMappingHandlerAdapter

: Looking for @ControllerAdvice:

org.springframework.boot.context.embedded.AnnotationConfigEmbeddedWebApplicationContext@2ac50210: startup date [Sun Apr 09 16:21:28 UTC 2017]; root of context hierarchy

2017-04-09 16:21:31.612

INFO 1 --- [ost-startStop-1]

s.w.s.m.m.a.RequestMappingHandlerMapping

: Mapped "{[/]}" onto public java.lang.String com.lenovo.earth.controller.HelloWorldController.helloworld()

2017-04-09 16:21:31.617

INFO 1 --- [ost-startStop-1]

s.w.s.m.m.a.RequestMappingHandlerMapping

: Mapped "{[/error],produces=[text/html]}" onto public org.springframework.web.servlet.ModelAndView

org.springframework.boot.autoconfigure.web.BasicErrorController.errorHtml(javax.servlet.http.HttpServletRequest,javax.servlet.http.HttpServletResponse)

2017-04-09 16:21:31.618

INFO 1 --- [ost-startStop-1]

s.w.s.m.m.a.RequestMappingHandlerMapping

: Mapped "{[/error]}" onto public org.springframework.http.ResponseEntity>

org.springframework.boot.autoconfigure.web.BasicErrorController.error(javax.servlet.http.HttpServletRequest)

2017-04-09 16:21:31.652

INFO 1 --- [ost-startStop-1]

o.s.w.s.handler.SimpleUrlHandlerMapping

: Mapped URL path [/webjars/**] onto handler of type [class

org.springframework.web.servlet.resource.ResourceHttpRequestHandler]

2017-04-09 16:21:31.652

INFO 1 --- [ost-startStop-1]

o.s.w.s.handler.SimpleUrlHandlerMapping

: Mapped URL path [/**] onto handler of type [class org.springframework.web.servlet.resource.ResourceHttpRequestHandler]

2017-04-09 16:21:31.705

INFO 1 --- [ost-startStop-1]

o.s.w.s.handler.SimpleUrlHandlerMapping

: Mapped URL path [/**/favicon.ico] onto handler of type [class

org.springframework.web.servlet.resource.ResourceHttpRequestHandler]

2017-04-09 16:21:31.944

INFO 1 --- [ost-startStop-1]

o.s.j.e.a.AnnotationMBeanExporter

: Registering beans for JMX exposure on startup

2017-04-09 16:21:31.973

INFO 1 --- [ost-startStop-1]

com.lenovo.earth.ServletInitializer

: Started ServletInitializer in 4.543 seconds (JVM running for 11.865)

09-Apr-2017 16:21:32.041

INFO [localhost-startStop-1]

org.apache.catalina.startup.HostConfig.deployWAR

Deployment of web application archive /usr/local/tomcat/webapps/ROOT.war has finished in 6,880 ms

09-Apr-2017 16:21:32.048

INFO [main]

org.apache.coyote.AbstractProtocol.start

Starting ProtocolHandler [http-nio-8080]

09-Apr-2017 16:21:32.069

INFO [main]

org.apache.coyote.coyote.AbstractProtocol.start

Starting ProtocolHandler [ajp-nio-8009]

09-Apr-2017 16:21:32.074

INFO [main]

org.apache.catalina.startup.Catalina.start

Server startup in 7006 ms

2017-04-09 16:21:54.946

INFO 1 --- [nio-8080-exec-1]

o.s.web.servlet.DispatcherServlet

: FrameworkServlet 'dispatcherServlet': initialization started

2017-04-09 16:21:54.977

INFO 1 --- [nio-8080-exec-1]

o.s.web.servlet.DispatcherServlet

: FrameworkServlet 'dispatcherServlet': initialization completed in 30 ms

Stop Following

Go to Top

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+ Showcase

- 资源管理

[Home](#) / Project Detail

ITS Project

Description:

Statistic

2
APPLICATION

8
SERVICE

Resource Quota



Information

Namespace: project-15
Status:
Creator: admin
Created At: 2016/12/19 15:24:38
Updated At: 2016/12/19 15:24:38

+ 那些坑，那些事

• 底层平台的那些坑

- K8S Deployment ID出现重复，导致部署后不更新应用
<https://github.com/kubernetes/kubernetes/issues/29735>
- flannel重启导致重新分配IP
- K8S Dashboard卡顿的问题
- harbor服务器重启后出现mysql无主进程

• 平台开发的那些事

- 平台健壮性：当服务器频繁挂掉的时候，才知道现实和理想的距离
- Angular2出新版本了，更还是不更



thanks.

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We Are



Focused on **CUSTOMERS**
in everything we do

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Global **TEAM** players guided
by integrity and **TRUST**

我们是全球化**团队**，正直**互信**合作共赢



ENTREPRENEURS committed to
driving change

我们是**创业**者，主动担当锐意变革



INNOVATORS who relentlessly
pursue new ideas

我们是**创新**者，坚持不懈推陈出新

We Do What We Say.
We Own What We Do.
We Wow Our Customers.
说到做到，尽心尽力，成就客户

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