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Key Management Service

Quick Start

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Document conventions

Style	Description	Example
Danger	A danger notice 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.
Warning	A warning notice 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 restart an instance.
Notice	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	**Notice:** If the weight is set to 0, the server no longer receives new requests.
Note	A note indicates supplemental instructions, best practices, tips, and other content.	**Note:** You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click **Settings**> **Network**> **Set network type**.
Bold	Bold formatting is used for buttons , menus, page names, and other UI elements.	Click **OK**.
`Courier font`	Courier font is used for commands	Run the `cd /d C:/window` command to enter the Windows system folder.
Italic	Italic formatting is used for parameters and variables.	`bae log list --instanceid` *Instance_ID*
[] or [a|b]	This format is used for an optional value, where only one item can be selected.	`ipconfig [-all|-t]`
{} or {a|b}	This format is used for a required value, where only one item can be selected.	`switch {active|stand}`

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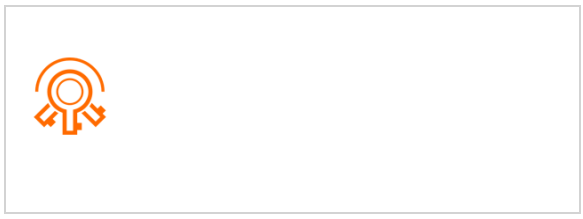
1.Overview

You can use Key Management Service (KMS) to encrypt and protect sensitive data assets. This topic describes a series of operations that help you get started with KMS.

Activate KMS

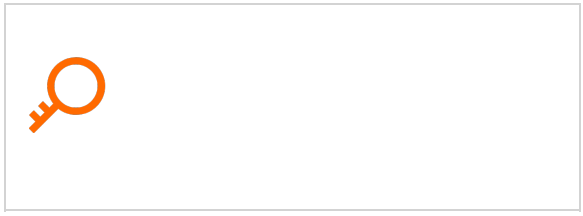


Activate KMS

You can use KMS only after it is activated.

- Activate KMS

Manage and use keys



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2.Activate KMS

Before you can use Key Management Service (KMS), you must activate it. This topic describes how to activate KMS.

Prerequisites

An Alibaba Cloud account is created, and real-name verification is completed for the account. For more information, see Account registration and Real-name verification.

Activate KMS in the KMS console

1. Log on to the KMS activation page.
2. Read and select **Key Management Service Terms of Service**.
3. Click **Activate Now**.
   After KMS is activated, you are charged based on your actual resource usage. For more information, see Billing.

Activate KMS by using the API

You can call the OpenKmsService operation to activate KMS.

> **Note** You can call the DescribeAccountKmsStatus operation to query the KMS status of the Alibaba cloud account.

3.Manage and use keys

3.1. Create a CMK

This topic describes how to use Key Management Service (KMS) to create customer master keys (CMKs). CMKs are used to encrypt data.

Procedure

1. Log on to the KMS console.
2. In the top navigation bar, select the region where you want to create a CMK.
3. In the left-side navigation pane, click **Keys**.
4. Click **Create Key**.
5. In the **Create Key** dialog box, configure parameters as prompted.

Parameter	Description
Key Spec	Valid values: ○ Symmetric keys: ■ Aliyun_AES_256 ■ Aliyun_SM4 ○ Asymmetric keys: ■ RSA_2048 ■ EC_P256 ■ EC_P256K ■ EC_SM2 **Note** Aliyun_SM4 and EC_SM2 types are used only in mainland China regions where Managed HSM is available.
Purpose	○ Encrypt/Decrypt: The purpose of the CMK is to encrypt or decrypt data. ○ Sign/Verify: The purpose of the CMK is to generate or verify a digital signature.
Alias Name	The optional identifier of the CMK. For more information, see Use aliases.
Protection Level	○ Software: Use a software module to protect the CMK. ○ Hsm: Host the CMK in a hardware security module (HSM). Managed HSM uses the HSM as dedicated hardware to safeguard the CMK.
Description	The description of the CMK.

Parameter	Description
Rotation Period	The automatic rotation period. Valid values: ○ 30 Days ○ 90 Days ○ 180 Days ○ 365 Days ○ Disable: Rotation is disabled. ○ Customize: Customize a period that ranges from 7 days to 730 days. **Note** You can specify this parameter only if Key Spec is set to Aliyun_AES_256 or Aliyun_SM4.

6. Click **Advanced** and specify **Key Material Source**.
   - **Alibaba Cloud KMS**: Use KMS to generate key material.
   - **External**: Import key material from an external source. For more information about how to import key material, see Import key material.

     Note If you select External, you must also select **I understand the implications of using the external key materials key**.
7. Click **OK**.After the CMK is created, you can view its detailed information, such as the CMK ID, status, and protection level on the Keys page.

3.2. Encrypt resources of cloud services

Key Management Service (KMS) is integrated with cloud services such as Elastic Compute Service (ECS), Object Storage Service (OSS), Container Service for Kubernetes, and ApsaraDB for RDS. You can use KMS to encrypt the resources of these cloud services to ensure data security on the cloud.

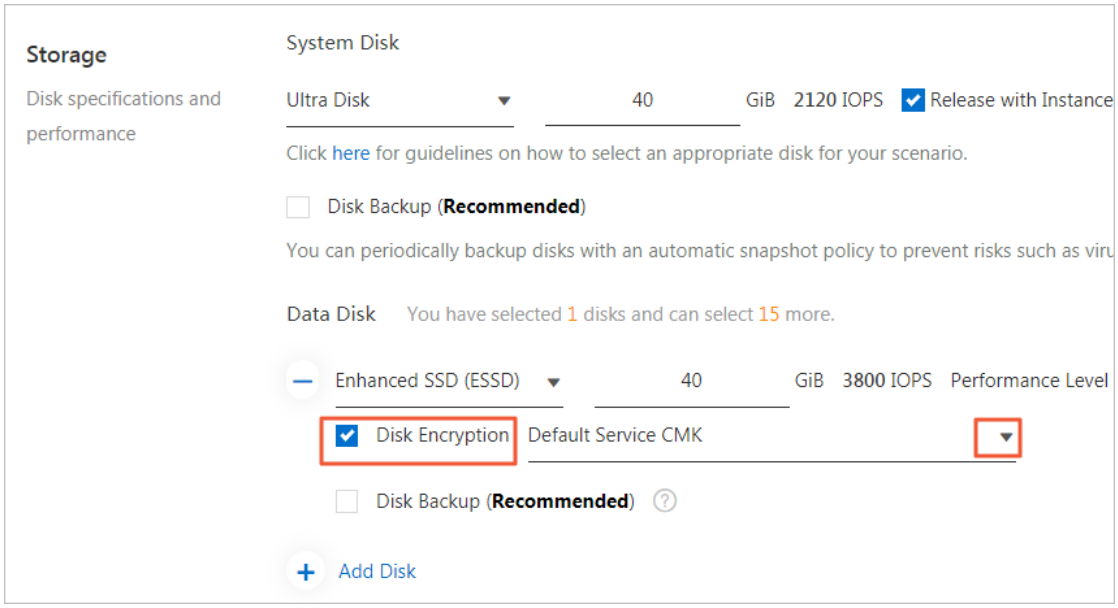
Encrypt ECS resources

You can use KMS to encrypt ECS resources, such as system disks, data disks, and relevant images and snapshots.

The following example describes how to encrypt data disks when you create an ECS instance. For information about how to encrypt other ECS resources, see Use KMS to protect ECS instance workloads with one click.

1. Log on to the ECS console.
2. In the left-side navigation pane, choose **Instances & Images > Instances**.
3. In the upper-right corner of the **Instances** page, click **Create Instance**.
4. In the **Storage** section of the **Basic Configurations** step, perform the following steps to encrypt a data disk:
   i. Click **Add Disk**.
   ii. Configure specifications for the disk.

iii. Select **Disk Encryption** and select a key from the drop-down list.You can select **Default Service CMK** to use the default service CMK or select a CMK you created in KMS for encryption.



5. Specify other parameters as prompted. For more information, see Create an instance by using the provided wizard.

Encrypt OSS resources

After files are uploaded to an OSS bucket, KMS automatically encrypts the files.

- **Enable encryption during bucket creation**
  i. Log on to the OSS console.
  ii. In the upper-right corner of the **Overview** page, click **Create Bucket**.
  iii. In the **Create Bucket** pane, set **Encryption Method** to **KMS**.
  iv. Specify **Encryption Algorithm**.
  v. Specify **CMK**.
  - **alias/acs/oss**: OSS uses the service CMK in KMS to generate different keys to encrypt different objects. The objects are automatically decrypted when they are downloaded.
  - **CMK ID**: OSS uses a specific CMK to generate different keys to encrypt different objects. The objects are automatically decrypted when they are downloaded by the users who have decryption permissions. Before you specify a CMK ID, you must create a common key or an external key in the same region as the bucket in the KMS console. For more information, see Create a CMK.

  > **Note** For more information about settings of other parameters, see Create buckets.

- **Encrypt data in an existing bucket**
  i. Log on to the OSS console.
  ii. In the left-side navigation pane, click **Buckets**.
  iii. Click the name of your bucket.
  iv. In the left-side navigation pane, choose **Basic Settings > Server-side Encryption**.

v. Click **Configure**.

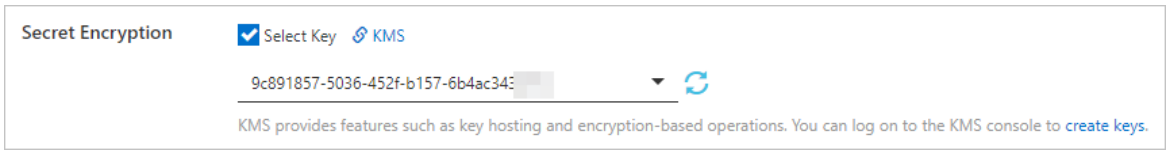
- Set **Encryption Method** to **KMS**.
- Specify **Encryption Algorithm**.
- Specify **CMK**.
  - **alias/acs/oss**: OSS uses the service CMK in KMS to generate different keys to encrypt different objects. The objects are automatically decrypted when they are downloaded.
  - **CMK ID**: OSS uses a specific CMK to generate different keys to encrypt different objects. The objects are automatically decrypted when they are downloaded by the users who have decryption permissions. Before you specify a CMK ID, you must create a common key or an external key in the same region as the bucket in the KMS console. For more information, see Create a CMK.
- Click **Save**.

> **Notice** The configurations of the default encryption method for a bucket do not affect the encryption configurations of the existing files in the bucket.

Encrypt Container Service for Kubernetes resources

In clusters of Container Service for Kubernetes Pro, you can use a CMK that you created in KMS to encrypt Kubernetes secrets.

1. Log on to the ACK console.
2. In the left-side navigation pane, choose **Clusters > Clusters**.
3. In the upper-right corner of the Clusters page, click **Create Kubernetes Cluster**. In the **Select Cluster Template** dialog box, find **Professional Managed Cluster (Preview)** and click **Create**.
4. On the **ACK managed edition** tab, find **Secret Encryption**, select **Select Key**, and then select a specific CMK ID from the drop-down list.

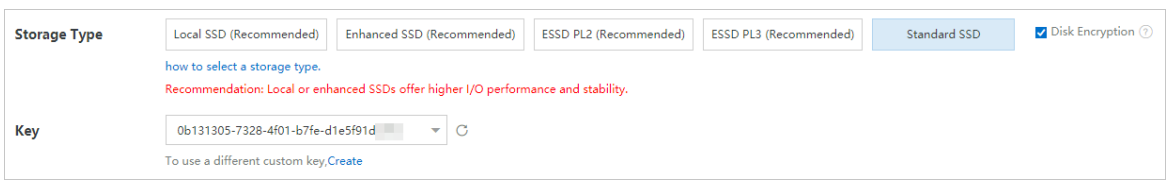


5. Specify other parameters as prompted. For more information, see Create an ACK Pro cluster.

Encrypt ApsaraDB for RDS resources

ApsaraDB for RDS supports disk encryption and Transparent Data Encryption (TDE). Disk encryption for ApsaraDB RDS for MySQL is used as an example to describe how to encrypt data.

1. Go to the instance creation page of ApsaraDB for RDS.
2. In the **Storage Type** field, select **Standard SSD** or **Enhanced SSD (Recommended)** and then select **Disk Encryption**.
3. Select a CMK ID from the **Key** drop-down list.



4. Specify other parameters as prompted. For more information, see Create an ApsaraDB RDS for MySQL instance.

Encrypt resources of other cloud services

For information about how to encrypt resources of other cloud services, see Alibaba Cloud services that can be integrated with KMS.

3.3. Sample code for data encryption

After you create a CMK of the AES or SM4 type, you can use code of KMS SDK for Java to encrypt data. This topic provides sample code of KMS SDK for Java to describe how to encrypt data.

Preparations

1. Obtain the dependency declaration of KMS SDK for Java. For information about the required SDK version, see SDK overview. Example:

```
<dependency>
  <groupId>com.aliyun</groupId>
  <artifactId>aliyun-java-sdk-core</artifactId>
  <version>4.5.2</version>
</dependency>
<dependency>
  <groupId>com.aliyun</groupId>
  <artifactId>aliyun-java-sdk-kms</artifactId>
  <version>2.11.1</version>
</dependency>
```

2. Obtain the endpoints to access KMS based on the region where you use KMS. For more information, see Endpoints.

> **Note** In the example, you can specify the region ID to access the public endpoint of KMS. For more information about how to access the VPC endpoint of KMS, see Code samples of SDK for Java.

Encrypt data

Use the following code of KMS SDK for Java to encrypt data:

```
import com.aliyuncs.DefaultAcsClient;
import com.aliyuncs.IAcsClient;
import com.aliyuncs.exceptions.ClientException;
import com.aliyuncs.exceptions.ServerException;
import com.aliyuncs.profile.DefaultProfile;
import com.google.gson.Gson;
import java.util.*;
import com.aliyuncs.kms.model.v20160120.*;
public class Encrypt {
  public static void main(String[] args) {
    /*
     * 1. Specify the region where your CMK resides.
     * 2. Specify the AccessKey ID and AccessKey secret that are required to access KMS.
     */
    DefaultProfile profile = DefaultProfile.getProfile("cn-hangzhou", "<accessKeyId>", "<accessSecret>");
    IAcsClient client = new DefaultAcsClient(profile);
    EncryptRequest request = new EncryptRequest();
    // Specify the CMK alias or CMK ID that is used to encrypt "Hello world".
    request.setKeyId("alias/Apollo/SalaryEncryptionKey");
    request.setPlaintext("Hello world");
    try {
      EncryptResponse response = client.getAcsResponse(request);
      System.out.println(new Gson().toJson(response));
    } catch (ServerException e) {
      e.printStackTrace();
    } catch (ClientException e) {
      System.out.println("ErrCode:" + e.getErrCode());
      System.out.println("ErrMsg:" + e.getErrMsg());
      System.out.println("RequestId:" + e.getRequestId());
    }
  }
}
```

For more sample code, see KMS code development sample library.

4.Manage and use secrets

4.1. Create a secret

This topic describes how to use Key Management Service (KMS) to create a secret. KMS allows you to manage secrets in a centralized manner.

Procedure

1. Log on to the KMS console.
2. In the top navigation bar, select the region where you want to create a secret.
3. In the left-side navigation pane, click **Secrets**.
4. Click **Create Secret**.
5. In the **Create Secret** dialog box, configure parameters as prompted.

Parameter	Description
Secret Name	The name of the secret.
Secret Value	The value of the secret. Secrets Manager encrypts the secret value and stores it in the initial version.
Secret InitVersion	The number of the initial version. Version numbers are unique in each secret object.
Encryption Master Key	The customer master key (CMK) that is used for encryption. You can select a system-managed key or a custom key as the encryption CMK. The system-managed key is automatically distributed by Secrets Manager. The custom key is the CMK that you created in KMS.
Secret Description	The description of the secret.

6. Click **OK**.After the secret is created, you can view detailed information such as the secret name, encryption key, and creation time.

4.2. Sample code for Secrets Manager

This topic provides sample code of KMS SDK for Java to describe how to use a secret created in Secrets Manager. This topic uses the Java SDK as an example to describe how to use a secret.

Preparations

1. Obtain the dependency declaration of KMS SDK for Java. For information about the required SDK version, see SDK overview. Example:

```
<dependency>
  <groupId>com.aliyun</groupId>
  <artifactId>aliyun-java-sdk-core</artifactId>
  <version>4.5.2</version>
</dependency>
<dependency>
  <groupId>com.aliyun</groupId>
  <artifactId>aliyun-java-sdk-kms</artifactId>
  <version>2.12.0</version>
</dependency>
```

2. Obtain the endpoints to access KMS based on the region where you use KMS. For more information, see Endpoints.

> **Note** In the example, you can specify the region ID to access the public endpoint of KMS. For more information about how to access the VPC endpoint of KMS, see Code samples of SDK for Java.

Use secrets

You can create a secret to store protected data. For more information, see Overview.

```
package com.aliyun.kms.secretmanager.samples;
import com.aliyuncs.DefaultAcsClient;
import com.aliyuncs.exceptions.ClientException;
import com.aliyuncs.kms.model.v20160120.*;
import com.aliyuncs.profile.DefaultProfile;
import com.aliyuncs.profile.IClientProfile;
import com.aliyuncs.http.HttpClientConfig;
public class FastUsage {
    /*
     * Before you access Secrets Manager, assign a permission policy to your access account in the RAM cons
ole. For example, assign the AliyunKMSFullAccess policy, which grants management permissions on KMS, to
the account. You can also assign system policies or custom policies that grant required permissions on API o
perations.
     **/
  public static DefaultAcsClient getkmsClient() {
    /*
     * 1. Specify the region where Secrets Manager resides.
     * 2. Specify the AccessKey ID and AccessKey secret that are required to access KMS.
     **/
    IClientProfile profile = DefaultProfile.getProfile("cn-hangzhou","$your_access_key","$your_access_secr
et");
```

```
        HttpClientConfig clientConfig = HttpClientConfig.getDefault();
        profile.setHttpClientConfig(clientConfig);
        return new DefaultAcsClient(profile);
    }
    public static void CreateSecretSample(String secret_name,String secret_data,String version_id) throws Cl
ientException {
        DefaultAcsClient acsClient = getkmsClient();
        CreateSecretRequest req = new CreateSecretRequest();
        req.setSecretName(secret_name);
        req.setSecretData(secret_data);
        req.setVersionId(version_id);
        req.setSecretDataType("text");
        req.setDescription("my app passwd");
        req.setEncryptionKeyId("");        //You can use a symmetric CMK or leave this parameter empty. When thi
s parameter is left empty, you can use the managed key that is created in Secrets Manager.
        req.setTags("");
        CreateSecretResponse rsp = acsClient.getAcsResponse(req);
        System.out.printf("CreateSecret arn: %s; secret_name: %s; versionid: %s; requestid: %s \n",rsp.getArn()
,rsp.getSecretName(),rsp.getVersionId(),rsp.getRequestId());
    }
    public static void GetSecretValueSample(String secret_name,String version_stage) throws ClientExceptio
n {
        DefaultAcsClient acsClient = getkmsClient();
        GetSecretValueRequest req = new GetSecretValueRequest();
        req.setSecretName(secret_name);
        req.setVersionStage(version_stage);
        GetSecretValueResponse  rsp = acsClient.getAcsResponse(req);
        System.out.printf("GetSecretValue  data: %s \n",rsp.getSecretData());
    }
    public static void PutSecretValueSample(String secret_name,String secret_data,String version_id,String v
ersion_stages) throws ClientException {
        DefaultAcsClient acsClient = getkmsClient();
        PutSecretValueRequest req = new PutSecretValueRequest();
        req.setSecretName(secret_name);
        req.setSecretData(secret_data);
        req.setSecretDataType("text");
        req.setVersionId(version_id);
        req.setVersionStages(version_stages);  //The secret value of the version that is marked with a specified s
tage label in the JSON format.
        PutSecretValueResponse rsp = acsClient.getAcsResponse(req);
        System.out.printf("PutSecretValue versionid: %s; now stages: %s \n",rsp.getVersionId(),rsp.getVersionS
```

```
tages());
  }
  public static void DeleteScretSample() throws ClientException {
    DefaultAcsClient acsClient = getkmsClient();
    DeleteSecretRequest req = new DeleteSecretRequest();
    req.setSecretName("myapp_secret");
    req.setForceDeleteWithoutRecovery("true");
    DeleteSecretResponse rsp = acsClient.getAcsResponse(req);
    System.out.printf("DeleteSecret force delete secret:%s \n",rsp.getSecretName());
  }
  public static void main(String[] args ){
    try {
      /*
       * Create a secret and specify the initial version and the secret value that you want to encrypt. The initi
al version is marked with ACSCurrent.
       * */
      FastUsage.CreateSecretSample("myapp_secret","mysqpasswdv1","v1");
      /*
       * Obtain the secret value. If you do not specify a version number or stage label, Secrets Manager retur
ns the secret value of the version marked with ACSCurrent.
       * */
      FastUsage.GetSecretValueSample("myapp_secret","");
      /*
       * Store the secret value of a new version in the secret and specify VersionStages for this version. If Ver
sionStages is not specified, the version is marked with ACSCurrent.
       * */
      FastUsage.PutSecretValueSample("myapp_secret","mysqpasswdv2","v2","[\"ACSCurrent\", \"MyUser
stage\"]");
      /*
       * Obtain the secret value again. By default, the secret value of the new version is obtained.
       * */
      FastUsage.GetSecretValueSample("myapp_secret","");
      FastUsage.PutSecretValueSample("myapp_secret","mysqpasswdv3","v3","");
      /*
       * Obtain the secret value. By default, the secret value of the new version is obtained.
       * */
      FastUsage.GetSecretValueSample("myapp_secret","");
      /*
       * Obtain the secret value. After VersionId or VersionStages is specified, you can obtain the secret value
of an earlier version.
       * */
```

```
        FastUsage.GetSecretValueSample("myapp_secret","MyUserstage");
        FastUsage.DeleteScretSample();
      } catch (ClientException e) {
        e.printStackTrace();
      }
    }
}
```

For more sample code, see KMS code development sample library.