

Alibaba Cloud Application Configuration Management

Best Practices

Issue: 20190111

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Generic conventions

Table -1: Style conventions

Style	Description	Example
	This warning information indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	 Danger: Resetting will result in the loss of user configuration data.
	This warning information indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	 Warning: Restarting will cause business interruption. About 10 minutes are required to restore business.
	This indicates warning information, supplementary instructions, and other content that the user must understand.	 Notice: Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructions, best practices, tips, and other content that is good to know for the user.	 Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus, page names, and other UI elements.	Click OK .
Courier font	It is used for commands.	Run the <code>cd /d C:/windows</code> command to enter the Windows system folder.
<i>Italics</i>	It is used for parameters and variables.	<code>bae log list --instanceid Instance_ID</code>
[] or [a b]	It indicates that it is a optional value, and only one item can be selected.	<code>ipconfig [-all -t]</code>
{ } or {a b}	It indicates that it is a required value, and only one item can be selected.	<code>swich {stand / slave}</code>

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1 Configuration change risk management

This topic explains how to mitigate the underlying production risks of configuration modification with some best practices in configuration management.

How to better manage the configurations

ACM provides different dimensions such as `dataId`, `group`, `app`, and `namespace` to help you manage all the configurations in your organization. By making proper use of these dimensions, you can reduce unintentional mistakes during the configuration management and ensure system stability.

- Recommended configuration management methods
 - `dataId`
 - Indicates a set of configuration items in the `key=value` format.
 - Name the `dataId` properly and give it a meaningful name, for example: `com.company.trade.threadpool.params`, `trade.p1.props`.
 - `group`
 - Generally uses the module name or resource name. If one application uses Nginx and SLB, the group name could be Nginx and SLB.
 - `app`
 - The application grouping, which is a simple business unit or microservice group. Generally, one application is developed and maintained by one small or medium team.
 - `namespace`
 - Isolates configurations of multiple applications, such as configurations in multiple environments.
- Classification of the configuration influences

Each configuration item may have different influences on the system. For example, an incorrect change of the log level can change the log volume in the system, and generally have no other negative effects. While changes to the connection pool, thread pool, threshold value, and host configuration often exert influences on a server level or an application service cluster level.

The consequences of incorrect changes to global routing rules, load balancing policies, network configurations, and other key configurations of the distributed system can be significant.

t. Therefore, prioritizing configurations to different impact levels (such as P0 to P4) by their influences is a good practice.

Example:

Priority	Influence	Example
P0	All	Global routing rules, network configurations, and load balancing configurations
P1	Application clusters	Threshold values of the cluster and cluster service endpoints
P2	Host-level and key configurations	Host resources configurations and thread pool size
P3	Process-level and non-key configurations	Log level
P4	Minor configurations	Version

- Minimize cumbersome configurations

If you place all the configuration items in one configuration set, everyone can make changes on the same configuration set. This not only results in more frequent configuration modifications and configuration push, but also increases the risks of conflicts and misoperations, creating barriers to better configuration authorization and control of configuration priority change process.

- Canary release is essential for key configurations

When the configuration hierarchy is defined, it is important for you to mitigate the risks of modifications of key configurations (such as P0 or P1 configurations) with publishing policies like modification review and gray scale.

How to ensure configuration security

- Do not store sensitive configuration information as plaintext in ACM

ACM Server does not provide data encryption by default on the host and in the configuration storage. Sensitive configuration information, such as password, token, and AccessKey must be encrypted before being stored in ACM.

ACM provides configuration encryption tools in APIs and in the console for you to encrypt the information before being stored in ACM.

2 MQ client traffic control design

MQ (Message Queue) is a commonly-used asynchronous RPC technology. This topic takes Alibaba Cloud MQ as an example to explain how to use ACM to implement traffic control over MQ.

Brief introduction to MQ traffic control

For MQ calling, a typical traffic control method is to control traffic at the subscription end. Two traffic control methods are supported:

- Concurrent traffic control over message subscribers
- Consumption delay traffic control over message subscribers

The basic principle for consumption delay traffic control over message subscribers is to control the consumption speed by adding a delay upon each consumption at the client end. Under this circumstance, the fastest theoretical concurrent consumption speed is:

$$\text{MaxRate} = 1 / \text{ConsumInterval} * \text{ConcurrentThreadNumber}$$

For example, if the concurrent thread number (ConcurrentThreadNumber) is 20, and the consumption delay (ConsumInterval) is 100 ms, then according to the preceding formula:

$$200 = 1 / 0.1 * 20$$

Theoretically, we can limit concurrent consumption traffic within 200.

In comparison with the concurrent thread number traffic control, consumption delay traffic control has some advantages, such as that it's easier to implement, it's less dependent on MQ client packages, and it doesn't need the client to provide the dynamic adjustment API that controls the concurrent thread number.

When using the above traffic control methods, if you want to implement dynamic global control under a distributed architecture, you can simply distribute traffic control parameters from the configuration center.

The following part elaborates how to implement dynamic global traffic control for asynchronous message consumption from the configuration center. The example involves Alibaba Cloud's MQ (Message Queue) and ACM (Application Configuration Management), and is based on Java.

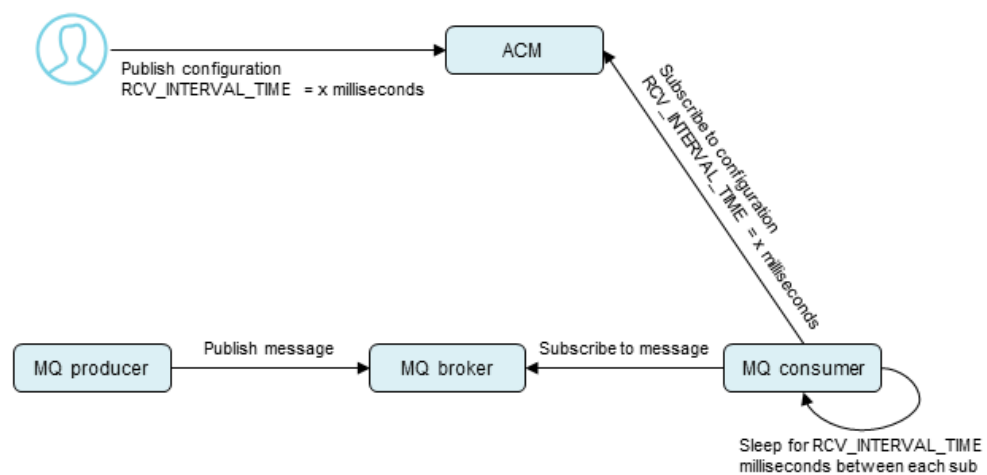


Note:

The reason why we take MQ as an example is that MQ Consumer Client SDK currently doesn't support dynamic adjustment of the existing concurrent thread number, and we can solve the problem of dynamic MQ consumption traffic control by dynamically adjusting consumption delay with ACM.

Basic principles of consumption-delay-based traffic control

As shown in the following diagram, the administrator or application publishes the consumption interval configuration (RCV_INTERVAL_TIME) through the ACM console, which is subscribed to by all MQ consumption applications. Theoretically, it takes no more than 1 second for this configuration to be published and distributed to all clients (depends on network latency).



Sample code

This section provides the example code of dynamic global traffic control for asynchronous message consumption from the configuration center. For more information about SDK, see official documentation of [MQ](#) and [ACM](#).

Create ACM configuration

Create consumption delay parameters on ACM.

Create Configuration

* Data ID:

[Show Advanced Options](#)

Description:

* Target ☒ us-west-1

Region:

Data ☐ Off

Encryption:

Format: ☒ Text ☐ JSON ☐ XML ☐ YAML ☐ HTML ☐ Properties

* Configuration Body:

```

1  # Time interval between message receiving in single thread,
2  # RCV_INTERVAL_TIME <=0 means no interval. The unit is ms.
3
4  RCV_INTERVAL_TIME = 5000

```

Set global consumption delay variable

1. Set global variable for consumption receipt delay.

```

// Initialize delay parameter for message receipt in milliseconds
static int RCV_INTERVAL_TIME = 10000;
// Initialize configuration service, and then the console will
// automatically retrieve the following parameters with the example
// code
ConfigService.init("acm.aliyun.com", /*Tenant ID*/"xxx", /*AK*/"xxx",
/*SK*/"yyy");
// Actively retrieve configuration
String content = ConfigService.getConfig("app.mq.qos", "DEFAULT_GROUP", 6000);
Properties p = new Properties();
try {
    p.load(new StringReader(content));
    RCV_INTERVAL_TIME = Integer.valueOf(p.getProperty("RCV_INTERVAL_TIME"));
} catch (IOException e) {
    e.printStackTrace();
}

```

```
}
```

2. Set ACM listener, and ensure the RCV_INTERVAL_TIME parameter is promptly updated upon modification of the configuration.

```
// Add a listener to the configuration during initialization, which
// will send a callback notice upon configuration change.
ConfigService.addListener("app.mq.qos", "DEFAULT_GROUP", new
ConfigChangeListener() {
    public void receiveConfigInfo(String configInfo) {
        Properties p = new Properties();
        try {
            p.load(new StringReader(configInfo));
            RCV_INTERVAL_TIME = Integer.valueOf(p.getProperty("
RCV_INTERVAL_TIME"));
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
});
```

Set MQ consumption delay logic

The complete example is as follows:



Note:

- In this example, the access of the RCV_INTERVAL_TIME parameter is intentionally kept unlocked, and the reason will not be elaborated here.
- Aliyun ONS Client doesn't provide a dynamic concurrent thread number. The default concurrency is 20 by default. Therefore, in this example, we will use the consumption delay parameter to dynamically adjust QoS.

```
//The following code can be directly pasted into the Main() parameter
Properties properties = new Properties();
properties.put(PropertyKeyConst.ConsumerId, "CID_consumer_group");
properties.put(PropertyKeyConst.AccessKey, "xxx");
properties.put(PropertyKeyConst.SecretKey, "yyy");
properties.setProperty(PropertyKeyConst.SendMsgTimeoutMillis, "3000");
// Set TCP access domain name (in this example, we use a public cloud
production environment).
properties.put(PropertyKeyConst.ONSAddr,
"http://onsaddr-internet.aliyun.com/rocketmq/nsaddr4client-internet
");
Consumer consumer = ONSFactory.createConsumer(properties);
consumer.subscribe(/*Topic*/"topic-name", /*Tag*/null, new MessageLis
tener()
{
    public Action consume(Message message, ConsumeContext context) {
        // MQ Subscribe QoS logical start,
        // Each consuming process will sleep for RCV_INTERVAL_TIME
seconds with 100 ms sleeping cycle.
        // Within each cycle, the thread will check RCV_INTERVAL_TIME
in case it's set to a smaller value.
        // RCV_INTERVAL_TIME <= 0 means no sleeping.
        int rcvIntervalTimeLeft = RCV_INTERVAL_TIME;
```

```
while (rcvIntervalTimeLeft > 0) {
    if (rcvIntervalTimeLeft > RCV_INTERVAL_TIME) {
        rcvIntervalTimeLeft = RCV_INTERVAL_TIME;
    }
    try {
        if (rcvIntervalTimeLeft >= 100) {
            rcvIntervalTimeLeft -= 100;
            Thread.sleep(100);
        } else {
            Thread.sleep(rcvIntervalTimeLeft);
            rcvIntervalTimeLeft = 0;
        }
    } catch (InterruptedException e) {
        e.printStackTrace();
    }
}
// MQ Subscribe interval logical ends
System.out.println("Receive: " + message);
/*
 * Put your business logic here.
 */
doSomething();
return Action.CommitMessage;
}
});
consumer.start();
```

Running result

Run the standalone Consumer for consumption. Assuming the message queue always has more messages than you can consume, the testing will be conducted in three stages, each lasting for five minutes. We can achieve the following results by using ACM configuration push service.

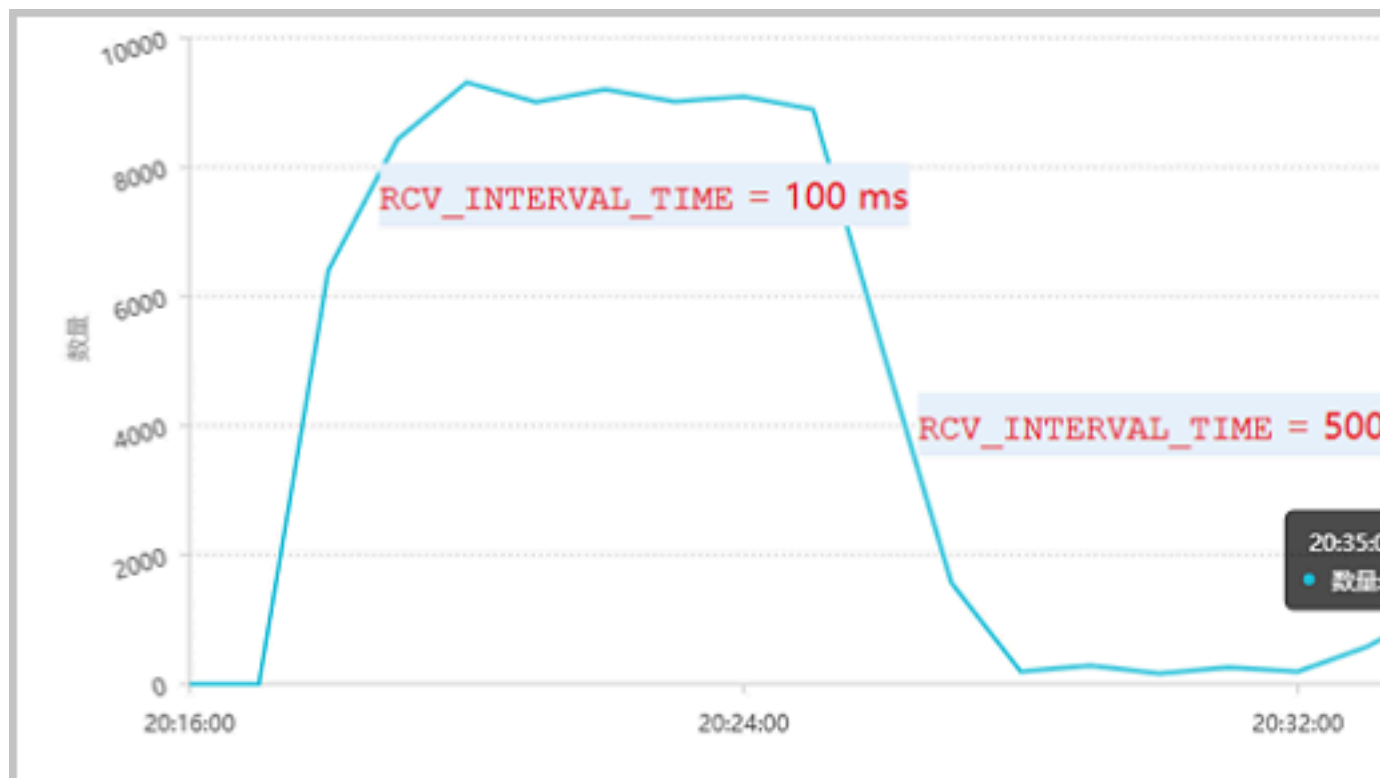
- RCV_INTERVAL_TIME = 100 ms
- RCV_INTERVAL_TIME = 5000 ms
- RCV_INTERVAL_TIME = 1000 ms

For a testing case with a standalone MQ consumption business processing time of approximately 100 ms and a standalone concurrent thread number of 20, the testing results are as follows:

- RCV_INTERVAL_TIME = 100 ms: The average consumption performance is approximately 9000 tpm
- RCV_INTERVAL_TIME = 5000 ms: The average consumption performance is restricted to approximately 200 tpm
- RCV_INTERVAL_TIME = 1000 ms: The average consumption performance rises to approximately 1100 tpm

As expected, these results indicate that the consumption is inversely proportional to tpm. Most importantly, the application is not interrupted during the whole process. The traffic control push

takes effect on distributed clusters in less than one second. The standalone performance result is as follows:



3 Build standard PaaS service configuration from the configuration center

MQ (Message Queue) is a common asynchronous RPC technology. This article explains how to conduct traffic control settings with standard configuration naming format, by taking traffic control over MQ as an example.

How configuration convention issues arise

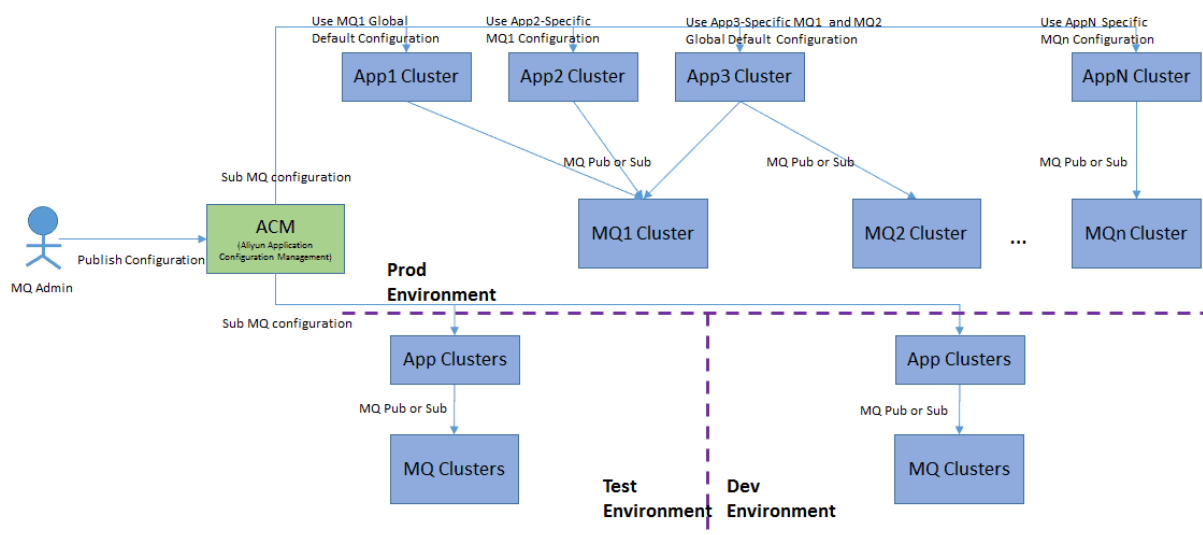
For single attribute configuration of a single application, you can directly use the following configuration file, without any configuration convention issues.

```
//Configuration directory structure
--app
  |--src
    |--config
      |--application.properties
// Configuration content
RCV_INTERVAL_TIME=20
```

However, when writing distributed rules for distributed PaaS services, the PaaS service provider (rather than the application party) often encounters many problems when designing the configuration. Some of the issues in the MQ traffic control scenario are:

- How to distinguish global configuration from local application configuration: For example, how can a PaaS service provider conduct global rule configuration and application-specific configuration when managing services provided by the platform.
- How to distinguish MQ services of different clusters: For example, how to distinguish configuration of MQ1 Cluster from MQ2 Cluster when the configuration naming is consistent?
- How to use one configuration center to isolate different environments such as Dev, Test, Staging, and Prod?

The preceding MQ traffic control scenario is illustrated as follows:



Obviously, improper configuration naming rules will affect the above configuration's ease of use.

The following is a detailed description of how to set the flow limit in a standardized configuration naming format. Before talking about the configuration naming conventions, it's necessary to understand the configuration structure organizing capability of the configuration center.

Configuration structure functions of the configuration center

In addition to centralized configuration management and subscription push, the configuration center also has the configuration structuring capability to help the administrator greatly simplify configuration management in various complex application scenarios.

1. Description of the configuration center's configuration structuring capability

- Tenant isolation: The configuration center has the capability to isolate configuration based on users and scenarios. With tenant isolation, different configurations in different tenants can have the same name but different authentication mechanisms.
- Minimum configuration set: Several configurations combine a configuration collection by configuring a central group. Use the minimum configuration collection to change and publish different configurations for unified publishing and processing. Configuration path, similar to file path or network domain name, decides the hierarchical relationship between different configuration sets.
- Key-Value form of a specific configuration: Users can set specific configuration content in the configuration center.

2. Comparison among different configuration centers with configuration structuring capabilities

To give you a more straightforward impression, we compared several configuration center products:

- **Alibaba Cloud ACM:** Alibaba Cloud Application Configuration Management, formerly known as Diamond, is the earliest configuration center product in China. Alibaba Cloud ACM currently has different open-source versions on Git. It also has an enterprise version available from Alibaba Cloud.
- **Spring Cloud Config:** Spring Cloud official configuration center tool, mainly used in the Java Spring industry.
- **ZooKeeper:** With partial configuration center capabilities, ZooKeeper is positioned in distributed coordination information management, and can only be used as a configuration center for a moderate application scale. Considering its wide application scope, we included it in the comparison.

Comparison details are as follows:

Function	ACM	Spring Cloud Config	ZooKeeper
Tenant-based isolation	Namespace and Group isolation. Different Namespaces require different AK/SK authentications, which are not required for Group.	A Git project is a tenant.	No readily available tenant isolation technology.
Minimal configuration set	The configuration set marked with DataID is the minimal configuration set. The configuration set doesn't have the concept of path, but can be queried by using wildcard characters if the configuration set is properly designed. In this way, the similar effect of a configuration path can be achieved.	A configuration file in a Git project is the minimal configuration set, and doesn't have the concept of configuration path.	Znode is the minimal configuration set, and has the concept of configuration path.

Function	ACM	Spring Cloud Config	ZooKeeper
Key-Value configuration	KV content is assembled by the user at will under DataID in any formats, such as properties, Json, XML, and so on. Validation function is provided on the management page.	Set KV by using the properties configuration file.	Set KV by setting the Value of Znode, and the content format is not restricted.

To sum up, ACM has a relatively higher degree of flexibility in both tenant isolation and minimal configuration set. The next part covers how to use ACM's Namespace, Group, DataID and other configuration functions to design a suitable configuration structure to implement QoS traffic control policies.

Best practices for distributed service configuration design based on the configuration center

1. Configuration structure

To meet functional needs of MQ configuration, we can use the following configuration methods in combination with the ACM features.

- Isolate MQ configurations for different environments with different namespaces. For example:
 - Use ProdEnv namespace for the production environment, TestEnv for the test environment, and DevENV for the development environment.
 - Different environments are automatically isolated with AK/SK, which further enhances the security.
- MQ services provided by different clusters are distinguished with Group to isolate configurations and simplify the access methods.
 - For example, for MQ clusters that specifically serve the subordinate departments and core transaction departments, as well as MQ clusters that specifically serve the subordinate departments and transaction departments, we can use Group to distinguish different global configurations. By doing this, all applications use the same company's/subsidiary's AK/SK (or similar authentication system key) in the production system, which simplifies the deployment, effectively isolates the configurations of different clusters, and reduces the configuration complexity.

```
DataID: mq.global.qos
Group: Trading
```

```
DataID: mq.global.qos
Group: ProductCategory
```

- Global configurations are stored in the form of configuration items with unified DataIDs.
 - Wherein, the configuration ID begins with `mq.global` indicates global configuration, `qos` indicates qos configuration, and default value can be used for Group.

```
DataID: mq.global.qos
Group: Default_Group
```

- Application local configuration IDs are named with the same prefix qos.*
 - Configuration IDs begin with `mq.app.[appname]` stands for the app configuration item to be reloaded, and default value can be used for Group.

```
DataID: mq.app.app1.qos
Group: Default_Group
DataID: mq.app.app2.qos
Group: Default_Group
```

3. Settings of KVs for specific configurations

For many configuration center products, such as Apollo, ACM System Manager Parameter Store, a specific configuration is the configuration center's smallest management unit. You need to set KVs of configurations one by one at a certain level. Two common practices are:

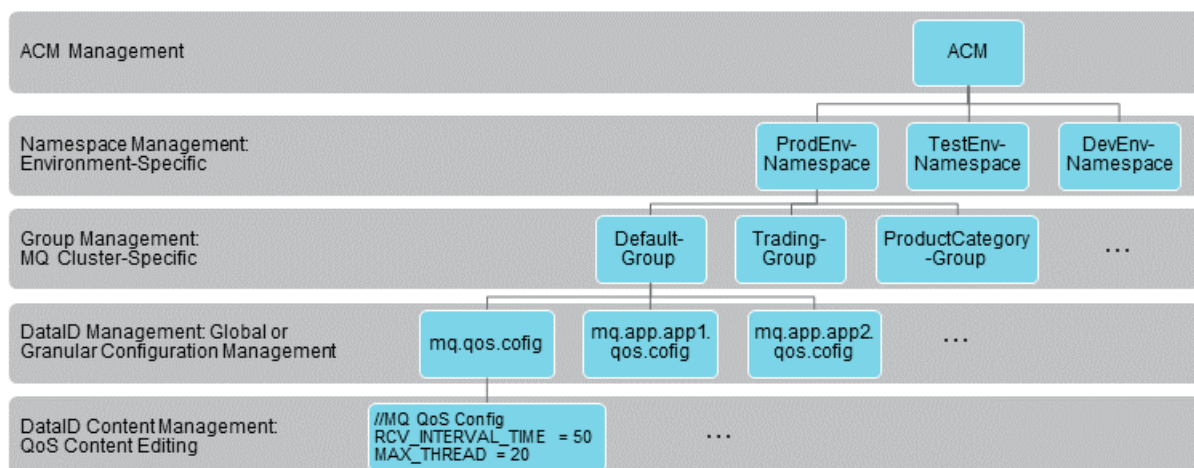
- Similar to the preceding configuration center, save each key to a unique DataID. For example:
 - Set `mq.global.qos.RCV_INTERVAL_TIME` to 50
 - Set `mq.global.qos.MAX_THREAD` to 20
- Combine common configurations into the same DataID, and save them in the same configuration file (supported formats are Properties, JSON, XML, and so on)
 - For example, setting of `mq.global.qos` is as follows:

```
//MQ traffic control QoS settings
RCV_INTERVAL_TIME = 50
MAX_THREAD = 20
```

In practice, the second method is found not only to have greater flexibility, multiple configurations are also supported for simultaneous release in one change, which reduces performance overhead, in theory, it has also achieved the atomic action effect of changing mass change.

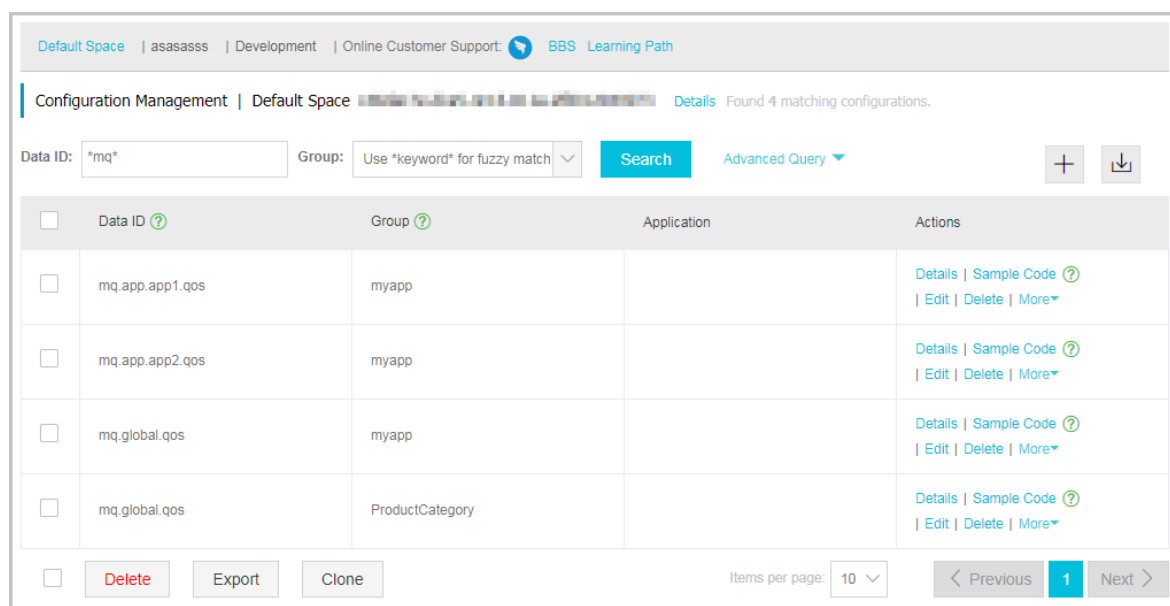
4. Configuration structure diagram

Configuration structure diagram of the preceding design is shown as follows:



5. Advantages of the scheme

- Isolating configurations for different environments with Namespaces allows MQ configuration items to use the same names in different Namespaces. Different namespaces are isolated by the administrator, program AK/SK, and permission settings, allowing you to centrally manage configuration items without affecting other environments.
- Isolating different clusters in the same environment by using Groups ensures the configuration consistency of different clusters (for example the configuration name doesn't change), simplifies code, and logically isolates different cluster configurations.
- Standard naming settings of the minimal configuration set DataIDs allow MQ clients to conveniently find both the MQ default global configurations, and their own application-specific configurations. In addition, on the **Configurations** page, administrators can add an asterisk (*) to each end of the keyword to easily filter out all MQ rules. For example:



References

- [#unique_6](#)

4 Simplify Spring Cloud micro-services environment configuration management with ACM

This article describes how to use Alibaba Cloud Configuration Center (ACM) in concert with Spring Cloud to help you simplify environment configuration management in a micro-service architecture, by testing different databases connected to the production environment and configuring different data source (including connection pool) parameters.

Environment attributes of configuration

During the continuous delivery of the system, the diversity and complexity of the system's final running environment undoubtedly make it harder for us to manage configurations. Eugen Paraschiv briefly discussed this in his post [Configuration Must Be Environment Specific](#). It is also elaborated in depth in the "Containerization, scheduling, and configuration management" section in [Configuration management challenges in modern application architectures](#).

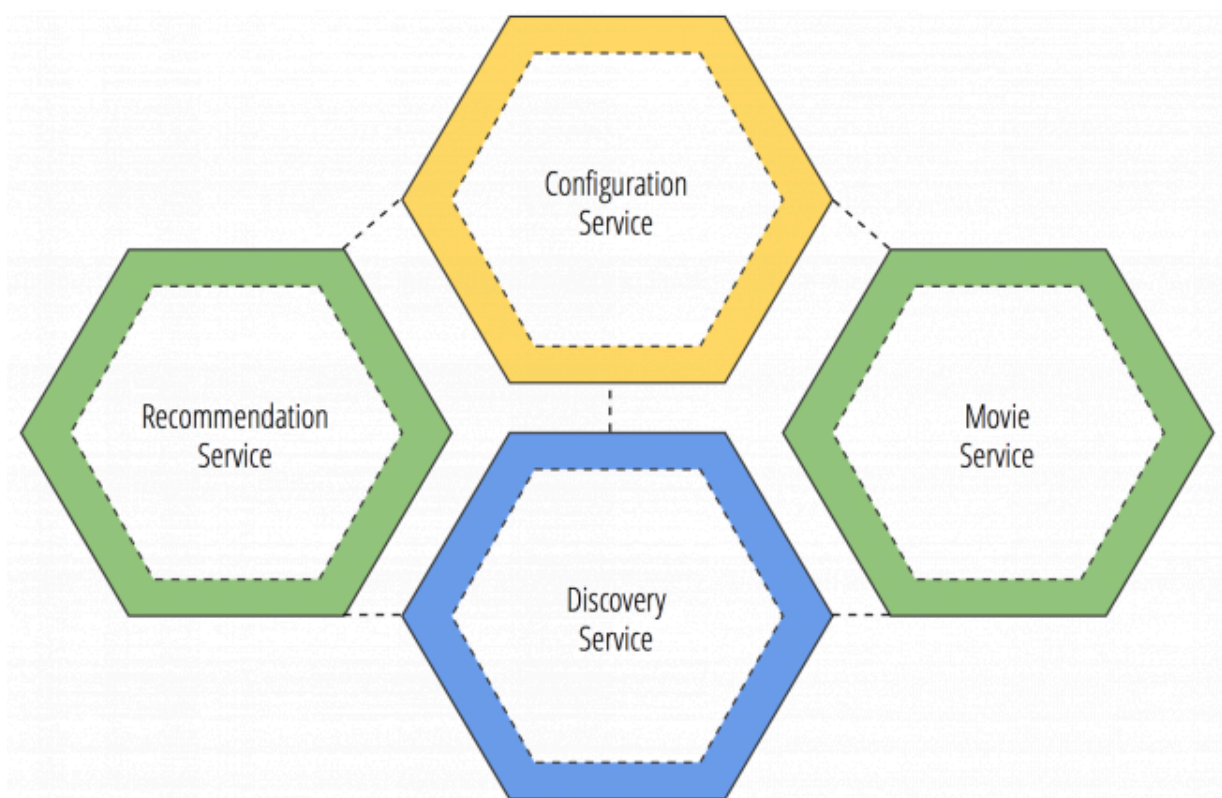
Due to the differences between the configurations of different environments, the artifacts of those environments are not consistent, and sometimes Docker can't deliver the "build once, run anywhere" experience as expected. Here are some simple examples to help you better understand.

- The logLevel should be set to DEBUG in the development environment, INFO in the staging environment, and WARNING in the production environment.
- The database runs on a 4-core 8 GB-RAM machine in the development environment, but on a 32-core 96 GB-RAM machine in the production environment.
- The maximum thread number in the execution thread pool of the daily environment should be set to 15, while this number should be larger in the production environment, which is 150 by default.
- In the online environment, application data sources in the Central Data Center need to connect to Database A, while application data sources in Shenzhen Data Center should connect to Database B due to the proximity.
- Two-way synchronization switch should be switched off only in and only in Mini Taobao environment.
- The new features should be made available only in the online Hangzhou Unit environment rather than other unit environments.

In this article we will briefly describe how to use Alibaba Cloud ACM in Spring Cloud to replace Spring Cloud Config in simplifying environment configuration management, and help you understand the ACM-based solutions to simplify micro-service environment configuration management. We will also list the pros and cons of ACM and Spring Cloud Config.

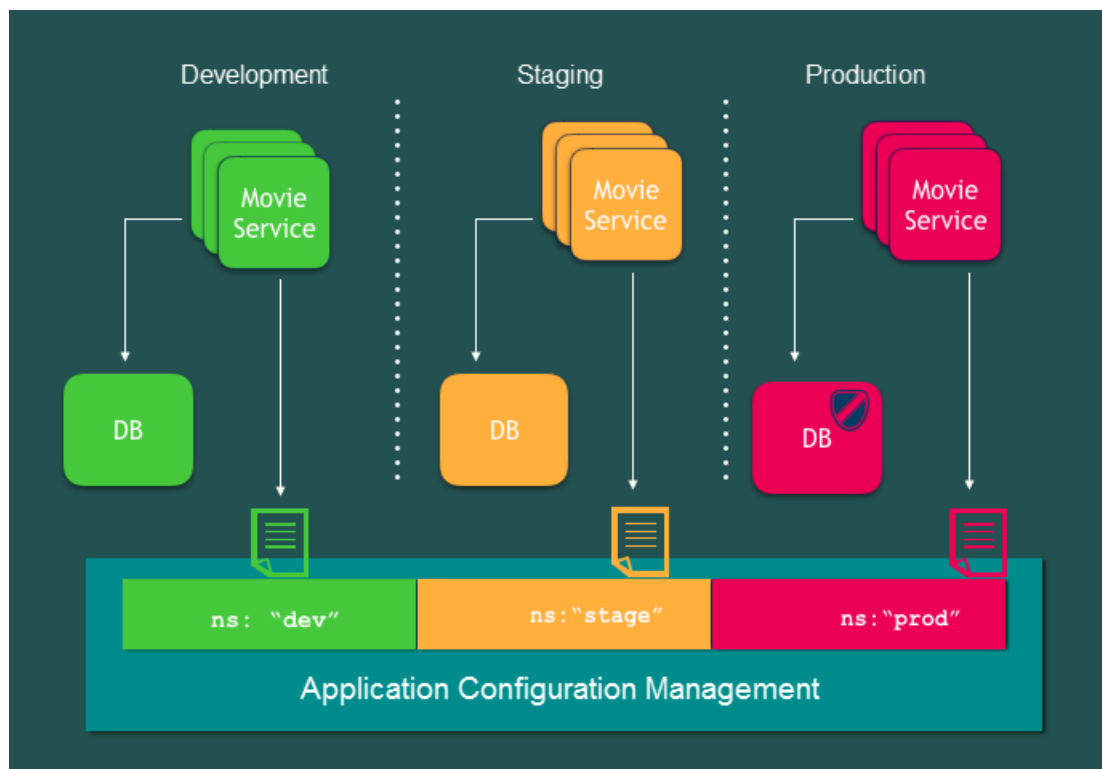
User stories

In daily engineering practice, we often picture a simple scenario with a user story to facilitate the elaboration and communication. This is an illustration used for preaching in the early stages:



Taking Movie Service as an example. Let's assume that we need to retrieve a list of all movies from the relational database MySQL(RDS). We only need the top-configuration machines for the production database, and we need to use different databases in the testing, pre-release, and production environments. Therefore, our applications need to have different data source configuration, connection pool configuration, database security configuration, and so on in different environments.

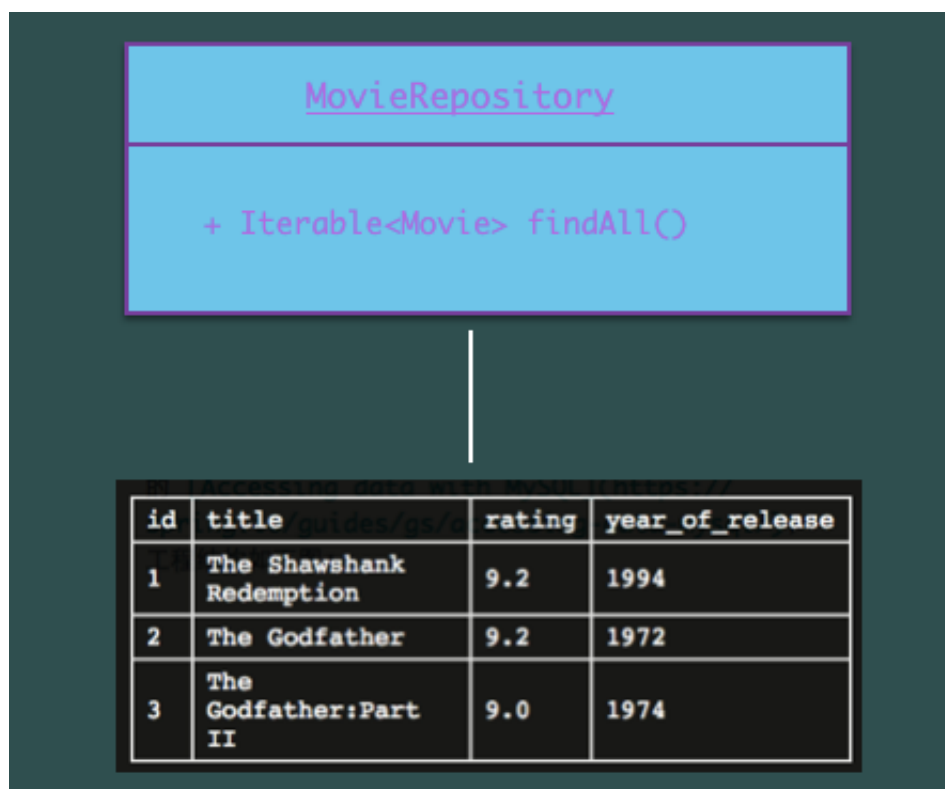
The following figure shows how to map different environments with ACM Namespace, and set different data source configurations for Movie Service in different running environments.



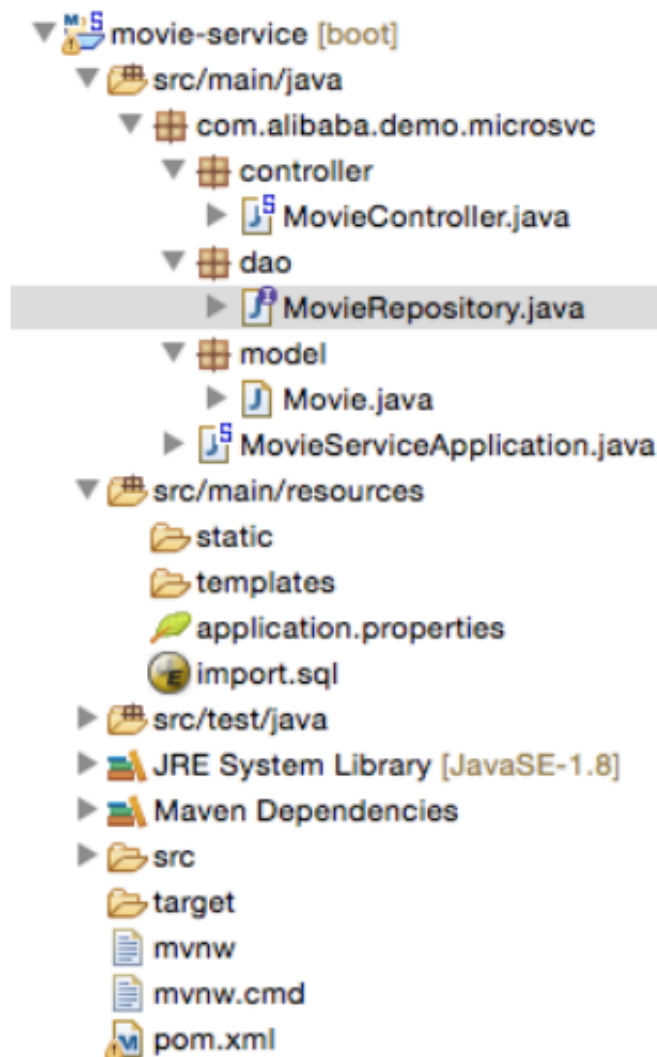
Create micro-service: movie service

- Create Spring Boot Starter micro-service: movie service

Movie service's business logic is very straightforward: to list all movies in MySQL(RDS):



Here we created a standard JPA application (similar to the sample project on Spring official website [Accessing data with MySQL](#)). The project structure is as shown in the following figure:



- Introduce JPA, MySQL, connection pool HikariCP and WEB dependencies

```

<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-web</artifactId>
</dependency>
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-data-jpa</artifactId>
</dependency>
<dependency>
  <groupId>mysql</groupId>
  <artifactId>mysql-connector-java</artifactId>
  <scope>runtime</scope>
</dependency>
<dependency>
  <groupId>com.zaxxer</groupId>
  <artifactId>HikariCP</artifactId>
  <version>2.7.6</version>

```

```
</dependency>
```

- Create MySQL(RDS) database and users

```
mysql> create database db_example; -- Create the new database
mysql> create user 'springuser'@'localhost' identified by '
ThePassword'; -- Creates the user
mysql> grant all on db_example.* to 'springuser'@'localhost'; --
Gives all the privileges to the new user on the newly created
database
```

For detailed steps, see the “Create the database” section in [Accessing data with MySQL](#).

- Create a web Controller

```
package com.alibaba.demo.microsvc.controller;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.ResponseBody;
import org.springframework.web.bind.annotation.RestController;
import com.alibaba.demo.microsvc.dao.MovieRepository;
import com.alibaba.demo.microsvc.model.Movie;
@RestController
public class MovieController {
    @Autowired
    MovieRepository movieRepository;
    @RequestMapping("/list-movies")
    public @ResponseBody Iterable<Movie> listMovies() {
        return movieRepository.findAll();
    }
}
```

Use Namespace in ACM to create isolated environment configuration



Note:

To use ACM on Alibaba Cloud, you must enable this service. For instructions, see [#unique_8](#).

Once you activate the service and log on, you can create namespaces and configurations in the [ACM console](#).

- Create three environments in ACM: dev, stage, and prod

Namespaces

Public Network Environment

China East 1 (Hangzhou)

China North 1 (Qingdao)

China North 2 (Beijing)

China South 1 (Shenzhen)

China East 2 (Shanghai)

Asia Pacific SE 1 (Singapore)

Hong Kong(China)

Create Namespace

Namespaces	Namespace ID	Number of Configurations / Quota	Actions
Default Space	c46...ca5-4c1...2f8...73	3 / 200	Details Delete Edit
dev	83b...065-43f1-997...953e7fb	0 / 200	Details Delete Edit
stage	d5a...769-446...7aa...7f	0 / 200	Details Delete Edit
prod	020...7e2-413...36f...9	0 / 200	Details Delete Edit

Contact Us

- Create configuration respectively for dev, stage, and prod environments

Create Configuration

* Data ID:

com.alibaba.cloud.acm:movie-service.properties

[Advanced Options](#)

Description:

* Target

☒ public

Region:

Data

☐ ☒

[?](#)

Encryption

Format:

☒ TEXT
 ☐ JSON
 ☐ XML
 ☐ YAML
 ☐ HTML
 ☐ properties

* Configuration Content

[?](#)

```

6 # MySQL settings
7 spring.datasource.platform=mysql
8 spring.datasource.url=jdbc:mysql://localhost:3306/db_example?useSSL=false
9 spring.datasource.username=springuser
10 spring.datasource.password=ThePassword
11 spring.datasource.driver-class-name=com.mysql.jdbc.Driver
12
13 # HikariCP connection pool settings
14 spring.datasource.hikari.connection-timeout=60000
15 spring.datasource.hikari.maximum-pool-size=5
16 spring.datasource.hikari.minimum-idle=2
17 spring.datasource.hikari.idle-timeout=30000
18
19 # Keep the connection alive if idle for a long time (needed in production)
20 spring.datasource.hikari.connection-test-query=SELECT 1
21

```

In the previous step, we set different values for the same configuration item in different environments. Taking the `spring.datasource.url` configuration item as an example, we connect different databases to different environments by setting different URLs, and only enables SSL (`useSSL=true`) in the production environment.

```

dev:
    spring.datasource.url=jdbc:mysql://localhost:3306/db_example?
    useSSL=false
prod:
    spring.datasource.url=jdbc:mysql://30.5.101.169:3306/db_example?
    useSSL=true

```

In addition, we have set a larger database connection pool and a smaller timeout value for the prod environment.

```

dev:
    spring.datasource.hikari.connection-timeout=60000
    spring.datasource.hikari.maximum-pool-size=10
prod:

```

```
spring.datasource.hikari.connection-timeout=15000  
spring.datasource.hikari.maximum-pool-size=200
```

To make it easier to debug, we only enable SQL Trace in the dev environment.

```
dev:  
    spring.jpa.show-sql=true
```

Integrate Movie Service with ACM

Next, we integrate Movie Service with ACM to obtain the corresponding environment configuration from ACM. For instructions on how to use ACM in Spring Cloud, see [Spring Cloud ACM](#).

- Introduce ACM dependencies to Movie Service

```
<dependency>  
    <groupId>com.alibaba.cloud</groupId>  
    <artifactId>spring-cloud-starter-acm</artifactId>  
    <version>1.0.1</version>  
</dependency>
```

- Configure ACM connection information, namespace, accessKey, secretKey, and other information in application.properties

```
spring.application.name=movie-service  
spring.application.group=com.alibaba.cloud.acm  
alibaba.acm.endpoint=acm.aliyun.com  
alibaba.acm.namespace=<your_namespace_id>  
alibaba.acm.accessKey=<your_ak>  
alibaba.acm.secretKey=<your_sk>
```



Note:

You can find your namespace_id, accessKey, secretKey, and other information in “namespace details” or “code example of configuration”.

Namespace Details

Region ID: **us-west-1**

Namespace Name: **Default Space(EDAS)**

Namespace ID: **[REDACTED]**

End Point: **addr-us-west-1-internal.acm.aliyun.com**

Automatically Issue AccessKey and SecretKey (Recommended for production environment): [Details](#)

AccessKey (Recommended for development environment): [Obtain](#)

SecretKey (Recommended for development environment): [Obtain](#)

ACM's Dedicated AccessKey (To be deprecated soon and not recommended): **[REDACTED]**

ACM's Dedicated SecretKey (To be deprecated soon and not recommended): **[REDACTED]**

Note: ACM's dedicated AK/SK is mainly used for compatibility requirements. We recommend that you always use Alibaba Cloud AK/SK.[Details](#)

Ok

Access Movie Service from your browser

Request

Method: GET Request URL: **http://localhost:8080/list-movies** **SEND**

Parameters

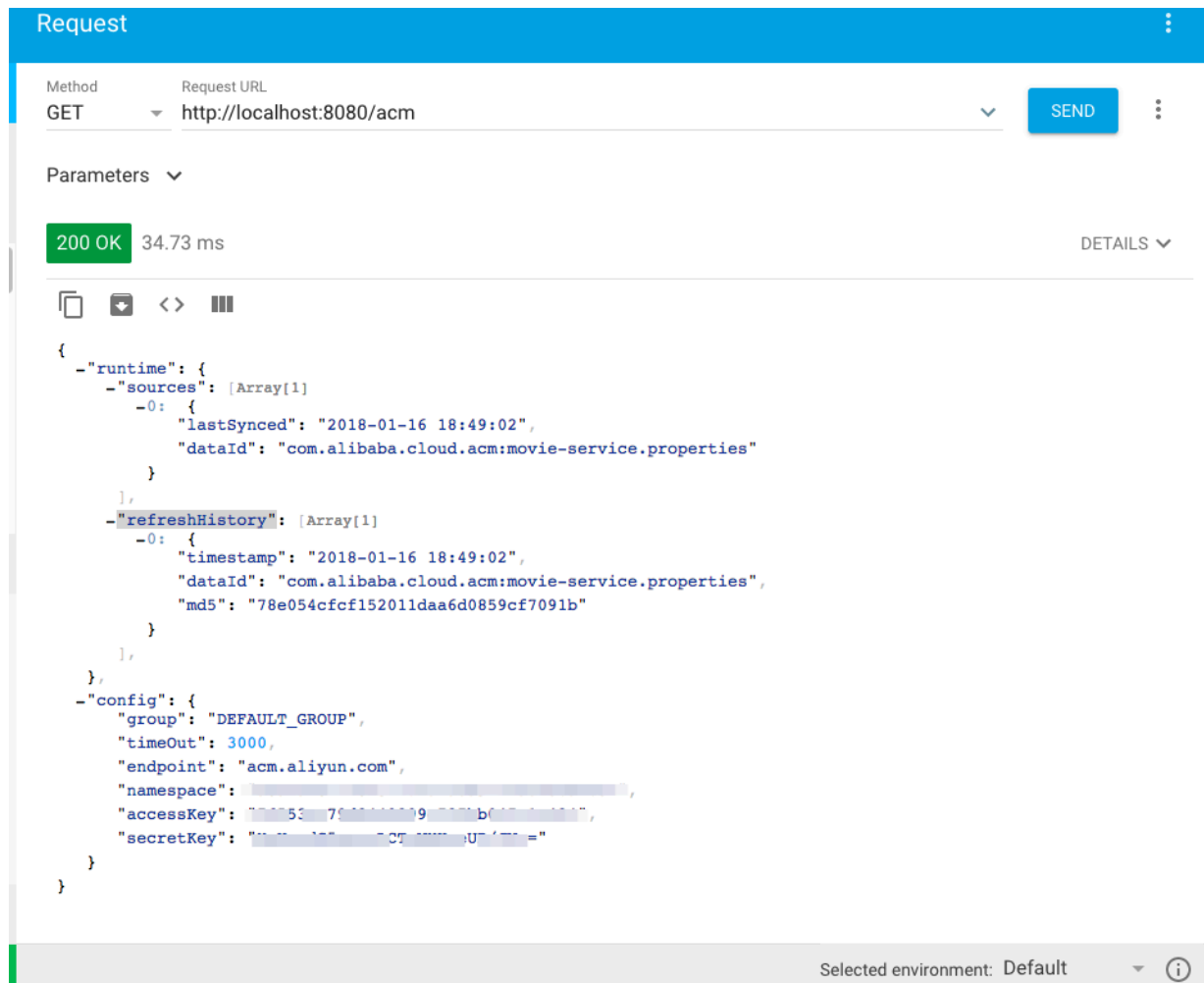
200 OK 551.52 ms **DETAILS**

```
[Array[3]
  -0: {
    "id": 1,
    "title": "The Shawshank Redemption",
    "rating": 9,
    "yearOfRelease": "1994"
  },
  -1: {
    "id": 2,
    "title": "The Godfather",
    "rating": 9,
    "yearOfRelease": "1972"
  },
  -2: {
    "id": 3,
    "title": "The Godfather:Part II",
    "rating": 9,
    "yearOfRelease": "1974"
  }
],
```

Selected environment: **Default**

View pushing and refreshing history of ACM configurations

If spring-boot-starter-actuator dependency has been introduced to Movie Service, and `management.security.enabled=false` is set in `application.properties`, you can view the application's configuration consumption and refreshing history from endpoint `http://<ip:port>>/acm`.



You can also view the configuration's push track, configuration version, and other information from the [ACM console](#). For instructions, see ACM documentation.

Brief comparison between ACM and Spring Cloud Config

What's compared	Spring cloud config	Alibaba Cloud ACM
Spring Cloud seamless integration	Supported	Supported
Source code distribution method	Open source	To be open-sourced soon
Billing method	Free of charge	Free of charge

What's compared	Spring cloud config	Alibaba Cloud ACM
Large scale (over 100,000 configuration items) production verification	No publicly available cases of large scale production verification	Verified with Alibaba data center's production environment featuring millions of configuration items, with over 100 million configuration changes pushed every day, and the Double 11 shopping spree and many other demanding scenarios
Configuration management UI console	No console, dependent on IDE , GIT, and other third-party tools	Professional configuration management UI console
Multi-language support	Mainly supports Java ecosystem, without any native clients for other languages	Supports Node.js, C++ and other native multi-language clients
Multi-data center, Local active-active disaster recovery, multi-zone, and other architectures	Dependent on support of GIT, ZooKeeper, and so on, without an explicit official statement	Supported
Configuration change push	Dependent on RabbitMQ/ Kafka	Built-in push mechanism, without external dependency
Timeliness of large scale configuration push	Dependent on SLA and Webhooks such as GIT Webhooks and so on. Enterprise level large scale production capability is yet to be verified.	Industrial level production in milliseconds
Audit capability for configuration changes	Weak	Built-in audit mechanism (with an audit capability conforming to National Graded Protection of Information Security - Level 3)
Push track	Unable to view real-time monitoring that is configured to push to the client	Provides configuration change push tracks for monitoring configuration change push status

What's compared	Spring cloud config	Alibaba Cloud ACM
Data isolation	Supports application, profile , label, git repo, and other isolation policies	In addition to isolation policies provided by Spring Cloud, ACM supports multi-tenant, app, data_id, group and other multi-level isolation policies
Production and O&M cost	High (must have sufficient GIT /RabbitMQ knowledge and talent reserve)	Low (no third-party component dependencies)
High availability	N/A (customers must assume all risks)	99.99% (Alibaba Cloud assumes the risks)
Secure communication	Supports SSL	Supports SSL
Disaster tolerance	Two levels (storage, server cache)	Three levels (plus local disaster recovery of the client)

Download project

Sample project used in this article can be downloaded from movie-service.tar.gz.

This project has passed the test in the following environments:

- Spring Cloud Edgware.RELEASE
- Spring Boot 1.5.9. RELEASE
- HikariCP 2.7.6
- MySQL 5.7.11
- ACM 4.2.0
- ACM Spring Cloud SDK 1.0.1



Note:

Before running this project locally, make sure to set your own ACM accessKey and secretKey in application.properties.