

# Kubernetes云原生实战三十三 微服务上云后本地如何联调？

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## Kt Connect

Kt Connect是阿里巴巴开源的一款云原生协同开发测试解决方案，目前包含以下几个核心功能，参加[官方文档](https://alibaba.github.io/kt-connect)。 <https://alibaba.github.io/kt-connect>

### 核心功能

1. 本地直接访问Kubernetes集群内网

通过KtConnect可以直接连接Kubernetes集群内部网络，在不修改代码的情况下完成本地联调测试

1. 本地解析Kubernetes服务内网域名

直接使用服务名解析服务Cluster IP，本地开发也能获得真正的云原生体验

1. 重定向集群服务流量到本地

将集群中的流量转移到本地，使得集群中的服务无需额外配置即可访问本地服务

1. 测试环境多人协作互不干扰

通过自动或手工设定流量规则，在不影响测试环境正常使用的前提下，仅将指定请求重定向到本地

1. 支持Windows/MacOS/Linux开发环境

不同的操作系统，相同的使用方式，让所有开发者轻松共享Kubernetes网络互通的便利

# Kt Connect 安装使用

下面我们以windows为例，介绍一下Kt Connect的安装使用。

## 1. 安装

### 1、下载kubectI并解压放入D盘

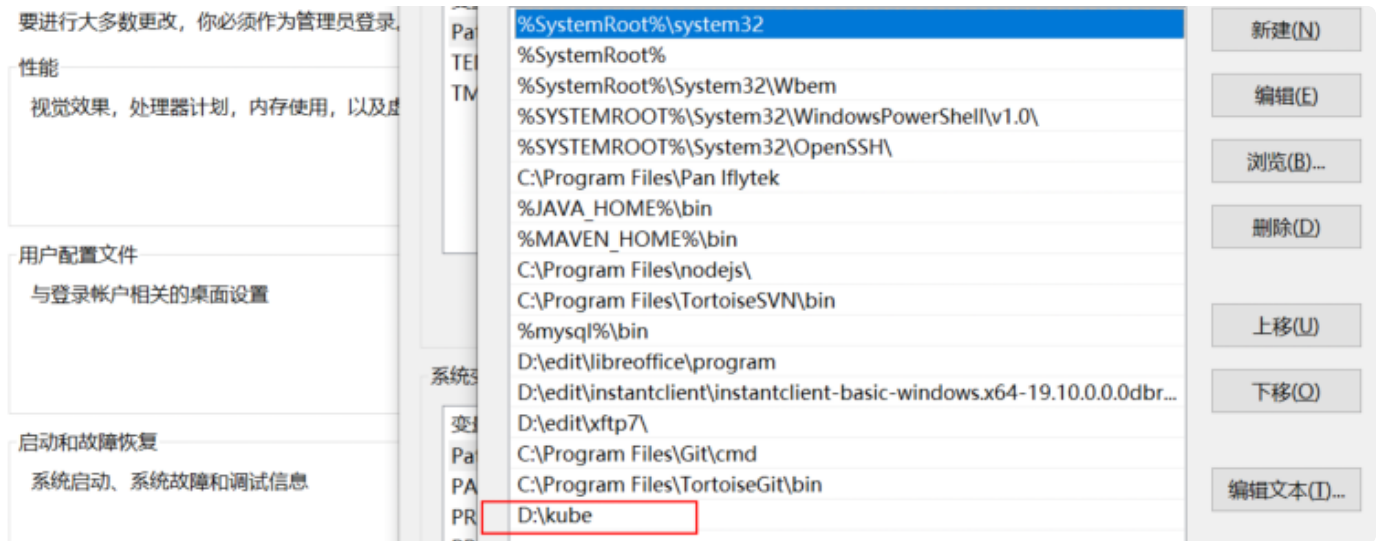
在此[链接](#)中下载kubectI的可执行文件，注意下载对应我们线上kubernetes版本的kubectI，如果想要下载对应其它版本，可以修改上面链接将版本号改为对应的即可。

下载[KTConnect文件](#)，解压到同一路径之下。

此电脑 > 软件 (D:) > kube				▼	🔄
^	名称	^	修改日期	类型	
	ktctl.exe		2022/11/29 1:17	应用程序	
	kubectI.exe		2023/1/6 8:39	应用程序	
	wintun.dll		2021/10/17 12:39	应用程序	

### 2、配置环境变量

将Kt Connect的解压目录D:\kube\添加到PATH环境变量中



3、执行kubectl version命令查看已安装的 kubectl 版本号

```
$ kubectl version
Client Version: version.Info{Major:"1", Minor:"21", GitVersion:"v1.21.5", GitCom
mit:"aea7bbadd2fc0cd689de94a54e5b7b758869d691", GitTreeState:"clean", BuildDate:
"2021-09-15T21:10:45Z", GoVersion:"go1.16.8", Compiler:"gc", Platform:"windows/a
md64"}
Server Version: version.Info{Major:"1", Minor:"21", GitVersion:"v1.21.5", GitCom
mit:"aea7bbadd2fc0cd689de94a54e5b7b758869d691", GitTreeState:"clean", BuildDate:
"2021-09-15T21:04:16Z", GoVersion:"go1.16.8", Compiler:"gc", Platform:"linux/amd
64"}
```

## 2. 连接配置

1、从Kubernetes master节点下载集群配置文件kubeconfig

此文件默认位置在master节点中的\$HOME/.kube/config

2、将C盘当前用户根目录下创建.kube文件夹，并将集群配置文件kubeconfig拷贝到此处



### 3. 连接集群

现在我们想连接kubernetes集群中namespace为workbench的项目，可以按照如下操作进行

1、运行命令连接指定集群

#xx为指定项目命名空间

```
ktctl --namespace=workbench connect
```

```

$ ktctl --namespace=workbench connect
3:59PM INF Using cluster context kubernetes-admin@cluster.local (cluster.local)
3:59PM INF KtConnect 0.3.7 start at 7564 (windows amd64)
3:59PM INF Fetching cluster time ...
4:00PM INF Using tun2socks mode
4:00PM INF Successful create config map kt-connect-shadow-hrpwz
4:00PM INF Deploying shadow pod kt-connect-shadow-hrpwz in namespace workbench
4:00PM INF Waiting for pod kt-connect-shadow-hrpwz ...
4:00PM INF Pod kt-connect-shadow-hrpwz is ready
4:00PM INF Port forward local:20407 -> pod kt-connect-shadow-hrpwz:22 established
4:00PM INF Socks proxy established
2023/01/06 16:00:15 Using existing driver 0.14
2023/01/06 16:00:15 Creating adapter
2023/01/06 16:00:15 Removed orphaned adapter "KtConnectTunnel 1"
4:00PM INF Tun device KtConnectTunnel is ready
4:00PM INF Adding route to 109.233.0.0/16
4:00PM INF Adding route to 172.31.184.223/32
4:00PM INF Adding route to 172.30.128.0/17
4:00PM INF Adding route to 172.30.64.0/18
4:00PM INF Adding route to 172.30.32.0/19
4:00PM INF Adding route to 172.30.16.0/20
4:00PM INF Adding route to 172.30.0.0/21
4:00PM INF Adding route to 172.30.8.0/22
4:00PM INF Adding route to 172.30.12.0/23
4:00PM INF Adding route to 172.30.14.0/24
4:00PM INF Adding route to 172.30.15.0/25
4:00PM INF Adding route to 172.30.15.128/26
4:00PM INF Adding route to 172.30.15.192/27
4:00PM INF Adding route to 172.30.15.240/28
4:00PM INF Adding route to 172.30.15.232/29
4:00PM INF Adding route to 172.30.15.224/30
4:00PM INF Adding route to 172.30.15.228/31
4:00PM INF Adding route to 172.30.15.230/32
4:00PM INF Adding route to 172.29.63.24/32
4:00PM INF Route to tun device completed
4:00PM INF Setting up dns in local mode
4:00PM INF Port forward local:2873 -> pod kt-connect-shadow-hrpwz:53 established
4:00PM INF Setup local DNS with upstream [tcp:127.0.0.1:2873 udp:172.16.100.13:53]
4:00PM INF Creating udp dns on port 53
4:00PM INF -----
4:00PM INF All looks good, now you can access to resources in the kubernetes cluster
4:00PM INF -----

```

当连接上指定namespace后，可以在kubesphere平台看到本地创建的容器



2、 当连接上以后就可以直接在本地访问云上的接口了

### 直接通过dns访问服务接口

```
$ curl http://workbench-gateway-service.workbench:8088/workbench-center/salesAchieveOperator/getAchieveOperatorInfo
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left  Speed
100  121    100    121    0    0   529      0  --:--:--  --:--:--  --:--:--  552{"success":false,"message":"您的身份已过期，请重新登录","code":520,"result":null,"timestamp":1672996957923}
```

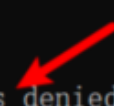
使用postman调本地接口通过feign调用集群服务, 有正常响应

```
Servlet:547 - Completed initialization in 83 ms  
lg:46 - Feign request: /achievement/getFixedStoreDetailCarByPage,token is eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJleHAiOjE2NzI5OTY1NzQsInZvZX1  
r:115 - Flipping property: workbench-manager.ribbon.ActiveConnectionsLimit to use NEXT property: niws.loadbalancer.availabilityFilteringRule.a  
r:197 - Client: workbench-manager instantiated a LoadBalancer: DynamicServerListLoadBalancer:{NFLoadBalancer:name=workbench-manager,current li  
lancer:222 - Using serverListUpdater PollingServerListUpdater  
y:115 - Flipping property: workbench-manager.ribbon.ActiveConnectionsLimit to use NEXT property: niws.loadbalancer.availabilityFilteringRule.a  
lancer:150 - DynamicServerListLoadBalancer for client workbench-manager initialized: DynamicServerListLoadBalancer:{NFLoadBalancer:name=workbe  
cessive connection failure:0; Total blackout seconds:0; Last connection made:Thu Jan 01 08:00:00 CST 1970; First connection made: Thu J  
  
ller:149 - >web===汽车-领导-我的业绩【定点储备额】下钻 IdentityId:4 permissionSQL: (customer_group_code in ('京渝客户群','中南客户群','一汽客户群
```

#### 4. 可能出现的问题

运行 `ktctl --namespace=workbench connect` 可能会出现hosts权限拒绝

```
34PM INF Adding route to 172.30.15.240/28
34PM INF Adding route to 172.30.15.232/29
34PM INF Adding route to 172.30.15.224/30
34PM INF Adding route to 172.30.15.228/31
34PM INF Adding route to 172.30.15.230/32
34PM INF Adding route to 172.29.63.24/32
34PM INF Route to tun device completed
34PM INF Setting up dns in local mode
34PM WRN Failed to dump hosts file
34PM ERR Exit: open C:\Windows\System32\drivers\etc\hosts: Access is denied.
34PM INF Pid file was removed
34PM INF Removed pid file C:\Users\liangzhou14/.kt/pid/connect-14820.pid
34PM INF Removed key file C:\Users\liangzhou14/.kt/key/kt-connect-shadow-mqncn.key
34PM INF Cleaning configmap kt-connect-shadow-mqncn
34PM INF Cleaning shadow pod kt-connect-shadow-mqncn
```

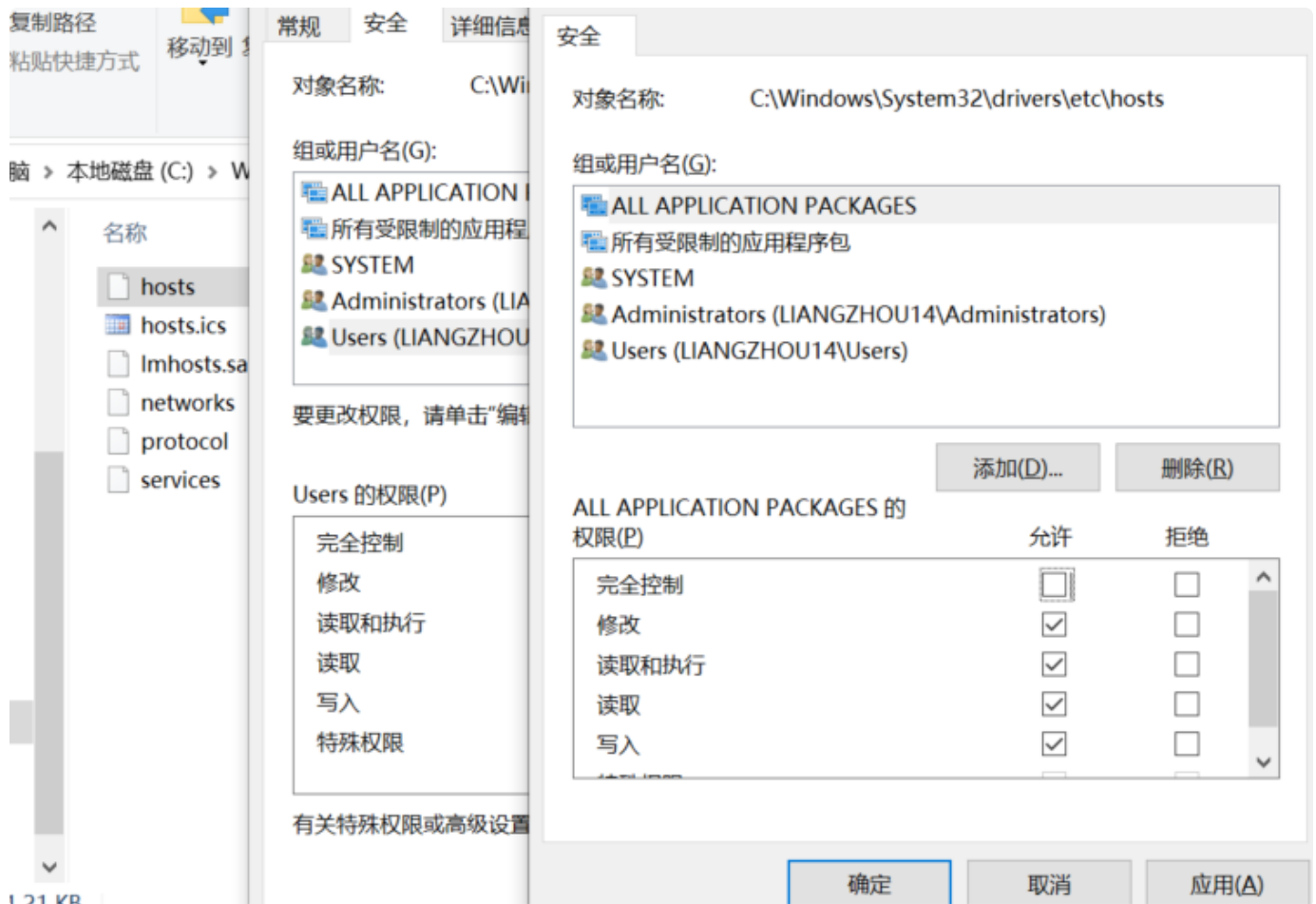


## 解决方案

方法1:

修改C盘 `C:\Windows\System32\drivers\etc\` 此路径下hosts文件权限

在 hosts文件上点击鼠标右键，在弹出的选项中，点击打开“属性”，选中用户后，点击编辑，勾选上下方的“修改”和“写入”权限，完成后，点击右下角的“应用”，再重新运行命令。



方法2:

如果方法1不行，在本地新建一个记事本文件，将 hosts文件打开全选再复制进新建的记事本中，将记事本名修改成hosts替换进C:\Windows\System32\drivers\etc\路径下hosts文件，重新运行命令。

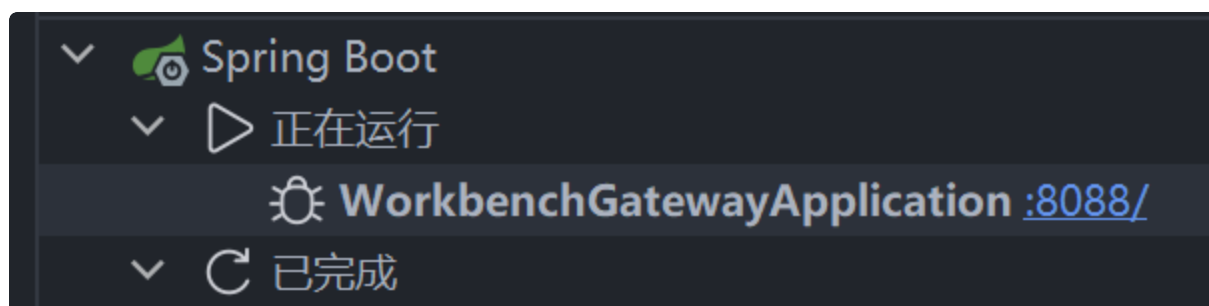
## KT Exchange

上面我们通过Kt Connect 模式可以在本地直接连上K8S网络，有时候我们还需要另外一种模式，即将远程服务流量打到本地，方便本地进行联调。



如下所示：我在本地启动了一个网关服务，现在想让线上的服务全部打到我本地，方便我在本地进行 debug。这时候我们就需要使用Kt Exchange 模式。

1、首先我在本地启动服务，服务的端口需要跟K8S中需要代理对象的Service端口保持一致



2、使用ktctl exchange启动服务代理流量

```
1 PS C:\Users\> ktctl exchange workbench-gateway-service --namespace workben  
ch --expose 8088  
2  
3  
4  
5  
6  
7  
8 2:05PM INF Using cluster context kubernetes-admin@cluster.local (cluster.l  
ocal)  
9 2:05PM INF KtConnect 0.3.7 start at 13508 (windows amd64)  
10 2:06PM INF Fetching cluster time ...  
11 2:06PM INF Fetching cluster time ...  
12 2:06PM INF Using selector mode  
13 2:06PM INF Service workbench-gateway-service locked  
14 2:06PM INF Successful create config map workbench-gateway-service-kt-excha  
nge-qefhw  
15 2:06PM INF Deploying shadow pod workbench-gateway-service-kt-exchange-qefh  
w in namespace workbench  
16 2:06PM INF Waiting for pod workbench-gateway-service-kt-exchange-qefhw ...  
17 2:06PM INF Pod workbench-gateway-service-kt-exchange-qefhw is ready  
18 2:06PM INF Forwarding pod workbench-gateway-service-kt-exchange-qefhw to l  
ocal via port 8088  
19 2:06PM INF Port forward local:60912 -> pod workbench-gateway-service-kt-ex  
change-qefhw:22 established  
20 2:06PM INF Reverse tunnel 0.0.0.0:8088 -> 127.0.0.1:8088 established  
21 2:06PM INF Service workbench-gateway-service unlocked  
22 2:06PM INF -----  
23 2:06PM INF Now all request to service 'workbench-gateway-service' will be  
redirected to local  
24 2:06PM INF -----
```

这里的workbench-gateway-service指的是pod对应的service

端口也需要跟service的端口保持一致

```
C:\Users\jianzhang11>kubectl get po -nworkbench
```

NAME	READY	STATUS	RESTARTS	AGE
kt-connect-shadow-tuczv	1/1	Running	0	161m
kt-rectifier-cnrzr	0/1	Terminating	0	51s
wb-web-admin-6cf664496f-v42rw	1/1	Running	0	5d23h
wb-web-app-7b7b6cdb84-zhx6x	1/1	Running	0	5d20h
wb-web-front-5bdc77c696-ckxc2	1/1	Running	0	3d23h
workbench-center-5d686c8c8c-a7gp5	1/1	Running	0	3d22h
workbench-gateway-6c8887fc5d-j9cwk	1/1	Running	0	6d5h
workbench-gateway-service-kt-exchange-qefhw	1/1	Running	0	33s
workbench-job-77f6865db8-t2vtrq	1/1	Running	0	61d
workbench-manager-84665966f9-55s8v	1/1	Running	0	173m
workbench-task-86f8cf468d-6ftdn	1/1	Running	0	6d20h
workbench-web-7f5859fdd8-8vc2q	1/1	Running	0	6d19h

启动完成后可以看到启动了一个exchange的服务，此时流量就会从K8S集群代理到本地来了。