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# 多 K8s 集群下的 GitOps 实践

慈轶恒



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高级技术专家

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# GitOps: What & Why



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## DevOps

一种DevOps理念的践行方式

## GitOps

使用Git(或其它开发者熟知的)工具，以开发者为中心，对云原生应用持续部署过程中操作基础设施的体验。

## 特性

声明式 / IaC / 节省人力 / 节省时间 / 可追溯 (合规/可审计) / 代码质量 (code review) / 快速回滚&灾难恢复(与部署体验一致) / 发布状态易于观察

## 适用场景

所有怀有DevOps理念的团队 / 初创团队

使用门槛：枚举应用生命周期内的所有状态 / 编写pipeline

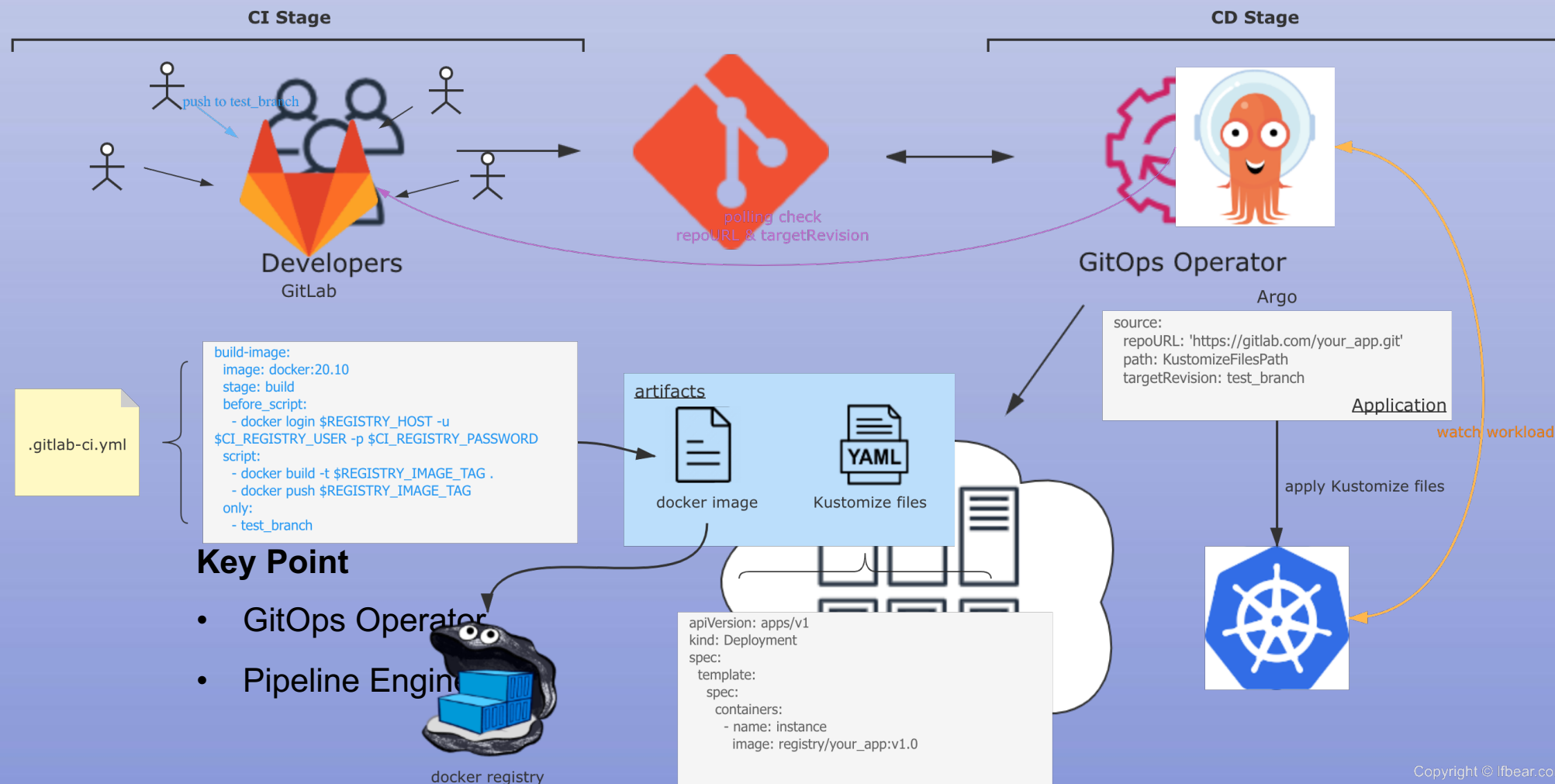
## 待解决

复杂的多环境支持 / 密码&密钥&证书管理

# GitOps: How it run



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# GitOps: Practices



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Applications - Argo CD x myapp / gitops-test - GitLab x Argo CD - Declarative GitOps x

Not Secure | 10.32.32.180:8080/myapp/gitops-test

GitLab Menu

gitops-test

- Project information
- Repository
- Issues 0
- Merge requests 0
- CI/CD
- Security & Compliance
- Deployments
- Monitor
- Infrastructure
- Packages & Registries
- Analytics
- Wiki
- Snippets
- Settings

42 Commits 1 Branch 0 Tags 256 KB Files 489 KB Storage

main gitops-test / +

History Find file Web IDE Clone

AutoCommitByRobot  
gitops-test authored 9 minutes ago

65fea2c0

README CI/CD configuration Add LICENSE Add CHANGELOG Add CONTRIBUTING Auto DevOps enabled

Add Kubernetes cluster Configure Integrations

Name	Last commit	Last update
.gitlab-ci.yml	Update .gitlab-ci.yml	15 hours ago
Dockerfile	Update Dockerfile	17 hours ago
README.md	Initial commit	20 hours ago
deployment.yaml	AutoCommitByRobot	9 minutes ago
kustomization.yaml	Add new file	20 hours ago
main.go	Update main.go	9 minutes ago

README.md

gitops-test

<< Collapse sidebar

# Predicament: multi-cluster



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The screenshot illustrates the 'Predicament: multi-cluster' by showing a Kubernetes Dashboard with multiple clusters. The dashboard is divided into a sidebar and a main content area. The sidebar contains filters for SYNC and HEALTH status, as well as sections for PROJECTS, CLUSTERS, and NAMESPACES. The main content area displays a grid of application cards. Each card represents an application in a specific cluster, showing details like Project, Repository, Target Revision, Path, Destination, and Namespace. The status of each application is indicated by a heart icon (Healthy) and a checkmark (Synced). Actions like SYNC, REFRESH, and DELETE are available for each application. The dashboard also includes a search bar, a 'Log out' button, and a 'Items per page' dropdown.

Applications

APPLICATIONS

+ NEW APP SYNC APPS

Log out

Search applications...

Items per page: 20

**testapp**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test1

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster1**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test1

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster2**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test2

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster3**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test3

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster4**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test4

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster5**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test5

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster6**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test6

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster7**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test7

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

**testapp-cluster8**

Project: default

Labels:

Status: ♥ Healthy ✓ Synced

Repository: http://10.32.32.180:8080/myapp/gitops-test

Target Revi... main

Path: .

Destination: kind-test8

Namespace:

↻ SYNC 🔄 REFRESH 🗑 DELETE

SYNC

☐ OutOfSync 0

☐ Synced 1

☐ Unknown 0

HEALTH

☐ Degraded 0

☐ Healthy 1

☐ Missing 0

☐ Progressing 0

☐ Suspended 0

☐ Unknown 0

LABELS

PROJECTS

CLUSTERS

NAMESPACES

## 单应用在多集群中

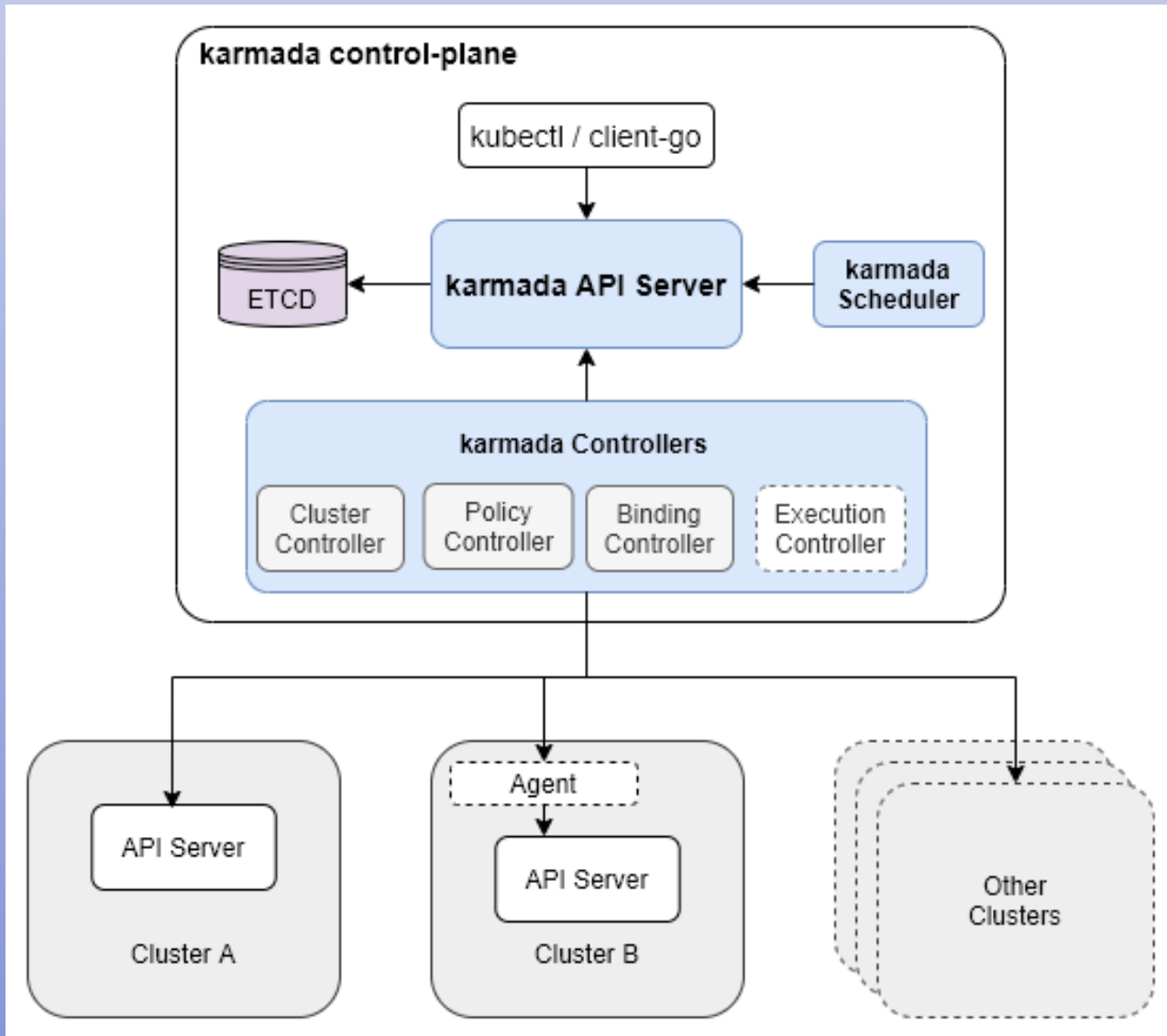
1. 视图体验不佳
  2. 不易对比差异
  3. 无法及时察觉到异常
  4. 集群变更成本较大
- ...



### What & Why

### 跨集群的应用管理系统

- 多集群负载集中管理
- K8s原生API
- 灵活的部署策略定义和差异定义
- 开放的调度策略

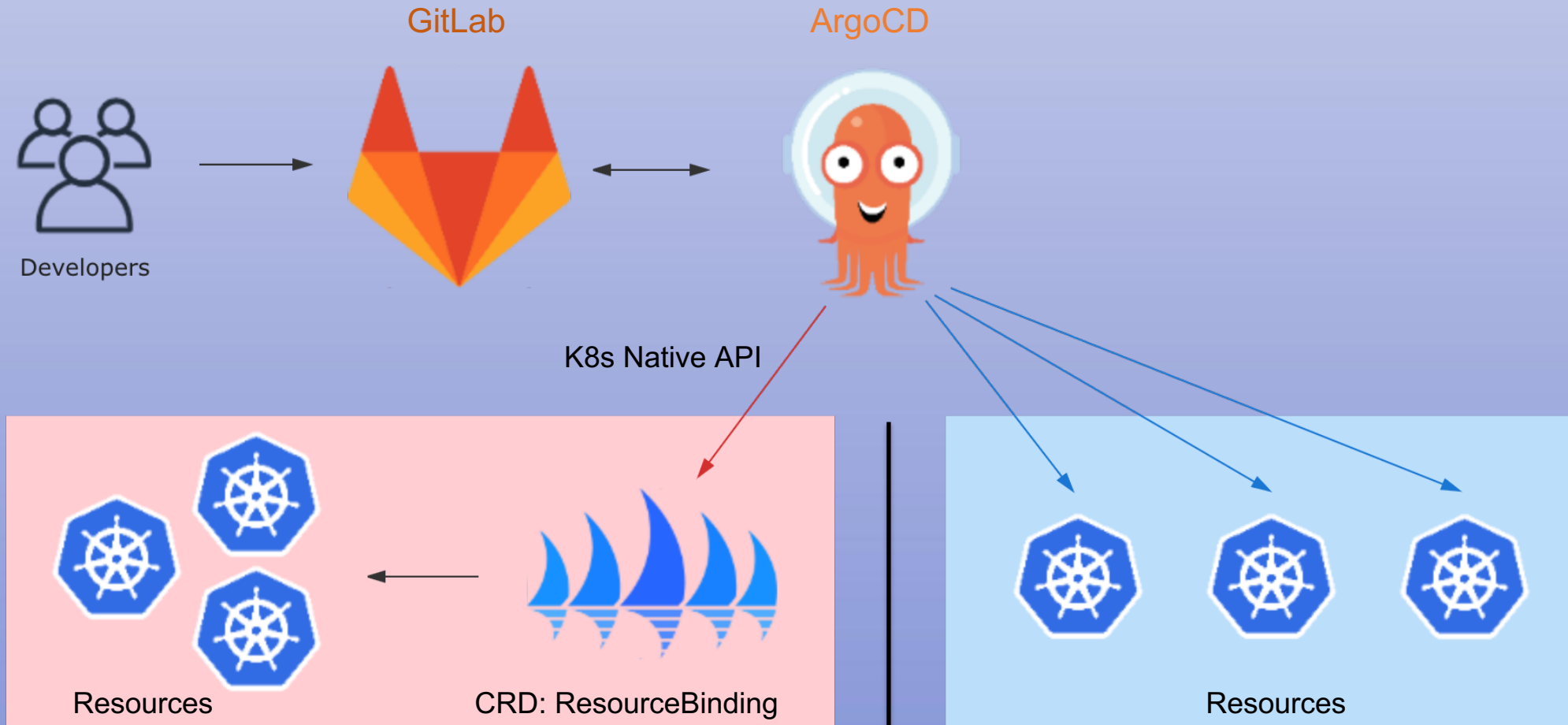




# GitOps + Karmada



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# Best Practices



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## 实践收益

- 云原生
- 应用视角
- 便捷的差异管理
- 多集群下的状态观测

Applications / ocean-agent

APP DETAILS

APP HEALTH  
Healthy

SUMMARY

EVENTS

KIND	ResourceBinding
NAME	ocean-agent-deployment
NAMESPACE	ccp
CREATED_AT	08/10/2021 16:30:09

LIVE MANIFEST

```
76     namespace: ccp
77     resourceVersion: '23621960'
78     status:
79       aggregatedStatus:
80         - applied: true
81           clusterName: ''
82           status:
83             availableReplicas: 1
84             conditions:
85               - lastTransitionTime: '2021-08-13T09:21:49Z'
86                 lastUpdateTime: '2021-08-14T08:06:56Z'
87                 message: ReplicaSet "ocean-agent-695f9fd5fd" has successfully progressed.
88                 reason: NewReplicaSetAvailable
89                 status: 'True'
90                 type: Progressing
91               - lastTransitionTime: '2021-09-26T04:35:32Z'
92                 lastUpdateTime: '2021-09-26T04:35:32Z'
93                 message: Deployment has minimum availability.
94                 reason: MinimumReplicasAvailable
95                 status: 'True'
96                 type: Available
97             observedGeneration: 3
98             readyReplicas: 1
```

EDIT



## 展望

Karmada更好的助力GitOps落地

- 实体资源状态更友好的展现：CRD的调整适配
- 从GitOps Operator(ArgoCD)角度增强易用性，如：argocd的状态检查脚本

GitOps更丰富的应用场景和现存问题的共同解决



- GitOps
- K8s Multi-Cluster