Alibaba Cloud
Resource Access Management

Tutorials

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Document conventions

Style	Description	Example
	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.
	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.
	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.
	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]`

Style	Description	Example
{} or {a|b}	**This format is used for a required value, where only one item can be selected.**	`switch {active|stand}`

Contents

1 Use RAM to manage permissions of O&M engineers

This topic describes how to use RAM to grant and then manage permissions of O&M engineers.

Prerequisites

An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click *Create a new Alibaba Cloud account*.

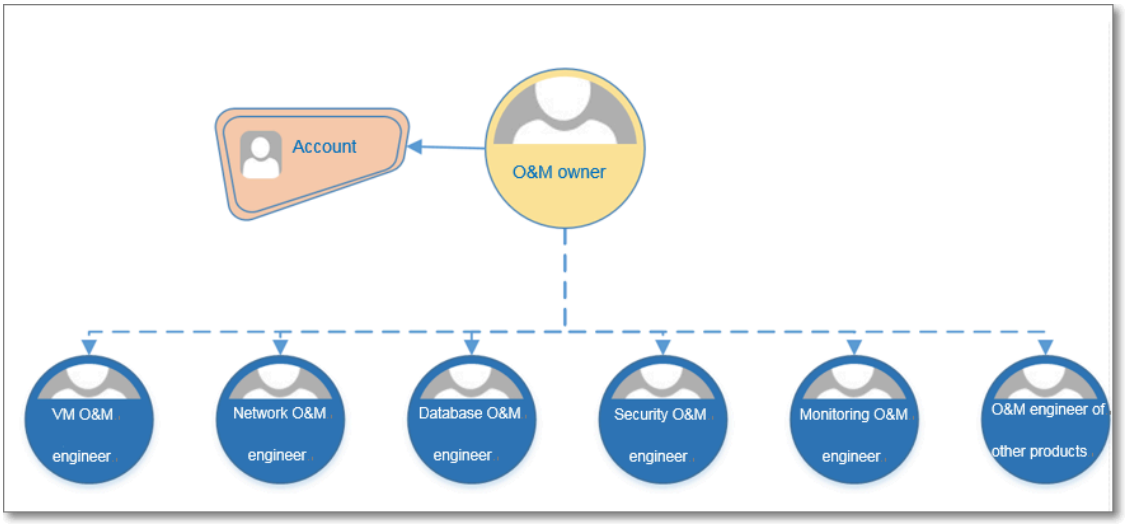
Context

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 Alibaba 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.



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. ***#unique_4*.**
3. **In the User Logon Name/Display Name column, find the target RAM user.**
4. **Click Add Permissions.**
5. **In the Policy Name column, click `AliyunRDSFullAccess` and `AliyunDTSFullAccess`.**
6. **Click OK.**
7. **Click Finished.**

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

O&M owner	Policy	Description
O&M owner	AdministratorAccess	Grants the O&M owner the permission to manage all Alibaba Cloud resources.
VM O&M engineer	AliyunECSFullAccess	Grants the VM O&M engineer the permission to manage Elastic Compute Service (ECS).
	AliyunESSFullAccess	Grants the VM O&M engineer the permission to manage Elastic Scaling Service (ESS).
	AliyunSLBFullAccess	Grants the VM O&M engineer the permission to manage Server Load Balancer (SLB).
	AliyunNASFullAccess	Grants the VM O&M engineer the permission to manage Network Attached Storage (NAS).
	AliyunOSSFullAccess	Grants the VM O&M engineer the permission to manage Object Storage Service (OSS).

O&M owner	Policy	Description
	AliyunOTSFullAccess	Grants the VM O&M engineer the permission to manage Table Store (OTS).
Network O&M engineer	AliyunCDNFullAccess	Grants the network O&M engineer the permission to manage Content Delivery Network (CDN).
	AliyunCENFullAccess	Grants the network O&M engineer the permission to manage Cloud Enterprise Network (CEN).
	AliyunCommonBandwidthPackageFullAccess	Grants the network O&M engineer the permission to manage Internet Shared Bandwidth.
	AliyunEIPFullAccess	Grants the network O&M engineer the permission to manage Elastic IP (EIP).
	AliyunExpressConnectFullAccess	Grants the network O&M engineer the permission to manage ExpressConnect.
	AliyunNATGatewayFullAccess	Grants the network O&M engineer the permission to manage NAT Gateway.
	AliyunSCDNFullAccess	Grants the network O&M engineer the permission to manage Secure Content Delivery Network (SCDN).
	AliyunSmartAccessGatewayFullAccess	Grants the network O&M engineer the permission to manage Smart Access Gateway.
	AliyunVPCFullAccess	Grants the network O&M engineer the permission to manage Virtual Private Cloud (VPC).
	AliyunVPNGatewayFullAccess	Grants the network O&M engineer the permission to manage VPN Gateway.

O&M owner	Policy	Description
Database O&M engineer	AliyunRDSFullAccess	Grants the database O&M engineer the permission to manage Relational Database Service (RDS).
	AliyunDTSFullAccess	Grants the database O&M engineer the permission to manage Data Transmission Service (DTS).
Security O&M engineer	AliyunYundunFullAccess	Grants the security O&M engineer the permission to manage Alibaba Cloud Security.
Monitoring O&M engineer	AliyunActionTrailFullAccess	Grants the monitoring O&M engineer the permission to manage ActionTrail.
	AliyunARMSFullAccess	Grants the monitoring O&M engineer the permission to manage Application Real-Time Monitoring Service ARMS).
	AliyunCloudMonitorFullAccess	Grants the monitoring O&M engineer the permission to manage CloudMonitor.
	(Optional) ReadOnlyAccess	Optional. Grants the monitoring O&M engineer the read-only permission to all Alibaba Cloud resources.
	AliyunSupportFullAccess	Grants the monitoring O&M engineer the permission to manage Alibaba Cloud support systems.

2 Use RAM to limit the IP addresses used to access Alibaba Cloud resources

This topic describes how to use RAM to limit the IP addresses that are used to access Alibaba Cloud resources. This feature of RAM enables a higher level of security.

Prerequisites

- **An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click** *Create a new Alibaba Cloud account*.
- **The RAM service is activated, and you can log on to the** *RAM console*. **If the RAM service is not activated, activate the service before proceeding. For more information, see** *#unique_6*.
- **You have a basic knowledge of the policy elements, structure, and syntax before creating a custom policy. For more information, see** *#unique_7* **and** *#unique_8*.

Context

Enterprise A has purchased more than one type of Alibaba Cloud resources, such as ECS instances, RDS instances, SLB instances, and OSS buckets. To ensure business and data security, this enterprise wants to only allow RAM users to access Alibaba Cloud resources from its IP addresses of the corporate intranet.

Solution

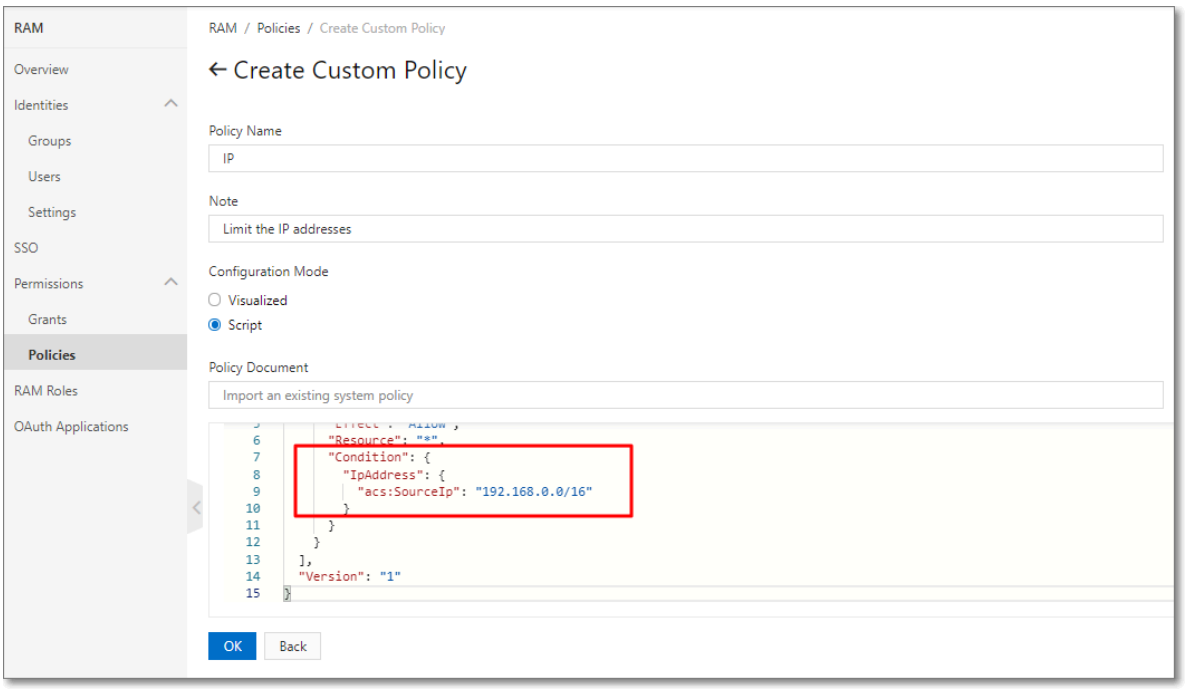
To only allow RAM users to access Alibaba Cloud resources from the specified IP addresses, create and attach a custom policy for the RAM users.

1. *#unique_4*.
2. *Create a custom policy*.
3. *#unique_9*.

Create a custom policy

1. **In the left-side navigation pane, click Policies under Permissions.**
2. **On the Policies page, click Create Policy.**
3. **On the page that appears, specify the Policy Name and Note parameters.**

4. Under Configuration Mode, select Script. Copy and paste the following sample script to the *Policy Document* area, and edit the script based on your business needs.



If the following policy is attached to a RAM user, the RAM user can only access ECS instances from the IP addresses in the CIDR block range of 192.168.0.0/16. In this case, the `acs:SourceIp` parameter in `Condition` is set to `192.168.0.0/16`.

```
{
  "Statement": [
    {
      "Action": "ecs:*",
      "Effect": "Allow",
      "Resource": "*",
      "Condition": {
        "IpAddress": {
          "acs:SourceIp": "192.168.0.0/16"
        }
      }
    }
  ],
  "Version": "1"
}
```

Note:

The `Condition` setting only applies to the actions that are specified for the current policy. You can change the `192.168.0.0/16` CIDR block to the IP address of your corporate intranet.

5. Click OK.

3 Use RAM to limit the time of accessing Alibaba Cloud resources

This topic describes how to use RAM to limit the time of accessing Alibaba Cloud resources to enable a higher level of security.

Prerequisites

- **An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click** *Create a new Alibaba Cloud account*.
- **The RAM service is activated, and you can log on to the** *RAM console*. **If the RAM service is not activated, activate the service before proceeding. For more information, see** *#unique_6*.
- **You have a basic knowledge of the policy elements, structure, and syntax before creating a custom policy. For more information, see** *#unique_7* **and** *#unique_8*.

Context

Enterprise A has purchased more than one type of Alibaba Cloud resources, such as ECS instances, RDS instances, SLB instances, and OSS buckets. To ensure business and data security, this enterprise wants RAM users to only access Alibaba Cloud resources during the working hours.

Solution

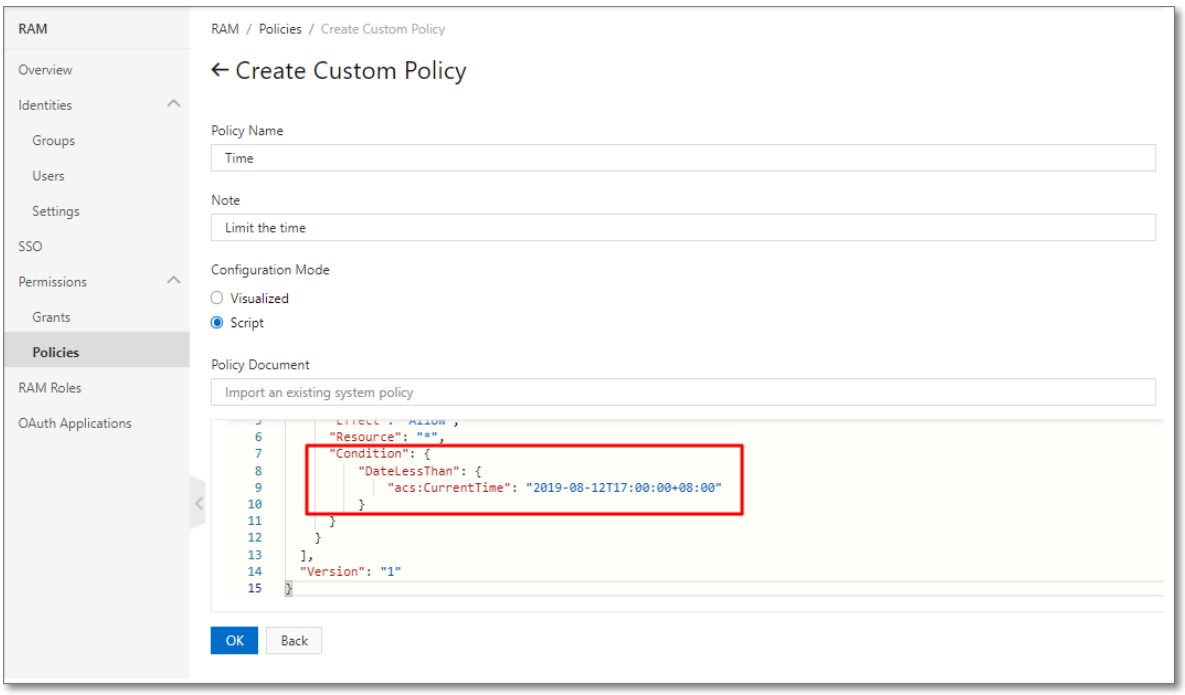
To only allow RAM users to access Alibaba Cloud resources during the specified period, create and attach a custom policy for the RAM users.

1. *#unique_4*.
2. *Create a custom policy*.
3. *#unique_9*.

Create a custom policy

1. **In the left-side navigation pane, click Policies under Permissions.**
2. **On the Policies page, click Create Policy.**
3. **On the page that appears, specify the Policy Name and Note parameters.**

4. **Under Configuration Mode, select Script. Copy and paste the following sample script to the *Policy Document* area, and edit the script based on your business needs.**



If the following policy is attached to a RAM user, the RAM user can only access ECS instances before 17:00 on August 12, 2019 (UTC+8). In this case, the `acs:CurrentTime` parameter in `Condition` is set to `2019-08-12T17:00:00+08:00`.

```
{
  "Statement": [
    {
      "Action": "ecs:*",
      "Effect": "Allow",
      "Resource": "*",
      "Condition": {
          "DateLessThan": {
              "acs:CurrentTime": "2019-08-12T17:00:00+08:00"
          }
      }
    }
  ],
  "Version": "1"
}
```

Note:

The `Condition` setting only applies to the actions that are specified for the current policy. You can change the `2019-08-12T17:00:00+08:00` value if necessary.

5. **Click OK.**

4 Use RAM to limit the methods of accessing Alibaba Cloud resources

This topic describes how to use RAM to limit the methods of accessing Alibaba Cloud resources to enable a higher level of security.

Prerequisites

- **An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click *Create a new Alibaba Cloud account*.**
- **The RAM service is activated, and you can log on to the *RAM console*. If the RAM service is not activated, activate the service before proceeding. For more information, see *#unique_6*.**
- **You have a basic knowledge of the policy elements, structure, and syntax before creating a custom policy. For more information, see *#unique_7* and *#unique_8*.**

Context

Enterprise A has purchased more than one type of Alibaba Cloud resources, such as ECS instances, RDS instances, SLB instances, and OSS buckets. To ensure business and data security, this enterprise wants to only allow RAM users to access Alibaba Cloud resources by using the HTTPS method.

Solution

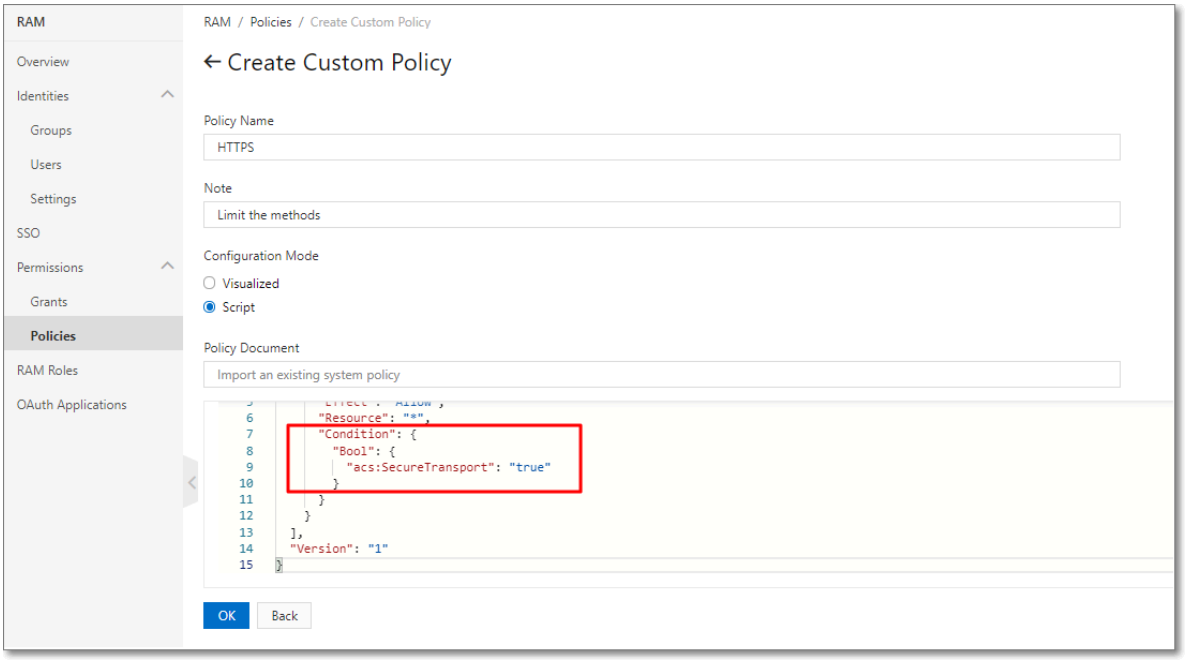
To only allow RAM users to access Alibaba Cloud resources by using the HTTPS method, create and attach a custom policy for the RAM users.

1. *#unique_4*.
2. *Create a custom policy*.
3. *#unique_9*.

Create a custom policy

1. **In the left-side navigation pane, click Policies under Permissions.**
2. **On the Policies page, click Create Policy.**
3. **On the page that appears, specify the Policy Name and Note parameters.**

4. **Under Configuration Mode, select Script. Copy and paste the following sample script to the *Policy Document* area, and edit the script based on your business needs.**



If the following policy is attached to a RAM user, the RAM user can only access ECS instances by using the HTTPS method. In this case, the `acs:SecureTransport` parameter in `Condition` is set to `true`.

```
{
  "Statement": [
    {
      "Action": "ecs:*",
      "Effect": "Allow",
      "Resource": "*",
      "Condition": {
        "Bool": {
          "acs:SecureTransport": "true"
        }
      }
    }
  ],
  "Version": "1"
}
```

Note:

The `Condition` setting only applies to the actions that are specified for the current policy. The valid values for the `acs:SecureTransport` parameter include `true` and `false`.

5. **Click OK.**

5 Use a temporary STS token to authorize a mobile app to access Alibaba Cloud resources

This topic describes how to use a temporary STS token of a RAM role to authorize a mobile app to access Alibaba Cloud resources.

Prerequisites

An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click *Create a new Alibaba Cloud account*.

Context

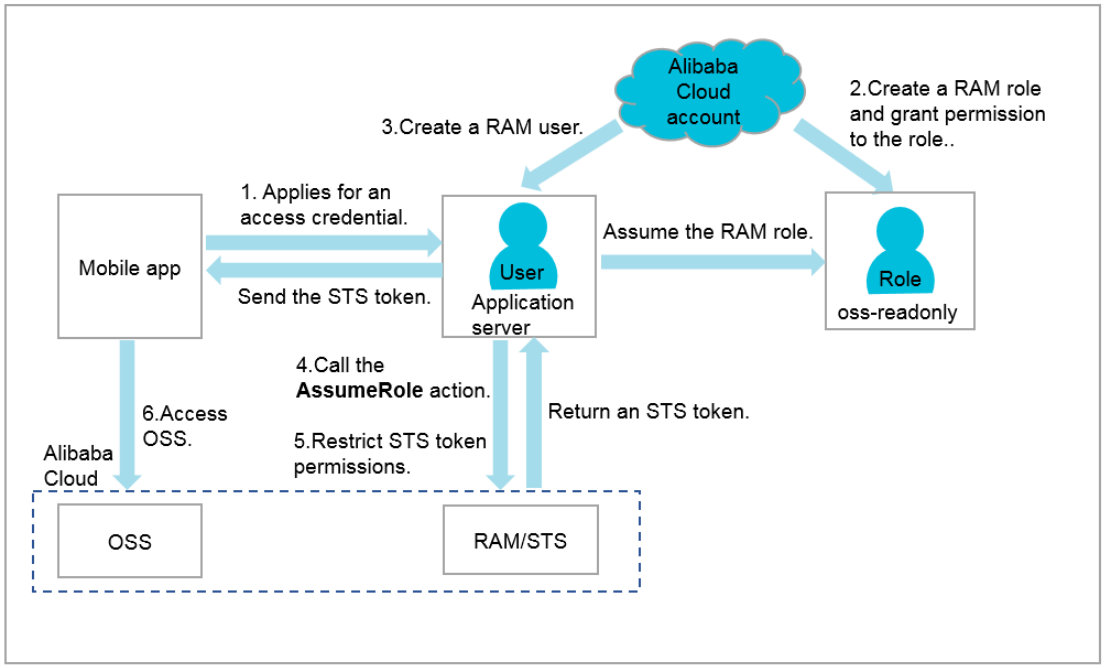
Enterprise A has developed a mobile app and purchased the OSS service. The mobile app runs on mobile devices, which are not controlled by Enterprise A. Enterprise A must grant necessary permissions to the mobile app. Then, the mobile app can access OSS to upload and download data.

The requirements of Enterprise A are as follows:

- **Direct data transmission: The mobile app no longer transfers data through the application server of Enterprise A. It directly uploads data to or downloads data from OSS.**
- **Security control: AccessKey pairs are not saved on mobile devices. Mobile devices are controlled by app users and cannot provide trusted operating environments.**
- **Risk control: Security risks are minimized. During direct access to OSS, each app client is authorized according to the principle of least privilege (POLP) and the access duration is strictly controlled.**

Solution

Before a mobile app can directly connect to OSS to upload or download data, the mobile app must apply for an access credential from the application server. The application server assumes a RAM role as a RAM user, and calls the `AssumeRole` STS API operation to obtain a temporary STS token. The temporary STS token is sent to the mobile app. Then, the mobile app can use the temporary STS token to access OSS.



1. **The mobile app applies for an access credential from the application server.**
2. **Enterprise A uses its Alibaba Cloud account to create a RAM role and grant necessary permissions to the role. For more information, see** *Create a RAM role and grant necessary permissions*.
3. **Enterprise A uses its Alibaba Cloud account to create a RAM user for the application server and allows the application server to assume the RAM role. For more information, see** *Create a RAM user and allow the user to assume a RAM role*.
4. **The application server calls the** *#unique_13* **STS API operation to obtain a temporary STS token of the RAM role. For more information, see** *Obtain the temporary STS token of the RAM role*.
5. **The application server further restricts the permissions of the temporary STS token for fine-grained access control on each mobile app. For more information, see** *Restrict the permissions of the temporary STS token*.
6. **The mobile app uses the temporary STS token to directly upload data to or download data from OSS. For more information, see** *Use the temporary STS token to access OSS*.

Create a RAM role and grant necessary permissions

The Alibaba Cloud account ID of Enterprise A used in the following procedure is `123456789012****`.

1. **Enterprise A uses its Alibaba Cloud account to create a RAM role named `oss-readonly`.**

   > **Note:**
   > **When the RAM role is created, the Current Alibaba Cloud Account is selected as the trusted account. This ensures that only RAM users under the account can assume this role.**

   For more information, see *#unique_14*.

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

   - **In this example, the Alibaba Cloud Resource Name (ARN) of the RAM role is `acs:ram::123456789012****:role/oss-readonly`.**
   - **The trust policy of the RAM role is illustrated as follows.**

     > **Note:**
     > **The following trust policy indicates that only RAM users under the current Alibaba Cloud account of Enterprise A can assume the RAM role:**

     ```
     {
     "Statement": [
     {
      "Action": "sts:AssumeRole",
      "Effect": "Allow",
      "Principal": {
        "RAM": [
          "acs:ram::123456789012****:root"
        ]
      }
     }
     ],
     "Version": "1"
     }
     ```

2. **Enterprise A uses its Alibaba Cloud account to attach the `AliyunOSSReadOnlyAccess` policy (OSS read-only permission) to the RAM role `oss-readonly`.**

   For more information, see *#unique_15*.

Create a RAM user and allow the user to assume a RAM role

1. **Enterprise A uses its Alibaba Cloud account to create a RAM user named `appserver`.**

   For more information, see *#unique_4*.

2. **Enterprise A uses its Alibaba Cloud account to attach the `AliyunSTSAssumeRoleAccess` policy to the RAM user. Then, the RAM user can assume a RAM role.**

   For more information, see *#unique_9*.

Obtain the temporary STS token of the RAM role

1. **The application server uses the AccessKey pair of the RAM user to call the `AssumeRole` STS API operation.**

   Note:
   The AccessKey pair for the application server must be configured.

   The following example describes how to use Alibaba Cloud CLI to call the `AssumeRole` operation:

```
$ aliyuncli sts AssumeRole --RoleArn acs:ram::123456789012****:role/
oss-readonly --RoleSessionName client-001
 {
     "AssumedRoleUser": {
         "AssumedRoleId": "391578752573****:client-001",
         "Arn": "acs:ram::123456789012****:role/oss-readonly/client-
001"
     },
     "Credentials": {
         "AccessKeySecret": "93ci2umK1QKNEja6WGqi1Ba7Q2Fv9P
wxZqtVF2Vy****",
         "SecurityToken": "********",
         "Expiration": "2016-01-13T15:02:37Z",
         "AccessKeyId": "STS.F13GjskXTjk38dBY6YxJt****"
     },
     "RequestId": "E1779AAB-E7AF-47D6-A9A4-53128708B6CE"
 }
```

   Note:
   In this example, the returned temporary STS token has all permissions of the RAM role `oss-readonly` because the `Policy` parameter is unspecified. The permissions of the temporary STS token can be restricted. For more information, see *Restrict the permissions of the temporary STS token*.

2. **The STS service sends the temporary STS token to the application server. The temporary STS token contains the following elements: `AccessKeyId`, `AccessKeySecret`, and `SecurityToken`.**

   Note:

The temporary STS token (`SecurityToken`) is only valid for a short period of time. If the mobile app requires a longer validity period, the application server can issue a new temporary STS token every 1,800 seconds.

Restrict the permissions of the temporary STS token

In actual scenarios, the `Policy` parameter must be configured to restrict the permissions of the temporary STS token, according to the user or device, to avoid unauthorized access. The following is an example of how this parameter is configured.

The following code sample indicates that only `sample-bucket/2015/01/01/*.jpg` can be accessed.

```
$ aliyuncli sts AssumeRole --RoleArn acs:ram::123456789012****: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": "391578752573****:client-002",
        "Arn": "acs:ram::123456789012****:role/oss-readonly/client-002"
    },
    "Credentials": {
        "AccessKeySecret": "28Co5Vyx2XhtTqj3RJgdud4ntyzrSNdUvNygAj7x
****",
        "SecurityToken": "********",
        "Expiration": "2016-01-13T15:03:39Z",
        "AccessKeyId": "STS.FJ6EMcS1JLZgAcBJSTDG1****"
    },
    "RequestId": "98835D9B-86E5-4BB5-A6DF-9D3156ABA567"
}
```

Note:
The default maximum validity period of the temporary STS token is 3,600 seconds. Enterprise A can specify the `DurationSeconds` parameter to limit the expiration time of the temporary STS token.

Use the temporary STS token to access OSS

1. **The application server sends the temporary STS token to the mobile app.**
2. **The mobile app uses the temporary STS token to access OSS.**

   The following example describes how to use Alibaba Cloud CLI and the temporary STS token to access an OSS object:

```
Configure the temporary STS token syntax: aliyuncli oss Config --
host  --accessid  --accesskey  --sts_token
```

```
$ aliyuncli oss Config --host oss.aliyuncs.com --accessid STS.
FJ6EMcS1JLZgAcBJSTDG1**** --accesskey 28Co5Vyx2XhtTqj3RJgdud4ntyzrSN
dUvNygAj7x**** --sts_token CAESnQMIARKAASJgnzMzlXVyJn4KI+FsysaIpTGm
8ns8Y74HVEj0pOevO8ZWXrnnkz4a4rBEPBAdFkh3197GUsprujsiU78Fkszx
hnQPKkQKcyvPihoXqKvuukrQ/Uoudk31KAJEz5o2EjlNUREcxWjRDRSISMzkxNTc4
NzUyNTczOTcyODU0KgpjbGllbnQtMDAxMKmZxIHBKjoGUnNhTUQ1Qn8KATEa
egoFQWxsb3cSJwoMQWN0aW9uRXF1YWxzEgZBY3Rpb24aDwoNb3NzOkdldE9i
amVjdBJICg5SZXNvdXJjZUVxdWFscxIIUmVzb3VyY2UaLAoqYWNzOm9zczoq
Oio6c2FtcGxlLWJ1Y2tldC8yMDE1LzAxLzAxLyouanBnSgU0MzI3NFIFMjY4
NDJaD0Fzc3VtZWRSb2xlVXNlcmAAahIzOTE1Nzg3NTI1NzM5NzI4NTRyCWVj
cy1hZG1pbnjgxt7Cj/bo****
Access OSS:
$ aliyuncli oss Get oss://sample-bucket/2015/01/01/grass.jpg grass.
jpg
```

Related topics

#unique_16

#unique_17

#unique_18

#unique_19

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.

Prerequisites

An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click *Create a new Alibaba Cloud account*.

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:

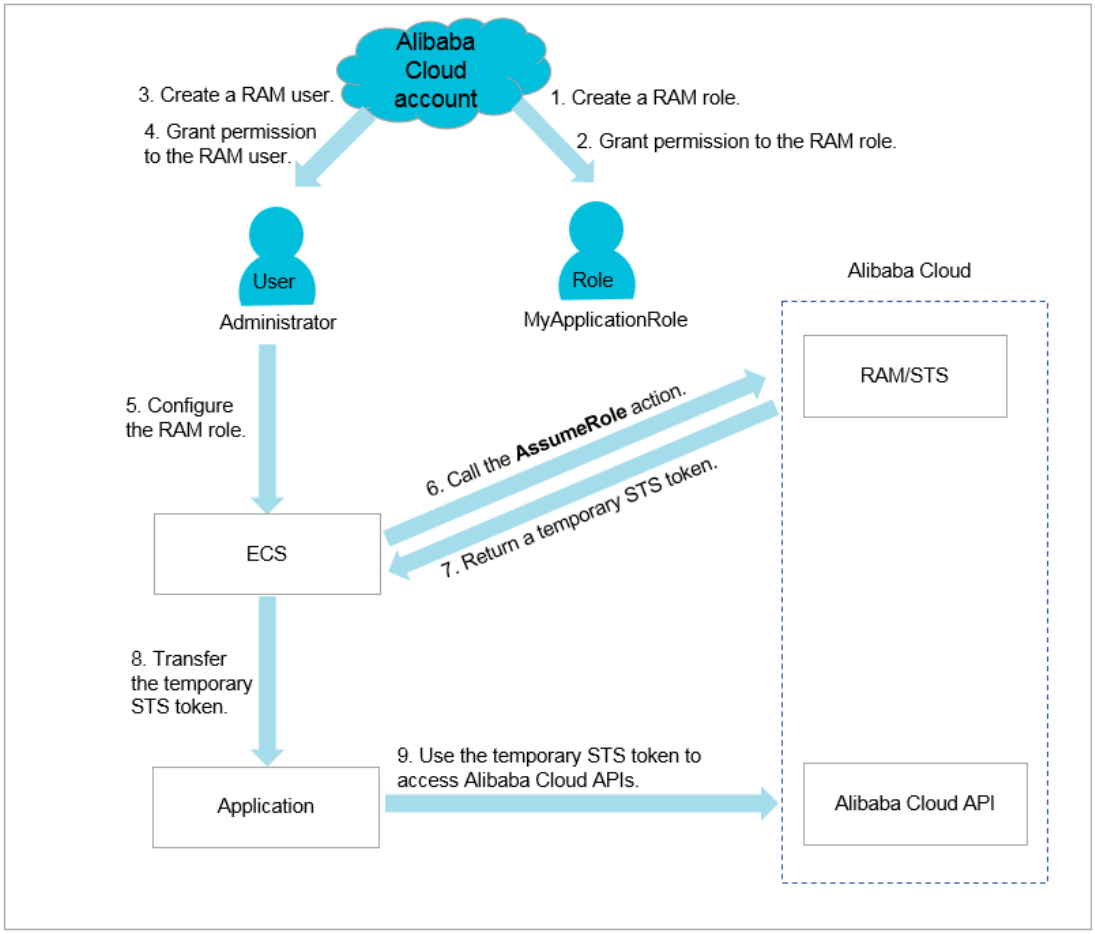
- **Embed the access keys into the code.**
- **Save the access keys in the configuration files of the applications.**

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.



Procedure

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 *#unique_21*.

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 *#unique_15*.

   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 *#unique_4*.

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 *#unique_22*.

   For information about how to grant permission to a RAM user, see *#unique_9*.

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.J8XXXXXXXXX4",
     "AccessKeySecret" : "9PjfXXXXXXXXBf2XAW",
     "Expiration" : "2017-06-09T09:17:19Z",
     "SecurityToken" : "CAIXXXXXXXXXXwmBkleCTkyI+",
     "LastUpdated" : "2017-06-09T03:17:18Z",
     "Code" : "Success"
     }cess"
     ```

```
}
```

- **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 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.**

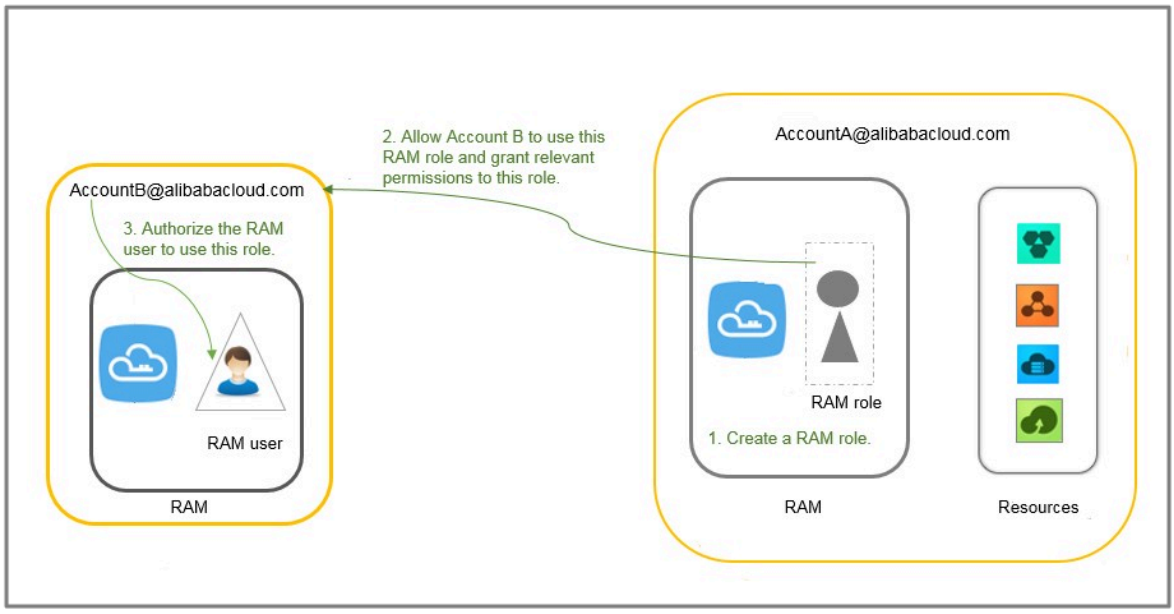
  For more information, see *Cross-account resource access*.
- **If Enterprise A or Enterprise B ends the agreement, Account A can revoke the permissions of Account B. In this case, all RAM users of Account B lose the permissions associated with this role.**

  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 7-1: 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_30*.

   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 `AliyunECSFullAccess` policy to the role ecs-admin.**

   For more information, see *#unique_31*.

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 `AliyunSTSAssumeRoleAccess` 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.

8 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 *#unique_33*.
4. **Create RAM users and add the users to different user groups.**

   For more information, see *#unique_34*.
5. **Create two custom policies and attach them to different user groups.**

   For more information, see *#unique_31*.

   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:DescribeTag*",
        "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:DescribeTag*"` 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.

9 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_36*.

10 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 *#unique_38*.

Attach custom policies to RAM users

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

   For more information, see *#unique_39*.
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 *#unique_31*.

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

11 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 *#unique_41*.

Attach custom policies to RAM users

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

   For more information, see *#unique_22*.
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** *#unique_42*.

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:ListObjects",
            "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 `ListBuckets`, `GetBucketAcl`, and `GetObjectAcl` actions to check whether the bucket is public.

```
{
    "Version": "1",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                      "oss:ListBuckets",
                      "oss:GetBucketStat",
                      "oss:GetBucketInfo",
                      "oss:GetBucketTagging",
                      "oss:GetBucketAcl"
                      ],
            "Resource": "acs:oss:*:*:*"
        },
        {
            "Effect": "Allow",
```

```
            "Action": [
                "oss:ListObjects",
                "oss:GetBucketAcl"
            ],
            "Resource": "acs:oss:*:*:myphotos"
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:GetObject",
                "oss:GetObjectAcl"
            ],
            "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:ListBuckets",
                      "oss:GetBucketStat",
                      "oss:GetBucketInfo",
                      "oss:GetBucketTagging",
                      "oss:GetBucketAcl"
                      ],
            "Resource": [
                "acs:oss:*:*:*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:ListObjects",
                "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:ListBuckets",
                      "oss:GetBucketStat",
                      "oss:GetBucketInfo",
                      "oss:GetBucketTagging",
                      "oss:GetBucketAcl"
                      ],
            "Resource": [
                "acs:oss:*:*:*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:ListObjects",
                "oss:GetObject"
            ],
            "Resource": [
                "acs:oss:*:*:myphotos",
                "acs:oss:*:*:myphotos/*"
            ]
        },
        {
            "Effect": "Deny",
            "Action": "oss:*",
            "Resource": [
                "acs:oss:*:*:*"
            ],
            "Condition":{
                "NotIpAddress": {
                    "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 directory to
users.
   └── qingdao
        ├── 2014
        └── 2015
```

  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 `ListObjects` permission is required.

```
{
    "Version": "1",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "oss:GetObject"
            ],
            "Resource": [
                "acs:oss:*:*:myphotos/hangzhou/2015/*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:ListObjects"
            ],
            "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:ListBuckets",
                      "oss:GetBucketStat",
                      "oss:GetBucketInfo",
                      "oss:GetBucketTagging",
                      "oss:GetBucketAcl"
                      ],
            "Resource": [
                "acs:oss:*:*:*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:GetObject",
                "oss:GetObjectAcl"
            ],
            "Resource": [
                "acs:oss:*:*:myphotos/hangzhou/2015/*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "oss:ListObjects"
            ],
            "Resource": [
                "acs:oss:*:*:myphotos"
            ],
            "Condition": {
                "StringLike": {
                    "oss:Delimiter": "/",
                    "oss:Prefix": [
                        "",
                        "hangzhou/",
                        "hangzhou/2015/*"
                    ]
```

```
                    }
                }
            }
        ]
}
```

12 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 *#unique_44*.

Attach custom policies to RAM users

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

   For more information, see *#unique_39*.
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 *#unique_31*.

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:LoginDatabase",
      "Effect": "Allow",
      "Resource": "acs:rds:*:*:dbinstance/rds783a0639ks5k7****"
    }
  ],
  "Version": "1"
}
```

Note:

You need to replace `rds783a0639ks5k7****` with the ID of the RDS instance to be accessed.

  - **Authorize a RAM user to access all RDS instances.**

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

```
      "Action": "dms:LoginDatabase",
      "Effect": "Allow",
      "Resource": "acs:rds:*:*:*"
    }
  ],
  "Version": "1"
}
```

13 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 *#unique_46*.

Attach custom policies to RAM users

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

   For more information, see *#unique_39*.
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 *#unique_31*.

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:*:*:loadbalancer/i-001",
                  "acs:slb:*:*:loadbalancer/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:AddBackendServers",
      "Resource": ["acs:slb:*:*:loadbalancer/slb-001"]
    },
    {
      "Effect": "Allow",
      "Action": "slb:AddBackendServers",
      "Resource": ["acs:ecs:*:*:instance/i-001"]
    },
    {
        "Effect": "Allow",
        "Action": "slb:DescribeLoadBalancers",
        "Resource": "acs:slb:*:*:loadbalancer/*"
    }
  ],
  "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.

14 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 *#unique_48*.

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_39*.
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 *#unique_31*.

15 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.

Prerequisites

An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click *Create a new Alibaba Cloud account*.

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. **Enter the user name, select Event Type and Time, and then click Search.**
4. **Find the target event, then click +.**
5. **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 *#unique_50*.**
- **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-BCF9-9A4B8C22B147",
    "requestParameters":{
        "GroupName":"grp1",
    },
    "serviceName":"Ram",
    "sourceIpAddress":"42.120.XX.XX",
    "userAgent":"AliyunConsole",
    "userIdentity":{
        "type":"ram-user",
        "principalId":"27418064654829****",
        "accountId":"123456789012****",
        "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-4BA3F3A970E1",
    "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": "27418064654829****",
        "accountId": "43274",
        "accessKeyId": "f6Iz********EI4d",
        "userName": "Alice"
    }
}
```

16 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. **An Alibaba Cloud account is created. If not, create one before proceeding. To create an Alibaba Cloud account, click** *Create a new Alibaba Cloud account*.
2. **View the ActionTrail API actions and their descriptions. For more information, see** *#unique_52*.
3. **View the RAM policy structure and syntax. For more information, see** *#unique_52*.

Procedure

1. *#unique_4*.
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 *#unique_31*.
   - **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_22*.

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"
            }
        }
    }]
}
```