

Alibaba Cloud Resource Access Management

Best Practices

Issue: 20190815

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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 an optional value, and only one item can be selected.	<code>ipconfig [-all -t]</code>

Style	Description	Example
<code>{}</code> or <code>{a b}</code>	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 Use RAM to maintain security of your Alibaba Cloud resources

This topic describes how to use RAM to apply access and security settings to your Alibaba Cloud resources so that you can better manage access permissions with fine-grained access control.

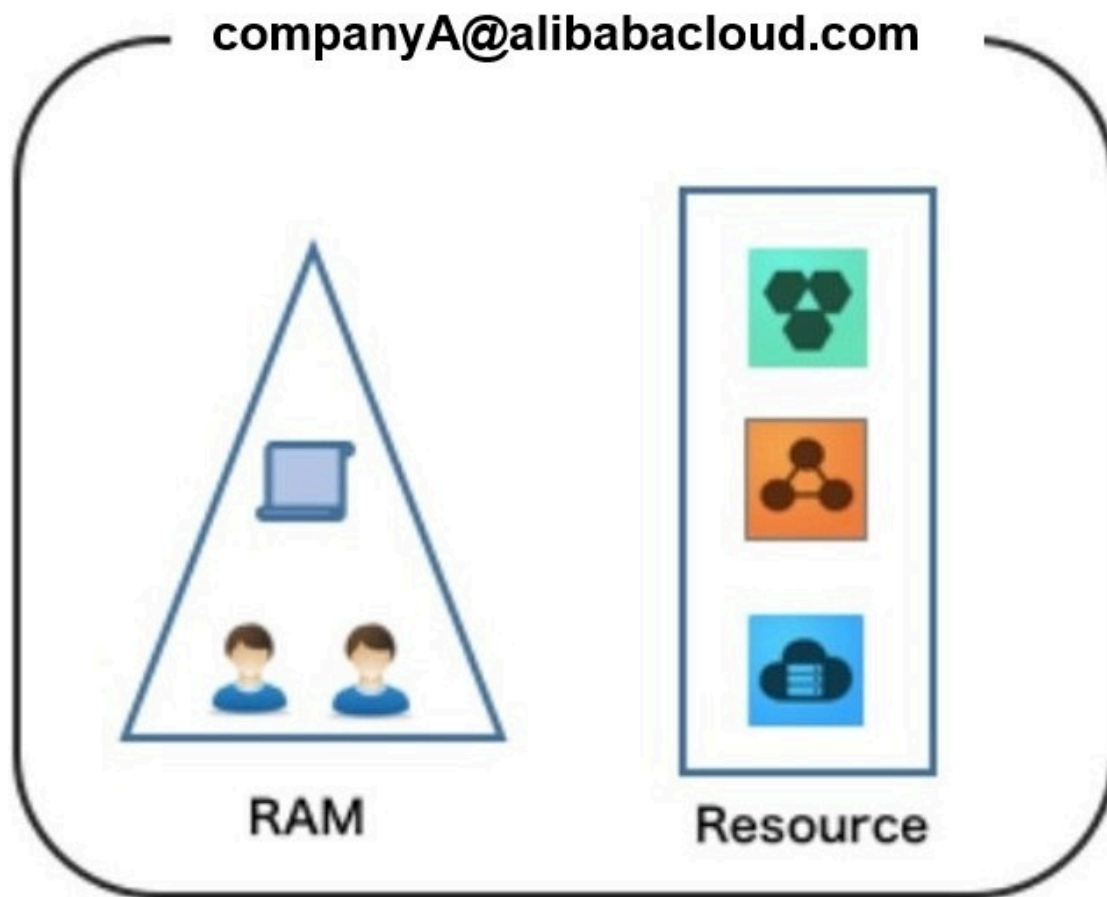
Scenario

When you migrate your business resources to the cloud, the traditional organizational structures and previous management methods of your resources may no longer meet your requirements. As a result, the migration of your resources may create higher security management issues as follows:

- The responsibilities of the RAM users are not clear.
- The Alibaba Cloud account owner does not want to share the access key with RAM users due to security risks involved.
- RAM users can access resources by using different methods, which is not unified and may mistakenly cause security risks.
- The resource access permissions of RAM users need to be frequently recalled when the users no longer require these permissions.

Solution

To resolve the preceding issues, you can use RAM to create RAM users and grant resource access permissions to RAM users. Specifically, you can use RAM to separate the access key of your Alibaba Cloud account from RAM users and grant minimum permissions to users as needed to maintain the security of your resources.



Security management solution

- Create independent RAM users.

An enterprise needs only one Alibaba Cloud account. As a best practice, the Alibaba Cloud account is not used for daily tasks. However, multiple RAM users can be created under the account, and granted the necessary access permissions to resources as needed.

For more information, see [Create a RAM user](#).

- **Separate console users from API users.**

We recommend that you do not create a logon password for console operations and an access key for API operations for a RAM user at the same time.

- To allow an application to access cloud resources only through APIs, you only need to create an access key for the application.
- To allow an employee to operate on cloud resources only through the console, you only need to set a logon password for the employee.

For more information, see [Create a RAM user](#).

- **Create RAM users and group them.**

If your Alibaba Cloud account has multiple RAM users, you can group RAM users with same responsibilities and grant permissions to the group as needed.

For more information, see [Create a RAM user group](#).

- **Grant the minimum permissions to different RAM user groups.**

You can attach proper system policies to RAM users or user groups as needed.

You can also create custom policies for fine-grained permission management. In this way, by granting the minimum permissions to different RAM users and user groups, you can better manage the RAM users' operations on the cloud resources.

For more information, see [Create a custom policy](#).

- **Configure strong password policies.**

You can configure password policies with custom conventions regarding the minimum length, mandatory characters, and validation period, for RAM users in the RAM console. If a RAM user is allowed to change their logon password, the user must create a strong logon password and rotate the password or access key on a regular basis.

For more information, see [Set a security policy for RAM users](#).

- **Enable an MFA device for your Alibaba Cloud account.**

You can enable a multi-factor authentication (MFA) device for your Alibaba Cloud account to enhance the account security. When you log on to Alibaba Cloud with MFA enabled, the system requires the following two security factors:

1. Your username and password
2. Verification code provided by the MFA device

For more information, see [Enable an MFA device for an Alibaba Cloud account](#).

- **Enable SSO for RAM users.**

After Single Sign On (SSO) is enabled, all the internal accounts of your enterprise will be authenticated. Then, users can log on to Alibaba Cloud to access corresponding resources only by using an internal account.

For more information, see [Overview of user-based SSO](#).

- **Do not share the access key of your Alibaba Cloud account.**

Your Alibaba Cloud account has full control permissions over resources under it, and its access keys have the same permissions as logon passwords. However, access keys are used for programmatic access whereas logon passwords are used to log on to the console. Therefore, to avoid information leaks due to misuse of an access key, we recommend that you do not share or use the access key of your Alibaba Cloud account.

Instead, create a RAM user and grant this user the relevant permissions.

For more information, see [Create an access key for a RAM user](#).

- **Specify operation conditions to enhance security.**

You can specify the operational conditions that a RAM user must meet before they can use your cloud resources. For example, you can specify that the RAM user must use a secure channel (such as SSL), use a specified source IP address, or operate within a specified period of time.

For more information, see [Policy elements](#).

- Manage permissions of your cloud resources.

By default, all your resources are under your Alibaba Cloud account. A RAM user can use the resources but do not own the resources. This allows you to easily manage the instances or data created by RAM users.

- For an existing RAM user that you no longer require, you can remove all of its corresponding permissions by simply removing the RAM user account.
- For a RAM user that requires a permission, you need to first create the RAM user, set the logon password or access key for it, and then grant the RAM user the relevant permissions as needed.

For more information, see [Grant permission to a RAM user](#).

- Use STS to grant temporary permissions to RAM users.

The Security Token Service (STS) is an extended authorization service of RAM. You can use STS to grant temporary permissions to RAM users and specify the permission and automatic expiration time of the tokens as needed.

For more information, see [What is STS?](#)



Note:

You must [register an Alibaba Cloud account](#) before you use RAM to maintain security of your Alibaba Cloud resources.

Result

After migrating your services to the cloud, you can use the preceding solutions to ensure you manage your cloud-based resources effectively and keep your Alibaba Cloud account and all business assets secure.

What to do next

You can use RAM to categorize your O&M requirements and assign tasks to different engineers as needed. For more information, see [Manage permissions of different O&M engineers by using RAM](#).

2 Manage permissions of different O&M engineers by using RAM

You can grant and manage the permissions of different O&M engineers by using RAM to meet various O&M requirements while also facilitating better management and control.

Scenario

Your company purchases several Alibaba Cloud products and deploys a number of application systems on the cloud, which brings greater O&M requirements.

- Different O&M owners are responsible for different Alibaba Cloud products.
- Different O&M engineers require different permissions to access, operate, and manage cloud resources.

Solution

You can categorize the O&M requirements by product to make them easier to manage. More specifically, you can set an O&M owner and assign different O&M engineers to different categories of requirements and attach your specified policies to these engineers, as shown in the following figure.

Figure 2-1: O&M owner

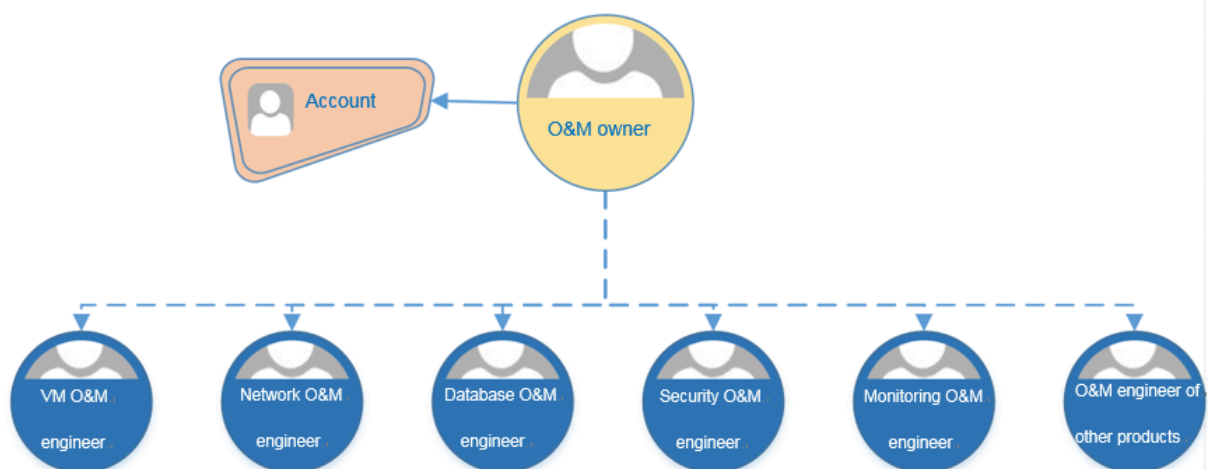


Table 2-1: Policies

O&M owner	Policy	Description
O&M owner	AdministratorAccess	This policy grants the O&M owner the permission to manage all Alibaba Cloud resources.
VM O&M engineer	AliyunECSFullAccess	This policy grants the VM O&M engineer the permission to manage Elastic Compute Service (ECS).
	AliyunESSFullAccess	This policy grants the VM O&M engineer the permission to manage Elastic Scaling Service (ESS).
	AliyunSLBFullAccess	This policy grants the VM O&M engineer the permission to manage Server Load Balancer (SLB).
	AliyunNASFullAccess	This policy grants the VM O&M engineer the permission to manage Network Attached Storage (NAS).
	AliyunOSSFullAccess	This policy grants the VM O&M engineer the permission to manage Object Storage Service (OSS).
	AliyunOTSTFullAccess	This policy grants the VM O&M engineer the permission to manage Table Store (OTS).
Network O&M engineer	AliyunCDNFullAccess	This policy grants the network O&M engineer the permission to manage Content Delivery Network (CDN).
	AliyunCENFullAccess	This policy grants the network O&M engineer the permission to manage Cloud Enterprise Network (CEN).

O&M owner	Policy	Description
	AliyunCommonBandwidthPackageFullAccess	This policy grants the network O&M engineer the permission to manage Internet Shared Bandwidth.
	AliyunEIPFullAccess	This policy grants the network O&M engineer the permission to manage Elastic IP (EIP).
	AliyunExpressConnectFullAccess	This policy grants the network O&M engineer the permission to manage ExpressConnect.
	AliyunNATGatewayFullAccess	This policy grants the network O&M engineer the permission to manage NAT Gateway.
	AliyunSCDNFullAccess	This policy grants the network O&M engineer the permission to manage Secure Content Delivery Network (SCDN).
	AliyunSmartAccessGatewayFullAccess	This policy grants the network O&M engineer the permission to manage Smart Access Gateway.
	AliyunVPCFullAccess	This policy grants the network O&M engineer the permission to manage Virtual Private Cloud (VPC).
	AliyunVPNGatewayFullAccess	This policy grants the network O&M engineer the permission to manage VPN Gateway.
Database O&M engineer	AliyunRDSFullAccess	This policy grants the database O&M engineer the permission to manage Relational Database Service (RDS).
	AliyunDTSFullAccess	This policy grants the database O&M engineer the permission to manage Data Transmission Service (DTS).
Security O&M engineer	AliyunYundunFullAccess	This policy grants the security O&M engineer the permission to manage Alibaba Cloud Security.

O&M owner	Policy	Description
Monitoring O&M engineer	AliyunActionTrailFullAccess	This policy grants the monitoring O&M engineer the permission to manage ActionTrail.
	AliyunARMSFullAccess	This policy grants the monitoring O&M engineer the permission to manage Application Real-Time Monitoring Service (ARMS).
	AliyunCloudMonitorFullAccess	This policy grants the monitoring O&M engineer the permission to manage CloudMonitor.
	(Optional) ReadOnlyAccess	(Optional) This policy grants the monitoring O&M engineer the read-only permission to all Alibaba Cloud resources.
	AliyunSupportFullAccess	This policy grants the monitoring O&M engineer the permission to manage Alibaba Cloud support systems.

Example

This example describes how to set the RAM user `alice@secloud.onaliyun.com` as the database O&M owner, so that the user can manage RDS and DTS.

1. Log on to the [RAM console](#).
2. [Create a RAM user](#) and name the user `alice@secloud.onaliyun.com`.
3. Find the created RAM user and click **Add Permissions**.
4. In the Policy Name column, select `AliyunRDSFullAccess` and `AliyunDTSFullAccess`, and click **Ok**.



Note:

To grant other O&M permissions to the RAM user, see the policies described in the preceding table.

3 User management and access control

This topic provides an example scenario that describes how to use Alibaba Cloud RAM to manage user permissions and resources.

Scenario

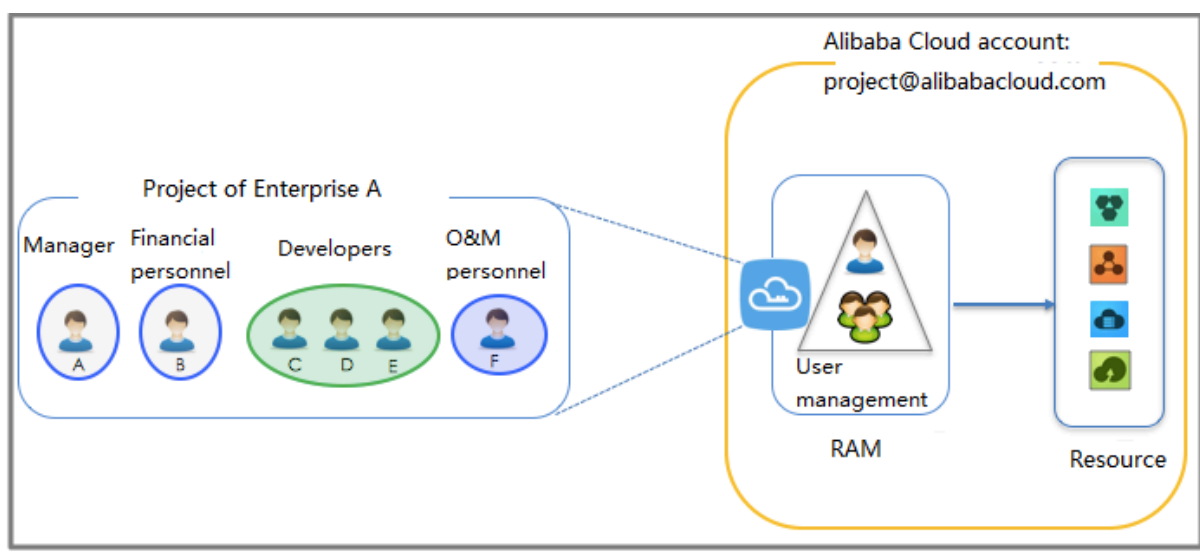
Assume that Enterprise A has bought several types of Alibaba Cloud resources, such as ECS instances, RDS instances, SLB instances, and OSS buckets, for Project-X. In this project, multiple employees need to perform operations on these cloud resources. Specifically, different employees require different permissions to complete different operations.

Requirement analysis

- Employees do not share the Alibaba Cloud account to avoid mistaken disclosure of the account password or AccessKey.
- Independent RAM users are created for different employees and the RAM users are granted independent permissions.
- All operations of all RAM users can be audited.
- Fees are not charged to each RAM user, but are instead charged to the corresponding Alibaba Cloud account to which the RAM users belong.

Solution

Figure 3-1: Solution



1. Set multi-factor authentication (MFA) to avoid risks associated with mistaken disclosure of the Alibaba Cloud account password. For more information, see [\(Optional\) Set MFA](#).
2. Create RAM users for different employees (or applications) and set logon passwords or create AccessKeys. For more information, see [Create a RAM user](#).
3. If multiple RAM users require the same permissions, we recommend that you create a user group and add the corresponding users to this user group. For more information, see [\(Optional\) Create a RAM user group](#).
4. Attach one or more system policies to the groups or users. For more information, see [#unique_21](#). For finer-grained permission management, you can create one or more custom policies and attach them to individual users or to a user group. For more information, see [#unique_22/unique_22_Connect_42_section_qpwwvf_xdb](#).

4 Grant temporary permissions to mobile apps

This topic describes how to use the RAM role STS token to grant temporary permissions to mobile apps.

Scenario

Enterprise A has developed a mobile app, which runs on users' own devices. Therefore, Enterprise A cannot manage these devices directly and wants to use Alibaba Cloud OSS so that the mobile app can upload data to and download data from OSS.

The requirements of Enterprise A are as follows:

- Enterprise A does not want the app to use the appServer to transmit data. Instead, it wants the app to directly upload data to and download data from OSS.
- To maintain account security, Enterprise A will not save the AccessKey to the mobile app because mobile devices that run the app are not managed by Enterprise A directly.
- Enterprise A wants to minimize its security risks by granting the app temporary access credentials (by means of an STS token) that the app can then use to connect to OSS, thereby restricting the access duration to a specified period of time.

Solution

- Use the Alibaba Cloud account of Enterprise A (Account A) to create a role in RAM, grant relevant permissions to the role, and allow the appServer (which is logged on as a RAM user) to use this role.

For more information, see [Create a RAM role and user, and grant permissions](#).

- When an app needs to connect directly to OSS to upload or download data, the appServer can assume a role (by calling the STS AssumeRole API) to get a temporary STS token and transfer it to the app. Then, the app can use the temporary STS token to access the OSS API directly.

For more information, see [Obtain and transfer the role STS token and access OSS](#).

- The appServer can further limit the resource operation permissions of the temporary STS token when it assumes the role, to better manage the permissions of each app.

For more information, see [Restrict STS token permissions](#).

Create a RAM role and user, and grant permissions

Assume that the account ID of Account A is 11223344.

1. Account A creates a RAM role `oss - readonly` and selects Current Alibaba Cloud Account as the trusted account so that only RAM users under Account A can assume this role.

For more information, see [#unique_27](#).

After creating the role, Enterprise A can view the role information on the basic information page.

- In this example, the Alibaba Cloud Resource Name (ARN) of the role is as follows:

```
acs : ram :: 11223344 : role / oss - readonly
```

- The trust policy in the role (in which only RAM users under Account A can assume) is as follows:

```
{
  "Statement": [
    {
      "Action": "sts : AssumeRole",
      "Effect": "Allow",
      "Principal": {
        "RAM": [
          "acs : ram :: 11223344 : root" // If the trusted
          entity type of the role is Alibaba Cloud account
          , 'root' is used by default .
        ]
      }
    }
  ],
  "Version": "1"
}
```

2. Account A attaches the policy `AliyunOSSReadOnlyAccess` (OSS read-only permission) to the role `oss-readonly`.

For more information, see [#unique_21](#).

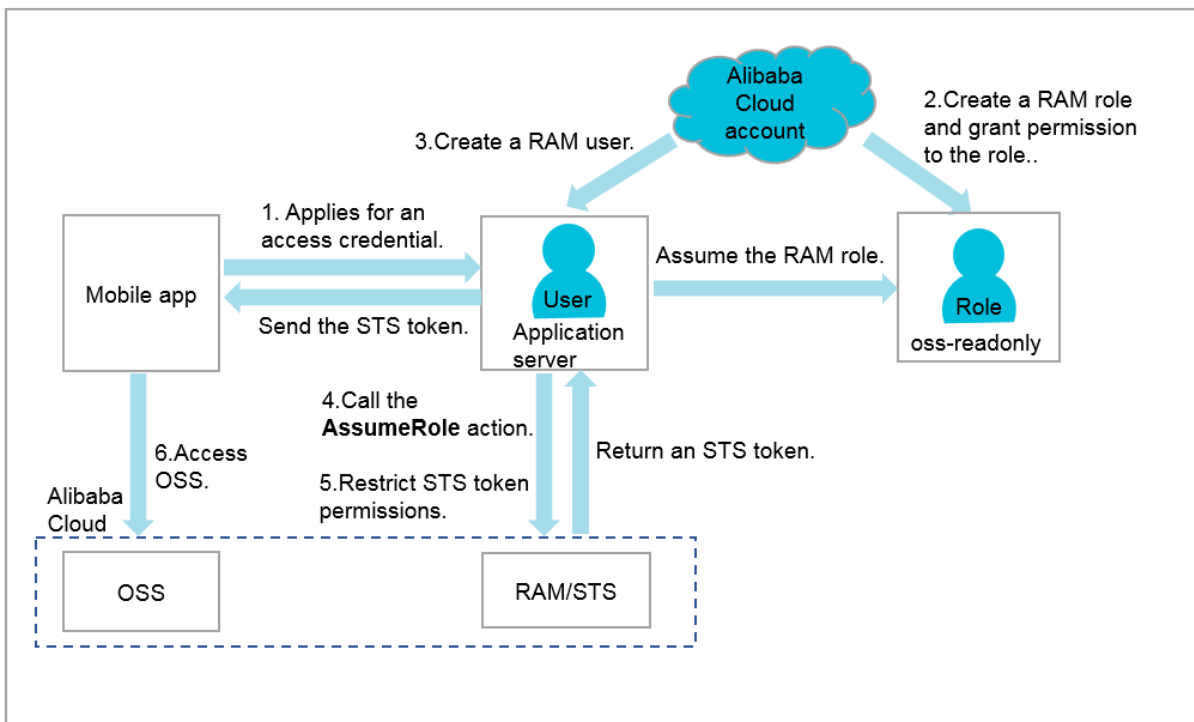
3. Account A creates a RAM user (here, the RAM user is named Appserver) for the appServer, creates an AccessKey for the RAM user, and attaches the `AliyunSTSA`

AssumeRoleAccess system policy to the user so that the user can call the STS AssumeRole API.

Obtain and transfer the role STS token and access OSS

The procedure for an app to obtain a role STS token and use it to call the OSS API is illustrated in the following figure.

Figure 4-1: Procedure



The appServer uses the AccessKey of the RAM user Appserver to call the STS API AssumeRole.



Note:

The AccessKey for the appServer must be configured.

The following is an example of how to use aliyuncli to call the AssumeRole API:

```
$ aliyuncli sts AssumeRole -- RoleArn acs : ram :: 11223344 :
role / oss - readonly -- RoleSessionName client - 001
{
  " AssumedRoleUser ": {
    " AssumedRoleId ": " 3915787525 73972854 : client - 001
",
    " Arn ": " acs : ram :: 11223344 : role / oss - readonly /
client - 001 "
  },
  " Credentials ": {
```

```

    " AccessKeySecret ": " 93ci2umK1Q KNEja6WGqi 1Ba7Q2Fv9P
wxZqtVF2Vy nUvz ",
    " SecurityToken ": " CAES6AIIAR KAAUiwSHpk D3GXRMQk9s
tDr3YSVbyG qanqS + fPLEEkjZ + dlGfnGdCI2 PV93jksole 8ijH8dHJRH
RA5JA1YCGs fX5hrzcNM3 7Vr4eVdWfV QhoCw0DXBp Hv // ZcITp +
ELRr4MHsny GiErnDsXLk I7q / sbuWg6PACZ / jzQfEWQb / f7Y1Gh1TVF
MuRjEzR2pz a1hUamsz0G RCWTZZeEp0 WEFaayISMz kxNTc4NzUy
NTcz0TcyOD U0KgpjbGll bnQtMDAxMK T + lIHBKjoGUn NhTUQ1QkoK
ATEaRQoFQW xsb3cSGwoM QWN0aW9uRX F1YWxzEgZB Y3Rpb24aAw
oBKhIfCg5S ZXNvdXJjZU VxdWFscxII UmVzb3VyY2 UaAwoBKkoF
NDMyNzRSBT I2ODQyWg9B c3N1bWVkUm 9sZVVzZXJg AGoSMzKxNT
c4NzUyNTcz 0TcyODU0cg lly3MtYWRT aW544Mbewo / 26AE =",
    " Expiration ": " 2016 - 01 - 13T15 : 02 : 37Z ",
    " AccessKeyId ": " STS . F13GjskXTj k38dBY6YxJ tXAZk "
  },
  " RequestId ": " E1779AAB - E7AF - 47D6 - A9A4 - 53128708B6 CE "
}

```

Restrict STS token permissions

1. After calling the AssumeRole API, you can grant fine-grained permissions to the STS token.

Specifically, if you do not specify a policy when calling the AssumeRole API, the STS token has all permissions of `oss - readonly`. To solve this issue, you can specify a policy to further restrict the permissions of the STS token, for example, only allow the STS token to access `sample - bucket / 2015 / 01 / 01 /*. jpg`

. The following is an example:

```

$ aliyuncli sts AssumeRole -- RoleArn acs : ram :: 11223344
: role / oss - readonly -- RoleSessionName client - 002 --
Policy "{\"Version \": \" 1 \", \"Statement \": [{\"Effect \": \"
Allow \", \"Action \": \" oss : GetObject \", \"Resource \": \" acs
: oss :*:*: sample - bucket / 2015 / 01 / 01 /*. jpg \"}]}"
{
  "AssumedRoleUser": {
    "AssumedRoleId": " 3915787525 73972854 : client - 002
",
    "Arn": " acs : ram :: 11223344 : role / oss - readonly /
client - 002 "
  },
  "Credentials": {
    "AccessKeySecret": " 28Co5Vyx2X htTqj3RJgd ud4ntyZrSN
dUvNygAj7x EMow ",
    "SecurityToken": " CAESnQMIAR KAASJgnzMz lXVyJn4KI
+ FsysaIpTgm 8ns8Y74HVE j0p0ev08ZW Xrnnkz4a4r BEPBAdFkh3
197GUspruj siU78Fkszx hnQPkkQKcy vPihoXqKvu ukrQ / Uoudk31KAJ
Ez5o2EjLNU REcxWjRDRS ISMzKxNTc4 NzUyNTcz0T cy0DU0Kgpj
bGllbnQtMD AxMKmZxIHB KjoGUnNhTU Q1Qn8KATEa egoFQWxsb3
cSJwoMQWN0 aW9uRXF1YW xzEgZBY3Rp b24aDwoNb3 Nz0kdldE9i
amVjdBJICg 5SZXNvdXJj ZUVxdWFscx IIUmVzb3Vy Y2UaLAoqYW
NzOm9zZczo Oio6c2FtcG xllWJ1Y2tl dC8yMDE1Lz AxLzAxLyou
anBnSgU0Mz I3NFIFMjY4 NDJaD0Fzc3 VtZWRSb2xl VXNlcmAAah
Iz0TE1Nzg3 NTI1NzNM5Nz I4NTRYCWVj cy1hZG1pbN jgxt7Cj / boAQ
==",
    "Expiration": " 2016 - 01 - 13T15 : 03 : 39Z ",
    "AccessKeyId": " STS . FJ6EMcS1JL ZgAcBJSTDG 1Z4CE "
  },
}

```

```
" RequestId ": " 98835D9B - 86E5 - 4BB5 - A6DF - 9D3156ABA5 67 "
}
```

**Note:**

The default validity period of the STS token is 3600 seconds (maximum limit). You can use the `DurationSeconds` parameter to limit the STS token expiration time.

2. The appServer obtains and parses the credentials.
 - The appServer obtains the `AccessKeyId`, `AccessKeySecret`, and STS token from the credentials returned by the `AssumeRole` API.
 - The STS token validity period is determined. If the application requires a longer validity period, the appServer must re-issue a new STS token, for example, issue one STS token every 1800 seconds.
3. The appServer securely transfers the STS token to the app.
4. The app uses the STS token to directly access APIs of Alibaba Cloud services (such as OSS).

The following is an example of how to use `aliyuncli` and an STS token to access an OSS object (here, the STS token is issued to `client-002`):

```
Configure the STS token syntax : aliyuncli oss Config
-- host -- accessid -- accesskey -- sts_token
$ aliyuncli oss Config -- host oss.aliyuncs.com --
accessid STS.FJ6EMcS1JL ZgAcBJSTDG 1Z4CE -- accesskey
28Co5Vyx2X htTqj3RJgd ud4ntyZrSN dUvNygAj7x EMow -- sts_token
CAESnQMIAR KAASJgnzMz lXVyJn4KI + FsysaIpTGm 8ns8Y74HVE
j0p0ev08ZW Xrnnkz4a4r BEPBAdFkh3 197GUspruj siU78Fkszx
hnQPKkQKcy vPihoXqKvu ukrQ / Uoudk31KAJ Ez5o2EjLNU REcxWjRDRS
ISMzKxNTc4 NzUyNTcz0T cyODU0Kgpj bGllbnQtMD AxMKmZxIHB
KjoGUnNhTU Q1Qn8KATEa egoFQWxsB3 cSJwoMQWN0 aW9uRXF1YW
xzEgZBY3Rp b24aDwoNb3 Nz0kdldE9i amVjdBJICg 5SZXNvdXJj
ZUVxdWFscx IIUmVzb3Vy Y2UaLAoqYW NzOm9zczoq 0io6c2FtcG
xLLWJ1Y2tl dC8yMDE1Lz AxLzAxLyous anBnSgU0Mz I3NFIFMjY4
NDJaD0Fzc3 VtZWRSb2xl VXNlcmAAah Iz0TE1Nzg3 NTI1NzZM5Nz
I4NTRYCWVj cy1hZG1pbm jgxt7Cj / boAQ ==
access OSS objects
$ aliyuncli oss Get oss://sample-bucket/2015/01/01/
/grass.jpg grass.jpg
```

What to do next

For more information, see:

- [Set up direct data transfer for mobile apps](#)
- [Permission control](#)
- [Set up data callback for mobile apps](#)

- **STS temporary access authorization**

5 Cross-account resource authorization and access

This topic describes how to use RAM roles to perform cross-account resource authorization and access.

Scenario

Account A and Account B represent two different enterprises (Enterprise A and Enterprise B, respectively). Enterprise A has bought various cloud resources (such as ECS instances, RDS instances, SLB instances, and OSS buckets) to support its business

.

Requirement analysis

- Account A is the resource owner and wants to grant Account B the relevant permissions to perform operations on resources of Account A.
- Account B wants to further grant the permissions to its RAM users (employees or applications). If an employee of Account B joins or leaves Enterprise B, Account A cannot make any changes to the permissions.
- If Enterprise A or Enterprise B ends the agreement, Account A can remove the permissions of Account B at any time.

Solution

Use RAM roles to perform cross-account authorization and resource access.

- Account A creates a role in RAM, grants relevant permissions to the RAM role, and allows Account B to use this role.

For more information, see [Cross-account authorization](#).

- If an employee (that is, a RAM user) under Account B needs to use this role, Account B can grant permissions to this RAM user to perform operations on the resources of Account A.

For more information, see [Cross-account resource access](#).

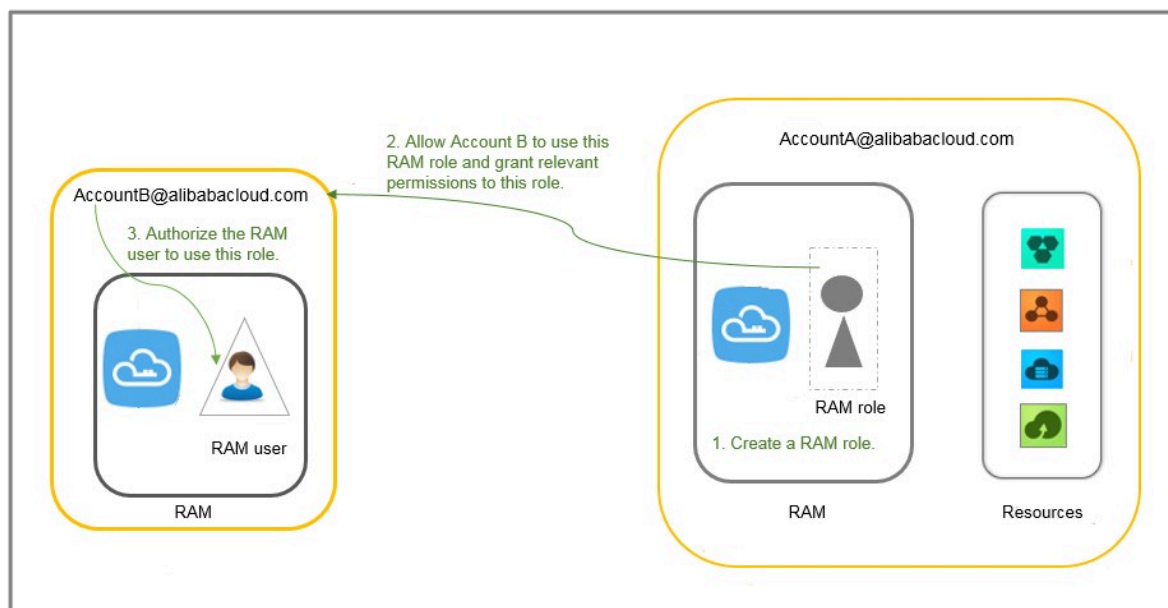
- If Enterprise A or Enterprise B ends the agreement, Account A can revoke the permissions of Account B. In this case, all RAM users of Account B lose the permissions associated with this role.

For more information, see [Removing cross-account authorization](#).

Cross-account authorization

The following figure shows how to use a RAM role to achieve cross-account authorization. In this example, Enterprise A (whose account ID is 11223344 and account alias is company-a) needs to grant ECS operation permissions to the employees of Enterprise B (whose account ID is 12345678 and account alias is company-b).

Figure 5-1: Use a RAM role to achieve cross-account authorization



1. Account A creates a RAM role (here, the role is named `ecs-admin`) and selects Other Alibaba Cloud Account (here, the account ID is 12345678) as a trusted entity.

For more information, see [#unique_27](#).

After creating the role, Account A can view the role information on the Basic Information page.

- In this example, the Alibaba Cloud Resource Name (ARN) of the role is as follows:

```
acs : ram :: 11223344 : role / ecs - admin
```

- The trust policy in the role (in which only RAM users under Account B can assume) is as follows:

```
{
  "Statement": [
    {
```

```
" Action ": " sts : AssumeRole ",
" Effect ": " Allow ",
" Principal ": {
  " RAM ": [
    " acs : ram :: 12345678 : root "
  ]
}
],
" Version ": " 1 "
}
```

2. Account A attaches the `AliyunECSF ullAccess` policy to the role `ecs-admin`.

For more information, see [#unique_21](#).

3. Account B creates a RAM user (here, the RAM user is named Alice) for its employee, sets a logon password for the RAM user, and attaches the `AliyunSTSA ssumeRoleA ccess` system policy for the RAM user to call the STS AssumeRole API.

Cross-account resource access

To allow RAM user Alice under Account B to access the ECS resources of Account A (through the Alibaba Cloud console), follow these steps:

1. Log on to the RAM console.

During logon, enter the account alias `company-b`, RAM user name Alice, and password 123456.

2. Move the pointer over the account icon and click Switch Role.

On the displayed page, enter `company-a` for Enterprise Alias/Default Domain Name and `ecs-admin` for Role Name.



Note:

After completing the preceding operations, the RAM user Alice can perform operations on the ECS resources of Account A.

Removing cross-account authorization

If Account A wants to remove the permission of using the role `ecs-admin` from Account B, the procedure is as follows:

1. Log on to the RAM console, click RAM Roles, and click the role name of `ecs-admin`.

2. Click the Trust Policy Management tab and delete `acs : ram :: 12345678 : root` .

**Note:**

Account A can also remove the permission of using the role `ecs-admin` from Account B by deleting the `ecs-admin` role on the RAM Roles page. However, the role cannot have any policies attached to it before being deleted.

6 Use RAM to authorize applications to access Alibaba Cloud resources

This topic describes how to use RAM to authorize applications to access Alibaba Cloud resources by obtaining the temporary STS token of a RAM role.

Scenario

An enterprise has bought ECS instances and wants to deploy its applications in ECS. To allow the applications to access other Alibaba Cloud APIs by using access keys, the enterprise can use one of the following methods:

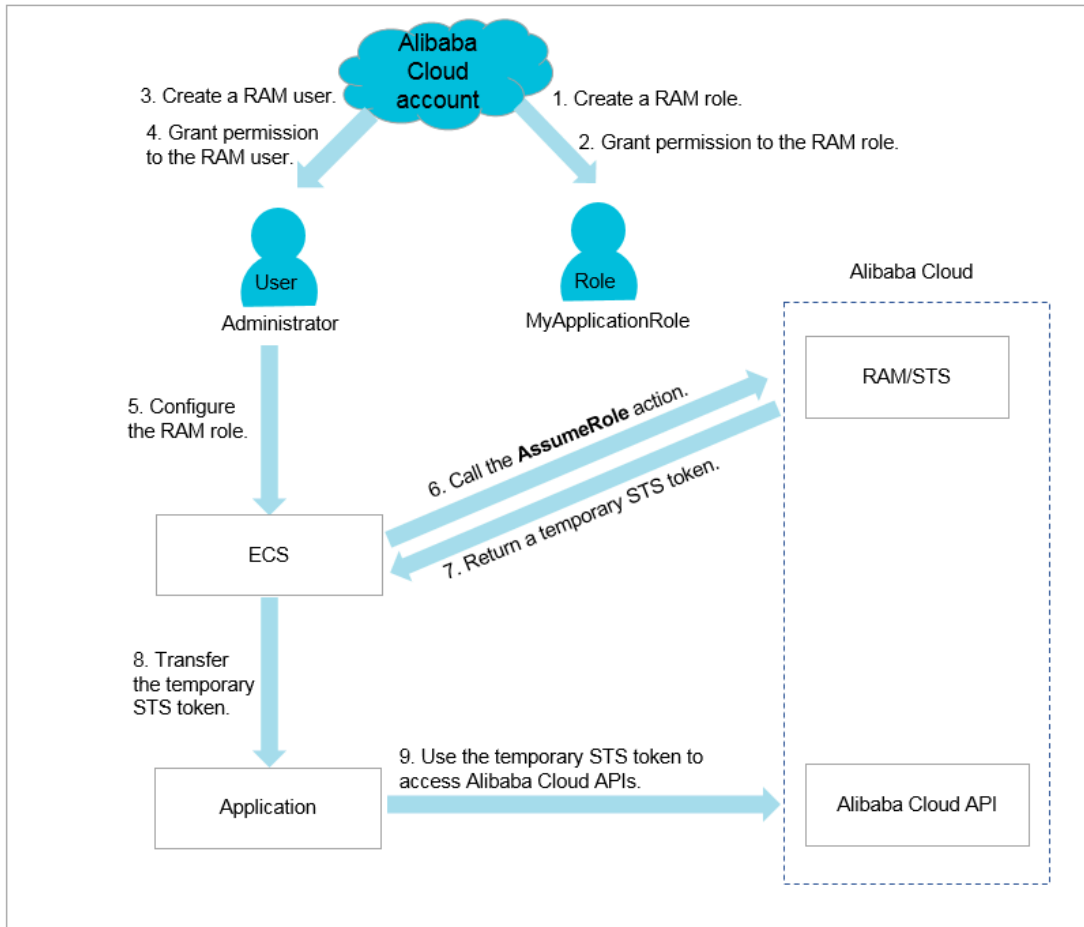
- Embed the access keys into the code.
- Save the access keys in the configuration files of the applications.

However, if the preceding methods are used, the following issues occur:

- **Access key disclosure:** If the access keys are embedded in the ECS instances in plaintext, they can be mistakenly disclosed to another user due to the sharing of a snapshot, or an image to create a shared image instance.
- **O&M complexity:** If the access keys are changed (due to access key rotation or changes to user identities), all instances and images need to be updated and redeployed because the access keys exist in the ECS instances. As a result, the management of instances and images is highly complex.

Solution

To resolve the preceding issues, the enterprise can combine ECS with the access control feature of RAM. Specifically, the administrator creates a RAM role for each ECS instance (that is, the operating environment of the applications) and grants each RAM role appropriate permissions. The applications can use the temporary STS token of the corresponding RAM role to call other Alibaba Cloud APIs.



1. The enterprise uses its Alibaba Cloud account to create a RAM role (MyApplicationRole).



Note:

The preceding role is an Alibaba Cloud service in which ECS is selected as the trusted service.

For information about how to create a RAM role, see [Create a RAM role for a trusted Alibaba Cloud service](#).

2. The enterprise uses its Alibaba Cloud account to grant relevant permissions to the RAM role.

For information about how to grant permission to a RAM role, see [Grant permission to a RAM role](#).



Note:

If the temporary STS token does not have corresponding permissions, the enterprise needs to attach related policies to the RAM role. After the policies

attached to the RAM role are updated, the permissions associated with the temporary STS token take effect immediately and the user does not need to restart the ECS instance.

3. The enterprise uses its Alibaba Cloud account to create a RAM user.

For information about how to create a RAM user, see [Create a RAM user](#).

4. The enterprise uses its Alibaba Cloud account to grant relevant permissions to the RAM user.

- If the administrator and the RAM user have the same responsibilities, the `AdministratorAccess` permission should be granted to the user.
- If the administrator and the RAM user have different responsibilities, the `PassRole` permission should be granted to the user.

The enterprise uses its Alibaba Cloud account to create a custom policy in the RAM console and attach the policy to the RAM user. The policy content is as follows:

```
{
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "ram:PassRole",
      "Resource": "acs:ram:*:*:role/MyApplicationRole"
      // Replace MyApplicationRole with the name of your
      RAM role.
    }
  ],
  "Version": "1"
}
```



Note:

- Only authorized RAM users can configure RAM roles for ECS instances. In this way, the use of RAM roles is strictly controlled, which helps to prevent any abuse of permission usage.
- Before a RAM user (for example, a RAM user that only has access to ECS and is not a RAM permission administrator) creates an ECS instance and configures a RAM role, ECS checks whether the RAM user has the `ram:`

`PassRole` permission of the RAM role. If no permission is found, the RAM user cannot create an ECS instance.

For information about how to create a custom policy, see [Create a custom policy](#).

For information about how to grant permission to a RAM user, see [Grant permission to a RAM user](#).

5. The RAM user starts the ECS instance and then configures the RAM role.
6. ECS calls the `AssumeRole` action of the STS API to obtain the temporary STS token of the RAM role.



Note:

STS verifies the identity of ECS and the policies attached to the RAM role. If the verification succeeds, a temporary STS token is issued. If the verification fails, the request is denied.

For information about how to use a RAM role by calling an STS API action, see [Use the instance RAM role by calling APIs](#).

7. STS returns the temporary STS token to ECS.
8. ECS sends the temporary STS token to applications in the ECS instance by using the instance metadata.
 - In Linux, the temporary STS token and its validity period can be obtained by using the instance metadata. For more information, see [Access other Alibaba Cloud APIs by using instance RAM roles](#).

Request example:

```
$ curl http://100.100.100.200/latest/meta-data/ram/security-credentials/MyApplicationRole
```

Response example

```
[root@local ~]# curl http://100.100.100.200/latest/meta-data/ram/security-credentials/MyApplicationRole
{
  "AccessKeyId" : "STS.J8XXXXXXXXXX4",
  "AccessKeySecret" : "9PjfXXXXXXXXXXBf2XAW",
  "Expiration" : "2017-06-09T09:17:19Z",
  "SecurityToken" : "CAIXXXXXXXXXXXwmBkleCTkyI+",
  "LastUpdated" : "2017-06-09T03:17:18Z",
  "Code" : "Success"
}
```

```
}
```

- If the applications use an Alibaba Cloud SDK, the Alibaba Cloud SDK can obtain the STS token of the RAM role from the ECS instance metadata, and you do not need to configure any access key-related information in the SDK.

For more information, see [Configure a RAM role to access ECS instances without using an access key](#).



Note:

The applications can access Alibaba Cloud APIs when the temporary STS token is within the validity period. The STS token usually expires after one hour. ECS automatically refreshes the STS token before it expires.

9. The applications use the STS token to access Alibaba Cloud APIs.

What to do next

If Alibaba Cloud RAM does not meet all of your permission application requirements, you can use other Alibaba Cloud services, such as Function Compute and MaxCompute, that provide the access control features to authorize applications to access your Alibaba Cloud resources.

7 Use tags to authorize ECS instances by group

This topic describes how to use tags to authorize resources (such as ECS instances) by group so that RAM users can only view and operate on the tagged resources.

Scenario

You have 10 ECS instances. You want your dev team to manage 5 of them, and your ops team to manage the other 5. However, you want each team to see only their authorized resources (not the authorized resources of the other team).

Preparations

Make sure that you can log on to the [RAM console](#) by using your RAM account.

Solution

Create two RAM user groups, tag these two groups, and grant permissions to the groups.

- Tag five of them with the key as team and the value as dev.
- Tag the other five with the key as team and the value as ops.

Procedure

1. Log on to the ECS console, click Instances, and select the target instance. In the Actions column, choose More > Instance Settings > Edit Tag.
2. Click Create, enter the key and value, and click Confirm.
3. Log on to the RAM console, create two RAM user groups, and name the groups as dev and ops.

For more information, see [\(Optional\) Create a RAM user group](#).

4. Create RAM users and add the users to different user groups.

For more information, see [Create a RAM user](#).

5. Create two custom policies and attach them to different user groups.

For more information, see [Permission granting in RAM](#).



Note:

After you attach a policy to a user group, the RAM users in this group inherit the relevant permissions.

In this example, the policy name of the dev user group is `policyForDevTeam`. The policy content is as follows:

```
{
  "Statement": [
    {
      "Action": "ecs:*",
      "Effect": "Allow",
      "Resource": "*",
      "Condition": {
        "StringEquals": {
          "ecs:tag/team": "dev"
        }
      }
    },
    {
      "Action": "ecs:DescribeTags*",
      "Effect": "Allow",
      "Resource": "*"
    }
  ],
  "Version": "1"
}
```

In the preceding policy,

- The `"Action": "ecs:*"` element with `"Condition"` is used to filter the instances tagged as `"team": "dev"`.
- The `"Action": "ecs:DescribeTags*"` element is used to display all tags. When a user performs operations in the ECS console, the system displays all the tags for the user to select, and then filters the instances according to the tag key and value selected by the user.



Note:

You can create the policy `policyForOpsTeam` according to the example and grant this policy to the ops user group.

Display authorized instances

1. Log on to the ECS console as a RAM user.



Note:

After a user logs on to the ECS console, the system navigates to the ECS overview page by default. In this case, the number of the ECS instances displayed on the page is 0. To view relevant instances, click `Instances`.

2. Click Instances and click Tags next to the search box.



Note:

You need make sure that the region displayed in the console is the region to which the instances belong.

3. Move the pointer over Tag Key. The Tag Value list is displayed. Select a value, and the system then filters the corresponding instances.

What to do next

You can use the procedures described in this topic to tag and authorize security groups, disks, snapshots, and images by group.



Note:

Only custom images can be tagged.

8 Use tags to authorize RDS instances by group

This topic describes how to use tags to authorize resources (such as RDS instances) by group so that RAM users can only view and operate on the tagged resources.

Scenario

You have 10 RDS instances. You want your dev team to manage 5 of them, and your ops team to manage the other 5. However, you want each team to see only their authorized instances (not the authorized resources of the other team).

Preparations

For more information, see [Use tags to authorize ECS instances by group](#).

The following is an example of the custom policy relevant to RDS:

```
{
  "Statement": [
    {
      "Action": "rds:*",
      "Effect": "Allow",
      "Resource": "*",
      "Condition": {
        "StringEquals": {
          "rds:ResourceTag/team": "dev"
        }
      }
    },
    {
      "Action": "rds:DescribeTag*",
      "Effect": "Allow",
      "Resource": "*"
    }
  ],
  "Version": "1"
}
```

In the preceding policy,

- The `"Action": "rds:*"` element with `"Condition"` is used to filter the instances tagged as `"team": "dev"`. The keyword of `"Condition"` is `rds:ResourceTag`.
- The `"Action": "rds:DescribeTag*"` element is used to display all tags. When a user performs operations in the RDS console, the system displays all the tags for the user to select, and then filters the instances according to the tag key and value selected by the user.

What to do next

If the relevant permissions of a RAM user are missing after you have tagged RDS instances into groups and granted permissions, see [#unique_47](#).

9 Manage ECS permissions by using RAM

This topic describes how to manage ECS permissions of RAM users by creating policies in RAM.

Common policies

The following table lists some common policies that can be created in RAM to manage ECS permissions.

Policy	Description
AliyunECSFullAccess	Grants a RAM user full management permissions for ECS instances.
AliyunECSReadOnlyAccess	Grants a RAM user read-only permission for ECS instances.



Note:

For more information about ECS permissions, see [Authentication rules](#).

Attach custom policies to RAM users

1. Create custom policies according to the subsequent ECS authorization examples.

For more information, see [#unique_50](#).

2. Locate the target policy and click the policy name.
3. On the References tab, click Grant Permission.
4. In the Principal field, enter the ID or name of the target RAM user.
5. Click OK.



Note:

You can also attach policies to a RAM user or a RAM user group as needed. For more information, see [Permission granting in RAM](#).

ECS authorization examples

- **Example 1:** As a RAM administrator with multiple instances, authorize a user to operate on only two of your instances.

The IDs of these two ECS instances are i-001 and i-002.

```
{
```



```

" Statement ": [
  {
    " Action ": " ecs :*",
    " Effect ": " Allow ",
    " Resource ": [
      " acs : ecs :*:*: instance / i - 001 ",
      " acs : ecs :*:*: instance / i - 002 "
    ]
  },
  {
    " Action ": " ecs : Describe *",
    " Effect ": " Allow ",
    " Resource ": "*"
  }
],
" Version ": " 1 "
}

```



Note:

- The authorized RAM user can view all the ECS instances but can only operate on two of them.
- The `Describe *` element is required in a policy. If a policy does not contain the `Describe *` element, the authorized RAM user cannot view any instance in the console. However, the RAM user can operate on the two specified ECS instances by calling API actions, by using the CLI, or by using ECS SDKs.

- **Example 2:** As a RAM administrator, authorize a RAM user to view ECS instances in the Qingdao region, but do not allow them to view information about disks and snapshots.

You can grant ECS permissions to the user by region and resource type.

```

{
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": " ecs : Describe *",
      " Resource ": " acs : ecs : cn - qingdao :* : instance /*"
    }
  ],
  " Version ": " 1 "
}

```

- **Example 3:** As a RAM administrator, authorize a RAM user to create snapshots.

If a RAM user cannot create disk snapshots after being granted the ECS instance administrator permission, you must grant disk permissions to the user again. In this example, the ECS instance ID is `inst-01` and the disk ID is `dist-01`.

```

{
  " Statement ": [
    {

```

```
" Action ": " ecs :*",
" Effect ": " Allow ",
" Resource ": [
  " acs : ecs ::*: instance / inst - 01 "
]
},
{
" Action ": " ecs : CreateSnap shot ",
" Effect ": " Allow ",
" Resource ": [
  " acs : ecs ::*: disk / dist - 01 ",
  " acs : ecs ::*: snapshot /*"
]
},
{
" Action ": [
  " ecs : Describe *"
],
" Effect ": " Allow ",
" Resource ": "*"
}
],
" Version ": " 1 "
}
```

10 Manage OSS permissions by using RAM

This topic describes how to manage OSS permissions of RAM users by creating policies in RAM.

Common policies

The following table lists some common policies that can be created in RAM to manage OSS permissions.

Policy	Description
AliyunOSSFullAccess	Grants a RAM user full management permissions for OSS instances.
AliyunOSSReadOnlyAccess	Grants a RAM user read-only permission for OSS instances.



Note:

For more information about OSS permissions, see [Overview](#).

Attach custom policies to RAM users

1. Create custom policies according to the subsequent OSS authorization examples.

For more information, see [Create a custom policy](#).

2. Locate the target policy and click the policy name.
3. On the References tab, click Grant Permission.
4. In the Principal field, enter the ID or name of the target RAM user.
5. Click OK.



Note:

You can also attach policies to a RAM user or a RAM user group as needed. For more information, see [Grant permission to a RAM user](#) and [Grant permission to a RAM user group](#).

OSS authorization examples

- Example 1: As a RAM administrator, authorize a user to fully manage an OSS bucket.

```
{  
  "Version": "1",
```

```

    " Statement ": [
      {
        " Effect ": " Allow ",
        " Action ": " oss :*",
        " Resource ": [
          " acs : oss :*:*: myphotos ",
          " acs : oss :*:*: myphotos /*"
        ]
      }
    ]
  }
}

```

- **Example 2: As a RAM administrator, authorize a user to list and read resources in an OSS bucket.**

- Authorize a RAM to list and read resources in an OSS bucket by using the OSS CLI or by using OSS SDKs. The name of the OSS bucket is `myphotos` .

```

{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": " oss : ListObject s ",
      " Resource ": " acs : oss :*:*: myphotos "
    },
    {
      " Effect ": " Allow ",
      " Action ": " oss : GetObject ",
      " Resource ": " acs : oss :*:*: myphotos /*"
    }
  ]
}

```

- Authorize a RAM user to operate on resources in the OSS console.



Note:

When a RAM user logs on to the OSS console, the console calls the

`ListBucket s` , `GetBucketA cl` , and `GetObjectA cl` actions to check whether the bucket is public.

```

{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListBucket s ",
        " oss : GetBucketS tat ",
        " oss : GetBucketI nfo ",
        " oss : GetBucketA cl "
      ],
      " Resource ": " acs : oss :*:*:*"
    },
    {
      " Effect ": " Allow ",
      " Action ": [

```

```

        " oss : ListObject s ",
        " oss : GetBucketA cl "
    ],
    " Resource ": " acs : oss :*:*: myphotos "
  },
  {
    " Effect ": " Allow ",
    " Action ": [
      " oss : GetObject ",
      " oss : GetObjectA cl "
    ],
    " Resource ": " acs : oss :*:*: myphotos /*"
  }
]
}

```

- **Example 3: As a RAM administrator, authorize a RAM user to access OSS instances by using a specified IP address.**

- Add the following condition in the `Allow` element. This allows the IP address segments `192 . 168 . 0 . 0 / 16` and `172 . 12 . 0 . 0 / 16` to read data in `myphotos`.

```

{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListBucket s ",
        " oss : GetBucketS tat ",
        " oss : GetBucketI nfo ",
        " oss : GetBucketA cl "
      ],
      " Resource ": [
        " acs : oss :*:*:*"
      ]
    },
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListObject s ",
        " oss : GetObject "
      ],
      " Resource ": [
        " acs : oss :*:*: myphotos ",
        " acs : oss :*:*: myphotos /*"
      ],
      " Condition ":{
        " IPAddress ": {
          " acs : SourceIp ": [" 192 . 168 . 0 . 0 / 16
", " 172 . 12 . 0 . 0 / 16 " ]
        }
      }
    }
  ]
}

```

```
}
}
```

- Add the following condition in the `Deny` element. If the IP address of a RAM user is not within the `192 . 168 . 0 . 0 / 16` segment, the user cannot perform any operations on OSS instances.

```
{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListBucket s ",
        " oss : GetBucketS tat ",
        " oss : GetBucketI nfo ",
        " oss : GetBucketA cl "
      ],
      " Resource ": [
        " acs : oss :*:~:*"
      ]
    },
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListObject s ",
        " oss : GetObject "
      ],
      " Resource ": [
        " acs : oss :*:~: myphotos ",
        " acs : oss :*:~: myphotos /*"
      ]
    },
    {
      " Effect ": " Deny ",
      " Action ": " oss :*",
      " Resource ": [
        " acs : oss :*:~:*"
      ],
      " Condition ":{
        " NotIpAddre ss ": {
          " acs : SourceIp ": [" 192 . 168 . 0 . 0 / 16
        ]
      }
    }
  ]
}
```



Note:

A policy with the `Deny` command has a higher priority than the policy with the `Allow` command. Therefore, when a RAM user whose IP address is not within the `192 . 168 . 0 . 0 / 16` segment attempts to access data in `myphotos`, OSS notifies the user of having no permissions.

- **Example 4: Authorize a RAM user by OSS directory.**

You have a photo bucket named `myphotos`. The bucket contains directories that indicate the places where the photos were taken. Each directory contains sub-directories that indicate the years when the photos were taken.

```
myphotos [ Bucket ]
├── beijing
│   ├── 2014
│   └── 2015
├── hangzhou
│   ├── 2013
│   ├── 2014
│   └── 2015 // Grant read - only permission on this
└── qingdao
    ├── 2014
    └── 2015
directory to users .
```

You can grant read-only permission on the `myphotos / hangzhou / 2015 /` directory to a RAM user according to application scenarios and policy complexity. The following are examples of the application scenarios:

- **Scenario 1: Authorize a RAM user to read files in the directory without them having to list the files.**

In this scenario, the RAM user knows the complete paths of all files and can directly read the files by using the complete paths. Generally, a software system requires permission assignment for this.

```
{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : GetObject "
      ],
      " Resource ": [
        " acs : oss :*:*: myphotos / hangzhou / 2015 /*"
      ]
    }
  ]
}
```

```
}
```

- Scenario 2: Authorize a RAM user to access the `myphotos / hangzhou / 2015 /` directory and list files in the directory by using the OSS CLI.

Generally, software developers require such permission assignment. The developers do not know what files are available in a directory and can use the OSS CLI or API to directly obtain the directory information.

In this scenario, the `ListObject s` permission is required.

```
{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : GetObject "
      ],
      " Resource ": [
        " acs : oss :*:*: myphotos / hangzhou / 2015 /*"
      ]
    },
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListObject s "
      ],
      " Resource ": [
        " acs : oss :*:*: myphotos "
      ],
      " Condition ":{
        " StringLike ":{
          " oss : Prefix ":" hangzhou / 2015 /*"
        }
      }
    }
  ]
}
```



```
}
}
```

- Scenario 3: Authorize a RAM user to access the `myphotos / hangzhou / 2015 /` directory by using the OSS console.

In this scenario, the RAM user uses a visual OSS client, such as Windows File Explorer, to access the `myphotos / hangzhou / 2015 /` directory from the root directory through levels of sub-directories.

The following permissions are required:

- Permission to list all buckets
- Permission to list directories under `myphotos`
- Permission to list directories under `myphotos / hangzhou`

```
{
  " Version ": " 1 ",
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListBucket s ",
        " oss : GetBucketS tat ",
        " oss : GetBucketI nfo ",
        " oss : GetBucketA cl "
      ],
      " Resource ": [
        " acs : oss :*:~*"
      ]
    },
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : GetObject ",
        " oss : GetObjectA cl "
      ],
      " Resource ": [
        " acs : oss :*:~: myphotos / hangzhou / 2015 /*"
      ]
    },
    {
      " Effect ": " Allow ",
      " Action ": [
        " oss : ListObject s "
      ],
      " Resource ": [
        " acs : oss :*:~: myphotos "
      ],
      " Condition ": {
        " StringLike ": {
          " oss : Delimiter ": "/",
          " oss : Prefix ": [
            "",
            " hangzhou /",
            " hangzhou / 2015 /*"
          ]
        }
      }
    }
  ]
}
```

```
}  
  ]  
    }  
      }
```

11 Manage RDS permissions by using RAM

This topic describes how to manage RDS permissions of RAM users by creating policies in RAM.

Common policies

The following table lists some common policies that can be created in RAM to manage RDS permissions.

Policy	Description
AliyunRDSFullAccess	Grants a RAM user full management permissions for RDS instances.
AliyunRDSReadOnlyAccess	Grants a RAM user read-only permission for RDS instances.



Note:

For more information about RDS permissions, see [RAM authorization](#).

Attach custom policies to RAM users

1. Create custom policies according to the subsequent RDS authorization examples.

For more information, see [#unique_50](#).

2. Locate the target policy and click the policy name.
3. On the References tab, click Grant Permission.
4. In the Principal field, enter the ID or name of the target RAM user.
5. Click OK.



Note:

You can also attach policies to a RAM user or a RAM user group as needed. For more information, see [Permission granting in RAM](#).

RDS authorization examples

- **Example 1:** As a RAM administrator with multiple instances, authorize a user to operate on only two of your instances.

The IDs of these two RDS instances are i-001 and i-002.

```
{
```

```

" Statement ": [
  {
    " Action ": " rds :*",
    " Effect ": " Allow ",
    " Resource ": [
      " acs : rds :*:*: dbinstance / i - 001 ",
      " acs : rds :*:*: dbinstance / i - 002 "
    ]
  },
  {
    " Action ": " rds : Describe *",
    " Effect ": " Allow ",
    " Resource ": "*"
  }
],
" Version ": " 1 "
}

```

**Note:**

- The authorized RAM user can view all the RDS instances but can only operate on two of them.
 - The `Describe *` element is required in a policy. If a policy does not contain the `Describe *` element, the authorized RAM user cannot view any instance in the console. However, the RAM user can operate on the two specified RDS instances by calling API actions, by using the CLI, or by using RDS SDKs.
- **Example 2: As a RAM administrator, authorize a user to access data in the Alibaba Cloud Data Management System (DMS).**
 - Authorize a RAM user to access a specified RDS instance.

```

{
  " Statement ": [
    {
      " Action ": " dms : LoginDatab ase ",
      " Effect ": " Allow ",
      " Resource ": " acs : rds :*:*: dbinstance / rds783a063
9ks5k7 ****"
    }
  ],
  " Version ": " 1 "
}

```

**Note:**

You need to replace `rds783a063 9ks5k7 ****` with the ID of the RDS instance to be accessed.

- Authorize a RAM user to access all RDS instances.

```

{
  " Statement ": [

```

```
{
  " Action ": " dms : LoginDatab ase ",
  " Effect ": " Allow ",
  " Resource ": " acs : rds :*:~:*"
}
],
" Version ": " 1 "
}
```

12 Manage SLB permissions by using RAM

This topic describes how to manage SLB permissions of RAM users by creating policies in RAM.

Common policies

The following table lists some common policies that can be created in RAM to manage SLB permissions.

Policy	Description
AliyunSLBFullAccess	Grants a RAM user full management permissions for SLB instances.
AliyunSLBReadOnlyAccess	Grants a RAM user read-only permission for SLB instances.



Note:

For more information about SLB permissions, see [RAM authentication](#).

Attach custom policies to RAM users

1. Create custom policies according to the subsequent SLB authorization examples.

For more information, see [#unique_50](#).

2. Locate the target policy and click the policy name.
3. On the References tab, click Grant Permission.
4. In the Principal field, enter the ID or name of the target RAM user.
5. Click OK.



Note:

You can also attach policies to a RAM user or a RAM user group as needed. For more information, see [Permission granting in RAM](#).

SLB authorization examples

- **Example 1:** As a RAM administrator with multiple instances, authorize a user to operate on only two of your instances.

The IDs of these two SLB instances are i-001 and i-002.

```
{
```

```

" Statement ": [
  {
    " Effect ": " Allow ",
    " Action ": " slb :*",
    " Resource ": [
      " acs : slb :*:*: loadbalanc er / i - 001 ",
      " acs : slb :*:*: loadbalanc er / i - 002 "
    ]
  },
  {
    " Effect ": " Allow ",
    " Action ": " slb : Describe *",
    " Resource ": "*"
  }
],
" Version ": " 1 "
}

```

**Note:**

- The authorized RAM user can view all the SLB instances but can only operate on two of them.
- The `Describe *` element is required in a policy. If a policy does not contain the `Describe *` element, the authorized RAM user cannot view any instance in the console. However, the RAM user can operate on the two specified SLB instances by calling API actions, by using the CLI, or by using SLB SDKs.

- **Example 2:** As a RAM administrator, authorize a user to add ECS instances to an SLB instance. The ID the SLB instance is i-001.

```

{
  " Statement ": [
    {
      " Effect ": " Allow ",
      " Action ": " slb : AddBackend Servers ",
      " Resource ": [" acs : slb :*:*: loadbalanc er / slb - 001 " ]
    },
    {
      " Effect ": " Allow ",
      " Action ": " slb : AddBackend Servers ",
      " Resource ": [" acs : ecs :*:*: instance / i - 001 " ]
    },
    {
      " Effect ": " Allow ",
      " Action ": " slb : DescribeLoadBalancer s ",
      " Resource ": " acs : slb :*:*: loadbalanc er /*"
    }
  ],
  " Version ": " 1 "
}

```

**Note:**

After you have granted the SLB management permission to a RAM user according to the policy described in example 1, you also need to grant the following permissions to the user so that the user can add or remove ECS instances, or set the weight of ECS instances as needed:

- The permission for SLB resources
- The permission for ECS resources

- **Example 3: As a RAM administrator, authorize a user to perform any ECS-related operations on a specified SLB instance.**

```
{
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "slb:*",
      "Resource": [
        "acs:slb:*:*:loadbalancer/i-001",
        "acs:slb:*:*:loadbalancer/i-002"
      ]
    },
    {
      "Effect": "Allow",
      "Action": "slb:Describe*",
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": "slb:*",
      "Resource": "acs:ecs:*:*:*"
    }
  ],
  "Version": "1"
}
```



Note:

The preceding policy allows a RAM user to manage two specified SLB instances (IDs: i-001 and i-002) and perform all ECS-related operations on these two SLB instances, for example, add ECS instances to these two SLB instances and set the weight of ECS.

13 Manage CDN permissions by using RAM

This topic describes how to manage CDN permissions of RAM users by creating policies in RAM.

Common policies

The following table lists some common policies that can be created in RAM to manage CDN permissions.

Policy	Description
AliyunCDNFullAccess	Grants a RAM user full management permissions for CDN instances.
AliyunCDNReadOnlyAccess	Grants a RAM user read-only permission for CDN instances.



Note:

For more information about CDN permissions, see [API authentication rules](#).

Authorize a RAM user to perform the read-only, cache refresh, and push operations on CDN instances

1. Create a custom policy.

```
{
  "Version": "1",
  "Statement": [
    {
      "Action": [
        "cdn:Describe*",
        "cdn:PushObjectCache",
        "cdn:RefreshObjectCaches"
      ],
      "Resource": "acs:cdn:*:*:*:*",
      "Effect": "Allow"
    }
  ]
}
```

For more information, see [#unique_50](#).

2. Locate the target policy and click the policy name.
3. On the References tab, click Grant Permission.
4. In the Principal field, enter the ID or name of the target RAM user.

5. Click OK.**Note:**

You can also attach policies to a RAM user or a RAM user group as needed. For more information, see [Permission granting in RAM](#).

14 Record RAM operations by using ActionTrail

This topic describes how to record operations of an Alibaba Cloud account or a RAM user on resources by using ActionTrail.

View RAM operations by using ActionTrail

1. Log on to the [ActionTrail console](#).
2. On the History Search page, use the Filter drop-down list to search for the target event.
3. Click the event, then click View event.

Operations recorded by ActionTrail

ActionTrail can record the following RAM operations:

- Logon information of an Alibaba Cloud account or a RAM user. For more information, see [ConsoleSignin event log examples](#).
- Operations in the RAM console. The following is an example of a recorded operation event:

```
{
  " apiVersion ":" 2015 - 05 - 01 ",
  " eventId ":" 2cc52dee - d8d2 - 40c2 - 8de0 - 3a2cf1df ****",
  " eventName ":" DeleteGroup ",
  " eventSource ":" ram . aliyuncs . com ",
  " eventTime ":" 2015 - 11 - 03T13 : 41 : 49Z ",
  " eventType ":" ApiCall ",
  " eventVersion ":" 1 ",
  " requestId ":" 9AE24F49 - C52C - 4F0F - BCF9 - 9A4B8C22B1 47
",
  " requestParameters ":{
    " groupName ":" grp1 ",
  },
  " serviceName ":" Ram ",
  " sourceIpAddress ":" 42 . 120 . XX . XX ",
  " userAgent ":" AliyunConsole ",
  " userIdentity ":{
    " type ":" ram - user ",
    " principalId ":" 2741806465 4829 ****",
    " accountId ":" 1234567890 12 ****",
    " userName ":" Alice ",
    " sessionContext ":{
      " sessionAttributes ":{
        " creationDate ":" 2015 - 11 - 03T13 : 41 : 48Z ",
        " mfaAuthenticated ":" true "
      }
    }
  }
}
```

- RAM and STS API calls for resource creation, change, and deletion. The following is an example of a recorded event:

```
{
  " apiVersion ": " 2015 - 05 - 01 ",
  " eventId ": " 234ef3c7 - 8938 - 4bd7 - bb80 - 11754b7b ****",
  " eventName ": " CreateGroup ",
  " eventSource ": " ram . aliyuncs . com ",
  " eventTime ": " 2016 - 01 - 04T08 : 58 : 50Z ",
  " eventType ": " ApiCall ",
  " eventVersion ": " 1 ",
  " recipientAccountId ": " 43274 ",
  " requestId ": " 1485748C - DB62 - 4693 - AB7E - 4BA3F3A970 E1
",
  " requestParameters ": {
    " Comments ": " this is a test group ",
    " groupName ": " grp1 "
  },
  " serviceName ": " Ram ",
  " sourceIpAddress ": " 42 . 120 . XX . XX ",
  " userAgent ": " aliyuncli / 2 . 0 . 6 ",
  " userIdentity ": {
    " type ": " ram - user ",
    " principalId ": " 2741806465 4829 ****",
    " accountId ": " 43274 ",
    " accessKeyId ": " f6Iz ***** EI4d ",
    " userName ": " Alice "
  }
}
```

What to do next

For more information about operation records, see [ActionTrail event log syntax](#).

15 Authorize RAM users to use ActionTrail resources

This topic describes how to authorize RAM users to use ActionTrail resources by using system policies or custom policies.

Before you begin

1. View the ActionTrail API actions and their descriptions. For more information, see [RAM account authentication](#).
2. View the RAM policy structure and syntax. For more information, see [Policy structure and grammar](#).

Procedure

1. Create a RAM user.

For more information, see [#unique_66](#).

2. Grant permission to the RAM user.

- You can grant required permissions to the RAM user by attaching one or more system policies according to the subsequent ActionTrail-related system policies.

For more information, see [Permission granting in RAM](#).

- You can grant fine-grained permissions to the RAM user by creating custom policies according to the subsequent authorization examples.

For more information, see [#unique_50](#).

ActionTrail-related system policies

The following table lists the system policies that are commonly used in ActionTrail.

Table 15-1: System policies

System policy	Description
AliyunActionTrailFullAccess	Grants a RAM user full management permissions for ActionTrail resources.
AliyunActionTrailReadOnlyAccess	Grants a RAM user read-only permission for ActionTrail resources.

Authorization examples

- **Example 1: As a RAM administrator, grant a user read-only permission.**

```
{
  " Version ": " 1 ",
  " Statement ": [{
    " Effect ": " Allow ",
    " Action ": [
      " actiontrail : LookupEvents ",
      " actiontrail : Describe *",
      " actiontrail : Get *"
    ],
    " Resource ": "*"
  }]
}
```

- **Example 2: As a RAM administrator, grant a user read-only permission when they log on from a specified IP address.**

```
{
  " Version ": " 1 ",
  " Statement ": [{
    " Effect ": " Allow ",
    " Action ": [
      " actiontrail : LookupEvents ",
      " actiontrail : Describe *",
      " actiontrail : Get *"
    ],
    " Resource ": "*",
    " Condition ": {
      " IPAddress ": {
        " acs : SourceIp ": " 42 . 120 . XX . X / 24 "
      }
    }
  }]
}
```