云容器实例

SDK 参考

文档版本 01

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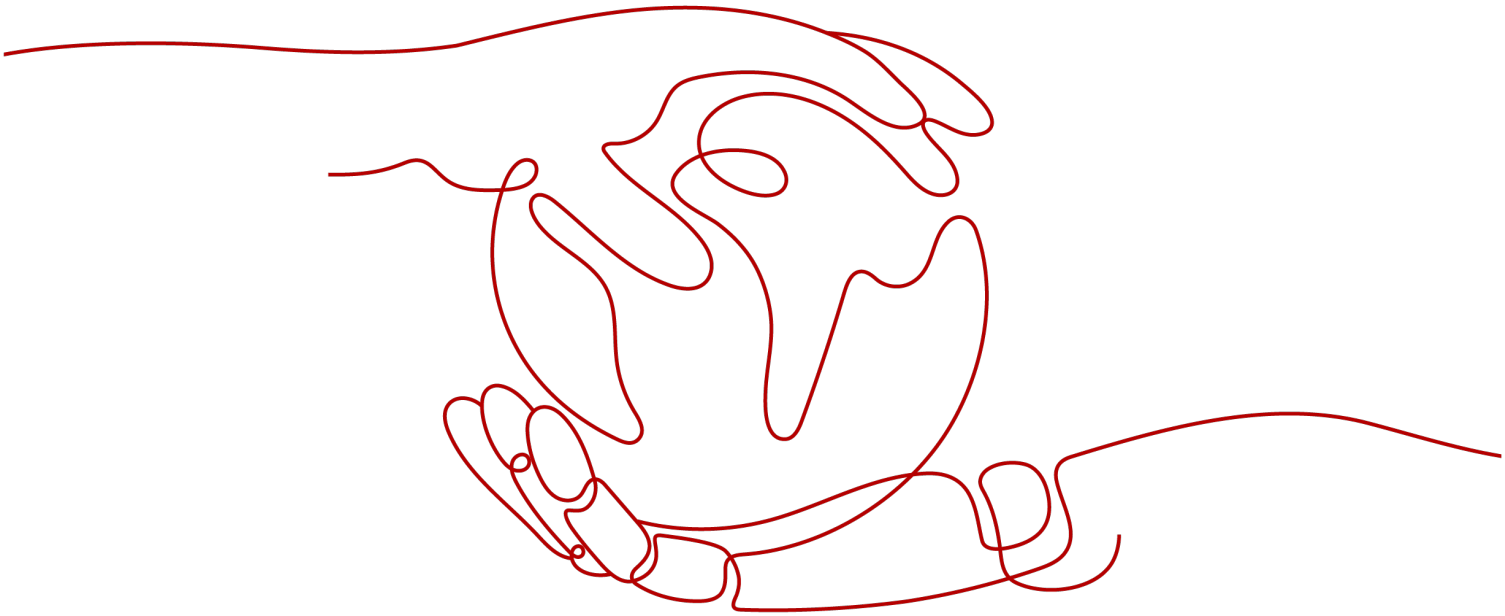

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华为公司对产品漏洞管理的规定以“漏洞处理流程”为准，该流程的详细内容请参见如下网址：
https://www.huawei.com/cn/psirt/vul-response-process
如企业客户须获取漏洞信息，请参见如下网址：
https://securitybulletin.huawei.com/enterprise/cn/security-advisory

目 录

1 使用 client-go 访问 CCI

本节将介绍如何将CCI认证工具cci-iam-authenticator与client-go结合使用以调用API。

安装 cci-iam-authenticator

请参考**使用kubectl**，下载安装及设置cci-iam-authenticator。

安装 kubernetes client-go

详情请参考**Installing client-go** 。

说明

当前**CCI服务开放的API对应的Kubernetes版本为1.19**，根据**Compatibility: client-go <-> Kubernetes clusters**，推荐使用的SDK版本为k8s.io/client-go@kubernetes-1.19.0。

使用 Go SDK

说明

示例已通过以下版本的测试：

1. k8s.io/client-go@kubernetes-1.15.0
2. k8s.io/client-go@kubernetes-1.16.0
3. k8s.io/client-go@kubernetes-1.17.0
4. k8s.io/client-go@kubernetes-1.18.0
5. k8s.io/client-go@kubernetes-1.19.0
6. k8s.io/client-go@kubernetes-1.20.0

使用用户名/密码进行认证

```
import (
    "fmt"

    "k8s.io/client-go/kubernetes"
    "k8s.io/client-go/tools/clientcmd"
    "k8s.io/client-go/tools/clientcmd/api"
)

const (
    apiVersion = "client.authentication.k8s.io/v1beta1"
    // 云容器实例 CCI，参考https://developer.huaweicloud.com/endpoint
```

```
    cciEndpoint = "<例如华北-北京四: https://cci.cn-north-4.myhuaweicloud.com>"
    // 统一身份认证服务 IAM，参考https://developer.huaweicloud.com/endpoint

    iamEndpoint = "<例如华北-北京四: https://iam.cn-north-4.myhuaweicloud.com>"
    // 地区和终端节点，参考https://developer.huaweicloud.com/endpoint

        projectName = "<例如华北-北京四: cn-north-4>"
)

// userName, domainName, password分别表示用户名、账号名及密码，需用户自行传入，因用户名、账号名及
密码用于认证，存在安全风险，请用户注意使用安全；
var userName, domainName, password string

// NewClient 通过username/password创建Clientset
func NewClient() (*kubernetes.Clientset, error) {
    config, err := clientcmd.BuildConfigFromFlags(cciEndpoint, "")
    if err != nil {
        return nil, err
    }
    var optionArgs []string
    optionArgs = append(optionArgs, fmt.Sprintf("--iam-endpoint=%s", iamEndpoint))
    optionArgs = append(optionArgs, fmt.Sprintf("--project-name=%s", projectName))
    optionArgs = append(optionArgs, fmt.Sprintf("--token-only=false"))
    optionArgs = append(optionArgs, fmt.Sprintf("--domain-name=%s", domainName))
    optionArgs = append(optionArgs, fmt.Sprintf("--user-name=%s", userName))
    optionArgs = append(optionArgs, fmt.Sprintf("--password=%s", password))

    config.ExecProvider = &api.ExecConfig{
        Command:    "cci-iam-authenticator",
        APIVersion: apiVersion,
        Args:       append([]string{"token"}, optionArgs...),
        Env:        make([]api.ExecEnvVar, 0),
    }
    return kubernetes.NewForConfig(config)
}
```

使用AK/SK进行认证

```
import (
    "fmt"
    "k8s.io/client-go/kubernetes"
    "k8s.io/client-go/tools/clientcmd"
    "k8s.io/client-go/tools/clientcmd/api"
)

const (
    apiVersion = "client.authentication.k8s.io/v1beta1"
    // 云容器实例 CCI，参考https://developer.huaweicloud.com/endpoint

    cciEndpoint = "<例如华北-北京四: https://cci.cn-north-4.myhuaweicloud.com>"
    // 统一身份认证服务 IAM，参考https://developer.huaweicloud.com/endpoint

    iamEndpoint = "<例如华北-北京四: https://iam.cn-north-4.myhuaweicloud.com>"
    // 地区和终端节点，参考https://developer.huaweicloud.com/endpoint

    projectName = "<例如华北-北京四: 'cn-north-4'>"
)

// 获取AK/SK参考: https://support.huaweicloud.com/devg-cci/
cci_kubectl_01.html#cci_kubectl_01__section17023744719
// ak，sk分别表示用户AK/SK，需用户自行传入，因AK/SK用于认证，存在安全风险，请用户注意使用安全。
var ak, sk string

// NewClient 通过AK/SK认证创建Clientset
func NewClient() (*kubernetes.Clientset, error) {
    config, err := clientcmd.BuildConfigFromFlags(cciEndpoint, "")
    if err != nil {
        return nil, err
    }
```

```
    var optionArgs []string
    optionArgs = append(optionArgs, fmt.Sprintf("--iam-endpoint=%s", iamEndpoint))
    optionArgs = append(optionArgs, fmt.Sprintf("--project-name=%s", projectName))
    optionArgs = append(optionArgs, fmt.Sprintf("--token-only=false"))
    optionArgs = append(optionArgs, fmt.Sprintf("--ak=%s", ak))
    optionArgs = append(optionArgs, fmt.Sprintf("--sk=%s", sk))
    config.ExecProvider = &api.ExecConfig{
        Command:    "cci-iam-authenticator",
        APIVersion: apiVersion,
        Args:       append([]string{"token"}, optionArgs...),
        Env:        make([]api.ExecEnvVar, 0),
    }
    return kubernetes.NewForConfig(config)
}
```

生成kubeconfig配置文件用于认证配置，参考**使用cci-iam-authenticator**的子命令generate-kubeconfig生成kubeconfig配置文件

```
import (
    "k8s.io/client-go/kubernetes"
    "k8s.io/client-go/tools/clientcmd"
)

// NewClient 通过kubeconfig配置文件创建Clientset
// kubeconfig配置文件需包含认证相关信息，具体请参考《cci-iam-authenticator使用参考》生成kubeconfig配置文件：https://support.huaweicloud.com/devg-cci/cci_kubectl_03.html
func NewClient() (*kubernetes.Clientset, error) {
    config, err := clientcmd.BuildConfigFromFlags("", "/path/to/kubeconfig")
    if err != nil {
        return nil, err
    }
    return kubernetes.NewForConfig(config)
}
```

代码示例

您可以前往**开发体验馆Codelabs / Namespace生命周期代码示例（Go）**下载相关代码，并在线调试。

FAQ

问：上述代码示例是否存在请求结果返回码为401的情况?

答：一般情况下，如果密码或AK/SK配置无误，client-go提供的定期刷新token的机制（即定期调用cci-iam-authenticator刷新token，具体实现参考**https://github.com/kubernetes/client-go/blob/master/plugin/pkg/client/auth/exec/exec.go**），能确保token不会因过期而失效（token的有效期为24小时），从而避免请求结果返回码为401。

但当账号权限发生变更时，token可能也会失效，不属于超期失效的情形，在该情形下，仍会出现请求结果返回码为401的情况。

2 使用 client-go 访问 CCI 的 CRD 资源 Network

您可以前往**开发体验馆Codelabs / Namespace生命周期代码示例（Go）**下载相关代码，并在线调试。

初始化项目

创建项目examples.com/cci-examples。

说明

项目依赖k8s.io/client-go、k8s.io/code-generator，以下版本可供参考

- k8s.io/client-go@kubernetes-1.15.0、k8s.io/code-generator@kubernetes-1.15.0
- k8s.io/client-go@kubernetes-1.16.0、k8s.io/code-generator@kubernetes-1.16.0
- k8s.io/client-go@kubernetes-1.17.0、k8s.io/code-generator@kubernetes-1.17.0
- k8s.io/client-go@kubernetes-1.18.0、k8s.io/code-generator@kubernetes-1.18.0
- k8s.io/client-go@kubernetes-1.19.0、k8s.io/code-generator@kubernetes-1.19.0
- k8s.io/client-go@kubernetes-1.20.0、k8s.io/code-generator@kubernetes-1.20.0

```
mkdir -p examples.com/cci-examples
cd examples.com/cci-examples/
go mod init examples.com/cci-examples
go get k8s.io/client-go@kubernetes-1.15.0
go get k8s.io/code-generator@kubernetes-1.15.0
```

定义 CRD 资源 Network

创建文件夹pkg/apis/networking.cci.io/v1beta1，其中networking.cci.io为CRD资源的group，v1beta1为CRD资源版本

```
mkdir -p pkg/apis/networking.cci.io/v1beta1
```

在新建文件夹中新建以下文件：

doc.go

```
// +k8s:deepcopy-gen=package
// +groupName=networking.cci.io
// +groupGoName=NetworkingCCI
package v1beta1
```

types.go

```
package v1beta1

import (
    metav1 "k8s.io/apimachinery/pkg/apis/meta/v1"
)

// +k8s:deepcopy-gen:interfaces=k8s.io/apimachinery/pkg/runtime.Object

// NetworkList is a list of network resource in container.
type NetworkList struct {
    metav1.TypeMeta `json:",inline"`
    // Standard list metadata.
    // More info: https://git.k8s.io/community/contributors/devel/api-conventions.md#metadata
    // +optional
    metav1.ListMeta `json:"metadata,omitempty" protobuf:"bytes,1,opt,name=metadata"`
    Items           []Network `json:"items" protobuf:"bytes,2,rep,name=items"`
}

// +genclient
// +k8s:deepcopy-gen:interfaces=k8s.io/apimachinery/pkg/runtime.Object

// Network is a network resource in container.
type Network struct {
    metav1.TypeMeta `json:",inline"`
    // +optional
    metav1.ObjectMeta `json:"metadata,omitempty" protobuf:"bytes,1,opt,name=metadata"`
    // Spec defines the attributes on a network
    // +optional
    Spec NetworkSpec `json:"spec,omitempty" protobuf:"bytes,2,opt,name=spec"`
    // Status describes the network status
    // +optional
    Status NetworkStatus `json:"status,omitempty" protobuf:"bytes,3,opt,name=status"`
}

// NetworkSpec describes the attributes on a network resource.
type NetworkSpec struct {
    // network type
    NetworkType string `json:"networkType,omitempty" protobuf:"bytes,5,opt,name=networkType"`
    // ID of the VPC to attach
    AttachedVPC string `json:"attachedVPC,omitempty" protobuf:"bytes,4,opt,name=attachedVPC"`
    // network ID
    NetworkID string `json:"networkID,omitempty" protobuf:"bytes,7,opt,name=networkID"`
    // Subnet ID
    SubnetID string `json:"subnetID,omitempty" protobuf:"bytes,8,opt,name=subnetID"`
    // available zone
    AvailableZone string `json:"availableZone,omitempty" protobuf:"bytes,9,opt,name=availableZone"`
    // The CIDR of the network
    CIDR string `json:"cidr,omitempty" protobuf:"bytes,3,opt,name=cidr"`
}

// NetworkStatus describes the status of a network
type NetworkStatus struct {
    // State describes the network state
    // +optional
    State string `json:"state" protobuf:"bytes,1,opt,name=state"`
    // Message describes why network is in current state
    // +optional
    Message string `json:"message,omitempty" protobuf:"bytes,2,opt,name=message"`
}

const (
    // NetworkInitializing means the network is initializing
    NetworkInitializing = "Initializing"
    // NetworkPending means the network is processing
    NetworkPending = "Pending"
    // NetworkActive means the network is available
    NetworkActive = "Active"
    // NetworkFailed means the network is not available
    NetworkFailed = "Failed"
```

```
    // NetworkTerminating means the network is undergoing graceful termination
    NetworkTerminating = "Terminating"
)
```

register.go

```
package v1beta1

import (
    metav1 "k8s.io/apimachinery/pkg/apis/meta/v1"
    "k8s.io/apimachinery/pkg/runtime"
    "k8s.io/apimachinery/pkg/runtime/schema"
)

// GroupName is the group name use in this package
const GroupName = "networking.cci.io"

// SchemeGroupVersion is group version used to register these objects
var SchemeGroupVersion = schema.GroupVersion{Group: GroupName, Version: "v1beta1"}

// Resource takes an unqualified resource and returns a Group qualified GroupResource
func Resource(resource string) schema.GroupResource {
    return SchemeGroupVersion.WithResource(resource).GroupResource()
}

var (
    // localSchemeBuilder and AddToScheme will stay in k8s.io/kubernetes.
    SchemeBuilder      = runtime.NewSchemeBuilder(addKnownTypes)
    localSchemeBuilder = &SchemeBuilder
    AddToScheme        = localSchemeBuilder.AddToScheme
)

// Adds the list of known types to the given scheme.
func addKnownTypes(scheme *runtime.Scheme) error {
    scheme.AddKnownTypes(SchemeGroupVersion,
        &Network{},
        &NetworkList{},
    )
    // Add the watch version that applies
    metav1.AddToGroupVersion(scheme, SchemeGroupVersion)
    return nil
}
```

创建构建脚本

新建hack文件夹用以存放构建脚本及依赖文件

```
mkdir hack
```

在hack文件夹中创建以下文件：

tools.go，建立该文件来依赖code-generator

```
// +build tools

/*
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distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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limitations under the License.
```

```
*/

// This package imports things required by build scripts, to force `go mod` to see them as dependencies
package tools

import _ "k8s.io/code-generator"
```

update-codegen.sh

```
#!/usr/bin/env bash

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# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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# limitations under the License.

set -o errexit
set -o nounset
set -o pipefail

SCRIPT_ROOT=$(dirname "${BASH_SOURCE[0]}")/..
CODEGEN_PKG=${CODEGEN_PKG:-$(cd "${SCRIPT_ROOT}"; ls -d -1 ./vendor/k8s.io/code-generator 2>/dev/
null || echo ../code-generator)}

# generate the code with:
# --output-base    because this script should also be able to run inside the vendor dir of
#                  k8s.io/kubernetes. The output-base is needed for the generators to output into the vendor dir
#                  instead of the $GOPATH directly. For normal projects this can be dropped.
# generators deepcopy,client,informer,lister
export CLIENTSET_PKG_NAME=networking.cci.io
export CLIENTSET_NAME_VERSIONED=v1beta1
"${CODEGEN_PKG}"/generate-groups.sh "deepcopy,client" \
  examples.com/cci-examples/pkg/client examples.com/cci-examples/pkg/apis \
  networking.cci.io:v1beta1 \
  --output-base "$(dirname "${BASH_SOURCE[0]}")/../../.." \
  --go-header-file "${SCRIPT_ROOT}"/hack/boilerplate.go.txt

# To use your own boilerplate text append:
#   --go-header-file "${SCRIPT_ROOT}"/hack/custom-boilerplate.go.txt
```

boilerplate.go.txt构建出来的文件的文件头，可定制

```
/*
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limitations under the License.
*/
```

至此，完成所有准备过程，此时目录的文件结构如下：

```
├── go.mod
├── go.sum
```

```
├── hack
│   ├── boilerplate.go.txt
│   ├── tools.go
│   └── update-codegen.sh
└── pkg
    └── apis
        └── networking.cci.io
            └── v1beta1
                ├── doc.go
                ├── register.go
                └── types.go

5 directories, 8 files
```

执行命名生成代码

以下命令在linux环境下执行

```
# 生成vendor文件夹
go mod vendor
# 执行构建脚本
chmod 755 hack/update-codegen.sh
# hack/update-codegen.sh会执行vendor/k8s.io/code-generator/generate-groups.sh
chmod 755 vendor/k8s.io/code-generator/generate-groups.sh
./hack/update-codegen.sh
```

执行成功后，将会生成代码，目录结构将为

```
├── go.mod
├── go.sum
├── hack
│   ├── boilerplate.go.txt
│   ├── tools.go
│   └── update-codegen.sh
└── pkg
    ├── apis
    │   └── networking.cci.io
    │       └── v1beta1
    │           ├── doc.go
    │           ├── register.go
    │           ├── types.go
    │           └── zz_generated.deepcopy.go
    └── client
        └── networking.cci.io
            └── v1beta1
                ├── clientset.go
                ├── doc.go
                ├── fake
                │   ├── clientset_generated.go
                │   ├── doc.go
                │   └── register.go
                ├── scheme
                │   ├── doc.go
                │   └── register.go
                └── typed
                    └── networking.cci.io
                        └── v1beta1
                            ├── doc.go
                            ├── fake
                            │   ├── doc.go
                            │   ├── fake_network.go
                            │   └── fake_networking.cci.io_client.go
                            ├── generated_expansion.go
                            ├── network.go
                            └── networking.cci.io_client.go
```

示例代码：创建 Network

说明

该示例测试版本：

k8s.io/client-go@kubernetes-1.15.0

k8s.io/code-generator@kubernetes-1.15.0

```
import (
    "time"

    metav1 "k8s.io/apimachinery/pkg/apis/meta/v1"
    "k8s.io/apimachinery/pkg/util/wait"
    "k8s.io/client-go/tools/clientcmd"

    "examples.com/cci-examples/pkg/apis/networking.cci.io/v1beta1"
    clientset "examples.com/cci-examples/pkg/client/networking.cci.io/v1beta1"
)

const (
    name      = "test-k8s-client-namespace-cn-north-1-default-network"
    namespace = "test-k8s-client-namespace"
)

// CreateNetwork 创建Network，并等待其状态变更为Active
// 参考《Namespace和Network》https://support.huaweicloud.com/devg-cci/cci_05_0023.html
// API参考：https://support.huaweicloud.com/api-cci/
createNetworkingCciIoV1beta1NamespacedNetwork.html
func CreateNetwork() (*v1beta1.Network, error) {
    config, _ := clientcmd.BuildConfigFromFlags("", "{path to kubeconfig}")
    cs, err := clientset.NewForConfig(config)
    if err != nil {
        return nil, err
    }

    projectId := "<账号ID，可以在我的凭证获取>"
    domainId := "<项目ID，可以在我的凭证获取>"
    securityGroupID := "<安全组ID，可以在安全组控制台获取>"
    availableZone := "<az名称，例如cn-north-1a、cn-north-4a或cn-east-3a>"
    vpcID := "虚拟私有云的ID，可在VPC控制台获取"
    cidr := "<子网网段，例如192.168.128.0/18>"
    networkID := "<子网的网络ID，可在VPC控制台 > 子网中获取>"
    subnetID := "<子网ID，可在VPC控制台 > 子网获取>"

    network := &v1beta1.Network{
        ObjectMeta: metav1.ObjectMeta{
            Annotations: map[string]string{
                "network.alpha.kubernetes.io/default-security-group": securityGroupID,
                "network.alpha.kubernetes.io/domain-id":              domainId,
                "network.alpha.kubernetes.io/project-id":             projectId,
            },
            Name: name,
        },
        Spec: v1beta1.NetworkSpec{
            AvailableZone: availableZone,
            CIDR:          cidr,
            AttachedVPC:   vpcID,
            NetworkID:     networkID,
            NetworkType:   "underlay_neutron",
            SubnetID:      subnetID,
        },
    }
    network, err = cs.NetworkingCCIV1beta1().Networks(namespace).Create(network)
    if err != nil {
        return nil, err
    }

    // 查询Network状态，等待其状态变为"Active"
    err = wait.Poll(time.Second*5, time.Second*30, func() (done bool, err error) {
```

```
        network, err = cs.NetworkingCCIV1beta1().Networks(namespace).Get(name, metav1.GetOptions{})
        if err != nil {
            return false, err
        }
        if network.Status.State == v1beta1.NetworkActive {
            return true, nil
        }
        return false, nil
    })
    return network, err
}
```

参考文档

Code Generation for CustomResources

code-generator

sample-controller

3 使用 kubernetes 官方 Python SDK 访问 CCI

本节介绍如何将cci认证工具cci-iam-authenticator与kubernetes-client/python结合使用以调用API。

安装 cci-iam-authenticator

请参考**使用kubectl**，下载安装及设置cci-iam-authenticator。

安装 kubernetes-client/python

您可参考**Installation**，下载安装kubernetes-client/python。

说明

当前**CCI的kubernetes API对应社区版本为1.19**，根据**Compatibility**，推荐使用的SDK版本为client 11.y.z。

使用 Python SDK

您可以前往**开发体验馆Codelabs / Namespace生命周期代码示例（Python）**下载相关代码，并在线调试。

首先需要先生成kubeconfig配置文件，参考**cci-iam-authenticator使用参考**，使用子命令generate-kubeconfig生成kubeconfig配置文件。

说明

- 这里的示例代码采用了定期刷新token的方式来防止token过期（缓存值token有效期为24小时），您可以增加获取失败重试的操作，以提升可用性。
- 定期刷新token的方式不适用于该账号权限发生变更的情形，如果账号权限发生变更（如主账号变更子账号权限，导致子账号权限发生变更），变更前获取的token会失效，需要重新获取

```
# -*- coding: utf-8 -*-
import logging
import time
import threading

from kubernetes import client, config
```

```
NAMESPACE = "test-k8s-client-namespace"

logging.basicConfig(
    level=logging.INFO,
    datefmt="%Y-%m-%d %H:%M:%S",
    format="%(asctime)s %(levelname)s %(message)s",
)


def create_namespace():
    flavor = "general-computing"
    pool_size = "10"

    namespace = client.V1Namespace(
        metadata=client.V1ObjectMeta(
            name=NAMESPACE,
            annotations={
                "namespace.kubernetes.io/flavor": flavor,
                "network.cci.io/warm-pool-size": pool_size,
            },
            labels={
                "rbac.authorization.cci.io/enable-k8s-rbac": "false",
            }
        )
    )

    logging.info("start to create namespace %s", NAMESPACE)
    client.CoreV1Api().create_namespace(namespace)
    logging.info("namespace created")


def create_network():
    name = "test-k8s-client-namespace-cn-north-7-default-network"
    project_id = "{project_id}"
    domain_id = "{domain_id}"
    security_group_id = "{security_group_id}"
    available_zone = "{available_zone}"
    vpc_id = "{vpc_id}"
    cidr = "{cidr}"
    network_id = "{network_id}"
    subnet_id = "{subnet_id}"

    body = {
        "apiVersion": "networking.cci.io/v1beta1",
        "kind": "Network",
        "metadata": {
            "annotations": {
                "network.alpha.kubernetes.io/default-security-group": security_group_id,
                "network.alpha.kubernetes.io/domain-id": domain_id,
                "network.alpha.kubernetes.io/project-id": project_id,
            },
            "name": name,
        },
        "spec": {
            "availableZone": available_zone,
            "cidr": cidr,
            "attachedVPC": vpc_id,
            "networkID": network_id,
            "networkType": "underlay_neutron",
            "subnetID": subnet_id,
        }
    }

    api = client.CustomObjectsApi()
    logging.info("start to create network")
    api.create_namespaced_custom_object(
        group="networking.cci.io",
        version="v1beta1",
        namespace=NAMESPACE,
```

```
        plural="networks",
        body=body,
    )
    logging.info("network created")


def create_deployment():
    app = "test-k8s-client-deployment"
    image = "library/nginx:stable-alpine-perl"

    body = client.V1Deployment(
        api_version="apps/v1",
        kind="Deployment",
        metadata=client.V1ObjectMeta(name=app),
        spec=client.V1DeploymentSpec(
            replicas=2,
            selector={"matchLabels": {"app": app}},
            template=client.V1PodTemplateSpec(
                metadata=client.V1ObjectMeta(labels={"app": app}),
                spec=client.V1PodSpec(
                    containers=[
                        client.V1Container(
                            name="container-0",
                            image=image,
                            resources=client.V1ResourceRequirements(
                                requests={"cpu": "500m", "memory": "1024Mi"},
                                limits={"cpu": "500m", "memory": "1024Mi"},
                            ),
                        )
                    ],
                    image_pull_secrets=[
                        client.V1LocalObjectReference(name="imagepull-secret")],
                    priority=0),
            ),
        )
    )
    logging.info("start to create deployment %s/%s", NAMESPACE, app)
    client.AppsV1Api().create_namespaced_deployment(NAMESPACE, body)
    logging.info("deployment created")


def get_deployment():
    app = "test-k8s-client-deployment"
    resp = client.AppsV1Api().read_namespaced_deployment(app, NAMESPACE)
    logging.info("deployment detail: %s", resp)


def delete_deployment():
    app = "test-k8s-client-deployment"
    logging.info("start to delete deployment")
    client.AppsV1Api().delete_namespaced_deployment(app, NAMESPACE)
    logging.info("deployment deleted")


def delete_namespace():
    logging.info("start to delete namespace: %s", NAMESPACE)
    client.CoreV1Api().delete_namespace(NAMESPACE)


def main():
    # Configs can be set in Configuration class directly or using helper
    # utility. If no argument provided, the config will be loaded from
    # default location.
    path = '{path to kubeconfig}'
    config.load_kube_config(path)

    # 因为token有效期为24小时，所以这里设置了一个每12小时获取新的token的定时任务
    # 注意：如果账号权限发生变更（如主账号变更子账号权限，导致子账号权限发生变更），变更前获取的
token会失效，需要重新获取。
```

```
    # 另外，您可以增加获取失败重试的操作，以提升可用性
    def _refresh():
        while True:
            time.sleep(12 * 3600)
            try:
                config.load_kube_config(path)
            except Exception as e:
                print("load_kube_config error: %s" % e)
    t = threading.Thread(target=_refresh)
    t.daemon = True
    t.start()

    create_namespace()
    create_network()
    # wait for namespace and network to be active
    logging.info("waiting for namespace and network to be active")
    time.sleep(30)
    create_deployment()
    get_deployment()
    delete_deployment()
    delete_namespace()


if __name__ == '__main__':
    main()
```

FAQ

问：以上示例是否适用于其他版本的kubernetes-client/python?

答：上述示例已通过测试，测试环境python3.7.4，测试版本包括：

1. 9.0.1
2. 10.1.0
3. 11.0.0
4. 12.0.1
5. 17.17.0
6. 18.17.0a1
7. 19.15.0

4 使用 kubernetes 官方 Java SDK 访问 CCI

本节将介绍如何将CCI认证工具cci-iam-authenticator与**kubernetes-client/java**结合使用以调用API。

安装 cci-iam-authenticator

请参考**使用kubectl**，下载安装及设置cci-iam-authenticator。

安装 kubernetes-client/java

详情请参考**Installation** 。

说明

当前**CCI服务开放的API对应的Kubernetes版本为1.19**，根据**Versioning-and-Compatibility**，推荐使用的SDK版本为11.0.2及以上。

如果要使用GenericKubernetesClient（参考**Code-Examples**），则需要9.0.0+以上版本

使用 Java SDK

您可以前往**开发体验馆Codelabs / Namespace生命周期代码示例（Java）**下载相关代码，并在线调试。

说明

示例已通过以下版本的测试：

1. 11.0.2

将以下依赖添加到项目的POM文件中：

```
<dependency>
    <groupId>io.kubernetes</groupId>
    <artifactId>client-java</artifactId>
    <version>11.0.2</version>
</dependency>
```

通过kubeconfig配置文件创建ApiClient（参考**使用cci-iam-authenticator**的子命令generate-kubeconfig生成kubeconfig配置文件）

```
public class CommonCases {

    // ...

    public static void main(String[] args) throws IOException, ApiException, InterruptedException {
```

```
        // file path to your KubeConfig
        String kubeConfigPath = "<path to kubeconfig>";

        // loading the out-of-cluster config, a kubeconfig from file-system
        File file = new File(kubeConfigPath);
        KubeConfig config = KubeConfig.loadKubeConfig(new FileReader(file));
        config.setFile(file);
        ApiClient client = buildClient(config).build();

        // ...

    }

    public static ClientBuilder buildClient(KubeConfig config) throws IOException {
        final ClientBuilder builder = new ClientBuilder();

        String server = config.getServer();
        if (!server.contains("://")) {
            if (server.contains(":443")) {
                server = "https://" + server;
            } else {
                server = "http://" + server;
            }
        }

        builder.setVerifyingSsl(config.verifySSL());

        builder.setBasePath(server);
        builder.setAuthentication(new CCIKubeconfigAuthentication(config));
        return builder;
    }
}
```

CCIKubeconfigAuthentication.java

```
package com.huawei.demos;

import io.kubernetes.client.openapi.ApiClient;
import io.kubernetes.client.util.KubeConfig;
import io.kubernetes.client.util.credentials.Authentication;
import okhttp3.Interceptor;
import okhttp3.OkHttpClient;
import okhttp3.Request;
import okhttp3.Response;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

import java.io.IOException;
import java.time.Instant;


/**
 * Uses a {@link KubeConfig} to configure {@link ApiClient} authentication to the CCI Kubernetes API.
 *
 * <p> Only try to use AccessTokenAuthentication mechanisms, which is enough for CCI.
 */
public class CCIKubeconfigAuthentication implements Authentication, Interceptor {

    private static final Logger log = LoggerFactory.getLogger(CCIKubeconfigAuthentication.class);
    private final KubeConfig config;
    private String token;
    private Instant expiry;

    public CCIKubeconfigAuthentication(final KubeConfig config) throws IOException {
        this.config = config;
        this.expiry = Instant.MIN;
    }
```

```
    private String getToken() {
        // get access token every 600 seconds
        if (Instant.now().isAfter(this.expiry)) {
            log.debug("Token expired, get new one from kubeconfig");
            this.token = config.getAccessToken();
            if (this.token != null) {
                this.expiry = Instant.now().plusSeconds(600);
            }
        }
        return this.token;
    }

    @Override
    public void provide(ApiClient client) {
        OkHttpClient httpClient = client.getHttpClient().newBuilder().addInterceptor(this).build();
        client.setHttpClient(httpClient);
    }

    @Override
    public Response intercept(Interceptor.Chain chain) throws IOException {
        Request request = chain.request();
        Request authRequest;
        authRequest = request.newBuilder().header("Authorization", "Bearer " + getToken()).build();
        return chain.proceed(authRequest);
    }
}
```

访问CCI服务

```
public class CommonCases {

    // ...

    private static void createNamespace(CoreV1Api api) throws ApiException {
        String enableK8sRbac = "false";
        String flavor = "general-computing";
        String warmPoolSize = "10";

        Map<String, String> labels = new HashMap<>();
        labels.put("rbac.authorization.cci.io/enable-k8s-rbac", enableK8sRbac);
        Map<String, String> annotations = new HashMap<>();
        annotations.put("namespace.kubernetes.io/flavor", flavor);
        annotations.put("network.cci.io/warm-pool-size", warmPoolSize);
        V1Namespace namespace = new V1Namespace()
                .metadata(new V1ObjectMeta().name(NAMESPACE).labels(labels).annotations(annotations));
        LOGGER.info("start to create namespace {}", NAMESPACE);
        api.createNamespace(namespace, null, null, null);
        LOGGER.info("namespace created");
    }

    private static void createNetwork(GenericKubernetesApi<Network, NetworkList> networkApi) throws
ApiException {
        String name = NETWORK;
        String projectID = "<账号ID，可以在我的凭证获取>";
        String domainID = "<项目ID，可以在我的凭证获取>";
        String securityGroupID = "<安全组ID，可以在安全组控制台获取>";
        String availableZone = "<az名称，例如cn-north-1a、cn-north-4a或cn-east-3a>";
        String vpcID = "虚拟私有云的ID，可在VPC控制台获取";
        String cidr = "<子网网段，例如192.168.128.0/18>";
        String networkID = "<子网的网络ID，可在VPC控制台 > 子网中获取>";
        String subnetID = "<子网ID，可在VPC控制台 > 子网获取>";
        String networkType = "underlay_neutron";

        Map<String, String> annotations = new HashMap<>();
        annotations.put("network.alpha.kubernetes.io/default-security-group", securityGroupID);
        annotations.put("network.alpha.kubernetes.io/domain-id", domainID);
        annotations.put("network.alpha.kubernetes.io/project-id", projectID);

        Network network = new Network()
```

```
            .metadata(new
V1ObjectMeta().name(name).namespace(NAMESPACE).annotations(annotations))
            .spec(new NetworkSpec()
                    .availableZone(availableZone)
                    .cidr(cidr)
                    .attachedVPC(vpcID)
                    .networkID(networkID)
                    .networkType(networkType)
                    .subnetID(subnetID));

        LOGGER.info("start to create network {}/{}", NAMESPACE, name);
        networkApi.create(network).throwsApiException();
        LOGGER.info("network created");
    }

    private static void waitNamespaceActive(CoreV1Api api) throws ApiException, InterruptedException {
        for (int i = 0; i < 5; i++) {
            V1Namespace ns = api.readNamespace(NAMESPACE, null, null, null);
            if (ns.getStatus() != null && NAMESPACE_ACTIVE.equals(ns.getStatus().getPhase())) {
                return;
            }
            Thread.sleep(WAIT_ACTIVE_MILLIS);
        }
        throw new IllegalStateException("namespace not active");
    }

    private static void waitNetworkActive(GenericKubernetesApi<Network, NetworkList> networkApi) throws
ApiException, InterruptedException {
        for (int i = 0; i < 5; i++) {
            Network network = networkApi.get(NAMESPACE, NETWORK).throwsApiException().getObject();
            if (network.getStatus() != null && NETWORK_ACTIVE.equals(network.getStatus().getState())) {
                return;
            }
            Thread.sleep(WAIT_ACTIVE_MILLIS);
        }
        throw new IllegalStateException("network not active");
    }

    private static void createDeployment(AppsV1Api api) throws ApiException {
        String app = APP;
        String cpu = "500m";
        String memory = "1024Mi";
        String containerName = "container-0";
        String image = "library/nginx:stable-alpine-perl";

        Map<String, Quantity> limits = new HashMap<>();
        limits.put("cpu", Quantity.fromString(cpu));
        limits.put("memory", Quantity.fromString(memory));
        V1Container container = new V1Container()
                .name(containerName)
                .image(image)
                .resources(new V1ResourceRequirements().limits(limits).requests(limits));

        Map<String, String> labels = new HashMap<>();
        labels.put("app", app);
        V1PodTemplateSpec podTemplateSpec = new V1PodTemplateSpec()
                .spec(new V1PodSpec()
                        .priority(0)
                        .imagePullSecrets(Collections.singletonList(new
V1LocalObjectReference().name("imagepull-secret")))
                        .containers(Collections.singletonList(container)))
                .metadata(new V1ObjectMeta().labels(labels));

        V1Deployment deployment = new V1Deployment()
                .metadata(new V1ObjectMeta().name(app))
                .spec(new V1DeploymentSpec()
                        .replicas(2)
                        .selector(new V1LabelSelector().matchLabels(labels))
                        .template(podTemplateSpec));
```

```
        LOGGER.info("start to create deployment {}/{}", NAMESPACE, APP);
        api.createNamespacedDeployment(NAMESPACE, deployment, null, null, null);
        LOGGER.info("deployment created");
    }

    private static void getDeployment(AppsV1Api api) throws ApiException {
        V1Deployment deployment = api.readNamespacedDeployment(APP, NAMESPACE, null, null, null);
        LOGGER.info("deployment metadata: {}", deployment.getMetadata());
    }

    private static void deleteDeployment(AppsV1Api api) throws ApiException {
        LOGGER.info("start to delete deployment");
        api.deleteNamespacedDeployment(APP, NAMESPACE, null, null, null, null, null, null);
        LOGGER.info("deployment deleted");
    }

    private static void deleteNamespace(CoreV1Api api) throws ApiException {
        LOGGER.info("start to delete namespace: {}", NAMESPACE);
        api.deleteNamespace(NAMESPACE, null, null, null, null, null, null);
        LOGGER.info("namespace deleted");
    }
}
```

FAQ

问：以上示例是否适用于其他版本的kubernetes-client/java?

答：由于以上示例使用了GenericKubernetesClient（参考**Code-Examples**，需要9.0.0+以上版本），所以不适用9.0.0以下版本SDK。

另外由于不同版本SDK之间存在一定差别，上述示例代码需要作一些细微调整才能适用于不同版本SDK，请自行调试。