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# **cfm-reslib**

*Release 0.1*

**CloudSnorkel**

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CloudFormation Resource Library: a collection of useful custom resources that are missing from CloudFormation.



## INSTRUCTIONS

### 1.1 Installation

cfm-reslib is delivered as a single CloudFormation template that exports a single output called `cfm-reslib`. To use it you must first install it in the account and region where it will be used.

#### 1.1.1 Install

Installation is a simple one-liner. Make sure you have [AWS CLI](#) installed and configured.

```
aws cloudformation create-stack --stack-name cfm-reslib --template-url https://s3.  
↪amazonaws.com/cfm-reslib/cfm-reslib-latest.template --capabilities CAPABILITY_IAM
```

You can also download the template and manually install it using [AWS Console](#).

#### 1.1.2 Update

If you've already installed this library before, you need to run a different command to update to the latest version.

```
aws cloudformation update-stack --stack-name cfm-reslib --template-url https://s3.  
↪amazonaws.com/cfm-reslib/cfm-reslib-latest.template --capabilities CAPABILITY_IAM
```

### 1.2 Usage

Once installed `cfm-reslib` can be used by defining a custom resource with `ServiceToken` set to the exported value. See [Available Custom Resources](#) for a list of supported custom resource types.

#### 1.2.1 YAML

```
Resources:  
  SomeCustomResource:  
    Type: Custom::    Properties:  
      ServiceToken: !ImportValue cfm-reslib  
      SomeParameter: some value
```

## 1.2.2 JSON

```
{
  "Resources": {
    "SomeCustomResource": {
      "Type": "Custom::SomeCustomResourceType",
      "Properties": {
        "ServiceToken": {"Fn::ImportValue": "cfm-reslib"},
        "SomeParameter": "some value"
      }
    }
  }
}
```



## AVAILABLE CUSTOM RESOURCES

### 2.1 Custom::*ElasticTranscoderPipeline*

The Custom::*ElasticTranscoderPipeline* resource creates an Elastic Transcoder pipeline.

#### 2.1.1 Syntax

##### JSON

```
{
  "Type" : "Custom::ElasticTranscoderPipeline",
  "Properties" : {
    "ServiceToken" : {"Fn::ImportValue": "cfm-reslib"},
    "Name" : string,
    "InputBucket" : string,
    "OutputBucket" : string,
    "Role" : string,
    "AwsKmsKeyArn" : string,
    "Notifications" : Notifications,
    "ContentConfig" : PipelineOutputConfig,
    "ThumbnailConfig" : PipelineOutputConfig
  }
}
```

##### YAML

```
Type: Custom::ElasticTranscoderPipeline
Properties :
  ServiceToken : !ImportValue cfm-reslib
  Name : string
  InputBucket : string
  OutputBucket : string
  Role : string
  AwsKmsKeyArn : string
  Notifications :
    Notifications
  ContentConfig :
    PipelineOutputConfig
  ThumbnailConfig :
```

*PipelineOutputConfig*

## 2.1.2 Properties

### Name

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### InputBucket

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### OutputBucket

*Required:* Yes

*Type:* string

*Update requires:* Replacement

### Role

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### AwsKmsKeyArn

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### Notifications

*Required:* Yes

*Type:* *Notifications*

*Update requires:* No interruption

## ContentConfig

*Required:* Yes

*Type:* PipelineOutputConfig

*Update requires:* No interruption

## ThumbnailConfig

*Required:* Yes

*Type:* PipelineOutputConfig

*Update requires:* No interruption

## Notifications

### Syntax

### JSON

```
{  
  "Progressing" : string,  
  "Completed" : string,  
  "Warning" : string,  
  "Error" : string  
}
```

### YAML

```
Progressing : string  
Completed : string  
Warning : string  
Error : string
```

## Properties

### Progressing

*Required:* No

*Type:* string

*Update requires:* No interruption

### Completed

*Required:* No

*Type:* string

*Update requires:* No interruption

## Warning

*Required:* No

*Type:* string

*Update requires:* No interruption

## Error

*Required:* No

*Type:* string

*Update requires:* No interruption

## PipelineOutputConfig

### Syntax

### JSON

```
{  
  "Bucket" : string,  
  "StorageClass" : string,  
  "Permissions" : [ Permission, ... ]  
}
```

### YAML

```
Bucket : string  
StorageClass : string  
Permissions :  
  - Permission
```

## Properties

### Bucket

*Required:* No

*Type:* string

*Update requires:* No interruption

## StorageClass

*Required:* No

*Type:* string

*Update requires:* No interruption

## Permissions

*Required:* No

*Type:* List of *Permission*

*Update requires:* No interruption

## Permission

### Syntax

### JSON

```
{
  "GranteeType" : string,
  "Grantee" : string,
  "Access" : [ string, ... ]
}
```

### YAML

```
GranteeType : string
Grantee : string
Access :
  - string
```

## Properties

### GranteeType

*Required:* No

*Type:* string

*Update requires:* No interruption

### Grantee

*Required:* No

*Type:* string

*Update requires:* No interruption

## Access

*Required:* No

*Type:* List of string

*Update requires:* No interruption

## 2.2 Custom::FindAMI

The `Custom::FindAMI` resource finds an AMI by owner, name and architecture. The result can then be used with `Ref`

### 2.2.1 Syntax

#### JSON

```
{
  "Type" : "Custom::FindAMI",
  "Properties" : {
    "ServiceToken" : {"Fn::ImportValue": "cfm-reslib"},
    "Owner" : string,
    "Name" : string,
    "Architecture" : string
  }
}
```

#### YAML

```
Type: Custom::FindAMI
Properties :
  ServiceToken : !ImportValue cfm-reslib
  Owner : string
  Name : string
  Architecture : string
```

### 2.2.2 Properties

#### Owner

*Required:* No

*Type:* string

*Update requires:* Replacement

#### Name

*Required:* No

*Type:* string

*Update requires:* Replacement

## Architecture

*Required:* No

*Type:* string

*Update requires:* Replacement

## 2.2.3 Examples

### Create EC2 Instance With Latest Ubuntu

The following example searches for the latest version of Ubuntu 16.04 AMI and creates a new EC2 instance with this image.

#### JSON

```
{
  "UbuntuAMI": {
    "Type": "Custom::FindAMI",
    "Properties": {
      "ServiceToken": {
        "Fn::ImportValue": "cfm-reslib"
      },
      "Owner": "099720109477",
      "Name": "ubuntu/images/hvm-ssd/ubuntu-xenial-16.04*",
      "Architecture": "x86_64"
    }
  },
  "UbuntuInstance": {
    "Type": "AWS::EC2::Instance",
    "Properties": {
      "InstanceType": "t2.micro",
      "ImageId": {
        "Ref": "UbuntuAMI"
      }
    }
  }
}
```

#### YAML

```
UbuntuAMI:
  Properties:
    Architecture: x86_64
    Name: ubuntu/images/hvm-ssd/ubuntu-xenial-16.04*
    Owner: "099720109477"
    ServiceToken:
      Fn::ImportValue: cfm-reslib
  Type: Custom::FindAMI
```

(continues on next page)

```

UbuntuInstance:
  Properties:
    ImageId:
      Ref: UbuntuAMI
    InstanceType: t2.micro
    Type: AWS::EC2::Instance

```

## 2.3 Custom::KafkaCluster

The Custom::KafkaCluster resource creates a Kafka Cluster (MSK). Now officially available in CloudFormation with AWS::MSK::Cluster.

### 2.3.1 Syntax

#### JSON

```

{
  "Type" : "Custom::KafkaCluster",
  "Properties" : {
    "ServiceToken" : {"Fn::ImportValue": "cfm-reslib"},
    "BrokerNodeGroupInfo" : BrokerNodeGroupInfo,
    "ClusterName" : string,
    "EncryptionInfo" : EncryptionInfo,
    "EnhancedMonitoring" : string,
    "KafkaVersion" : string,
    "NumberOfBrokerNodes" : integer
  }
}

```

#### YAML

```

Type: Custom::KafkaCluster
Properties :
  ServiceToken : !ImportValue cfm-reslib
  BrokerNodeGroupInfo :
    BrokerNodeGroupInfo
  ClusterName : string
  EncryptionInfo :
    EncryptionInfo
  EnhancedMonitoring : string
  KafkaVersion : string
  NumberOfBrokerNodes : integer

```

### 2.3.2 Properties

#### BrokerNodeGroupInfo

*Required:* Yes



*Type: BrokerNodeGroupInfo*

*Update requires: Replacement*

### ClusterName

*Required: Yes*

*Type: string*

*Update requires: Replacement*

### EncryptionInfo

*Required: Yes*

*Type: EncryptionInfo*

*Update requires: Replacement*

### EnhancedMonitoring

*Required: Yes*

*Type: string*

*Update requires: Replacement*

### KafkaVersion

*Required: Yes*

*Type: string*

*Update requires: Replacement*

### NumberOfBrokerNodes

*Required: Yes*

*Type: integer*

*Update requires: Replacement*

### BrokerNodeGroupInfo

#### Syntax

#### JSON

```
{  
  "BrokerAZDistribution" : string,  
  "ClientSubnets" : [ string, ... ],  
  "InstanceType" : string,
```

```
"SecurityGroups" : [ string, ... ],  
"StorageInfo" : StorageInfo  
}
```

## YAML

```
BrokerAZDistribution : string  
ClientSubnets :  
  - string  
InstanceType : string  
SecurityGroups :  
  - string  
StorageInfo :  
  StorageInfo
```

## Properties

### BrokerAZDistribution

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### ClientSubnets

*Required:* Yes

*Type:* List of string

*Update requires:* No interruption

### InstanceType

*Required:* Yes

*Type:* string

*Update requires:* No interruption

### SecurityGroups

*Required:* Yes

*Type:* List of string

*Update requires:* No interruption

## StorageInfo

*Required:* Yes

*Type:* *StorageInfo*

*Update requires:* No interruption

## StorageInfo

### Syntax

### JSON

```
{  
  "EbsStorageInfo" : EBSStorageInfo  
}
```

### YAML

```
EbsStorageInfo :  
  EBSStorageInfo
```

## Properties

### EbsStorageInfo

*Required:* No

*Type:* *EBSStorageInfo*

*Update requires:* No interruption

### EBSSStorageInfo

### Syntax

### JSON

```
{  
  "VolumeSize" : integer  
}
```

### YAML

```
VolumeSize : integer
```

## Properties

### VolumeSize

*Required:* No

*Type:* integer

*Update requires:* No interruption

### EncryptionInfo

#### Syntax

#### JSON

```
{  
  "EncryptionAtRest" : EncryptionAtRest  
}
```

#### YAML

```
EncryptionAtRest :  
  EncryptionAtRest
```

## Properties

### EncryptionAtRest

*Required:* No

*Type:* EncryptionAtRest

*Update requires:* No interruption

### EncryptionAtRest

#### Syntax

#### JSON

```
{  
  "DataVolumeKMSKeyId" : string  
}
```

#### YAML

```
DataVolumeKMSKeyId : string
```

## Properties

### DataVolumeKMSKeyId

*Required:* Yes

*Type:* string

*Update requires:* No interruption

## 2.4 Custom::

The Custom::

Unlike AWS::CertificateManager::Certificate, this resource automatically validates the certificate for you. This only works if you request a certificate for a domain that's hosted on Route53.

### 2.4.1 Syntax

#### JSON

```
{
  "Type" : "Custom::

```

#### YAML

```
Type: Custom::

```

### 2.4.2 Properties

#### DomainName

*Required:* Yes

*Type:* string

*Update requires:* Replacement

## **SubjectAlternativeNames**

*Required:* Yes

*Type:* List of string

*Update requires:* Replacement

## 3.1 Preparing Environment

1. Get the source code

```
git clone https://github.com/CloudSnorkel/cfm-reslib.git``
```

2. Switch to the code directory

```
cd cfm-reslib
```

3. Install requirements

```
pip install -r requirements.txt
```

4. Create a virtual environment with all of the requirements

```
pipenv install
```

## 3.2 Run Tests

Unit tests can be executed using `pytest` or simply with:

```
pipenv run test
```

## 3.3 Building

The building process creates a CloudFormation template that can be deployed and expose `cfm-reslib` to be imported by other CloudFormation stacks. This template uses Lambda and its source code needs to be uploaded to a bucket. The build script will create both a ZIP file and a template and will upload it to a given S3 bucket.

```
BUCKET=my-bucket-name  
python build.py $BUCKET
```

And just like when deploying the released versions of `cfm-reslib`, you can deploy this with `aws` CLI tool.

```
BUCKET=my-bucket-name  
aws cloudformation create-stack --stack-name cfm-reslib --template-url https://s3.  
↪amazonaws.com/$BUCKET/cfm-reslib-latest.template --capabilities CAPABILITY_IAM
```

Or when updating:

```
BUCKET=my-bucket-name
aws cloudformation update-stack --stack-name cfm-reslib --template-url https://s3.
↪amazonaws.com/$BUCKET/cfm-reslib-latest.template --capabilities CAPABILITY_IAM
```

Note that you won't be able to deploy multiple stacks of cfm-reslib in the same region because the exported name has to be unique across all stacks in a certain region.

## 3.4 Adding Custom Resources

There are two methods to implement a new custom resource. You will need to create a class for your resource in both.

1. If the custom resource uses just one boto3 call to create, update and delete a resource, you can inherit from `cfmreslib.boto.BotoResourceHandler`. Simply override all of the constants with the names of the methods that need to be called and you're done. Check out `ElasticTranscoderPipeline` for an example.
2. If you need more control of the process, inherit from `cfmreslib.base.CustomResourceHandler`. You will have to implement some methods that will be called for requests coming from CloudFormation. Check out `Route53Certificate` for an example.

Once you've added your custom resource, make sure to add it to `ALL_RESOURCES` at the end of `resources.py`.

### 3.4.1 Classes

**class** `cfmreslib.base.CustomResourceHandler`

Abstract base class for all custom resources. Implement this class for new resources. Check the documentation for each method. Not all methods are always required.

**NAME** = '<not set>'

Custom resource name to be used in CloudFormation with `Custom::` prefix.

**DESCRIPTION** = '<not set>'

Resource description for automatically generated documentation.

**EXAMPLES** = []

Optional resource examples to be used in documentation. Each example needs "title", "description" and "template".

**REPLACEMENT\_REQUIRED\_ATTRIBUTES** = {}

set of properties that require a replacement on update value changes.

**exists** () → bool

Checks if the resource specified in `self.physical_id` exists.

- Must always be implemented

**Returns** *True* if the resource exists, *False* if not

**ready** () → bool

Checks if the resource specified in `self.physical_id` is ready.

- Must always be implemented
- Can just return *True* if a resource existing means it's ready

**Returns** *True* if the resource exists, *False* if not



**data** () → Optional[Dict[str, object]]

Retrieves the current data that should be returned for this resource.

- Only required if `_wait_ready()` is used

**Returns** resource data, can be *None*

**create** (args: Dict[str, object]) → None

Creates a new resource with supplied arguments.

- Must set `self.physical_id`
- Must call `_success()`, `_fail()` or `_wait_ready()`
- Must always be implemented

**Parameters** **args** – arguments as passed from CloudFormation

**can\_update** (old\_args: Dict[str, object], new\_args: Dict[str, object], diff: List[str]) → bool

Checks if a resource can safely be updated or whether a new one has to be created.

- Must always be implemented, but can just return *False* if needed.

**Parameters**

- **old\_args** – existing arguments as passed from CloudFormation for the current resource
- **new\_args** – requested arguments as passed from CloudFormation
- **diff** – a list of argument names that have changed value

**Returns** *True* if the resource can be updated or *False* if it needs to be recreated

**update** (old\_args: Dict[str, object], new\_args: Dict[str, object], diff: List[str]) → None

Updates the resource specified in `self.physical_id` based on the old and new arguments.

- Must call `_success()`, `_fail()` or `_wait_ready()`
- Only required if `can_update()` ever returns *True*.

**Parameters**

- **old\_args** – existing arguments as passed from CloudFormation for the current resource
- **new\_args** – requested arguments as passed from CloudFormation
- **diff** – a list of argument names that have changed value

**delete** () → None

Deletes the resource specified in `self.physical_id`.

- Must call `_success()`, `_fail()` or `_wait_delete()`
- Must always be implemented

**get\_iam\_actions** () → List[str]

Returns a list of required IAM permissions for all operations.

- Must always be implemented

**class** cfmreslib.boto.BotoResourceHandler

**NAME = None**

Custom resource name to be used in CloudFormation with `Custom::` prefix.

**SERVICE = None**

boto3 service name that will be used to create the client (e.g. s3, acm, ec2).

**CREATE\_METHOD = {}**

Descriptor for method used to create resource. Requires “name” with the name of the method, and “physical\_id\_query” used to query for the physical id of the newly created resource from the method return value.

**UPDATE\_METHODS = []**

Optional list of descriptor for methods used to update an existing resource. Each item requires “name” with the name of the method, and “physical\_id\_argument” with the name of the method argument that needs to have the physical id of the updated resource.

**EXISTS\_METHOD = {}**

Descriptor for method used to check if resource exists. Requires “name” with the name of the method, and “physical\_id\_argument” with the name of the method argument that needs to have the physical id of the checked resource. This method will raise the exception set in `NOT_FOUND_EXCEPTION` when the resource does not exist.

**EXIST\_READY\_QUERY = {}**

Optional descriptor of query to check against the result of `EXISTS_METHOD`. When set we will wait until the resource is ready before finishing with create and update operations. Requires “query” with the query to run over the exists method result, “expected\_value” with the expected value (e.g. `READY`), and “failed\_values” with values that denote failure and should stop the operation.

**DELETE\_METHOD = {}**

Descriptor for method used to delete an existing resource. Requires “name” with the name of the method, and “physical\_id\_argument” with the name of the method argument that needs to have the physical id of the resource.

**NOT\_FOUND\_EXCEPTION = ''**

Name of exception thrown by the exists method if the resource doesn't exist.

**EXTRA\_PERMISSIONS = []**

A list of extra permissions required by any operations for this resource. Most permissions will be deduced by method names, but sometimes extra IAM permissions are required.

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