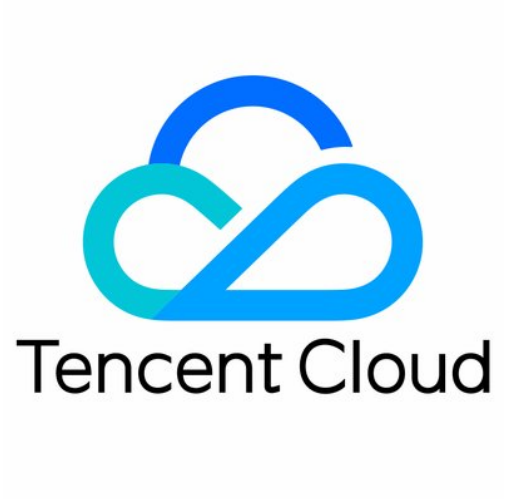
Cloud Log Service

Operation Guide

Product Documentation



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Overview

CLS manages the log data stored on it in the form of log topics and logsets. A log topic is the basic unit for log data collection, storage, search, and analysis, and a logset is used to categorize log topics for easier management.

This document describes how to manage logsets in the console. We recommend you read Log Topic and Logset first to learn more about concepts and use cases.

Prerequisites

You have logged in to the CLS console.

Directions

Creating logset

1. Click **Log Topic** on the left sidebar.
2. On the log topic management page, select the region, and click **Manage Logset**.
3. On the logset management page on the right, click **Create Logset**.
4. In the **Create Logset** pop-up window, enter the logset name and tag.
5. Click **OK**.

Viewing logset

1. Click **Log Topic** on the left sidebar.

2. On the log topic management page, select the region, and click **Manage Logset**.

3. Then you can view the logsets in the selected region on the right.

Editing logset

1. Click **Log Topic** on the left sidebar.

2. On the log topic management page, select the region, and click **Manage Logset**.

3. On the logset management page on the right, find the target logset ID/name and click **Edit**.

4. In the **Edit Logset** pop-up window, rename the logset.

5. Click **OK**.

Deleting logset

1. Click **Log Topic** on the left sidebar.

2. On the log topic management page, select the region, and click **Manage Logset**.

3. On the logset management page on the right, find the target logset ID/name and click **Delete**.

> Note：
> A logset can be deleted only when **no log topics are under it**. Otherwise, it cannot be deleted.

4. In the pop-up window, click **OK**.

Log Topic
Managing Log Topic

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Overview

CLS manages the log data stored on it in the form of log topics and logsets. A log topic is the basic unit for log data collection, storage, search, and analysis, and a logset is used to categorize log topics for easier management.

This document describes how to manage log topics in the console. We recommend you read Log Topic and Logset first to learn more about concepts and use cases.

Prerequisites

You have logged in to the CLS console.

Directions

Creating log topic

1. Click **Log Topic** on the left sidebar.

2. On the log topic management page, select a region and click **Create Log Topic**.

3. In the pop-up window, enter the following information:

   - Log Topic Name: For example, enter `nginx`.
   - Storage Class: STANDARD by default. For more information, see Storage Class Overview.
   - Log Retention Period: 30 days by default. You can specify a log storage period, after which logs will be automatically cleared. If LogListener is used, and a time field in the log content instead of the collection time is used as the logging time, the time specified by the time field will be used to determine whether a log expires.
   - Logset Operation:
     - Select an existing logset: Select the target logset from the **Logset** drop-down list.
     - Create logset:
       Logset Name: For example, enter `cls_test`.

- Log Topic Tag: Set a tag for the current log topic to be created, so that resources can be managed by category in different dimensions.
- Advanced Settings:
  - Partitions: Enter a positive integer. It defaults to 1. For more information, see Topic Partition.
  - Partition Auto-Split: Enabled by default.
  - Maximum Partitions: Enter an integer up to 50.
  - Logset Tag: This field is available only when **Logset Operation** is **Create logset**. You can set a tag for the logset to be created.

4. Click **OK**.
   After the log topic is created, you can click its ID/name on the **Log Topic** page to view its details.

Note：

- We recommend you select the same region as CVM or any other Tencent Cloud service from which logs are collected.
- After the log topic is created, its region and logset cannot be modified.
- Logs can be retained for 1 to 3600 days or permanently.

Editing log topic

1. Click **Log Topic** on the left sidebar.
2. On the log topic management page, find the target log topic ID/name and click **Edit**.
3. In the pop-up window, modify the basic information of the log topic.
4. Click **OK**.

Deleting log topic

1. Click **Log Topic** on the left sidebar.
2. On the log topic management page, find the target log topic ID/name and click **Delete**.
3. In the pop-up window, click **OK**.

Note：
Once a log topic is deleted, you cannot recover its topic configuration and log data.

Monitoring Traffic Statistics

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Traffic

Metric	Meaning	Unit	Dimension
Write traffic	Traffic incurred during log upload	MB	Log topic ID
Index traffic	Traffic incurred after the index feature is enabled	MB	Log topic ID
Private network read traffic	Private network read traffic incurred when a log is downloaded, consumed, or shipped via a private network	MB	Log topic ID
Public network read traffic	Public network read traffic incurred when a log is downloaded, consumed, or shipped via a public network	MB	Log topic ID
Read traffic	Total private and public network read traffic	MB	Log topic ID

Storage capacity

Metric	Meaning	Unit	Dimension
Log storage capacity	Storage capacity occupied by log data	MB	Log topic ID
Index storage capacity	Storage capacity occupied by index data	MB	Log topic ID
Storage Capacity	Total storage capacity occupied by log and index data	MB	Log topic ID

Service request quantity

Metric	Meaning	Unit	Dimension
Service requests	Number of requests that users use LogListener, API, or SDK to call CLS APIs, including read and write requests such as upload and download, creation and deletion, and search and analysis	COUNT	Log topic ID

Note：

The preceding monitoring metrics are reported to Cloud Monitor. For the corresponding detailed metrics and parameters, please see the CLS monitoring metrics.

Managing Topic Partition
Splitting Topic Partition

Last updated：2022-02-16 16:29:18

This document describes how to split topic partitions in the CLS console. CLS provides two operation modes: **auto-split** and **manual split**. In order to reduce the read/write restrictions due to traffic surges, we recommend you **enable auto-split**.

Overview

When a log topic is created, an initial number of partitions is set, which can be modified subsequently through partition split or merge based on the actual needs. As a single topic partition limits write requests (up to 500 requests/sec) and write traffic (up to 5 MB/sec), if your service requests exceed the upper limit of a single partition, you can increase the throughput of the log topic by splitting the partition so as to avoid write failures.

Directions

Auto-split

Note：
After the auto-split feature is enabled, if a topic partition keeps reaching the threshold of write requests or write traffic, CLS will automatically split it into a reasonable number of partitions (up to 50) based on the actual write conditions.
If the number of partitions of a log topic has reached the set maximum value, CLS will no longer trigger auto-split, and the excessive part will be rejected with an error code returned.

1. Log in to the CLS console.
2. On the left sidebar, click **Logset** to enter the logset management page.
3. Find the logset where you want to split topic partitions and click its ID/name to enter the logset information page.
4. In the **Log Topic** column, click the name of the log topic to enter its basic information page.
5. In the **Basic Info** column, click **Edit** as shown below:

6. In the pop-up dialog box, set **Partition Auto-Split** to and set the **Maximum Partitions** as shown below:

7. Click **OK** to complete partition auto-split.

Manual split

1. Log in to the CLS console.
2. On the left sidebar, click **Logset** to enter the logset management page.
3. Find the logset where you want to split topic partitions and click its ID/name to enter the logset information page.
4. In the **Log Topic** column, click the name of the log topic to enter its basic information page.
5. In the **Topic Partition Management** column, find the target topic partition to be split and click **Edit** as shown below:
6. In the pop-up dialog box, select **Split** as the **Operation** and set the **Partition Quantity** as shown below:

> Note
> Each partition has a left-closed, right-open range. Even split is used by default.

7. Click **OK** to complete split.

Merging Topic Partitions

Last updated：2021-03-10 10:06:05

Overview

This document describes how to merge topic partitions in the CLS console. By merging partitions in the adjacent range, the number of topic partitions can be reduced to avoid resource waste.

Notes

- Each log topic has at least one partition. If you only have one partition, you cannot merge it.
- Only one object adjacent to the specified topic partition can be merged at a time.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Logset** to enter the logset management page.
3. Find the logset where you want to merge topic partitions and click its ID/name to enter the logset information page.
4. In the **Log Topic** column, click the name of the log topic to enter its basic information page.
5. In the **Topic Partition Management** column, find the target topic partition to be merged and click **Edit** as shown below:
6. In the pop-up dialog box, select **Merge** as the **Operation** and select the object to be merged as shown below:
7. Click **OK** to complete merge.

Machine Group Management

Last updated：2022-01-19 12:43:17

Overview

A machine group is a server object configured to collect logs by LogListener of CLS. You can configure machine groups through the CLS console, and categorize them by use cases.

Directions

Creating a machine group by machine group IP

1. Log in to the CLS console.

2. Click **Machine Group** in the left sidebar.

3. Select the region of your CLS, such as Guangzhou, and then click **Create Machine Group**.

4. Configure the following information in the pop-up:

   - Logset Name: enter `cls_test` for example.
   - Configuration Mode: select **Configure machine group IP**.
   - IP: enter IPs of machines.

     Note：

     - Enter one IP per line. Do not enter IPs of Windows machines.
     - If you are using Tencent Cloud machines in the same region, you can enter private IPs directly, with one IP per line.
     - If you are using machine groups of different regions, enter public IPs.

   - LogListener Auto Upgrade: disclosed by default and can be configured.
   - LogListener Service Logs: enabled by default. This feature records logs of the running status and log collection among other aspects of LogListener. For details, see LogListener Service Logs.

5. Click **OK**.

Creating a machine group by machine ID

If your machine IPs change frequently, you need to modify machine group configuration once the IPs change.
To avoid the trouble, you can use CLS to configure machine groups dynamically by machine ID. You just need to enter the machine IDs when configuring LogListener, CLS will recognize and add these machines into the machine group automatically.

> Note：
> Configuring machine groups by machine ID is supported only on LogListener v2.3.0 and above. You need to upgrade lower versions manually to use this feature.

1. Log in to the CLS console.

2. Click **Machine Group** in the left sidebar.

3. Select the region of your CLS, such as Guangzhou, and then click **Create Machine Group**.

4. In the pop-up, configure the following items:

   - Logset Name: enter `cls_test` for example
   - Configuration Mode: select **Configure machine ID**
   - Machine ID: enter machine IDs.

     > Note：
     > Enter one machine ID per line, and do not enter Windows machine IDs.

   - LogListener Auto Upgrade: you're advised to enable this feature. For more information, see LogListener Upgrade Guide.
   - LogListener Service Logs: enabled by default. This feature records logs of the running status and log collection among other aspects of LogListener. For details, see LogListener Service Logs.

5. Click **OK**.

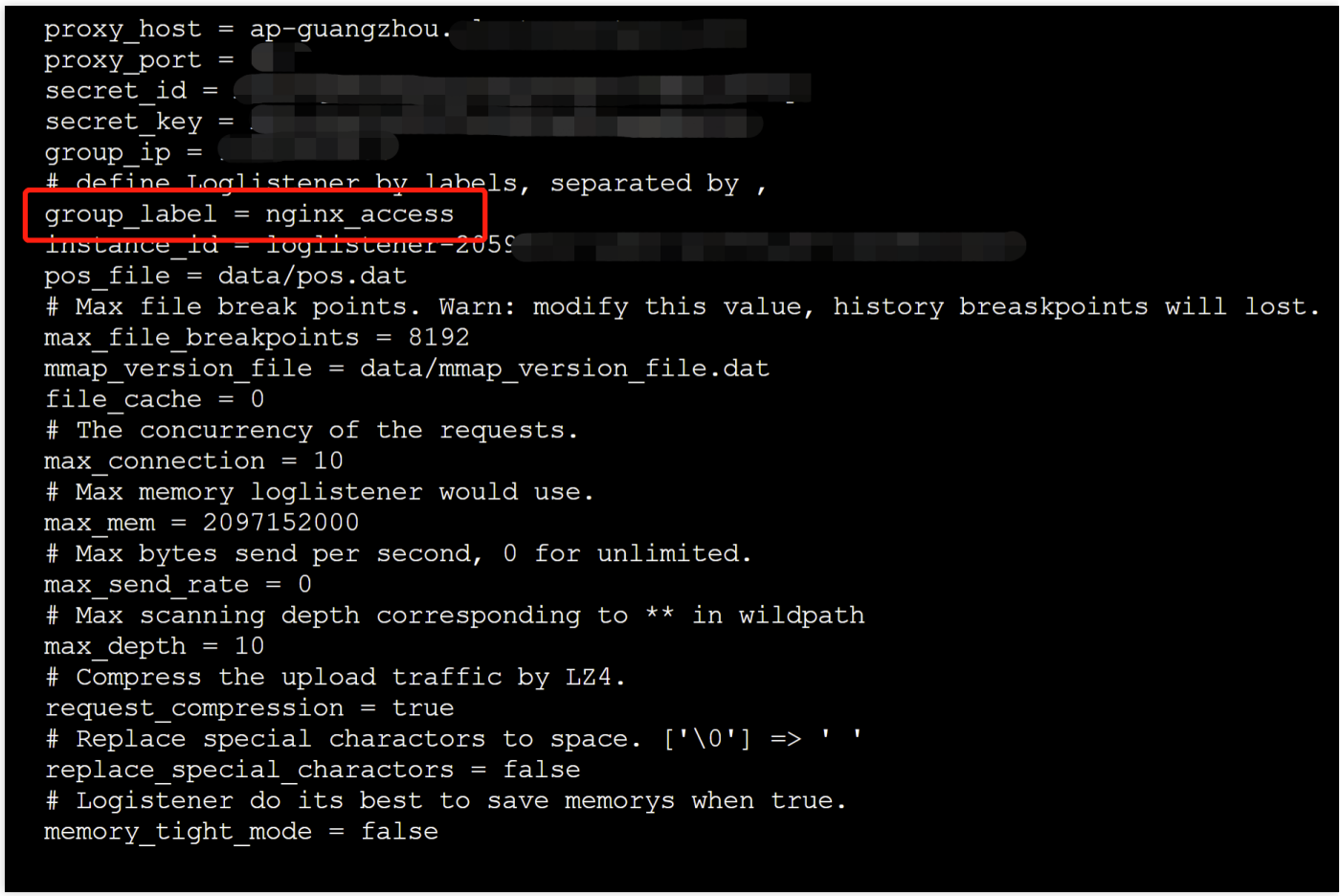
6. Log in to a machine added above, run the following command, open the `/etc/loglistener.conf` file under the installation directory of LogListener.

Take the `/user/local` installation directory as an example:

```
vi /usr/local/loglistener-2.3.0/etc/loglistener.conf
```

7. Press **i** to enter the edit mode.

8. Find the `group_label` parameter, and enter your custom machine IDs and separate them with a comma (,).



9. Press **Esc** to exit the edit mode.

0. Enter **:wq**, and press **Enter** to save the settings.

1. Run the following command, restart LogListener, and then the machine group will be created.

```
/etc/init.d/loglistenerd restart
```

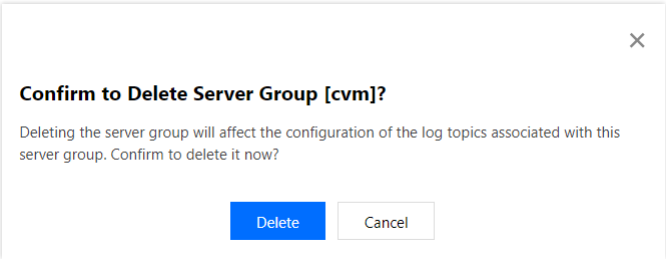
Viewing Machine Status

A machine group uses the heartbeat mechanism to maintain its connection with the CLS system. A machine group with LogListener installed regularly sends heartbeats to CLS.

1. Log in to the CLS console.
2. Click **Machine Group** in the left sidebar.
3. Find the target machine group, click **View**.
4. View the machine group status in the pop-up.
   You can view the machine group status to see if it works normally. If so, your server can communicate with CLS normally.

Deleting a machine group

1. Log in to the CLS console.
2. Click **Machine Group** in the left sidebar.
3. Find the target machine group, click **Delete**.
4. In the pop-up, click **OK**.



Note：
Once the machine group is deleted, logs will no longer be collected under its associated log topics.

Permission Management
CAM Access Management

Last updated：2022-10-17 14:52:48

Overview

CAM is a web-based Tencent Cloud service that helps you securely manage and control access to your Tencent Cloud resources. Using CAM, you can create, manage, and terminate users (user groups), and control who can access and use your Tencent Cloud resources through identity and policy management. For more information on CAM policies and how to use them, see Permissions and policies.

A root account can grant a sub-account or collaborator access to specified CLS resources.

Preset access policies

CLS offers two preset access policies to meet your basic access management demand.

- QcloudCLSFullAccess: Access to all CLS resources and actions, including creating log topics, modifying index configuration, deleting log topics, searching for logs, uploading logs, etc.
- QcloudCLSReadOnlyAccess: Only read access to CLS data; no CRUD access

For how to use the policies, see Authorization Management.

Custom access policies

You can use a custom access policy to grant access at a finer granularity, for example, to allow a specific user to view the data of a specific log topic.

A custom access policy consists of two parts:

- Action: The action a user is allowed to perform, such as searching for logs, modifying index configuration, uploading logs, and creating alarm policies
- Resource: The resources a user is allowed to operate on, such as a specific log topic, dashboard, data processing task

For more information on authorizable resource types and APIs of CLS, see Authorizable Resource Types. For more information on configuration methods, see Creating Custom Policy.

Configuring custom access policies can be a demanding process. The examples we offer in Examples of Custom Access Policies should meet most access management needs. You can also modify the examples based on your requirements.

1. Log in to the console with the root account (or an account with CAM access). On the Policies page, click **Create Custom Policy**.

2. In the pop-up window, click **Create by Policy Syntax**.

3. Select **Blank Template** and click **Next**.

4. Enter a policy name and policy content. For the latter, you can copy the content from Examples of Custom Access Policies.

5. Click **Complete** to save the policy. Then, you can associate it with a user/user group to grant the user/user group the corresponding operation permissions.

Authorizable Resource Types

Last updated：2022-04-18 15:02:55

Overview

CLS provides various types of resources. Some of its APIs allow you to configure user permissions based on resources. See here for examples.
The following table lists the types of resources that can be authorized in Cloud Access Management (CAM). Note that authorization by tag indicates whether a tag can be used to specify the range of resources on which users have operation permissions.

Resource Type	Resource Description Method in Access Policies	Authorization by Tag
Logset	`qcs::cls:$region:$account:logset/*` `qcs::cls:$region:$account:logset/$logsetId`	Supported
Log topic	`qcs::cls:$region:$account:topic/*` `qcs::cls:$region:$account:topic/$topicId`	Supported
Machine group	`qcs::cvm:$region:$account:machinegroup/*` `qcs::cvm:$region:$account:machinegroup/$machinegroupId`	Supported
Collection configuration	`qcs::cls:$region:$account:config/*` `qcs::cls:$region:$account:config/$configId`	Not supported
Dashboard	`qcs::cls:$region:$account:dashboard/*` `qcs::cls:$region:$account:dashboard/$dashboardId`	Supported
Alarm policy	`qcs::cls:$region:$account:alarm/*` `qcs::cls:$region:$account:alarm/$alarmId`	Not supported
Notification channel group	`qcs::cls:$region:$account:alarmNotice/*` `qcs::cls:$region:$account:alarmNotice/$alarmNoticeId`	Not supported
Data processing task	`qcs::cls:$region:uin/$account:datatransform/*` `qcs::cls:$region:uin/$account:datatransform/$TaskId`	Not supported
Shipping task (COS)	`qcs::cls:$region:$account:shipper/*` `qcs::cls:$region:$account:shipper/$shipperId`	Not supported

Resource Type	Resource Description Method in Access Policies	Authorization by Tag

Other resource types (disused; used by APIs of earlier versions only)	Single chart in the dashboard:
	`qcs::cls:$region:$account:chart/*`
	`qcs::cls:$region:$account:chart/$chartId`
		Not supported

You need to change the variable parameters such as `$region` and `$account` to your actual parameter information.

For all the APIs supported by CLS and their resource description methods, see here. APIs adopting the authorization granularity of resource support user permission configuration by using the methods of the corresponding resource types described above. For APIs adopting the authorization granularity of API, the corresponding resource range in a CAM permission policy must be `*` .

Practice

Different types of resources in CLS are associated with each other. For example, log sets contain log topics, and log topics must apply collection configuration to machine groups. Directly configuring user permissions in CAM permission policies according to resource IDs results in difficult management and is likely to cause the error where users do not have permissions on some APIs. Therefore, you are advised to configure CAM permission policies as follows:

- For resource types and corresponding APIs that support authorization by tag, bind related resources with tags and use tags to specify the ranges of resources on which users have operation permissions. For example, you can bind log topics, logsets, and related dashboards with tags so that you can assign management permissions on log topics with specified tags or assign management permissions on log topics and dashboards with specified tags. In either way, you can enable users to have the operation permissions on the APIs of the three types of resources.
- For resource types and corresponding APIs that do not support authorization by tag, to simplify management, you can directly set the resource range in the CAM permission policy to `*` , indicating all resources. To avoid misoperations by ordinary users, you can configure read-only permissions for ordinary users and management permissions for admins. For example, you can assign admins the management permissions on all data processing tasks and assign ordinary users the read-only permissions on all data processing tasks.

For more use cases, see Examples of Custom Access Policies.

Examples of Custom Access Policies

Last updated：2022-10-18 14:54:53

Authorization Policy Statements for Data Collection

Collecting data by using LogListener

Users can collect data and upload logs using the LogListener agent. The example below grants users the minimum access to uploading logs via LogListener.

```
{
"version": "2.0",
"statement": [{
"action": [
"cls:pushLog",
"cls:getConfig",
"cls:agentHeartBeat"
],
"resource": "*",
"effect": "allow"
}]
}
```

Note：
If your LogListener version is earlier than v2.6.5, you need to add "cls:listLogset" to the above content.

Uploading data with a self-built Kubernetes cluster

Users can collect and upload log data in self-built Kubernetes clusters with Logagent. The example below grants users the minimum permission to do so.

```
{
"version": "2.0",
"statement": [
{
"action": [
"cls:pushLog",
"cls:agentHeartBeat",
"cls:getConfig",
"cls:CreateConfig",
```

```
"cls:DeleteConfig",
"cls:ModifyConfig",
"cls:DescribeConfigs",
"cls:DescribeMachineGroupConfigs",
"cls:DeleteConfigFromMachineGroup",
"cls:ApplyConfigToMachineGroup",
"cls:DescribeConfigMachineGroups",
"cls:ModifyTopic",
"cls:DeleteTopic",
"cls:CreateTopic",
"cls:DescribeTopics",
"cls:CreateLogset",
"cls:DeleteLogset",
"cls:DescribeLogsets",
"cls:CreateIndex",
"cls:ModifyIndex",
"cls:CreateMachineGroup",
"cls:DeleteMachineGroup",
"cls:DescribeMachineGroups",
"cls:ModifyMachineGroup",
"cls:CreateConfigExtra",
"cls:DeleteConfigExtra",
"cls:DescribeConfigExtras",
"cls:ModifyConfigExtra"
],
"resource": "*",
"effect": "allow"
}
]
}
```

Uploading data by using an API

Users can upload logs to CLS using an API. The example below grants users the minimum access to uploading logs using an API.

```
{
"version": "2.0",
"statement": [{
"action": [
"cls:UploadLog"
],
"resource": "*",
"effect": "allow"
}]
}
```

Uploading data by using Kafka

Users can upload logs to CLS using the Kafka protocol. The example below grants users the minimum access to upload logs using the Kafka protocol.

```
{
"version": "2.0",
"statement": [{
"action": [
"cls:RealtimeProducer"
],
"resource": "*",
"effect": "allow"
}]
}
```

Managing collection configurations and machine groups

Users can create, modify, and delete collection configurations and machine groups.

- APIs with names containing **Config** are used to manage collection configuration related resources.
- APIs with names containing **MachineGroup** are used to manage machine group related resources.
- The three APIs with names containing **ConfigExtra** are used to manage log upload related configuration of self-built Kubernetes clusters. If you do not use self-built Kubernetes clusters to upload logs, you can ignore these APIs.

```
{
"version": "2.0",
"statement": [{
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:CreateConfig",
"cls:CreateConfig",
"cls:DeleteConfig",
"cls:DescribeConfigs",
"cls:ModifyConfig",
"cls:CreateConfigExtra",
"cls:DeleteConfigExtra",
"cls:ModifyConfigExtra",
"cls:CreateMachineGroup",
"cls:DeleteMachineGroup",
"cls:DescribeMachineGroups",
"cls:DeleteConfigFromMachineGroup",
```

```
"cls:ApplyConfigToMachineGroup",
"cls:ModifyMachineGroup"
],
"resource": "*",
"effect": "allow"
}
]
}
```

Authorization Policy Statements for Search and Analysis

Log search in the console

Managing all log topics

Users can search for and manage all log topics, including creating/deleting log topics and modifying index configurations, not including configuring collection, shipping log data, or processing logs.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:CreateLogset",
"cls:CreateTopic",
"cls:CreateExport",
"cls:CreateIndex",
"cls:DeleteLogset",
"cls:DeleteTopic",
"cls:DeleteExport",
"cls:DeleteIndex",
"cls:ModifyLogset",
"cls:ModifyTopic",
"cls:ModifyIndex",
"cls:MergePartition",
"cls:SplitPartition",
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
"cls:SearchLog",
```

```
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks",
"cls:CreateRebuildIndexTask",
"cls:EstimateRebuildIndexTask",
"cls:CancelRebuildIndexTask"
],
"resource": [
"*"
]
}
]
}
```

Managing specific log topics

Users can search for and manage specific log topics, including creating/deleting log topics and modifying index configurations, not including configuring collection, shipping log data, or processing logs.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:CreateLogset",
"cls:CreateTopic",
"cls:CreateExport",
"cls:CreateIndex",
"cls:DeleteLogset",
"cls:DeleteTopic",
"cls:DeleteExport",
"cls:DeleteIndex",
"cls:ModifyLogset",
"cls:ModifyTopic",
"cls:ModifyIndex",
"cls:MergePartition",
"cls:SplitPartition",
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
```

```
"cls:SearchLog",
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks",
"cls:CreateRebuildIndexTask",
"cls:EstimateRebuildIndexTask",
"cls:CancelRebuildIndexTask"
],
"resource": [
"qcs::cls:ap-guangzhou:100007***827:logset/1c012db7-2cfd-4418-****-7342c7a42516",
"qcs::cls:ap-guangzhou:100007***827:topic/380fe1f1-0c7b-4b0d-****-d514959db1bb"
]
}
]
}
```

Managing log topics with specific tags

Users can search for and manage log topics with specific tags, including creating/deleting log topics and modifying index configurations, not including configuring collection, shipping log data, or processing logs. When you tag a log topic, you need to also tag its logset.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:CreateLogset",
"cls:CreateTopic",
"cls:CreateExport",
"cls:CreateIndex",
"cls:DeleteLogset",
"cls:DeleteTopic",
"cls:DeleteExport",
"cls:DeleteIndex",
"cls:ModifyLogset",
"cls:ModifyTopic",
"cls:ModifyIndex",
"cls:MergePartition",
"cls:SplitPartition",
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
```

```
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
"cls:SearchLog",
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks",
"cls:CreateRebuildIndexTask",
"cls:EstimateRebuildIndexTask",
"cls:CancelRebuildIndexTask"
],
"resource": [
"*"
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"testCAM&test1"
]
}
}
}
]
}
```

Reading all log topics

Users can search for logs in all log topics.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
"cls:SearchLog",
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
```

```
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks"
],
"resource": [
"*"
]
}
]
}
```

Reading specific log topics

Users can search for logs in specific log topics.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
"cls:SearchLog",
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks"
],
"resource": [
"qcs::cls:ap-guangzhou:100007***827:logset/1c012db7-2cfd-4418-****-7342c7a42516",
"qcs::cls:ap-guangzhou:100007***827:topic/380fe1f1-0c7b-4b0d-****-d514959db1bb"
]
}
]
}
```

Reading log topics with specific tags

Users can search for logs in log topics with specific tags.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics",
"cls:DescribeExports",
"cls:DescribeIndex",
"cls:DescribeIndexs",
"cls:DescribePartitions",
"cls:SearchLog",
"cls:DescribeLogHistogram",
"cls:DescribeLogContext",
"cls:DescribeLogFastAnalysis",
"cls:DescribeLatestJsonLog",
"cls:DescribeRebuildIndexTasks"
],
"resource": [
"*"
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"testCAM&test1"
]
}
}
}
]
}
```

Searching for and analyzing logs via APIs

Searching for and analyzing all log topics

Users can search for and analyze all log topics via APIs.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:SearchLog"
```

```
],
"resource": [
"*"
]
}
]
}
```

Searching for and analyzing specific log topics

Users can search for and analyze specific log topics via APIs.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:SearchLog"
],
"resource": [
"qcs::cls:ap-guangzhou:100007***827:logset/1c012db7-2cfd-4418-****-7342c7a42516",
"qcs::cls:ap-guangzhou:100007***827:topic/380fe1f1-0c7b-4b0d-****-d514959db1bb"
]
}
]
}
```

Searching for and analyzing log topics with specific tags

Users can search for and analyze log topics with specific tags via APIs.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:SearchLog"
],
"resource": [
"*"
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
```

```
"testCAM&test1"
]
}
}
}
]
}
```

Analyzing logs by using dashboards

Managing all dashboards

Users can manage (including create, edit, and delete) all dashboards and view the data of all log topics via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:CreateChart",
"cls:CreateDashboard",
"cls:DeleteChart",
"cls:DeleteDashboard",
"cls:ModifyChart",
"cls:ModifyDashboard",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:CreateDashboardSubscribe",
"cls:ModifyDashboardSubscribe",
"cls:DescribeDashboardSubscribes",
"cls:DeleteDashboardSubscribe",
"cls:ModifyDashboardSubscribeAck"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"cls:SearchLog",
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
```

```
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": "*"
}
]
}
```

Managing log topics and dashboards with specific tags

Users can manage (including create, edit, and delete) dashboards with specific tags and view the data of log topics with specific tags via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:CreateChart",
"cls:CreateDashboard",
"cls:DeleteChart",
"cls:DeleteDashboard",
"cls:ModifyChart",
"cls:ModifyDashboard",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:CreateDashboardSubscribe",
"cls:ModifyDashboardSubscribe",
"cls:DescribeDashboardSubscribes",
"cls:DeleteDashboardSubscribe",
"cls:ModifyDashboardSubscribeAck"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
```

```
"effect": "allow",
"action": [
"cls:SearchLog",
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
}
]
}
```

Managing the log topics and dashboards of specific resources

Users can manage (including create, edit, and delete) specific dashboards and view the data of specific log topics via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:CreateChart",
"cls:CreateDashboard",
"cls:DeleteChart",
"cls:DeleteDashboard",
"cls:ModifyChart",
"cls:ModifyDashboard",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:CreateDashboardSubscribe",
"cls:ModifyDashboardSubscribe",
"cls:DescribeDashboardSubscribes",
"cls:DeleteDashboardSubscribe",
```

```
"cls:ModifyDashboardSubscribeAck"
],
"resource": [
"qcs::cls::uin/100000***001:dashboard/dashboard-0769a3ba-2514-409d-****-f65b20b23
736"
]
},
{
"effect": "allow",
"action": [
"cls:SearchLog",
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": [
"qcs::cls::uin/100000***001:topic/174ca473-50d0-4fdf-****-2ef681a1e02a"
]
}
]
}
```

Viewing all dashboards

Users can view all dashboards and the data of all log topics via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:DescribeDashboardSubscribes"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"cls:SearchLog",
```

```
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": "*"
}
]
}
```

Viewing log topics and dashboards with specific tags

Users can view dashboards with specific tags and view the data of log topics with specific tags via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:DescribeDashboardSubscribes"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"cls:SearchLog",
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": "*",
```

```
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
}
]
}
```

Viewing the log topics and dashboards of specific resources

Users can view specific dashboards and the data of specific log topics via dashboards.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:GetChart",
"cls:GetDashboard",
"cls:ListChart",
"cls:DescribeDashboards",
"cls:SearchDashboardSubscribe",
"cls:DescribeDashboardSubscribes"
],
"resource": [
"qcs::cls::uin/100000***001:dashboard/dashboard-0769a3ba-2514-409d-****-f65b20b23
736"
]
},
{
"effect": "allow",
"action": [
"cls:SearchLog",
"cls:DescribeTopics",
"cls:DescribeLogFastAnalysis",
"cls:DescribeIndex",
"cls:DescribeLogsets"
],
"resource": [
"qcs::cls::uin/100000***001:topic/174ca473-50d0-4fdf-****-2ef681a1e02a"
]
}
```

```
]
}
```

Authorization Policy Statements for Monitoring Alarms

Managing all alarm policies

Users can manage all alarm policies, including create and view alarm policies and create notification groups.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
]
},
{
"effect": "allow",
"action": [
"cls:DescribeAlarms",
"cls:CreateAlarm",
"cls:ModifyAlarm",
"cls:DeleteAlarm",
"cls:DescribeAlarmNotices",
"cls:CreateAlarmNotice",
"cls:ModifyAlarmNotice",
"cls:DeleteAlarmNotice",
"cam:ListGroups",
"cam:DescribeSubAccountContacts",
"cls:GetAlarmLog",
"cls:DescribeAlertRecordHistory",
"cls:CheckAlarmRule",
"cls:CheckAlarmChannel"
],
"resource": "*"
}
]
}
```

Viewing all alarm policies

Users can view all alarm policies.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
]
},
{
"effect": "allow",
"action": [
"cls:DescribeAlarms",
"cls:DescribeAlarmNotices",
"cls:GetAlarmLog",
"cls:DescribeAlertRecordHistory",
"cam:ListGroups",
"cam:DescribeSubAccountContacts"
],
"resource": "*"
}
]
}
```

Data Processing

Data processing

Managing all data processing tasks

Users can manage the data processing tasks of all log topics.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
```

```
"action": [
"cls:DescribeLogsets",
"cls:DescribeDataTransformPreviewDataInfo",
"cls:DescribeTopics",
"cls:DescribeIndex",
"cls:CreateDataTransform"
],
"resource": [
"*"
]
},
{
"effect": "allow",
"action": [
"cls:DescribeFunctions",
"cls:CheckFunction",
"cls:DescribeDataTransformFailLogInfo",
"cls:DescribeDataTransformInfo",
"cls:DescribeDataTransformPreviewInfo",
"cls:DescribeDataTransformProcessInfo",
"cls:DeleteDataTransform",
"cls:ModifyDataTransform"
],
"resource": [
"*"
]
}
]
}
```

Viewing all data processing tasks

Users can view the data processing tasks of all log topics, which does not require DSL function authorization.

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
]
```

```
},
{
"effect": "allow",
"action": [
"cls:DescribeDataTransformFailLogInfo",
"cls:DescribeDataTransformInfo",
"cls:DescribeDataTransformPreviewDataInfo",
"cls:DescribeDataTransformPreviewInfo",
"cls:DescribeDataTransformProcessInfo"
],
"resource": [
"*"
]
}
]
}
```

Scheduled SQL analysis

Performing scheduled SQL analysis on all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
]
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:SearchLog",
"cls:DescribeScheduledSqlInfo",
"cls:DescribeScheduledSqlProcessInfo",
"cls:CreateScheduledSql",
"cls:DeleteScheduledSql",
"cls:ModifyScheduledSql",
```

```
"cls:RetryScheduledSqlTask",
"cam:ListAttachedRolePolicies"
],
"resource": [
"*"
]
}
]
}
```

Consuming log topics with specific tags over Kafka

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:SearchLog",
"cls:DescribeScheduledSqlInfo",
"cls:DescribeScheduledSqlProcessInfo",
"cls:CreateScheduledSql",
"cls:DeleteScheduledSql",
"cls:ModifyScheduledSql",
"cls:RetryScheduledSqlTask",
"cam:ListAttachedRolePolicies"
```

```
],
"resource": [
"*"
]
}
]
}
```

Access Policies for Data Shipping/Consumption

Shipping to CKafka

Managing the CKafka shipping of all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cam:AttachRolePolicy",
"cam:CreateRole",
"cam:DescribeRoleList",
"ckafka:DescribeInstances",
"ckafka:DescribeTopic",
"ckafka:DescribeInstanceAttributes",
"cls:modifyConsumer",
"cls:getConsumer"
],
"resource": "*"
}
```

```
]
}
```

Managing the CKafka shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"age&13",
"name&vinson"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cam:AttachRolePolicy",
"cam:CreateRole",
"cam:DescribeRoleList",
"ckafka:DescribeInstances",
"ckafka:DescribeTopic",
"ckafka:DescribeInstanceAttributes",
"cls:modifyConsumer",
"cls:getConsumer"
],
"resource": "*"
}
]
}
```

Viewing the CKafka shipping of all log topics

Authorization for all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"ckafka:DescribeInstances",
"ckafka:DescribeTopic",
"ckafka:DescribeInstanceAttributes",
"cls:getConsumer"
],
"resource": "*"
}
]
}
```

Viewing the CKafka shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
```

```
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"ckafka:DescribeInstances",
"ckafka:DescribeTopic",
"ckafka:DescribeInstanceAttributes",
"cls:getConsumer"
],
"resource": "*"
}
]
}
```

Shipping to COS

Managing the COS shipping of all log topics

Authorization for all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets",
"cls:DescribeIndex"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
```

```
"tag:DescribeTagValues",
"cls:CreateShipper",
"cls:ModifyShipper",
"cls:DescribeShippers",
"cls:DeleteShipper",
"cls:DescribeShipperTasks",
"cls:RetryShipperTask",
"cos:GetService",
"cam:ListAttachedRolePolicies",
"cam:AttachRolePolicy",
"cam:CreateRole",
"cam:DescribeRoleList"
],
"resource": "*"
}
]
}
```

Managing the COS shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets",
"cls:DescribeIndex"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:CreateShipper",
```

```
"cls:ModifyShipper",
"cls:DescribeShippers",
"cls:DeleteShipper",
"cls:DescribeShipperTasks",
"cls:RetryShipperTask",
"cos:GetService",
"cam:ListAttachedRolePolicies",
"cam:AttachRolePolicy",
"cam:CreateRole",
"cam:DescribeRoleList"
],
"resource": "*"
}
]
}
```

Viewing the COS shipping of all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets" ],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:DescribeShippers",
"cls:DescribeShipperTasks",
"cls:RetryShipperTask",
"cam:ListAttachedRolePolicies"
],
"resource": "*"
}
]
}
```

Viewing the COS shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:DescribeShippers",
"cls:DescribeShipperTasks",
"cls:RetryShipperTask",
"cam:ListAttachedRolePolicies"
],
"resource": "*"
}
]
}
```

Shipping to SCF

Managing the SCF shipping of all log topics

Authorization for all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
```

```
"cls:DescribeLogsets"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cls:CreateDeliverFunction",
"cls:DeleteDeliverFunction",
"cls:ModifyDeliverFunction",
"cls:GetDeliverFunction",
"scf:ListFunctions",
"scf:ListAliases",
"scf:ListVersionByFunction"
],
"resource": "*"
}
]
}
```

Managing the SCF shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
```

```
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cls:CreateDeliverFunction",
"cls:DeleteDeliverFunction",
"cls:ModifyDeliverFunction",
"cls:GetDeliverFunction",
"scf:ListFunctions",
"scf:ListAliases",
"scf:ListVersionByFunction"
],
"resource": "*"
}
]
}
```

Viewing the SCF shipping of all log topics

Authorization for all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*"
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cls:GetDeliverFunction",
"scf:ListFunctions",
"scf:ListAliases",
"scf:ListVersionByFunction"
],
"resource": "*"
```

```
}
]
}
```

Viewing the SCF shipping of log topics with specific tags

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeTopics",
"cls:DescribeLogsets"
],
"resource": "*",
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cam:ListAttachedRolePolicies",
"cls:GetDeliverFunction",
"scf:ListFunctions",
"scf:ListAliases",
"scf:ListVersionByFunction"
],
"resource": "*"
}
]
}
```

Consumption over Kafka

Consuming all log topics over Kafka

Authorization for all log topics

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"]
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:DescribeKafkaConsumer",
"cls:CloseKafkaConsumer",
"cls:ModifyKafkaConsumer",
"cls:OpenKafkaConsumer",
"cam:ListAttachedRolePolicies"
],
"resource": [
"*"
]
}
]
}
```

Consuming log topics with specific tags over Kafka

Authorization for log topics with a specified tag

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:DescribeLogsets",
"cls:DescribeTopics"
],
"resource": [
"*"
```

```
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
},
{
"effect": "allow",
"action": [
"tag:DescribeResourceTagsByResourceIds",
"tag:DescribeTagKeys",
"tag:DescribeTagValues",
"cls:DescribeKafkaConsumer",
"cls:CloseKafkaConsumer",
"cls:ModifyKafkaConsumer",
"cls:OpenKafkaConsumer",
"cam:ListAttachedRolePolicies"
],
"resource": [
"*"
]
}
]
}
```

Authorization Policy Statements for Developers

CLS connection to Grafana

Displaying the data of all log topics via Grafana

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:SearchLog"
],
"resource": [
"*"
```

```
]
}
]
}
```

Displaying the data of log topics with specific tags via Grafana

```
{
"version": "2.0",
"statement": [
{
"effect": "allow",
"action": [
"cls:SearchLog"
],
"resource": [
"*"
],
"condition": {
"for_any_value:string_equal": {
"qcs:resource_tag": [
"key&value"
]
}
}
}
]
}
```

Log Collection
Collection Overview

Last updated：2022-10-24 11:56:04

Overview

CLS provides log collection clients that allow you to collect your application logs and import them into CLS through APIs or SDKs. Currently, CLS requires logs to be uploaded in a structured manner as key-value pairs.

Log Structuring

The structuring of logs is to store your log data on the CLS platform in key-value format. Structured logs can be searched for, analyzed, and shipped based on specified keys. CLS allows you to report structured data directly. For more information, see the following:

For example, a local raw log is as follows:

```
10.20.20.10;[Tue Jan 22 14:49:45 CST 2019 +0800];GET /online/sample HTTP/1.1;127.
0.0.1;200;647;35;http://127.0.0.1/
```

Specify that the log is parsed by separator and select semicolon (;) as the separator. Then the log can be parsed into multiple field groups and each group is organized in key-value pairs. A key name is defined for each key as follows:

```
IP: 10.20.20.10
time: [Tue Jan 22 14:49:45 CST 2019 +0800]
request: GET /online/sample HTTP/1.1
host: 127.0.0.1
status: 200
length: 647
bytes: 35
referer: http://127.0.0.1/
```

LogListener provides various parsing modes, in which reported logs with full text in a single line and full text in multi lines are both structured. LogListener adds `__CONTENT__` as a key and uses the original text as the value by default. The key-value pair is as follows:

LogListener Parsing Mode	Key	Description

LogListener Parsing Mode	Key	Description
Full text in a single line/Full text in multi lines	`__CONTENT__`	`__CONTENT__` is the key name by default.
JSON format	Name in the JSON file	The name and value in the original text of the JSON log are used as a key-value pair.
Separator format	Custom	After dividing fields using separators, you need to define a key name for each field group.
Full regular expression	Custom	After extracting fields based on a regular expression, you need to define a key name for each field group.

Collection Methods

CLS provides multiple methods for data collection:

Collection Method	Description
API	You can call CLS APIs to upload structured logs to CLS. For more information, see Uploading Log via API.
SDK	You can use SDKs to upload structured logs to CLS. For more information, see Collection via SDK.
LogListener client	LogListener is a log collection client provided by CLS. You can quickly access CLS by simply configuring LogListener in the console. For more information, see LogListener Use Process.

A comparison of the collection methods is as follows:

Category	Collection via LogListener	Collection via API
Code modification	Provides a non-intrusive collection method for applications, without code modification.	Reports logs only after modifying application code.
Resumable upload	Supports resumable upload of logs.	Automatically implemented by code.
Retransmission upon failure	Provides an inherent retry mechanism.	Automatically implemented by code.

Category	Collection via LogListener	Collection via API
Local cache	Supports local cache, ensuring data integrity during peak hours.	Automatically implemented by code.
Resource occupation	Occupies resources such as memory and CPU resources.	Occupies no additional resources.

Accessing Log Sources

You can access different log sources in different ways. For more information, see the following tables:

Log source environment

System Environment	Recommended Access Method
Linux/Unix	LogListener collection / Upload over Kafka / Log upload via API
Windows	Beats collection / Upload over Kafka / Log upload via API
iOS/Android/Web	Log upload via SDK

Tencent Cloud service logs

For more information, see Tencent Cloud Service Log Access.

Collection by LogListener

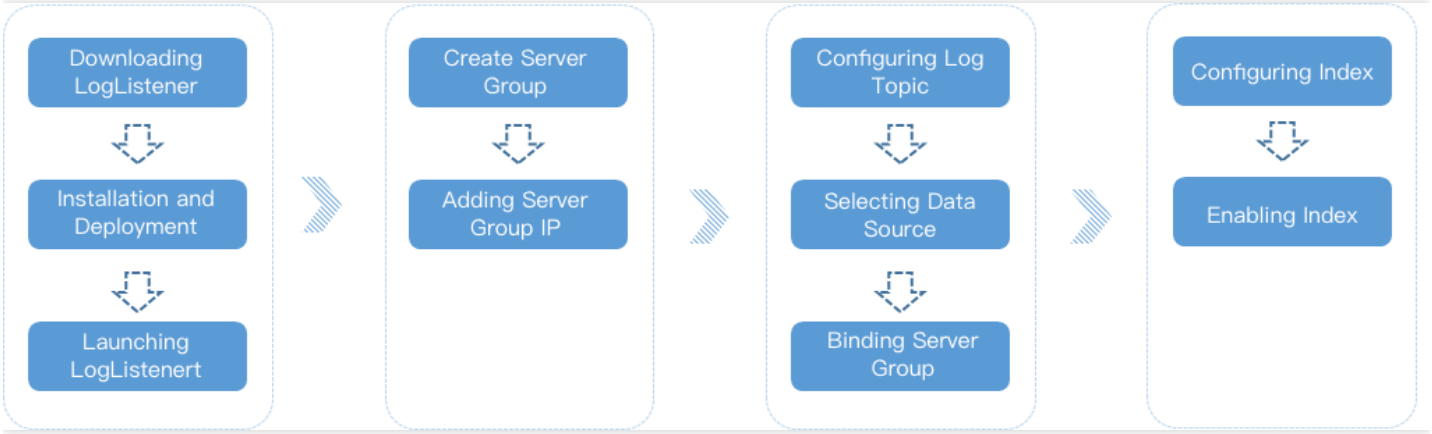
LogListener Use Process

Last updated：2019-11-22 09:59:35

Overview

LogListener is a log collection client provided by CLS. You can install and deploy it to easily and quickly access CLS without modifying the run logic of applications. It is a non-intrusive collection method for application services.

The procedures for collecting logs with LogListener are shown in the following figure:



Procedure Description

1. Download the latest version of LogListener.
2. Install and deploy LogListener on the destination server. Upon successful installation, it automatically launches and maintains a heartbeat connection with the backend of CLS.
3. Go to the CLS Console, create a server group, and add the server IP.
4. Go to the **Collection Configuration** page of the log topic, enter the log path to determine the data source, and bind the server group. For a detailed operation sample, please see the Collection of Full Text in a Single Line document.
5. Go to the **Index Configuration** page of the log topic, configure the full text or key-value index, and enable the index. For a detailed operation sample, please see the Collection of Full Text in a Single Line document.

By now, LogListener monitors the log files that meet the rules according to the collection configuration of the log topics. Users may view the collected log data via log search.

LogListener Installation and Deployment
LogListener Installation Guide

Last updated：2022-09-19 12:12:21

LogListener is a log collector provided by CLS. You can install and deploy it on a server to collect logs quickly.

Installation Environment

LogListener supports only Linux 64-bit operating systems and does not support Windows now. It is compatible with mainstream Linux operating system versions. If LogListener is incompatible with the Linux operating system version you use, submit a ticket.

OS	Compatible Versions
CentOS (64-bit)	CentOS_6.8_64-bit, CentOS_6.9_64-bit, CentOS_7.2_64-bit, CentOS_7.3_64-bit, CentOS_7.4_64-bit, CentOS_7.5_64-bit, CentOS_7.6_64-bit, CentOS_8.0_64-bit
Ubuntu (64-bit)	Ubuntu Server_14.04.1_LTS_64-bit, Ubuntu Server_16.04.1_LTS_64-bit, Ubuntu Server_18.04.1_LTS_64-bit
Debian (64-bit)	Debian_8.2_64-bit, Debian_9.0_64-bit
openSUSE (64-bit)	openSUSE_42.3_64-bit

Supported Features

Key features supported by different LogListener versions are as listed below. For more information, see LogListener Updates.

LogListener Version	Supported Feature	Feature Description	Documentation
v2.7.4	Host name collection (`hostname`)	LogListener collects and reports the machine host name as a default field and displays __HOSTNAME__ as a key, such as __HOSTNAME__:VM-108-centos.	-

LogListener Version	Supported Feature	Feature Description	Documentation
v2.6.4	Combined parsing to customize complex log parsing rules	You can use LogListener's combined parsing mode to parse logs. This mode allows you to enter JSON code in the console to customize the log parsing pipeline logic.	Combined Parsing Format
v2.6.0	CVM batch deployment	You can select CVM instances in the console and batch distribute LogListener deployment tasks through an API to automatically complete LogListener installation and deployment (including `accesskey` , ID, and region configuration).	Deploying LogListener on CVMs in Batches
v2.5.4	LogListener service logs	LogListener service logs are used to record the operation, collection, and monitoring activities of LogListener, and you can configure visual graphs to display such log data.	LogListener Service Logs
v2.5.2	Uploading parsing-failed logs	Parsing-failure logs can be uploaded, using `LogParseFailure` as the key name (`Key`) and the raw log content as the key value (`Value`).	-
v2.5.0	LogListener auto-upgrade function	Users can set a time period for Agent auto-upgrade or select specific machine groups to upgrade manually.	LogListener Upgrade Guide
v2.4.5	Multi-line log extraction with regex	The extraction mode of **Multi-line - Full regular expression** is added to LogListener collection configuration rules for log collection.	Full Regular Expression (Multi-Line)

Installation and startup

1. Downloading and installing LogListener

Download links of the latest version LogListener: Download by public network, Download by private network

Download the LogListener installation package and decompress it to the installation path (`/usr/local/` in this example). Then go to the LogListener directory `loglistener/tools` and run the following installation command.

- Operation command for the public network:

```
wget https://mirrors.tencent.com/install/cls/loglistener-linux-x64-2.8.2.tar.gz
&& tar -zxvf loglistener-linux-x64-2.8.2.tar.gz -C /usr/local && cd /usr/local/
loglistener-2.8.2/tools && ./loglistener.sh install
```

- Operation command for the private network:

```
wget http://mirrors.tencentyun.com/install/cls/loglistener-linux-x64-2.8.2.tar.
gz && tar -zxvf loglistener-linux-x64-2.8.2.tar.gz -C /usr/local && cd /usr/loc
al/loglistener-2.8.2/tools && ./loglistener.sh install
```

2. Initializing LogListener

In the `loglistener/tools` path, run the following command to initialize LogListener as the root user. By default, a private network is used to access the service:

```
./loglistener.sh init -secretid AKIDPEtPyKabfW8Z3Uspdz83xxxxxxxxxxx -secretkey wh
HwQfjdLnzzCE1jIf09xxxxxxxxxxx -region ap-xxxxxx
```

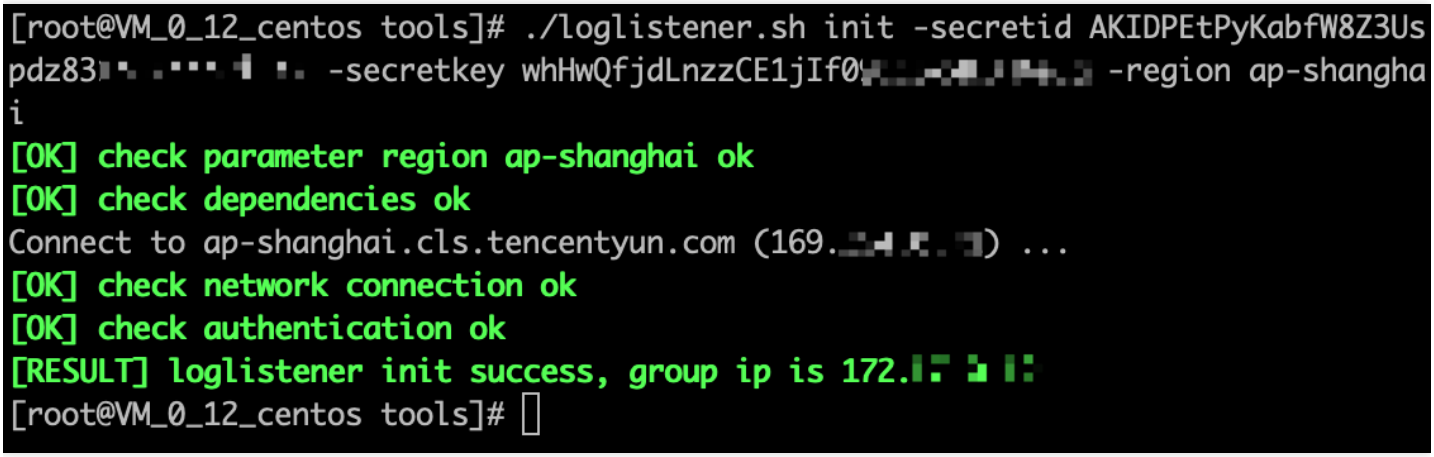
Note：
You need to replace **-secretid**, **-secretkey**, **-region**, and **-network** in the command with the actual values.
For more information, see Parameter description below.

Parameter description

Parameter	Description
secretid	Part of the Cloud API key. Used to identify who calls the API.
secretkey	Part of the Cloud API key. Used to encrypt signature strings and verify server-side signature strings.
region	Region where CLS resides. Enter a region abbreviation here, such as `ap-beijing` or `ap-guangzhou` .
network	Type of the network through which LogListener accesses the service by domain name. Valid values: `intra` (private network), `internet` (public network). Default value: `intra`
ip	Machine IP. If this parameter is left empty, LogListener will automatically get the local IP address.

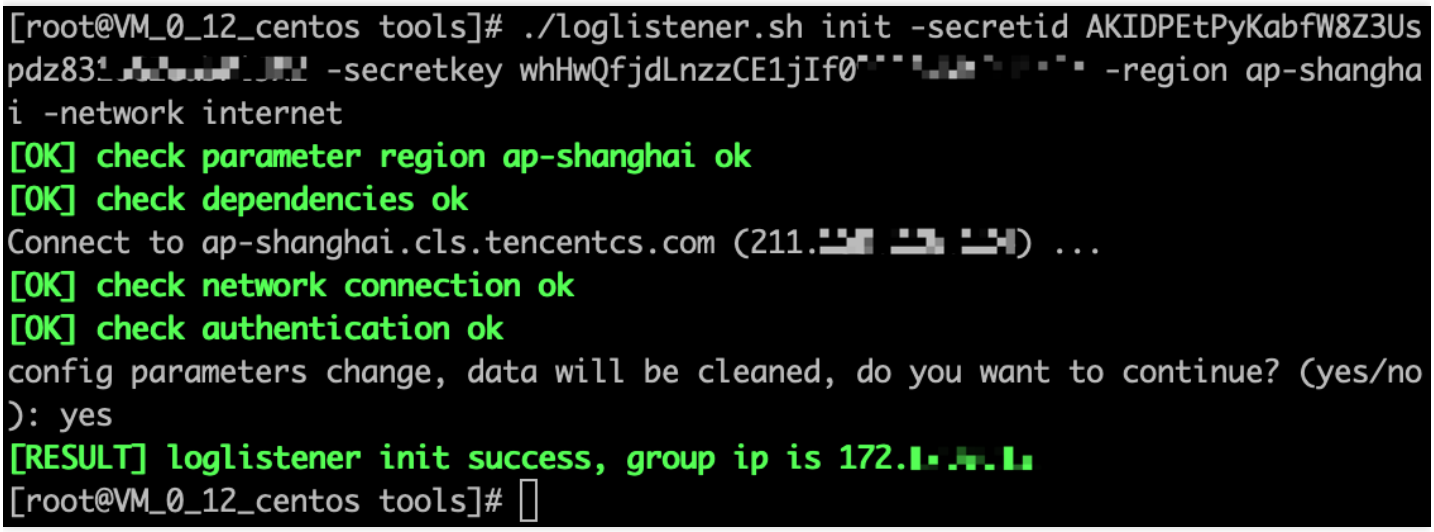
Parameter	Description
label	Machine group label, which is required if you want to identify the machine group. Multiple labels should be separated by comma.

A private network domain name is used by default:



If you need to access the service by domain name through the public network, run the following command to set the network parameter `internet` explicitly:

```
./loglistener.sh init -secretid AKIDPEtPyKabfW8Z3Uspdz83xxxxxxxxxxxx -secretkey w
hHwQfjdLnzzCE1jIf0xxxxxxxxxxxx -region ap-xxxxxx -network internet
```



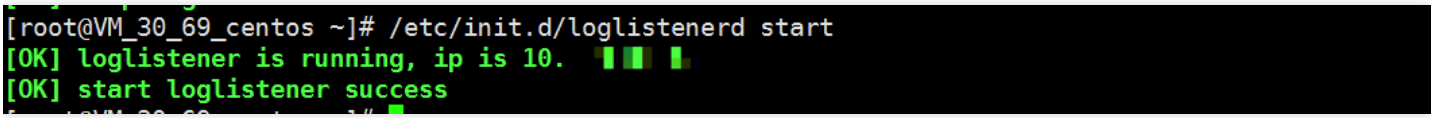
Note：

- We recommend that you use a collaborator key if the collaborator has been assigned with the CLS read/write permission by the root account.
- `region` indicates the region of the CLS you use, instead of the region where your business machine resides.
- If your CVM instance and logset are in the same region, we recommend you access the service domain name over the private network; otherwise, use the public network.
- For details about log collection, see Examples of Custom Access Policies.

3. Starting LogListener

After LogListener is successfully installed, run the following command to start it:

```
/etc/init.d/loglistenerd start
```



Common LogListener Operations

Note：
The operation commands used in this document are applicable only to LogListener v2.2.4 and later versions.
For operation commands applicable to earlier versions, see Operation Guide of Earlier LogListener Versions.

1. Checking the LogListener version

```
/etc/init.d/loglistenerd -v
```

2. Viewing LogListener help documentation

```
/etc/init.d/loglistenerd -h
```

3. Managing LogListener process

```
/etc/init.d/loglistenerd (start|restart|stop) # Start, restart, stop
```

4. Checking LogListener process status

```
/etc/init.d/loglistenerd status
```

LogListener normally runs two processes:

```
[root@VM-0-2-centos tools]# /etc/init.d/loglistenerd status
root      4375     1  0 12:27 pts/0    00:00:00 bin loglistenerm -d
root      4379  4375  0 12:27 pts/0    00:00:00 bin loglistener --conf=etc/loglistener.conf
```

5. Checking LogListener heartbeat and configuration

```
/etc/init.d/loglistenerd check
```

```
[root@VM_0_12_centos tools]# /etc/init.d/loglistenerd check
[OK] loglistener is running ok
[OK] check loglistener hearbeat ok
group ip:172
host:ap-shanghai.cls.tencentcs.com
port:80
gethostbyname ip:211
[OK] check loglistener config ok
{"logconf":[],"needupdate":false}
[root@VM_0_12_centos tools]#
```

Uninstalling LogListener

In the `loglistener/tools` directory, run the uninstallation command as the admin:

```
./loglistener.sh uninstall
```

Manually Updating LogListener

Reusing the breakpoint file (logs are not repeatedly collected)

1. Run the stop command to stop the existing LogListener.

2. Back up the breakpoint file directory (`loglistener/data`) on the earlier version; for example, back up the legacy breakpoint file to the `/tmp/loglistener-backup` directory.

```
cp -r loglistener-2.2.3/data /tmp/loglistener-backup/
```

3. Run the uninstallation command to uninstall the existing LogListener.

4. Download the latest version of LogListener. Then, install and initialize it with relevant commands.

5. Copy the breakpoint file directory backed up in step 2 to the new LogListener directory.

```
cp -r /tmp/loglistener-backup/data loglistener-<version>/
```

Change the value of `<version>` as required. The following is an example:

```
cp -r /tmp/loglistener-backup/data loglistener-2.8.2/
```

6. Run the start command to start the latest version of LogListener.

Not reusing the breakpoint file (logs may be repeatedly collected)

1. Run the stop command to stop the existing LogListener.
2. Run the uninstallation command to uninstall the earlier version of LogListener.
3. Download the latest version of LogListener. Then, install and initialize it with relevant commands.
4. Run the start command to start the latest version of LogListener.

Deploying LogListener on CVMs in Batches

Last updated：2021-10-25 15:06:09

Overview

CLS supports log collection via LogListener for Tencent Cloud Virtual Machines (CVMs). Before log collection, you need to deploy LogListener on CVM instances. If you need to deploy LogListener on a large number of CVM instances, you can perform batch deployment in the CLS console. Batch deployment will deploy configurations including AccessKeys, IDs, and regions.

Prerequisites

TencentCloud Automation Tools (TAT) is installed on the target CVM instances.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Overview** to go to the overview page.
3. Choose **Fast Integration** > **Cloud Product Logs**, and click **CVM**.
4. On the batch deployment configuration page, select the target CVM instances, enter `SecretId` information (`SecretId` and SecretKey), and set advanced configuration items accordingly.
5. Click **Next**.
6. On the instance installation page, click **Next** when the installation **Status** changes to **Completed**, which indicates that the installation is completed.

> Note：
> If the installation fails, move the cursor over to the **Status** of the instance installation to view the failure causes.

7. On the machine group importing page, select an existing machine group or create a machine group as required, and click **Import**.

Note：
The version of the LogListener deployed via batch deployment is 2.6.0 or later.

Installing LogListener in Self-built Kubernetes Cluster

Last updated：2022-10-13 14:36:07

This document describes how to install LogListener on a self-built Kubernetes cluster to collect logs to CLS. During the installation process, the system automatically performs the following operations:

1. Create a CLS-logconfigs CRD.
2. Deploy cls-provisioner.
3. Install LogListener in DaemonSet mode.

Directions

1. Log in to the Kubernetes cluster.
2. Run the following commands in sequence to install cls-provisioner Helm.

```
wget https://mirrors.tencent.com/install/cls/k8s/tencentcloud-cls-k8s-install.sh
```

```
chmod 744 tencentcloud-cls-k8s-install.sh
```

```
./tencentcloud-cls-k8s-install.sh --region xxx --secretid xxx --secretkey xxx
```

When the installation is completed, CLS automatically creates a default machine group named `cls-k8s-RandomID`.

> Note：
> Before installing cls-provisioner Helm, check that the Helm CLI is already installed in the Kubernetes cluster. For more information, see Installing Helm.

Parameters

- --secretid: Tencent Cloud account access key ID.

- --secretkey: Tencent Cloud account access key.
- --region: CLS region.
- --docker_root: The root directory of the cluster's Docker, which is `/var/lib/docker` by default.
- --cluster_id: Cluster ID.

> Note：
>
> - We recommend you use different `cluster_id` values for different clusters.
> - Data of different clusters can be shipped to the same topic.
> - The default ID is in the following format: cls-k8s-Random ID consisting of 8 characters.

- --network: Network type, which can be private network (default) or internet.
- --api_network: TencentCloud API network type, which can be private network or internet (default).
- --api_region: TencentCloud API region. For more information, see Available Regions.
- Keep `region` and `api_region` the same. For more information, see LogListener and CLS API 3.0.

Sample

Deploying LogListener in the Beijing region

```
./tencentcloud-cls-k8s-install.sh --secretid xxx --secretkey xx --region ap-beiji
ng --network internet --api_region ap-beijing
```

LogListener Upgrade Guide

Last updated：2022-06-23 14:52:36

Overview

To experience better CLS log collection service, you can upgrade the LogListener automatically or manually via the console or semi-automatically via scripts. After the LogListener version is upgraded, you don't need to download the latest-version installer. You can set a time period for auto upgrade or select specific machines to upgrade manually by one click.

Note：

- Auto upgrade is supported for LogListener v2.5.0 and later. For a better user experience, we recommend you install or upgrade to the latest version of LogListener.
- The auto upgrade feature requires Python 2. If Python 3 is installed on the collection machine, the upgrade process will not be fully executed.
- The script-based semi-auto upgrade feature requires Python 2.7. If this version is not installed on the collection machine, this upgrade mode cannot be used.

You can choose auto upgrade or manual upgrade for LogListener in the console.
If Agent upgrade fails or auto upgrade cannot be used due to version restrictions, you can use the semi-auto upgrade mode.

Directions

Auto upgrade

1. Log in to the CLS console.

2. On the left sidebar, click **Machine Group** to enter the management page.

3. Find the target machine group, move the cursor under  in the **Auto Upgrade** column, and click **Enable Now**.

4. In the pop-up, toggle the button on and specify the upgrade time period (the default period is from the current time to two hours later, such as 08:39-10:39).

5. Click **OK**. When the status of the target machine group changes to **Enabled** as displayed in the **Auto Upgrade** column, auto upgrade has been enabled successfully.

Note：

- You can set any time period for the auto upgrade, and the system will check if upgrade is needed every day in the specified time period. If the upgrade conditions are met, the auto-upgrade will be performed; otherwise, the operation will be performed.
- You can select multiple target machine groups and click **Auto Upgrade** to upgrade them in batches.

Manual upgrade

1. Log in to the CLS console.

2. On the left sidebar, click **Machine Group** to enter the management page.

3. Find the target machine group and click **Upgrade Now** in the **Operation** column.

4. In the pop-up window, select the target machine with status as **To be upgraded** and click **Manual Upgrade**.

The system will upgrade LogListener to the latest version by default. When you see **This is the latest version**, the manual upgrade is successful.

Note：

- When the status is **Unable to upgrade**, you cannot upgrade the LogListener in the console, and you need to download the latest-version installer to upgrade. For details, see LogListener Installation Guide.
- If **Abnormal heartbeat** appears, see Machine Group Exception for troubleshooting tips.

Semi-auto upgrade

1. Run the following command to check the Python version.

```
python -V
```

If the Python version is not 2.7, use auto or manual upgrade.

2. Run the following command to download the script.

```
wget http://mirrors.tencentyun.com/install/cls/agent-update.py
```

2. Run the following command to execute the script.

```
/usr/bin/python2.7 agent-update.py http://mirrors.tencentyun.com/install/cls/lo
glistener-linux-x64-x.tar.gz
```

Here, `x` in `loglistener-linux-x64-x.tar.gz` represents the version number of LogListener to upgrade to (such as 2.7.2). The latest version of LogListener is as displayed in LogListener Installation Guide. If the entered version does not exist, the download will fail. If the version entered is earlier than the current version installed on the machine, the upgrade will not take effect.

LogListener Service Logs

Last updated：2022-05-07 11:22:35

Overview

LogListener service logs are used to record the operation, collection, and monitoring activities of LogListener, and you can configure visualized graphs to display such log data.

Default configuration

Default Configuration Item	Description
Log Topic	When you enable LogListener service logs, the logset `cls_service_logging` will be created for you automatically, and all log data generated by associated machine groups will be categorized and stored in corresponding log topics. The following three log topics are created by default: • `loglistener_status` : the heartbeat status logs for the corresponding LogListener. • `loglistener_alarm` : logs corresponding to LogListener's monitoring by collection metric/error type . • `loglistener_business` : logs corresponding to LogListener's collection operations, with each log corresponds to one request.
Region	After the LogListener log services are enabled, logsets and log topics will be created under the machine groups in the same region of LogListener.
Log Storage Duration	The default storage duration is 7 days, and the value cannot be modified.
Index	Full-text index and key-value index are enabled for all collected log data by default. You can modify the index configuration. For details, please see Configuring Index.
Dashboard	Dashboard `service_log_dashboard` will be created in the same region of LogListener by default.

Note：

- LogListener service logs are only about collection and monitoring activities of LogListener, and do not support writing into other kinds of data.
- Log data generated by this feature does not incur costs.

- `cls_service_logging` is a unified logset for LogListener service logs.

Operations

- **Viewing LogListener status**
  When the LogListener service logs are enabled, you can view LogListener running status and collection statistics. You can view the number of active LogListeners, LogListener status distribution and other statistical metrics on the `service_log_dashboard` dashboard.

- **Log collection monitoring configuration**
  You can configure the collection and monitoring service logs by metric/error type. For example:
  - MEM, CPU, collection speed, collection latency, or other metrics
  - The number of parsing errors of LogListener

- **File-level monitoring**
  With the LogListener service logs are enabled, you can view the monitoring logs of files and directories. For example:
  - All collection statistics files of one IP
  - The amount of logs collected under a certain path on a certain IP, such as `app1` application logs located in `/var/log/app1/` . You can get the statistics of logs collected under this path.
  - The collection statistics of a topic.

Prerequisites

Only LogListener v2.5.4 and above support collection and monitoring service logs by machine/machine group. You're advised to upgrade LogListener to the latest version.

Directions

Enabling the service logs

1. Log in to the CLS console.
2. In the left sidebar, click **Machine Group** to go to the machine group management page.

3. On the machine group list page, select the target machine group and click  to enable the LogListener service logs.

Disabling LogListener service logs

1. Log in to the CLS console.
2. In the left sidebar, click **Machine Group** to view the machine group list.
3. Select the target machine group, and click  to disable the LogListener service logs.

> Note：
> After this feature is disabled, the log data saved in the logset `cls_service_logging` will not be deleted automatically. You can manually delete the logset where the service logs are saved.

Dashboard of Service Logs

When the LogListener service logs are enabled, CLS will create a dashboard `service_log_dashboard` by the type of recorded logs to display LogListener's collection and monitoring statistics.

Collection statistics dashboard

You can go to the Dashboard page of the CLS console, click the ID of the target dashboard to view LogListener collection statistics, including its status, parsing failure rate, sending success rate, and other metrics.

Log Types

LogListener status logs

The parameters of the log topic `loglistener_status` are detailed as follows:

Parameter	Description
InstanceId	LogListener unique identifier
IP	Machine group IP

Label	An array of machine IDs
Version	Version number
MemoryUsed	Memory utilization of LogListener
MemMax	Memory utilization threshold on this machine set by the Agent
CpuUsage	LogListener CPU utilization
Status	LogListener running status
TotalSendLogSize	Size of logs sent
SendSuccessLogSize	Size of successfully sent logs
SendFailureLogSize	Size of sending-failed logs
SendTimeoutLogSize	Size of logs with sending timed out
TotalParseLogCount	Total number of logs parsed
ParseFailureLogCount	Number of parsing-failed logs
TotalSendLogCount	Number of logs sent
SendSuccessLogCount	Number of successful sent logs
SendFailureLogCount	Number of sending-failed logs
SendTimeoutLogCount	Number of logs with sending timed out
TotalSendReqs	Total number of requests sent
SendSuccessReqs	Number of successful sent requests
SendFailureReqs	The number of sending-failed requests
SendTimeoutReqs	Number of requests with sending timed out
TotalFinishRsps	Total number of RSP files received
TotalSuccessFromStart	Total number of successfully sent requests since LogListener was enabled
AvgReqSize	Average request packet size
SendAvgCost	Average sending time
AvailConnNum	Number of available connections

QueueSize	The size of queued requests

LogListener alarm logs

The parameters of the log topic `loglistener_alarm` are detailed as follows:

Monitoring Metric	Description
InstanceId	LogListener unique identifier
Label	An array of machine IDs
IP	Machine group IP
Version	LogListener version
AlarmType.count	Statistics of alarm types
AlarmType.example	Sample alarm type

AlarmType:

alarm type	type ID	Description
UnknownError	0	Initializing the alarm type.
UnknownError	1	Failed to parse.
CredInvalid	2	Failed to verify.
SendFailure	3	Failed to send.
RunException	4	Abnormal LogListener running.
MemLimited	5	Reached the memory utilization threshold.
FileProcException	6	Exceptions occurred in file processing.
FilePosGetError	7	Failed to get the file publishing info.
HostIpException	8	Exceptions occurred in the server IP thread.
StatException	9	Failed to get the process info.
UpdateException	10	Exceptions occurred in the CLS modification feature.
DoSendError	11	Failed to confirm sending.

alarm type	type ID	Description
FileAddError	12	Failed to create the file.
FileMetaError	13	Failed to create the metadata file.
FileOpenError	14	Failed to open the file.
FileOpenError	15	Failed to read the file.
FileStatError	16	Failed to get the file status.
getTimeError	17	Failed to get the time from the log content.
HandleEventError	18	Exceptions occurred in processing the file.
handleFileCreateError	19	Exceptions occurred in `handleFileCreateEvent()`.
LineParseError	20	Failed to parse the log directory.
Lz4CompressError	21	Failed to compress.
readEventException	22	Failed to read.
ReadFileBugOn	23	A bug exists.
ReadFileException	24	Exceptions occurred in the read file.
ReadFileInodeChange	25	File node changed.
ReadFileTruncate	26	The read file is truncated.
WildCardPathException	27	Exceptions occurred in `addWildcardPathInotify()`.

LogListener collection logs

The parameters of the log topic `loglistener_business` are detailed as follows:

Parameter	Description
InstanceId	LogListener unique identifier
Label	An array of machine IDs
IP	Machine group IP
Version	LogListener version
TopicId	The target topic of the collected file

FileName	File path name
FileName	Actual file path
FileInode	File node
FileSize	File size
LastReadTime	The most recent read time of the file
ParseFailLines	Number of parsing-failed logs within a time window
ParseFailSize	Size of parsing-failed logs within a time window
ParseSuccessLines	Number of logs successful parsed within a time window
ParseSuccessSize	Size of logs successful parsed within a time window
ReadOffset	Offset of file reading in bytes
TruncateSize	Size of truncated log files within a time window
ReadAvgDelay	Average time delay for reads within a time window
TimeFormatFailuresLines	Number of timestamp matching errors within a time window
SendSuccessSize	Size of logs successful sent within a time window
SendSuccessCount	Number of logs successful sent within a time window
SendFailureSize	Size of sending-failed logs within a time window
SendFailureCount	Number of sending-failed logs within a time window
SendTimeoutSize	Size of logs with sending timed out within a time window
SendTimeoutCount	Number of logs with sending timed out within a time window
DroppedLogSize	Size of dropped logs within a time window
DroppedLogCount	Number of dropped logs in a time window
ProcessBlock	Whether the current file has triggered collection blocking in a statistical period (collection blocking will be triggered if the sliding window of a file has not moved for 10 minutes)

Collecting Syslog

Last updated：2022-10-28 15:00:41

Overview

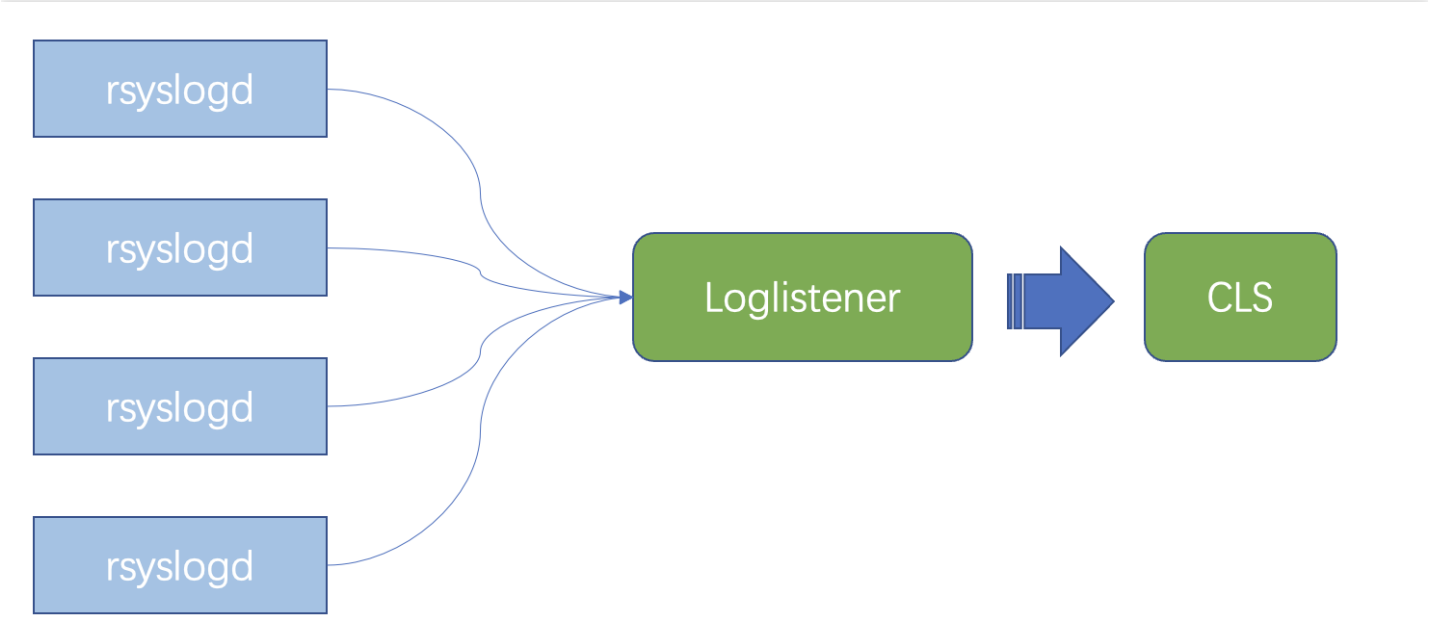
Syslog refers to system logs or records and is a standard for sending log messages in internet protocols. It is supported by network routers, switches, firewalls, and UNIX/Linux servers. Syslog monitoring and management are important for business operations, helping reduce system downtime, improve network performance, and enhance security policies.

Prerequisites

You have deployed RSyslog.

- You have activated CLS.
- You have installed LogListener 3.0.1.0 or later on the target server with the RSyslog IP.
- The configuration in the console is made available through an allowlist. Submit a ticket for application.

Use `rsyslog/etc/rsyslog.conf` to enable UDP/TCP forwarding:



Note：
For detailed directions on how to install LogListener, see LogListener Installation Guide.

Directions

Configuring RSyslog forwarding

- On the syslog server, modify RSyslog's configuration file `/etc/rsyslog.conf` by adding the forwarding rule in the last line. Then, RSyslog will forward syslog to the specified IP and port. If the current server is used to collect local syslog, the forwarding address should be `127.0.0.1`, and the port can be a random idle port.
- If another server is used to collect local syslog, the forwarding address should be the public network IP of the server, and the port can be a random idle port.

The following configuration indicates to forward all logs to `127.0.0.1:1000` over TCP. For more information on the configuration file, see RSyslog Documentation.

```
*.* @@127.0.0.1:1000
```

Run the following command to restart RSyslog for the log forwarding rule to take effect.

```
sudo service rsyslog restart
```

Configuring the syslog collection rule in the CLS console

Step 1. Select a log topic

- To select a new log topic, perform the following steps: Log in to the CLS console.
  i. On the left sidebar, click **Overview** to enter the overview page.
  ii. In the **Other Logs** section, find syslog collection and click **Access Now**.
  iii. On the **Create Log Topic** page, configure the log topic information such as the name and log retention period as needed and click **Next**.
- To select an existing log topic, perform the following steps: Log in to the CLS console.
  i. On the left sidebar, click **Log Topic** and select the target log topic to enter the log topic management page.

ii. On the **Collection Configuration** tab, click **Add** in the **LogListener Collection Configuration** section.

Step 2. Configure a machine group

On the **Machine Group Management** page, select the machine group to which to bind the current log topic and click **Next** to proceed to collection configuration. For more information, see Machine Group.

Step 3. Configure syslog collection

On the syslog collection configuration page, configure the following information:

Configuration Item	Type	Description
Collection Rule Name	Input box	Indicates the name of this collection rule.
Network Type	Radio button	Specifies the syslog transfer protocol: UDP or TCP.
Parsing Protocol	Radio button	Specifies the protocol for log parsing. It is empty by default, indicating no parsing. Valid values: `rfc3164` (RFC 3164), `rfc 5424` (RFC5424), `auto` (automatic selection).
Output Source	Input box	Specifies the protocol, address, and port for LogListener. It is in the format of [tcp/udp]://[ip]:[port]. If it is not specified, tcp://127.0.0.1:10000 will be used by default.
Upload upon Parsing Failure	Toggle	Specifies the operation upon parsing failure. If it is enabled, the full text of the log will be returned based on the input `key` ; otherwise, the log will be discarded.
Key Name of Parsing-Failed Logs	Input box	Specifies the key name of logs that failed to be parsed.

Step 4. Configure an index

1. On the index configuration page, configure the following information:

- Index Status: Select whether to enable it.
- Full-Text Index: Select whether to set it to case-sensitive. Full-Text Delimiter: It is "@&()='",;:<>[]{}/ \n\t\r" by default and can be modified as needed.
- Allow Chinese Characters: Select whether to enable this feature.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, toggle the switch on.

Note：

- Index configuration must be enabled first before you can perform searches.
- The modified index rules take effect only for newly written logs. The existing data is not updated.

2. Click **Submit**.

Viewing syslog

After configuring syslog collection in the current log topic, click **Search** to enter the **Search and Analysis** page to view the syslog.

Field	Description
HOSTNAME	Hostname. The current hostname will be obtained if it is not provided in the log.
program	`tag` field in the protocol.
priority	`priority` field in the protocol.
facility	`facility` field in the protocol.
severity	`severity` field in the protocol.
timestamp	Timestamp of the log.
content	Log content, which will contain all the content of unparsed logs if parsing fails.
SOURCE	IP of the current host.
client_ip	Client IP for log transfer.

Collecting Text Log
Full Text in a Single Line

Last updated：2022-10-13 14:50:37

Overview

A log with full text in a single line means a line is a full log. When CLS collects logs, it uses the line break `\n` to mark the end of a log. For easier structural management, a default key value `__CONTENT__` is given to each log, but the log data itself will no longer be structured, nor will the log field be extracted. The time attribute of a log is determined by the collection time.

Prerequisites

Suppose your raw log data is:

```
Tue Jan 22 12:08:15 CST 2019 Installed: libjpeg-turbo-static-1.2.90-6.el7.x86_64
```

The log is eventually structured by CLS as follows:

```
__CONTENT__:Tue Jan 22 12:08:15 CST 2019 Installed: libjpeg-turbo-static-1.2.90-
6.el7.x86_64
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.
2. In the pop-up dialog box, enter `test_full` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab and click the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, set **Collection Path** according to the log collection path format.
Log collection path format: `[directory prefix expression]/**/[filename expression]`.

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/**/*[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.
- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"`.
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx`.
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the "full text in a single line" mode

In the **Collection Configuration** page, select **Full text in a single line** as the **Extraction Mode**.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only

logs that match the regular expression will be collected and reported.

By default, this "full text in a single line" mode uses `__CONTENT__` as the key name of a log. Assume that a sample log is `Tue Jan 22 12:08:15 CST 2019 Installed: libjpeg-turbo-static-1.2.90-6.el7.x86_64` , and you want to collect all logs on Jan 22, then enter `__CONTENT__` in **Key** and `Tue Jan 22.*` in **Filter Rule**.

> Note：
> The relationship logic between multiple filter rules is "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.
2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.
- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: The default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

> Note：
> Index configuration must be enabled before you can perform searches.

3. Click **Submit**.

Related Operations

Log search

1. Log in to the CLS console.
2. On the left sidebar, click **Search and Analysis** to go to the search and analysis page.

3. Select the region, logset, and log topic as needed, and click **Search and Analysis** to search for logs according to the set query rules.

Full Text in Multi Lines

Last updated：2022-10-13 14:50:37

Overview

In "full text in multi lines" mode, a log spans multiple lines (such as a Java program log), and the line break `\n` cannot be used to mark the end of a log. To help CLS distinguish between logs, a first-line regular expression is used for matching. When a line of a log matches the preset regular expression, it is considered as the beginning of the log, and the log ends before the next matching line.

In "full text in multi lines" mode, a default key `__CONTENT__` is also set, but the log data itself is not structured, and no log fields are extracted. The time attribute of a log is determined by the collection time.

Prerequisites

Assume the raw data of a multi-line log is:

```
10.20.20.10 - - [Tue Jan 22 14:24:03 CST 2019 +0800] GET /online/sample HTTP/1.1
127.0.0.1 200 628 35 http://127.0.0.1/group/1
Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0 0.310
0.310
```

The log is eventually structured by CLS as follows:

```
__CONTENT__:10.20.20.10 - - [Tue Jan 22 14:24:03 CST 2019 +0800] GET /online/samp
le HTTP/1.1 127.0.0.1 200 628 35 http://127.0.0.1/group/1 \nMozilla/5.0 (Windows
NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0 0.310 0.310
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.

2. In the pop-up dialog box, enter `test-mtext` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in **LogListener Collection Configuration**, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, enter the collection rule name and enter the **Collection Path** according to the **log collection path format**.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?` . • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?` . • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/**/*[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.
- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"`.
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx`.
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring the "full text in multi lines" mode

1. On the **Collection Configuration** page, select **Full text in multi lines** as the **Extraction Mode**.

2. Define a regular expression according to the following rules.
   You can choose **Auto-Generate** or **Enter Manually** to define a first-line regular expression, and the system will

verify the regular expression based on the sample content.

- **Auto-Generate**: Enter the sample log in the text box, click **Auto-Generate**, and the system will automatically generate the first-line regular expression in the grayed-out text box.
- **Enter Manually**: Enter the sample log and first-line regular expression in the text box, click **Verify**, and the system will determine whether the expression has passed verification.

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.

In "full text in multi lines" mode, `__CONTENT__` is used as the key name of a log by default. For example, below is a sample log with full text in multi lines:

```
10.20.20.10 - - [Tue Jan 22 14:24:03 CST 2019 +0800] GET /online/sample HTTP/1.1
127.0.0.1 200 628 35 http://127.0.0.1/group/1
Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0 0.310
0.310
```

If you want to collect all logs of the machine `10.20.20.10`, enter `__CONTENT__` in **Key** and `10.20.20.10.*` in **Filter Rule**.

> Note：
> The relationship logic between multiple filter rules is "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring parsing-failed log upload

We recommend you enable **Upload Parsing-Failed Logs**. After it is enabled, LogListener will upload all types of parsing-failed logs. If it is disabled, such logs will be discarded.

After this feature is enabled, you need to configure the `Key` value for parsing failures (which is `LogParseFailure` by default). All parsing-failed logs are uploaded with the input content as the key name (`Key`) and the raw log content as the key value (`Value`).

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.

2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.

> Note：
> Index configuration must be enabled before you can perform searches.

- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: The default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

3. Click **Submit**.

Related Operations

For more information on log search, see Overview and Syntax Rules.

Full Regular Expression (Single-Line)

Last updated：2022-10-13 14:50:37

Overview

The single-line - full regular expression mode is a log parsing mode where multiple key-value pairs can be extracted from each log in a log text file in which each line is a raw log based on a regular expression. If you don't need to extract key-value pairs, configure it as instructed in Collecting Logs with Full Text in a Single Line.
When configuring the single-line - full regular expression mode, you need to enter a sample log first and then customize your regular expression. After the configuration is completed, the system will extract the corresponding key-value pairs according to the capture group in the regular expression.
This document describes how to collect logs in single-line - full regular expression mode.

Prerequisites

Suppose your raw log data is:

```
10.135.46.111 - - [22/Jan/2019:19:19:30 +0800] "GET /my/course/1 HTTP/1.1" 127.0.0.1 200 782 9703 "http://127.0.0.1/course/explore?filter%5Btype%5D=all&filter%5Bprice%5D=all&filter%5BcurrentLevelId%5D=all&orderBy=studentNum" "Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0" 0.354 0.354
```

The custom regex you configure is:

```
(\S+)[^\[]+(\[[^:]+:\d+:\d+:\d+\s\S+)\s"(\w+)\s(\S+)\s([^"]+)"\s(\S+)\s(\d+)\s(\d+)\s(\d+)\s"([^"]+)"\s"([^"]+)"\s+(\S+)\s(\S+).*
```

Then CLS extracts key-value pairs based on the `()` capture groups. You can specify the key name of each group.

```
body_bytes_sent: 9703
http_host: 127.0.0.1
http_protocol: HTTP/1.1
http_referer: http://127.0.0.1/course/explore?filter%5Btype%5D=all&filter%5Bprice%5D=all&filter%5BcurrentLevelId%5D=all&orderBy=studentNum
http_user_agent: Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0
remote_addr: 10.135.46.111
request_length: 782
request_method: GET
```

```
request_time: 0.354
request_url: /my/course/1
status: 200
time_local: [22/Jan/2019:19:19:30 +0800]
upstream_response_time: 0.354
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.
2. In the pop-up dialog box, enter `test-whole` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in **LogListener Collection Configuration**, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, enter the collection rule name and enter the **Collection Path** according to the **log collection path format**.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/*/[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.

- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"` .
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx` .
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring the single-line - full regular expression mode

1. On the **Collection Configuration** page, set **Extraction Mode** to **Single-line - Full regular expression** and enter a sample log in the **Log Sample** text box.
2. Define a regular expression according to the following rules.
   The system offers two ways to define a regular expression: **manual mode** and **auto mode**. You can manually enter the expression to extract key-value pairs for verification or click **Auto-Generate Regular Expression** to switch to auto mode. The system will extract key-value pairs to verify the regular expression according to the mode you selected and the regular expression you defined.

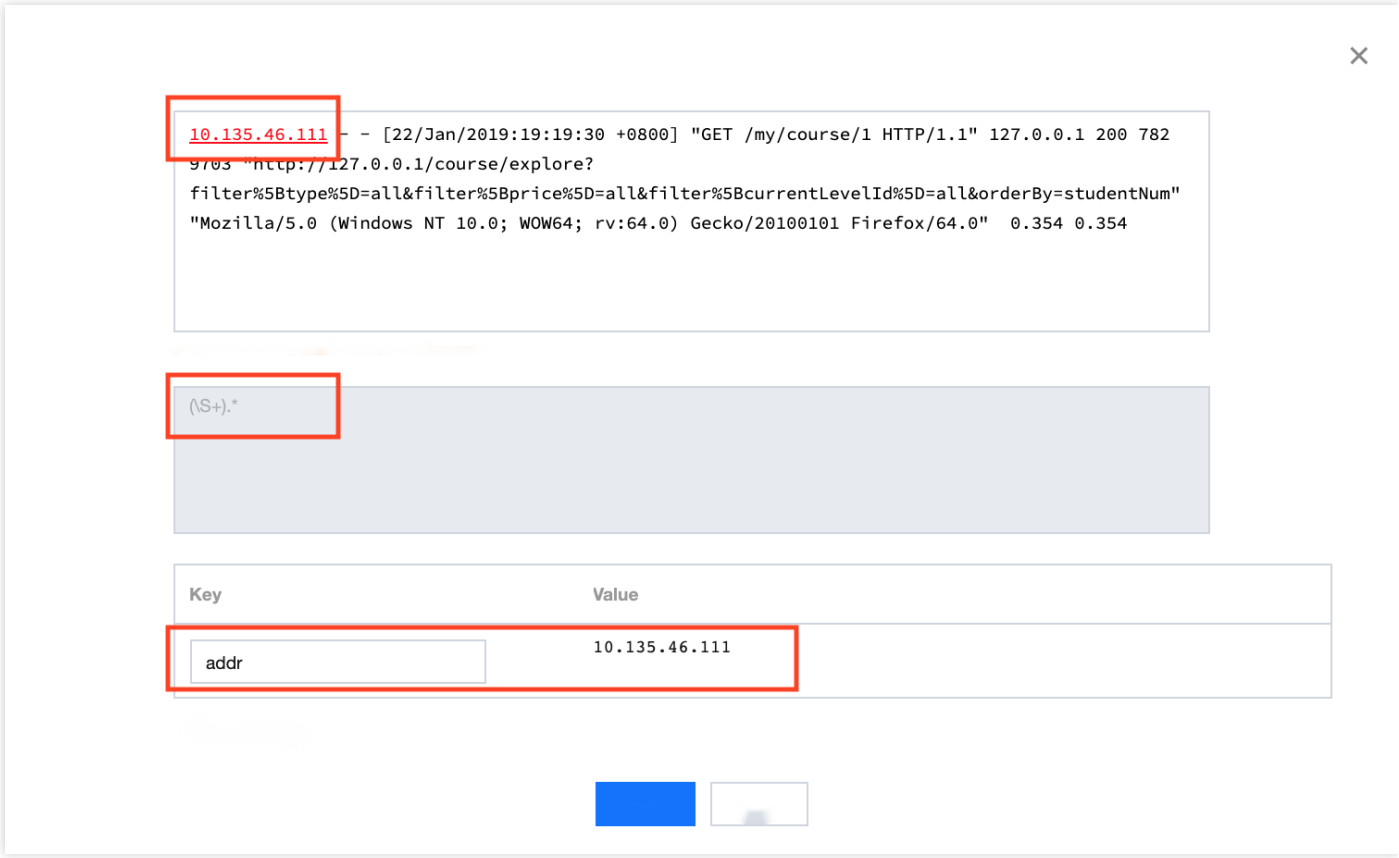
- **Manual mode**:

  i. Enter the regular expression in the **Regular Expression** text box.
  ii. Click **Verify**, and the system will determine whether the sample log matches the regular expression.

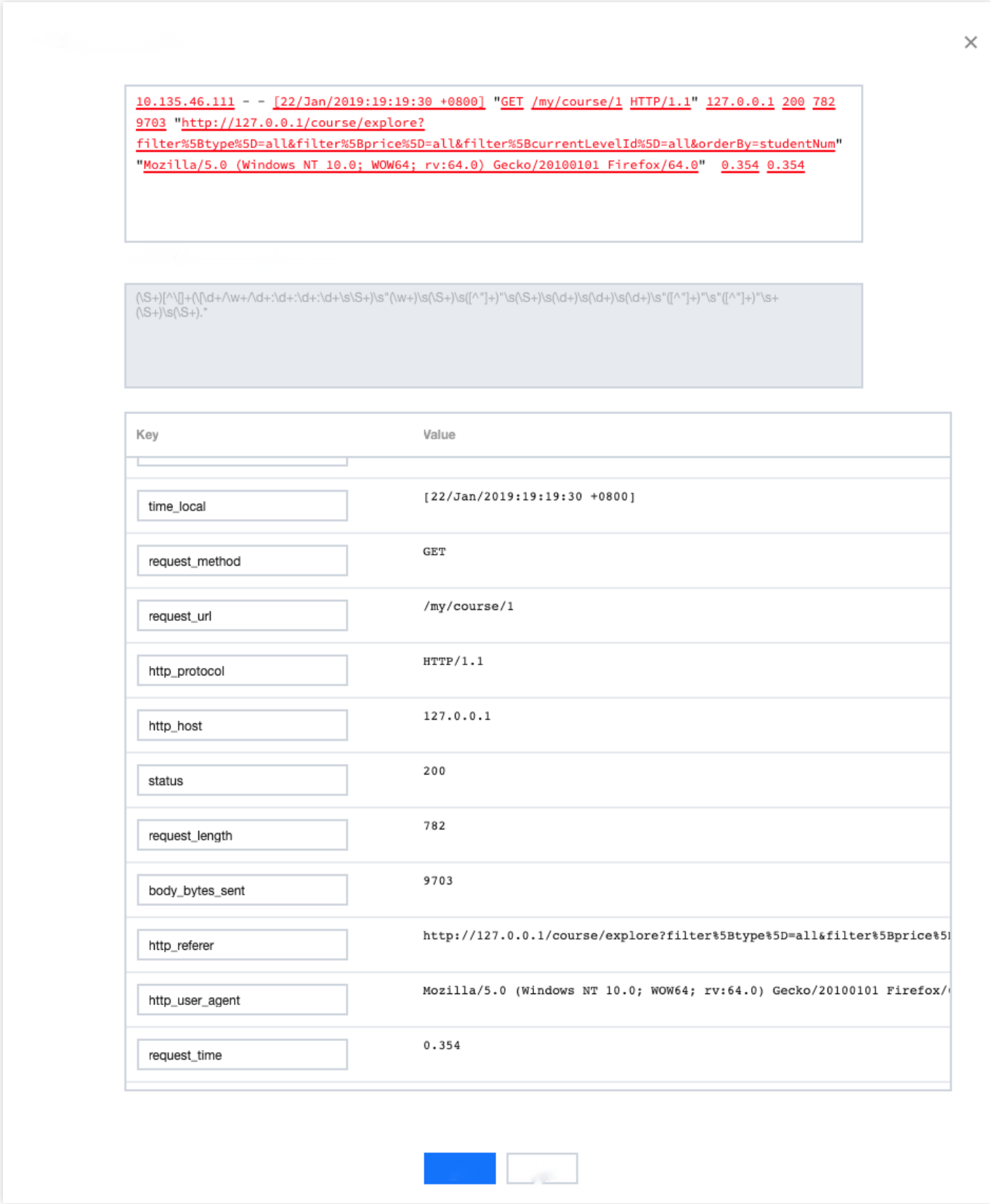
- **Auto Mode** (click **Auto-Generate Regular Expression** to switch):

  i. In the **Auto-Generate Regular Expression** pop-up view, select the log content from which to extract key-value pairs based on your actual search and analysis needs, enter the key name in the pop-up text box, and click **Confirm**.

  The system will automatically extract a regular expression from the content, and the **Automatic Extraction Result** will appear in the key-value table.



ii. Repeat step a until all key-value pairs are extracted.



iii. Click **OK**, and the system will automatically generate a complete regular expression according to the extracted key-value pairs.

Note：
No matter whether in auto mode or manual mode, the extraction result will be displayed in the **Extraction Result** after the regular mode is defined and verified successfully. You only need to define the key name of each key-value pair for use in log search and analysis.

Performing manual verification

1. If your log data is complex, you can set **Manual Verification** to  to enable manual verification.
2. Enter multiple sample logs, click **Verify**, and the system will verify the pass rate of the regular expression for the logs.

Configuring the collection time

- Log time is measured in milliseconds.
- The time attribute of a log is defined as follows:
- Collection time: It is the default time attribute of a log.

- Original timestamp: Set **Use Collection Time** to and enter the time key of the original timestamp and the corresponding time parsing format.
  For more information on the time format, see Configuring the Time Format.
- Collection time: The time attribute of a log is determined by the time when CLS collects the log.
- Original timestamp: The time attribute of a log is determined by the timestamp in the raw log.

Below are examples of how to enter a time resolution format:

- Example 1:
  The parsing format of the original timestamp `10/Dec/2017:08:00:00.000` is `%d/%b/%Y:%H:%M:%S.%f`.
- Example 2:
  The parsing format of the original timestamp `2017-12-10 08:00:00.000` is `%Y-%m-%d %H:%M:%S.%f`.
- Example 3:
  The parsing format of the original timestamp `12/10/2017, 08:00:00.000` is `%m/%d/%Y,`

`%H:%M:%S.%f` .

Note：
The log time is measured in milliseconds. If the log time is entered in an incorrect format, the collection time is used as the log time.

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.

To collect logs in full regular expression mode, you need to configure a filter rule according to the defined custom key-value pair. For example, if you want to collect all log data with a `status` field with the value 400 or 500 after the sample log is parsed in full regular expression mode, you need to configure `key` as `status` and the filter rule as `400|500` .

Note：
The relationship between multiple filter rules is logic "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring parsing-failed log upload

We recommend you enable **Upload Parsing-Failed Logs**. After it is enabled, LogListener will upload all types of parsing-failed logs. If it is disabled, such logs will be discarded.

After this feature is enabled, you need to configure the `Key` value for parsing failures (which is `LogParseFailure` by default). All parsing-failed logs are uploaded with the input content as the key name (`Key`) and the raw log content as the key value (`Value`).

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.
2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.

Note：

> Index configuration must be enabled before you can perform searches.

- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: The default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

3. Click **Submit**.

Related Operations

For more information on log search, see Overview and Syntax Rules.

Full Regular Expression (Multi-Line)

Last updated：2022-10-13 14:50:37

Overview

The multi-line - full regular expression mode is a log parsing mode where multiple key-value pairs can be extracted from a complete piece of log data that spans multiple lines in a log text file (such as Java program logs) based on a regular expression. If you don't need to extract key-value pairs, configure it as instructed in Collecting Logs with Full Text in Multi Lines.
When configuring the multi-line - full regular expression mode, you need to enter a sample log first and then customize your regular expression. After the configuration is completed, the system will extract the corresponding key-value pairs according to the capture group in the regular expression.

This document describes how to collect logs in multi-line - full regular expression mode.

> Note：
> To collect logs in multi-line - full regular expression mode, you need to upgrade to LogListener 2.4.5 as instructed in LogListener Installation Guide.

Prerequisites

Suppose your raw log data is:

```
[2018-10-01T10:30:01,000] [INFO] java.lang.Exception: exception happened
at TestPrintStackTrace.f(TestPrintStackTrace.java:3)
at TestPrintStackTrace.g(TestPrintStackTrace.java:7)
at TestPrintStackTrace.main(TestPrintStackTrace.java:16)
```

The first-line regular expression is:

```
\[\d+-\d+-\w+:\d+:\d+,\d+]\s\[\w+]\s.*
```

The custom regex you configure is:

```
\[(\d+-\d+-\w+:\d+:\d+,\d+)\]\s\[(\w+)\]\s(.*)
```

Then CLS extracts key-value pairs based on the `()` capture groups. You can specify the key name of each group.

```
time: 2018-10-01T10:30:01,000`
level: INFO`
msg: java.lang.Exception: exception happened
at TestPrintStackTrace.f(TestPrintStackTrace.java:3)
at TestPrintStackTrace.g(TestPrintStackTrace.java:7)
at TestPrintStackTrace.main(TestPrintStackTrace.java:16)
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.
2. In the pop-up dialog box, enter `test-multi` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in **LogListener Collection Configuration**, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, enter the collection rule name and enter the **Collection Path** according to the **log collection path format**.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `*` and `?`. • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/*/[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.

- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"` .
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx` .
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring the multi-line - full regular expression mode

1. On the **Collection Configuration** page, set **Extraction Mode** to **Multi-line - Full regular expression** and enter a sample log in the **Log Sample** text box.

2. Define a regular expression according to the following rules.
   You can choose **Auto-Generate** or **Enter Manually** to define a first-line regular expression in order to determine the boundary for multi-line logs. After the expression is verified successfully, the system will determine the number of logs that match the first-line regular expression.

- Auto-Generate: Click **Auto-Generate**, and the system will automatically generate the first-line regular expression in the grayed-out text box.
- Enter Manually: In the text box, enter the first-line regular expression, click **Verify**, and the system will determine whether the expression has passed.

3. Extract the regular expression.
   The system offers two ways to define a regular expression: **manual mode** and **auto mode**. You can manually enter the expression to extract key-value pairs for verification or click **Auto-Generate Regular Expression** to switch to auto mode. The system will extract key-value pairs to verify the regular expression according to the mode you selected and the regular expression you defined.

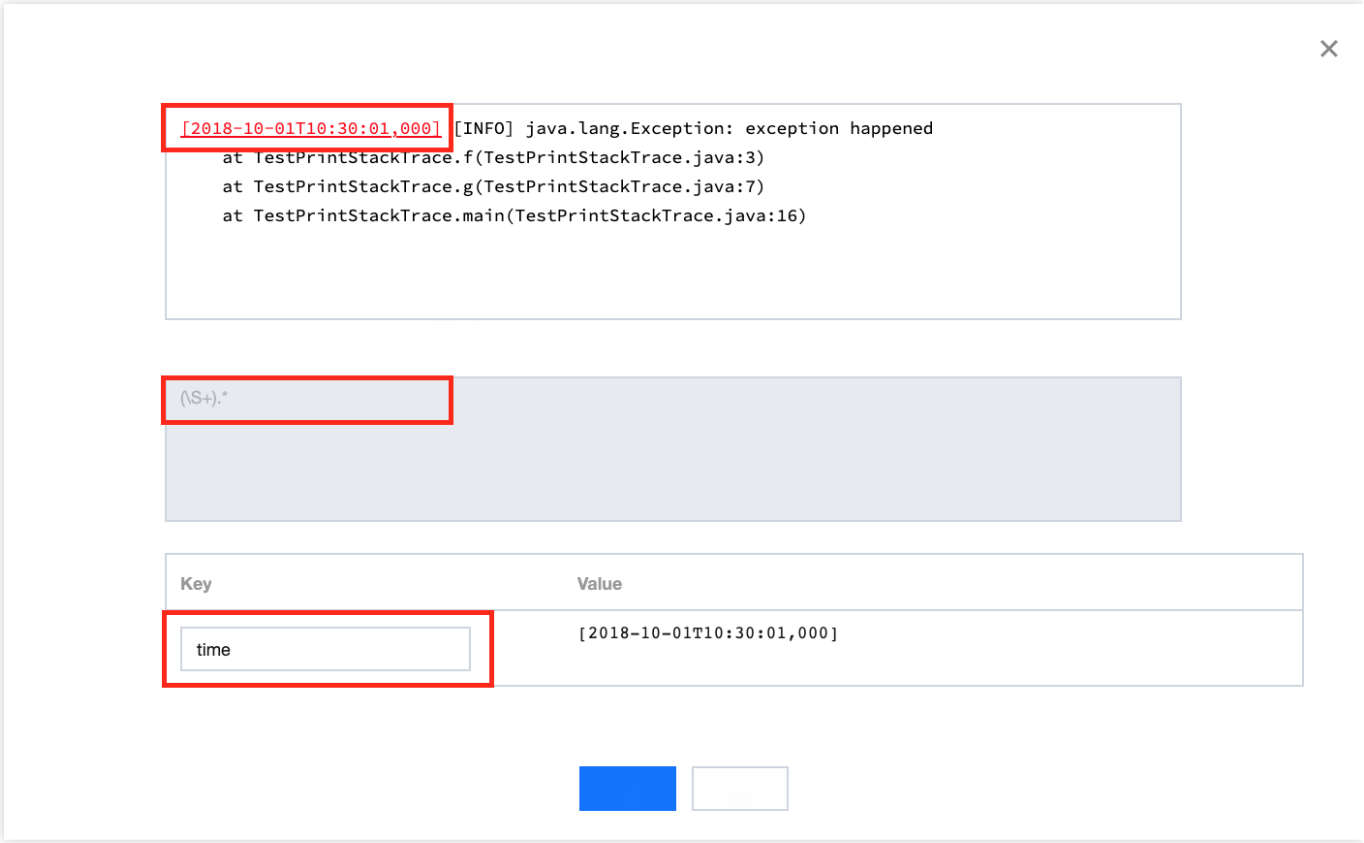
- **Manual mode**:

  i. Enter the regular expression in the **Regular Expression** text box.
  ii. Click **Verify**, and the system will determine whether the sample log matches the regular expression.

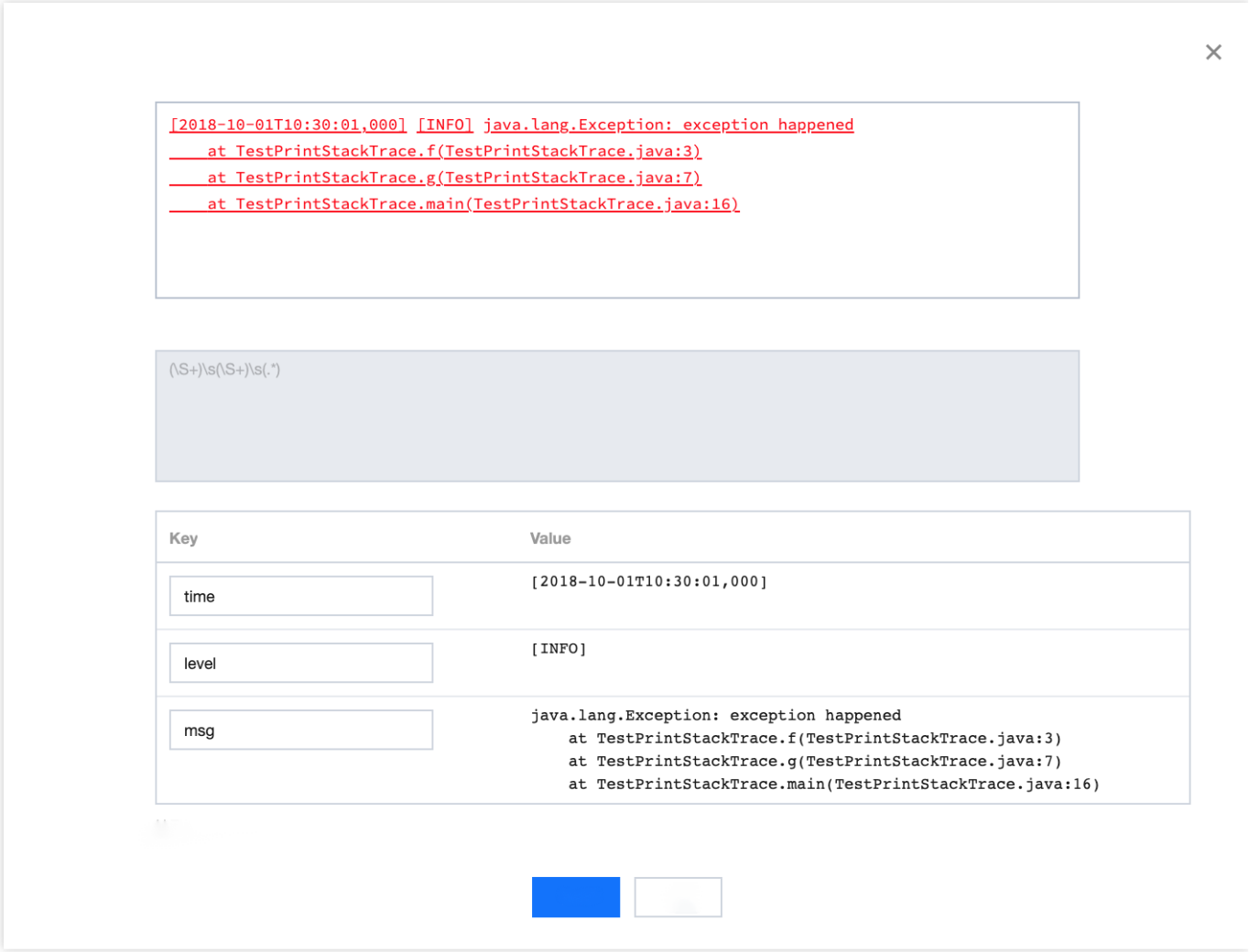
- **Auto Mode** (click **Auto-Generate Regular Expression** to switch):

i. In the **Auto-Generate Regular Expression** pop-up view, select the log content from which to extract key-value pairs based on your actual search and analysis needs, enter the key name in the pop-up text box, and click **Confirm**.

The system will automatically extract a regular expression from the content, and the **Automatic Extraction Result** will appear in the key-value table.



ii. Repeat step a until all key-value pairs are extracted.



iii. Click **OK**, and the system will automatically generate a complete regular expression according to the extracted key-value pairs.

> Note：
> No matter whether in auto mode or manual mode, the extraction result will be displayed in the **Extraction Result** after the regular mode is defined and verified successfully. You only need to define the key name of each key-value pair for use in log search and analysis.

Performing manual verification

1. If your log data is complex, you can set **Manual Verification** to  to enable manual verification.

2. Enter multiple sample logs, click **Verify**, and the system will verify the pass rate of the regular expression for the logs.

Configuring the collection time

Note：

- The log time is measured in seconds. If the log time is entered in an incorrect format, the collection time is used as the log time.
- The time attribute of a log is defined in two ways: collection time and original timestamp.
- Collection time: The time attribute of a log is determined by the time when CLS collects the log.
- Original timestamp: The time attribute of a log is determined by the timestamp in the raw log.

- **Using the collection time as the time attribute of logs**: Keep **Collection Time** enabled.
- **Using the original timestamp as the time attribute of logs**: Disable **Collection Time** and enter the time key of the original timestamp and the corresponding time parsing format in **Time Key** and **Time Parsing Format** respectively. For more information on the time parsing format, see Configuring Time Format.
  Below are examples of how to enter a time parsing format:
  Example 1: The parsing format of the original timestamp `10/Dec/2017:08:00:00` is `%d/%b/%Y:%H:%M:%S` .
  Example 2: The parsing format of the original timestamp `2017-12-10 08:00:00` is `%Y-%m-%d %H:%M:%S` .
  Example 3: The parsing format of the original timestamp `12/10/2017, 08:00:00` is `%m/%d/%Y, %H:%M:%S` .

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.

To collect logs in full regular expression mode, you need to configure a filter rule according to the defined custom key-value pair. For example, if you want to collect all log data with a `status` field with the value 400 or 500 after the sample log is parsed in full regular expression mode, you need to configure `key` as `status` and the filter rule as `400|500` .

Note：

The relationship between multiple filter rules is logic "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring parsing-failed log upload

We recommend you enable **Upload Parsing-Failed Logs**. After it is enabled, LogListener will upload all types of parsing-failed logs. If it is disabled, such logs will be discarded.

After this feature is enabled, you need to configure the `Key` value for parsing failures (which is `LogParseFailure` by default). All parsing-failed logs are uploaded with the input content as the key name (`Key`) and the raw log content as the key value (`Value`).

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.
2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.

Note：
Index configuration must be enabled before you can perform searches.

- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: The default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

3. Click **Submit**.

Related Operations

For more information on log search, see Overview and Syntax Rules.

JSON Format

Last updated：2022-10-13 14:50:37

Overview

A JSON log automatically extracts the key at the first layer as the field name and the value at the first layer as the field value to implement structured processing of the entire log. Each complete log ends with a line break `\n` .

Prerequisites

Suppose your raw JSON log data is:

```
{"remote_ip":"10.135.46.111","time_local":"22/Jan/2019:19:19:34 +0800","body_sen
t":23,"responsetime":0.232,"upstreamtime":"0.232","upstreamhost":"unix:/tmp/php-c
gi.sock","http_host":"127.0.0.1","method":"POST","url":"/event/dispatch","reques
t":"POST /event/dispatch HTTP/1.1","xff":"-","referer":"http://127.0.0.1/my/cours
e/4","agent":"Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefo
x/64.0","response_code":"200"}
```

After being structured by CLS, the log is changed to the following:

```
agent: Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0
body_sent: 23
http_host: 127.0.0.1
method: POST
referer: http://127.0.0.1/my/course/4
remote_ip: 10.135.46.111
request: POST /event/dispatch HTTP/1.1
response_code: 200
responsetime: 0.232
time_local: 22/Jan/2019:19:19:34 +0800
upstreamhost: unix:/tmp/php-cgi.sock
upstreamtime: 0.232
url: /event/dispatch
xff: -
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.
2. In the pop-up dialog box, enter `test-json` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in **LogListener Collection Configuration**, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, enter the collection rule name and enter the **Collection Path** according to the **log collection path format**.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?` * `indicates to match any multiple characters.` ?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?` . `\*` indicates to match any multiple characters. `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/**/*[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.
- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"`.
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx`.
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring the JSON mode

On the **Collection Configuration** page, select **JSON** as the **Extraction Mode**.

Configuring the collection time

Note：

- The log time is measured in seconds. If the log time is entered in an incorrect format, the collection time is used as the log time.
- The time attribute of a log is defined in two ways: collection time and original timestamp.
- Collection time: The time attribute of a log is determined by the time when CLS collects the log.
- Original timestamp: The time attribute of a log is determined by the timestamp in the raw log.

- **Using the collection time as the time attribute of logs**: Keep **Collection Time** enabled.
- **Using the original timestamp as the time attribute of logs**: Disable **Collection Time** and enter the time key of the original timestamp and the corresponding time parsing format in **Time Key** and **Time Parsing Format** respectively. For more information on the time parsing format, see Configuring Time Format.
  Below are examples of how to enter a time parsing format:
  Example 1: The parsing format of the original timestamp `10/Dec/2017:08:00:00` is `%d/%b/%Y:%H:%M:%S` .
  Example 2: The parsing format of the original timestamp `2017-12-10 08:00:00` is `%Y-%m-%d %H:%M:%S` .
  Example 3: The parsing format of the original timestamp `12/10/2017, 08:00:00` is `%m/%d/%Y, %H:%M:%S` .

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.

You can configure a filter rule for JSON logs according to the parsed key-value pair. For example, if you want to collect all log data with a `response_code` field with the value 400 or 500 from the original JSON log file, you need to configure `key` as `response_code` and the filter rule as `400|500` .

Note：
The relationship logic between multiple filter rules is "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring parsing-failed log upload

We recommend you enable **Upload Parsing-Failed Logs**. After it is enabled, LogListener will upload all types of parsing-failed logs. If it is disabled, such logs will be discarded.

After this feature is enabled, you need to configure the `Key` value for parsing failures (which is `LogParseFailure` by default). All parsing-failed logs are uploaded with the input content as the key name (`Key`) and the raw log content as the key value (`Value`).

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.
2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.

> Note：
> Index configuration must be enabled before you can perform searches.

- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: It is disabled by default and can be enabled as needed.
- Key-Value Index: Enabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis as needed. To disable key-value index, you can set  to  .

3. Click **Submit**.

Related Operations

For more information on log search, see Overview and Syntax Rules.

Separator Format

Last updated：2022-10-13 14:50:37

Overview

In a separator log, the entire log data can be structured according to the specified separator, and each complete log ends with a line break `\n`. When CLS processes separator logs, you need to define a unique key for each separate field.

Prerequisites

Suppose your raw log data is:

```
10.20.20.10 - ::: [Tue Jan 22 14:49:45 CST 2019 +0800] ::: GET /online/sample HTT
P/1.1 ::: 127.0.0.1 ::: 200 ::: 647 ::: 35 ::: http://127.0.0.1/
```

If the separator for log parsing is specified as `:::`, the log will be segmented into eight fields, and a unique key will be defined for each of them.

```
IP: 10.20.20.10 -
bytes: 35
host: 127.0.0.1
length: 647
referer: http://127.0.0.1/
request: GET /online/sample HTTP/1.1
status: 200
time: [Tue Jan 22 14:49:45 CST 2019 +0800]
```

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.

2. In the pop-up dialog box, enter `test-separator` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in **LogListener Collection Configuration**, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the server group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

On the **Collection Configuration** page, enter the collection rule name and enter the **Collection Path** according to the **log collection path format**.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?` . • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?` . • `\*` indicates to match any multiple characters. • `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*
- [Common directory prefix]/**/*[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.
- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"`.
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx`.
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.
- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Configuring the separator mode

1. Set **Extraction Mode** to **Separator**.
2. Select **Separator**, enter a sample log in the **Log Sample** text box, and click **Extract**.
   The system segments the sample log according to the selected separator and displays it in the extraction result box. You need to define a unique key for each field. Currently, log collection supports a variety of separators.

Common separators include space, tab, comma, semicolon, and vertical bar. If your log data uses other separators such as `:::`, it can also be parsed through custom delimiter.

Configuring the collection time

Note：

- The log time is measured in seconds. If the log time is entered in an incorrect format, the collection time is used as the log time.
- The time attribute of a log is defined in two ways: collection time and original timestamp.
- Collection time: The time attribute of a log is determined by the time when CLS collects the log.
- Original timestamp: The time attribute of a log is determined by the timestamp in the raw log.

- **Using the collection time as the time attribute of logs**
  Keep **Collection Time** as enabled.

- **Using the original timestamp as the time attribute of logs**
  Disable **Collection Time** and enter the time key of the original timestamp and the corresponding time parsing format in **Time Key** and **Time Parsing Format** respectively. For more information on the time parsing format, see Configuring Time Format.

Below are examples of how to enter a time parsing format:
Example 1: The parsing format of the original timestamp `10/Dec/2017:08:00:00` is `%d/%b/%Y:%H:%M:%S`.
Example 2: The parsing format of the original timestamp `2017-12-10 08:00:00` is `%Y-%m-%d %H:%M:%S`.
Example 3: The parsing format of the original timestamp `12/10/2017, 08:00:00` is `%m/%d/%Y, %H:%M:%S`.

Note：
Second can be used as the unit of log time. If the time is entered in a wrong format, the collection time is used as the log time.

Configuring filter rules

Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.

For separator-formatted logs, you need to configure a filter rule according to the defined custom key-value pair. For example, if you want to collect all log data with a `status` field with the value 400 or 500 after the sample log is parsed in separator mode, you need to configure `key` as `status` and the filter rule as `400|500`.

Note：
The relationship logic between multiple filter rules is "AND". If multiple filter rules are configured for the same key name, previous rules will be overwritten.

Configuring parsing-failed log upload

We recommend you enable **Upload Parsing-Failed Logs**. After it is enabled, LogListener will upload all types of parsing-failed logs. If it is disabled, such logs will be discarded.

After this feature is enabled, you need to configure the `Key` value for parsing failures (which is `LogParseFailure` by default). All parsing-failed logs are uploaded with the input content as the key name (`Key`) and the raw log content as the key value (`Value`).

Configuring indexes

1. Click **Next** to enter the **Index Configuration** page.
2. On the **Index Configuration** page, set the following information:

- Index Status: Select whether to enable it.

Note：
Index configuration must be enabled before you can perform searches.

- Full-Text Index: Select whether to set it to case-sensitive.
- Full-Text Delimiter: The default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
- Key-Value Index: Disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

3. Click **Submit**.

Related Operations

For more information on log search, see Overview and Syntax Rules.

Combined Parsing Format

Last updated：2022-10-13 14:50:37

Overview

If your log structure is too complex and involves multiple log parsing modes, and a single parsing mode (such as the NGINX mode, full regex mode, or JSON mode) cannot meet log parsing requirements, you can use LogListener to parse logs in combined parsing mode. You can enter code (in JSON format) in the console to define the pipeline logic for log parsing. You can add one or more LogListener plugins to process configurations, and the LogListener plugins are executed in the configuration processing order.

Prerequisites

Assume that the raw data of a log is as follows:

```
1571394459,http://127.0.0.1/my/course/4|10.135.46.111|200,status:DEAD,
```

The content of a custom plugin is as follows:

```
{
"processors": [
{
"type": "processor_split_delimiter",
"detail": {
"Delimiter": ",",
"ExtractKeys": [ "time", "msg1","msg2"]
},
"processors": [
{
"type": "processor_timeformat",
"detail": {
"KeepSource": true,
"TimeFormat": "%s",
"SourceKey": "time"
}
},
{
"type": "processor_split_delimiter",
"detail": {
"KeepSource": false,
```

```
"Delimiter": "|",
"SourceKey": "msg1",
"ExtractKeys": [ "submsg1","submsg2","submsg3"]
},
"processors": []
},
{
"type": "processor_split_key_value",
"detail": {
"KeepSource": false,
"Delimiter": ":",
"SourceKey": "msg2"
}
}
]
}
]
}
```

After being structured by CLS, the log is changed to the following:

```
time: 1571394459
submsg1: http://127.0.0.1/my/course/4
submsg2: 10.135.46.111
submsg3: 200
status: DEAD
```

Configuration Instructions

Custom plugin types

Plugin Feature	Plugin Name	Feature Description
Field extraction	processor_log_string	Performs multi-character (line breaks) parsing of fields, typically for single-line logs.
Field extraction	processor_multiline	Performs first-line regex parsing of fields (full regex mode), typically for multi-line logs.
Field extraction	processor_multiline_fullregex	Performs first-line regex parsing of fields (full regex mode), typically for multi-line logs; extracts regexes from multi-line logs.
Field	processor_fullregex	Extracts fields (full regex mode) from single-line logs.

extraction		
Field extraction	processor_json	Expands field values in JSON format.
Field extraction	processor_split_delimiter	Extracts fields (single-/multi-character separator mode).
Field extraction	processor_split_key_value	Extracts fields (key-value pair mode).
Field processing	processor_drop	Discards fields.
Field processing	processor_timeformat	Parses time fields in raw logs to convert time formats and set parsing results as log time.

Custom plugin parameters

Plugin Name	Support Subitem Parsing	Plugin Parameter	Required	Feature Description
processor_multiline	No	BeginRegex	Yes	Defines the first-line matching regex for multi-line logs.
processor_multiline_fullregex	Yes	BeginRegex	Yes	Defines the first-line matching regex for multi-line logs.
		ExtractRegex	Yes	Defines the extraction regex after multi-line logs are extracted.
		ExtractKeys	Yes	Defines the extraction keys.
processor_fullregex	Yes	ExtractRegex	Yes	Defines the extraction regex.
		ExtractKeys	Yes	Defines the extraction keys.
processor_json	Yes	SourceKey	No	Defines the name of the upper-level processor key processed by the current processor.
		KeepSource	No	Defines whether to retain `SourceKey` in the final key name.

processor_split_delimiter	Yes	SourceKey	No	Defines the name of the upper-level processor key processed by the current processor.
		KeepSource	No	Defines whether to retain `SourceKey` in the final key name.
		Delimiter	Yes	Defines the separator (single or multiple characters).
		ExtractKeys	Yes	Defines the extraction keys after separator splitting.
processor_split_key_value	No	SourceKey	No	Defines the name of the upper-level processor key processed by the current processor.
		KeepSource	No	Defines whether to retain `SourceKey` in the final key name.
		Delimiter	Yes	Defines the separator between the `Key` and `Value` in a string.
processor_drop	No	SourceKey	Yes	Defines the name of the upper-level processor key processed by the current processor.
processor_timeformat	No	SourceKey	Yes	Defines the name of the upper-level processor key processed by the current processor.
		TimeFormat	Yes	Defines the time parsing format for the `SourceKey` value (time data string in logs).

Directions

Logging in to the console

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic management page.

Creating a log topic

1. Click **Create Log Topic**.
2. In the pop-up dialog box, enter `define-log` as **Log Topic Name** and click **Confirm**.

Managing the machine group

1. After the log topic is created successfully, click its name to go to the log topic management page.
2. Click the **Collection Configuration** tab, click **Add** in the **LogListener Collection Configuration** area, and select the format in which you need to collect logs.
3. On the **Machine Group Management** page, select the machine group to which to bind the current log topic and click **Next** to proceed to collection configuration.
   For more information, see Machine Group Management.

Configuring collection

Configuring the log file collection path

On the **Collection Configuration** page, set **Collection Path** according to the log collection path format.
Log collection path format: `[directory prefix expression]/**/[filename expression]` .

After the log collection path is entered, LogListener will match all common prefix paths that meet the **[directory prefix expression]** rule and listen for all log files in the directories (including subdirectories) that meet the **[filename expression]** rule. The parameters are as detailed below:

Parameter	Description
Directory Prefix	Directory prefix for log files, which supports only the wildcard characters `\*` and `?` * `indicates to match any multiple characters.` ?` indicates to match any single character.
/**/	Current directory and all its subdirectories.
File Name	Log file name, which supports only the wildcard characters `\*` and `?` . `\*` indicates to match any multiple characters. `?` indicates to match any single character.

Common configuration modes are as follows:

- [Common directory prefix]/**/[common filename prefix]*

- [Common directory prefix]/**/*[common filename suffix]
- [Common directory prefix]/**/[common filename prefix]*[common filename suffix]
- [Common directory prefix]/**/*[common string]*

Below are examples:

No.	Directory Prefix Expression	Filename Expression	Description
1.	/var/log/nginx	access.log	In this example, the log path is configured as `/var/log/nginx/**/access.log`. LogListener will listen for log files named `access.log` in all subdirectories in the `/var/log/nginx` prefix path.
2.	/var/log/nginx	*.log	In this example, the log path is configured as `/var/log/nginx/**/*.log`. LogListener will listen for log files suffixed with `.log` in all subdirectories in the `/var/log/nginx` prefix path.
3.	/var/log/nginx	error*	In this example, the log path is configured as `/var/log/nginx/**/error*`. LogListener will listen for log files prefixed with `error` in all subdirectories in the `/var/log/nginx` prefix path.

Note：

- Only LogListener 2.3.9 and later support adding multiple collection paths.
- The system does not support uploading logs with contents in multiple text formats, which may cause write failures, such as `key:"{"substream":XXX}"`.
- We recommend you configure the collection path as `log/*.log` and rename the old file after log rotation as `log/*.log.xxxx`.
- By default, a log file can only be collected by one log topic. If you want to have multiple collection configurations for the same file, add a soft link to the source file and add it to another collection configuration.

Configuring the combined parsing mode

On the **Collection Configuration** page, select **Combined Parsing** as the **Extraction Mode**.

Configuring the collection policy

- Full collection: When LogListener collects a file, it starts reading data from the beginning of the file.

- Incremental collection: When LogListener collects a file, it collects only the newly added content in the file.

Use Limits

- If the combined parsing mode is used for data parsing, LogListener will consume more resources. We recommend you not use overly complex plug-in combinations to process data.
- If the combined parsing mode is used, the collection and filter features of the text mode will become invalid, but some of these features can be implemented through relevant user-defined plug-ins.
- If the combined parsing mode is used, the feature of uploading logs that fail to be parsed is enabled by default. For logs that fail to be parsed, the input name is the `Key` and the original log content is the `Value` for log uploading.

Related Operations

Log search

1. Log in to the CLS console.
2. On the left sidebar, click **Search and Analysis** to go to the search and analysis page.
3. Select the region, logset, and log topic as needed, and click **Search and Analysis** to search for logs according to the set query rules.

Configuring Time Format

Last updated：2022-10-13 14:50:37

CLS requires a time attribute for each log so that the system can manage the data by the time dimension. When logs are collected using LogListener, the time attribute can be configured using two methods:

- Default method: Use LogListener collection time as the time attribute.
- Custom method: Use a time field in the log content as the time attribute. In this method, you need to configure a time parsing format.

Note：
The time precision of LogListener collection is millisecond. Therefore, the time parsing format needs to be accurate to milliseconds. If the time specified in the required format is less than 1 millisecond, 0 is automatically filled in.

About Parsing Formats

Parameter Format	Description	Example
%a	Abbreviation for a weekday	Fri
%A	Full name for a weekday	Friday
%b	Abbreviation for a month	Jan
%B	Full name for a month	January
%d	A day of a month (01 to 31)	31
%h	Abbreviation for a month, same as `%b`	Jan
%H	An hour in the 24-hour system (00 to 23)	22
%I	An hour in the 12-hour system (01 to 12)	11
%m	Month (01 to 12), with 01 indicating January	08
%M	Minute (00 to 59), with 01 indicating one minute	59

Parameter Format	Description	Example
%n	Line break	Line break
%p	Morning (AM) or afternoon (PM)	AM/PM
%r	Specific 12-hour combined time format, equivalent to `%I:%M:%S %p`	11:59:59 AM
%R	Specific 24-hour combined time format, equivalent to `%H:%M`	23:59
%S	Second (00 to 59)	59
%f	Millisecond	0.123
%t	Tab	Tab
%y	Year, without the century (00 to 99)	19
%Y	Year, with the century, with 2018 indicating the year of 2018	2019
%C	Century (obtained by dividing the year by 100, ranging from 00 to 99)	20
%e	A day of a month (01 to 31)	31
%j	A day of a year (001 to 366)	365
%u	Weekday represented by a digit (1 to 7), with 1 indicating Monday and 7 indicating Sunday	1
%U	A week of a year (00 to 53), with the weeks starting from Sunday, that is, the first Sunday as the first day of the first week	23
%w	Weekday represented by a digit (0 to 6), with 0 indicating Sunday and 6 indicating Saturday	5
%W	A week of a year (00 to 53), with the weeks starting from Monday, that is, the first Monday as the first day of the first week	23
%s	Second-level (10-digit) UNIX timestamp	1571394459
%F	Millisecond-level (13-bit) UNIX timestamp	1571394459123
%z	Supports time zone parsing for time fields, including ISO 8601 time format and GMT time format	UTC/+0800/MST

Configuration Samples

Time Indication Sample	Time Extraction Format
2018-07-16 13:12:57.123	%Y-%m-%d %H:%M:%S.%f
[2018-07-16 13:12:57.012]	[%Y-%m-%d %H:%M:%S.%f]
06/Aug/2019 12:12:19 +0800	%d/%b/%Y %H:%M:%S
Monday, 02-Oct-19 16:07:05 MST	%A, %d-%b-%y %H:%M:%S
1571394459	%s
1571394459123	%F
06/Aug/2019 12:12:19 +0800	%d/%b/%Y %H:%M:%S %z
Monday, 02-Oct-19 16:07:05 MST	%A, %d-%b-%y %H:%M:%S %z

Importing LogListener Collection Configuration

Last updated：2022-08-24 12:06:36

This document describes how to use LogListener to quickly import the collection configuration rules of other log topics.

Overview

LogListener collection configuration refers to the collection path, use limits, collection mode, and other collection rules configured in the LogListener collection server before log collection. The collection configuration rule import feature allows users to import the collection configuration of an existing log topic to quickly configure LogListener collection rules when they add or modify collection configuration. This eliminates repetitive and tedious operations for configuring multiple log topics and improves the efficiency of collection configuration.

Note：

- By default, the collection of a log file can only be configured in only one LogListener.
- To apply multiple collection configurations to one file, you need to add a soft link to the source file and add the soft link to another group of collection configuration.
- Only LogListener 2.3.9 or above allows adding multiple collection paths.

Directions

1. Log in to the CLS console.
2. In the left sidebar, click **Log Topic** to go to the log topic management page.
3. Click the ID/name of an existing log topic to go to the log topic information page.
4. Click the **Collection Configuration** tab to go to the **Collection Configuration** tab page.
5. Click **Import Configuration Rule** in the upper-right corner.
6. In the configuration rule list displayed in the pop-up window, select the configuration rule of a log topic to import and click **OK** to import it to the collection configuration of the current log topic.

Note：

- The configuration rule list displays all log topics that support the cross-region log topic configuration rule import feature in the current region by default.
- Only the collection rules of log topics for which a collection path is configured can be imported to the collection configuration of the current log topic.

Collection Mode

LogListener can collect text logs in the following collection modes: Full Text in a Single Line, Full Text in Multi Lines, Full Regular Format (Single-Line), Full Regular Format (Multi-Line), JSON Format, and Separator Format.

LogListener Updates

Last updated：2021-10-25 15:04:18

This document describes CLS LogListener updates.

Note：

- Full/Incremental collection policies are available starting from LogListener v2.6.2.
- CVM batch deployment is available starting from LogListener v2.6.0.
- Multi-line - full regular expression collection mode is available starting from LogListener v2.4.5.
- LogListener auto upgrade is available starting from LogListener v2.5.0.
- Uploading parsing-failed logs is available starting from LogListener v2.5.2.
- You are advised to install or upgrade to the latest version for a better user experience.

Version	Change Type	Description
v2.6.2	New feature	Added support for incremental collection.
	Experience optimization	• Optimized the issue where collection is ignored in the period from file scanning to processing. • Optimized abnormal overriding during automatic upgrade.
v2.6.1	Experience optimization	• Optimized the issue where backtracking collection may occur during log rotation in some scenarios. • Adjusted the timeout duration for log upload on the collection end to avoid data duplication caused by timeout.
v2.6.0	New feature	• Added support for CVM batch deployment. • Added support for ciphertext storage of secret IDs/KEYs.
	Experience optimization	• Optimized the LogListener installation and stop logic. • Optimized the retry policy upon upload failures. • Added a tool for detecting and rectifying dead locks caused by Glibc libraries of earlier versions. • Optimized collection performance.
v2.5.9	Experience optimization	Optimized the resource limit policy.
v2.5.8	Experience optimization	• Fixed the issue that removing a directory soft link affects the collection of other directory soft links that point to the same target.

		• Fixed the issue that files in a directory cannot be collected if a soft link of the directory is removed and the same soft link is created again.
v2.5.7	Experience optimization	• Fixed the (new) issue that logs will be collected again when the log file size is greater than 2 GB. • Fixed the issue where renaming too many files will cause the program to malfunction. • Fixed the issue where specified fields cannot be updated under log collection monitoring.
v2.5.6	Experience optimization	Optimized the issue that under specific use cases, the collection program cannot be triggered.
v2.5.5	Experience optimization	• Optimized metadata checkpoints for collection to guarantee no data will lose due to restart. • Supports resource limit configuration and overrun handling for memory, CPU, and bandwidth.
v2.5.4	New feature	Added support for log collection monitoring.
	Experience optimization	Enhanced memory overrun handling: LogListener will be automatically loaded when memory overrun lasts for a period of time.
v2.5.3	Experience optimization	Optimized LogListener exceptions caused by memory issues.
v2.5.2	New feature	Added support for uploading parsing-failed logs.
	Experience optimization	Optimized the blocklist feature. Now, the blocklist FILE mode supports wildcard filtering.
v2.5.1	Experience optimization	Enhanced the handling when breakpoint metadata could not be found in the collection file.
v2.5.0	New feature	• Added support for automatic LogListener upgrade. • Added support for automatic LogListener start in Ubuntu operating system.
v2.4.6	Experience optimization	• Cleared residual configuration data in the cache after the collection configuration was changed. • Optimized the issue where file collection with a soft link pointing to the `realpath` file was affected when an `IN_DELETE` event that deleted the soft link was being processed. • Optimized the feature of collecting the same source file via the file's soft link and the directory's soft link at the same time.
v2.4.5	New feature	Added support for `multiline_fullregex_log` log collection.
v2.4.4	Experience	Optimized the issue of inaccurate log time caused by the msec feature.

	optimization	
v2.4.3	New feature	Added support for automatically checking the log format (logFormat).
v2.4.2	Experience optimization	Optimized the issue of cache eviction during configuration pulling in Tencent Cloud container scenarios.
v2.4.1	New feature	Added support for collecting logs in milliseconds.
	Experience optimization	Optimized exceptions due to no line break data in user logs.
v2.4.0	New feature	Added support for instance-level process monitoring by LogListener.
v2.3.9	New feature	Added support for blocklisting collection paths.
	Experience optimization	Optimized the memory leak issue due to outdated Boost library.
v2.3.8	New feature	Added support for multi-path log collection.
v2.3.6	Experience optimization	• Fixed the issue where collection stopped due to invalid key value. • Fixed the memory leak issue due to request failures with the error code 502 returned.
v2.3.5	New feature	Added support for log context search.
	Experience optimization	• Fixed the issue where log collection stopped when logs were uploaded but authentication failed in the static configuration mode. • Fixed the issue where dynamic configurations were no longer read after the memory exceeded the threshold in the dynamic configuration mode. • Fixed the issue where sometimes log collection repeated when the log production speed was too high during log rotation. • Fixed the memory leak issue caused by multiple failures to upload logs.
v2.3.1	Experience optimization	• Optimized memory limit. • When the memory limit was reached, requests lasting over 3s were considered as timed out.
v2.2.6	New feature	Added support for configuring private domain names and public domain names separately.
	Experience optimization	Fixed LogListener exceptions caused by `getip`.
v2.2.5	New feature	Added support for Tencent Cloud COC environment deployment.
	Experience	Fixed the core issue caused by `getip`.

	optimization	
v2.2.4	Experience optimization	• Changed the commands for installation and initialization to the subcommands `install` and `init` of `tools/loglistener.sh` respectively. • Changed the command for restart to `/etc/init.d/loglistenerd start|stop|restart`.
v2.2.3	Experience optimization	Renaming or creating logs during log rotation will not cause log loss.
v2.2.2	Experience optimization	A log greater than 512 KB will be automatically truncated.
Earlier versions	-	• v2.2.2 added support for collection by full regular expression. • v2.1.4 added support for full text in multi lines. • v2.1.1 added support for log structuring.

Uploading Log over Kafka

Last updated：2022-10-13 14:36:07

CLS allows you to upload logs to CLS by using Kafka Producer SDKs or other Kafka related agents.

Overview

Using Kafka as a message pipeline is common in log applications. First, the open source collection client or the producer on the machine directly writes logs to be collected, and then provides them to the downstream, such as Spark and Flink, for consumption through the Kafka message pipeline. CLS has complete upstream and downstream capabilities of the Kafka message pipeline. The following describes the scenarios suitable for you to upload logs using the Kafka protocol. For more Kafka protocol consumption scenarios, see Kafka Real-time Consumption.

- **Scenario 1**: You already have a self-built system based on open source collection and you do not want complex secondary modifications. Then you can upload logs to CLS by modifying configuration files.
  For example, if you have set up a log system using ELK, now you only need to modify the Filebeat or Logstash configuration file to configure the output destination (see Filebeat configuration) to CLS to implement convenient and simple log upload to CLS.
- **Scenario 2**: If you want to use Kafka producers to collect and upload logs, you do not need to install collection agents.
  CLS allows you to use various Kafka producer SDKs to collect logs and upload the logs to CLS via the Kafka protocol. For more information, see SDK call examples in this document.

Use Limits

- Supported Kafka protocol versions: 0.11.0.X, 1.0.X, 1.1.X, 2.0.X, 2.1.X, 2.2.X, 2.3.X, 2.4.X, 2.5.X, 2.6.X, 2.7.X, 2.8.X
- Supported compression modes: Gzip, Snappy, LZ4
- Current authentication mode: SASL_PLAINTEXT
- Upload over Kafka requires the `RealtimeProducer` permission. For more information, see Examples of Custom Access Policies.

Configuration Methods

To upload logs via Kafka, you need to set the following parameters:

Parameter	Description
LinkType	Currently, SASL_PLAINTEXT is supported.
hosts	Address of the initially connected cluster. For more information, see Service Entries.
topic	Log topic ID. Example: 76c63473-c496-466b-XXXX-XXXXXXXXXXXX
username	Logset ID. Example: 0f8e4b82-8adb-47b1-XXXX-XXXXXXXXXXXX
password	Password in the format of `${SecurityId}#${SecurityKey}`. Example: XXXXXXXXXXXXXX#YYYYYYYY

Service Entries

Region	Network Type	Port Number	Service Entry
Guangzhou	Private network	9095	gz-producer.cls.tencentyun.com:**9095**
	Public network	9096	gz-producer.cls.tencentcs.com:**9096**

Note：
This document uses the Guangzhou region as an example. The private and public domain names are identified by different ports. For other regions, replace the address prefixes. For more information, see here.

Examples

Agent call examples

Filebeat/Winlogbeat configuration

```
output.kafka:
enabled: true
hosts: ["${region}-producer.cls.tencentyun.com:9095"] # TODO: Service address. The public network port is 9096, and the private network port is 9095.
topic: "${topicID}" # TODO: Topic ID
version: "0.11.0.2"
compression: "${compress}" # Configure the compression method. Valid values: `gzip`, `snappy`, `lz4`.
```

```
username: "${logsetID}"
password: "${SecurityId}#${SecurityKey}"
```

Logstash example

```
output {
kafka {
topic_id => "${topicID}"
bootstrap_servers => "${region}-producer.cls.tencentyun.com:${port}"
sasl_mechanism => "PLAIN"
security_protocol => "SASL_PLAINTEXT"
compression_type => "${compress}"
sasl_jaas_config => "org.apache.kafka.common.security.plain.PlainLoginModule requ
ired username='${logsetID}' password='${securityID}#${securityKEY}';"
}
}
```

SDK call examples

Golang SDK call example

```
import (
"fmt"
"github.com/Shopify/sarama"
)
func main(){
config := sarama.NewConfig()
config.Net.SASL.Mechanism = "PLAIN"
config.Net.SASL.Version = int16(1)
config.Net.SASL.Enable = true
config.Net.SASL.User = "${logsetID}" // TODO: Logset ID
config.Net.SASL.Password = "${SecurityId}#${SecurityKey}" // TODO: Format: ${Secu
rityId}#${SecurityKey}
config.Producer.Return.Successes = true
config.Producer.RequiredAcks = ${acks} // TODO: Select the acks value according t
o the use case
config.Version = sarama.V1_1_0_0
config.Producer.Compression = ${compress} // TODO: Configuration compression mode
// TODO: Service address. The public network port is 9096, and the private networ
k port is 9095.
producer, err := sarama.NewSyncProducer([]string{"${region}-producer.cls.tencenty
un.com:9095"}, config)
if err != nil{
panic(err)
}
```

```
msg := &sarama.ProducerMessage{
Topic: "${topicID}", // TODO: Topic ID
Value: sarama.StringEncoder("goland sdk sender demo"),
}
// Send the messages
for i := 0; i <= 5; i++ {
partition, offset, err := producer.SendMessage(msg)
if err != nil{
panic(err)
}
fmt.Printf("send response; partition:%d, offset:%d\n", partition, offset)
}
_ = producer.Close()
}
```

Python SDK call example

```
from kafka import KafkaProducer
if __name__ == '__main__':
produce = KafkaProducer(
# TODO: Service address. The public network port is 9096, and the private network
port is 9095.
bootstrap_servers=["${region}-producer.cls.tencentyun.com:9095"],
security_protocol='SASL_PLAINTEXT',
sasl_mechanism='PLAIN',
# TODO: Logset ID
sasl_plain_username='${logsetID}',
# TODO: Format: ${SecurityId}#${SecurityKey}
sasl_plain_password='${SecurityId}#${SecurityKey}',
api_version=(0, 11, 0),
# TODO: Configuration compression mode
compression_type="${compress_type}",
)
for i in range(0, 5):
# TODO: Topic ID of the sent message
future = produce.send(topic="${topicID}", value=b'python sdk sender demo')
result = future.get(timeout=10)
print(result)
```

Java SDK call example

Maven dependencies:

```
<dependencies>
<!--https://mvnrepository.com/artifact/org.apache.kafka/kafka-clients-->
```

```
<dependency>
<groupId>org.apache.kafka</groupId>
<artifactId>kafka-clients</artifactId>
<version>0.11.0.2</version>
</dependency>
</dependencies>
```

Sample code:

```
import org.apache.kafka.clients.producer.*;
import java.util.Properties;
import java.util.concurrent.ExecutionException;
import java.util.concurrent.Future;
import java.util.concurrent.TimeUnit;
import java.util.concurrent.TimeoutException;
public class ProducerDemo {
public static void main(String[] args) throws InterruptedException, ExecutionExce
ption, TimeoutException {
// 0. Set parameters
Properties props = new Properties();
// TODO: In use
props.put("bootstrap.servers", "${region}-producer.cls.tencentyun.com:9095");
// TODO: Set the following according to the actual business scenario
props.put("acks", ${acks});
props.put("retries", ${retries});
props.put("batch.size", ${batch.size});
props.put("linger.ms", ${linger.ms});
props.put("buffer.memory", ${buffer.memory});
props.put(ProducerConfig.COMPRESSION_TYPE_CONFIG, "${compress_type}"); // TODO: c
onfiguration compression mode
props.put("key.serializer", "org.apache.kafka.common.serialization.StringSerializ
er");
props.put("value.serializer", "org.apache.kafka.common.serialization.StringSerial
izer");
props.put("security.protocol", "SASL_PLAINTEXT");
props.put("sasl.mechanism", "PLAIN");
// TODO: The user name is logsetID, and the password is the combination of securi
tyID and securityKEY: securityID#securityKEY.
props.put("sasl.jaas.config",
"org.apache.kafka.common.security.plain.PlainLoginModule required username='${log
setID}' password='${SecurityId}#${SecurityKey}';");
// 1. Create a producer object.
Producer<String, String> producer = new KafkaProducer<String, String>(props);

// 2. Call the send method.
Future<RecordMetadata> meta = producer.send(new ProducerRecord<String, String>(
"${topicID}", ${message}));
```

```
RecordMetadata recordMetadata = meta.get(${timeout}, TimeUnit.MILLISECONDS);
System.out.println("offset = " + recordMetadata.offset());
// 3. Close the producer.
producer.close();
}
}
```

SDK for C call example

```
// https://github.com/edenhill/librdkafka - master
#include <iostream>
#include <librdkafka/rdkafka.h>
#include <string>
#include <unistd.h>
#define BOOTSTRAP_SERVER "${region}-producer.cls.tencentyun.com:${port}"
#define USERNAME "${logsetID}"
#define PASSWORD "${SecurityId}#${SecurityKey}"
#define TOPIC "${topicID}"
#define ACKS "${acks}"
#define COMPRESS_TYPE "${compress_type}"
static void dr_msg_cb(rd_kafka_t *rk, const rd_kafka_message_t *rkmessage, void *
opaque) {
if (rkmessage->err) {
fprintf(stdout, "%% Message delivery failed : %s\n", rd_kafka_err2str(rkmessage->
err));
} else {
fprintf(stdout, "%% Message delivery successful %zu:%d\n", rkmessage->len, rkmess
age->partition);
}
}
int main(int argc, char **argv) {
// 1. Initialize the configuration.
rd_kafka_conf_t *conf = rd_kafka_conf_new();
rd_kafka_conf_set_dr_msg_cb(conf, dr_msg_cb);
char errstr[512];
if (rd_kafka_conf_set(conf, "bootstrap.servers", BOOTSTRAP_SERVER, errstr, sizeof
(errstr)) != RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
if (rd_kafka_conf_set(conf, "acks", ACKS, errstr, sizeof(errstr)) != RD_KAFKA_CON
F_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
```

```
}
if (rd_kafka_conf_set(conf, "compression.codec", COMPRESS_TYPE, errstr, sizeof(er
rstr)) != RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
// Set the authentication method.
if (rd_kafka_conf_set(conf, "security.protocol", "sasl_plaintext", errstr, sizeof
(errstr)) != RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
if (rd_kafka_conf_set(conf, "sasl.mechanisms", "PLAIN", errstr, sizeof(errstr)) !
= RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
if (rd_kafka_conf_set(conf, "sasl.username", USERNAME, errstr, sizeof(errstr)) !=
RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
if (rd_kafka_conf_set(conf, "sasl.password", PASSWORD, errstr, sizeof(errstr)) !=
RD_KAFKA_CONF_OK) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "%s\n", errstr);
return -1;
}
// 2. Create a handler.
rd_kafka_t *rk = rd_kafka_new(RD_KAFKA_PRODUCER, conf, errstr, sizeof(errstr));
if (!rk) {
rd_kafka_conf_destroy(conf);
fprintf(stdout, "create produce handler failed: %s\n", errstr);
return -1;
}
// 3. Send data.
std::string value = "test lib kafka ---- ";
for (int i = 0; i < 100; ++i) {
retry:
rd_kafka_resp_err_t err = rd_kafka_producev(
rk, RD_KAFKA_V_TOPIC(TOPIC),
RD_KAFKA_V_MSGFLAGS(RD_KAFKA_MSG_F_COPY),
RD_KAFKA_V_VALUE((void *) value.c_str(), value.size()),
```

```
RD_KAFKA_V_OPAQUE(nullptr), RD_KAFKA_V_END);
if (err) {
fprintf(stdout, "Failed to produce to topic : %s, error : %s", TOPIC, rd_kafka_er
r2str(err));
if (err == RD_KAFKA_RESP_ERR__QUEUE_FULL) {
rd_kafka_poll(rk, 1000);
goto retry;
}
} else {
fprintf(stdout, "send message to topic successful : %s\n", TOPIC);
}
rd_kafka_poll(rk, 0);
}
std::cout << "message flush final" << std::endl;
rd_kafka_flush(rk, 10 * 1000);
if (rd_kafka_outq_len(rk) > 0) {
fprintf(stdout, "%d message were not deliverer\n", rd_kafka_outq_len(rk));
}
rd_kafka_destroy(rk);
return 0;
}
```

SDK for C# call example

```
/*
* This demo only provides the easiest way of using the feature. The specific prod
uction needs to be implemented in combination with the call method.
* During use, the TODO items in the demo need to be replaced with actual values.
*
* Notes:
* 1. This demo is verified based on Confluent.Kafka 1.8.2.
* 2. The maximum value of `MessageMaxBytes` cannot exceed 5 MB.
* 3. This demo adopts the sync mode for production. You can change to the async m
ode during use based on your business scenario.
* 4. You can adjust other parameters during use as instructed at https://docs.con
fluent.io/platform/current/clients/confluent-kafka-dotnet/_site/api/Confluent.Kaf
ka.ProducerConfig.html.
*
* Confluent.Kafka reference: https://docs.confluent.io/platform/current/clients/c
onfluent-kafka-dotnet/_site/api/Confluent.Kafka.html
*/
using Confluent.Kafka;
namespace Producer
{
class Producer
{
```

```
private static void Main(string[] args)
{
var config = new ProducerConfig
{
// TODO: Domain name. For more information, visit https://intl.cloud.tencent.cn/document/product/614/18940. The private network port is 9095, and the public network port is 9096.
BootstrapServers = "${domain}:${port}",
SaslMechanism = SaslMechanism.Plain,
SaslUsername = "${logsetID}", // TODO: Logset ID of the topic
SaslPassword = "${SecurityId}#${SecurityKey}", // TODO: UIN key of the topic
SecurityProtocol = SecurityProtocol.SaslPlaintext,
Acks = Acks.None, // TODO: Assign a value based on the actual use case. Valid values: `Acks.None`, `Acks.Leader`, `Acks.All`.
MessageMaxBytes = 5242880 // TODO: The maximum size of the request message, which cannot exceed 5 MB.
};
// deliveryHandler
Action<DeliveryReport<Null, string>> handler =
r => Console.WriteLine(!r.Error.IsError ? $"Delivered message to {r.TopicPartitionOffset}" : $"Delivery Error: {r.Error.Reason}");
using (var produce = new ProducerBuilder<Null, string>(config).Build())
{
try
{
// TODO: Test verification code
for (var i = 0; i < 100; i++)
{
// TODO: Replace the log topic ID
produce.Produce("${topicID}", new Message<Null, string> { Value = "C# demo value" }, handler);
}
produce.Flush(TimeSpan.FromSeconds(10));
}
catch (ProduceException<Null, string> pe)
{
Console.WriteLine($"send message receiver error : {pe.Error.Reason}");
}
}
}
}
}
```

Uploading Logs via Logback Appender

Last updated：2022-11-15 15:02:17

Overview

Currently, CLS allows you to upload logs to CLS by using Logback Appender.

Background

Logback is an open source project of Apache. Logback allows you to deliver logs to various destinations, including consoles, files, GUI components, and even socket servers, NT event loggers, and UNIX Syslog daemons. In addition, you can have the flexibility to configure the logging behavior by editing a configuration file without modifying the application code.

Advantages

- Logs are not stored on disks: generated log data is delivered to servers via the network.
- No reconstruction is required: for applications that are using Logback, you only need to perform simple configuration to enable log collection.
- Logs are delivered in async non-blocking mode: the high concurrency and backend async delivery design make Logback ideal for high write concurrency.
- Resources are controllable: you can use parameters to control the size of the memory used by the producer to cache data to be sent and the number of threads used to execute data sending tasks.
- Automatic retries: you can configure the number of retries for exceptions that allow retries.
- Graceful shutdown: Logback will deliver logs in full mode before exiting.
- Log reporting result response: exceptions that occur during Logback running are output via `addError` .

Project Introduction and Configuration

Introducing dependencies into a Maven project

```
<dependency>
<groupId>com.tencentcloudapi.cls</groupId>
<artifactId>tencentcloud-cls-logback-appender</artifactId>
```

```
<version>1.0.3</version>
</dependency>
```

Modifying the Logback configuration file

```
<appender name="LoghubAppender" class="com.tencentcloudapi.cls.LoghubAppender">
<!--Required-->
<endpoint><region>.cls.tencentcs.com</endpoint>
<accessKeyId>${SecretID}</SecretID>
<accessKeySecret>${SecretKey}</SecretKey>
<topicId>${topicId}</topicId>
<!-- Optional. For details, see 'Parameter description'-->
<totalSizeInBytes>104857600</totalSizeInBytes>
<maxBlockMs>0</maxBlockMs>
<sendThreadCount>8</sendThreadCount>
<batchSizeThresholdInBytes>524288</batchSizeThresholdInBytes>
<batchCountThreshold>4096</batchCountThreshold>
<lingerMs>2000</lingerMs>
<retries>10</retries>
<baseRetryBackoffMs>100</baseRetryBackoffMs>
<maxRetryBackoffMs>50000</maxRetryBackoffMs>
<!-- Optional. Set the time format -->
<timeFormat>yyyy-MM-dd'T'HH:mm:ssZ</timeFormat>
<timeZone>Asia/Shanghai</timeZone>
<encoder>
<pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger - %msg</pattern>
</encoder>
<mdcFields>THREAD_ID,MDC_KEY</mdcFields>
</appender>
```

Logback Appender SDK

Please use tencentcloud-cls-logback-appender.

Uploading Logs via Loghub log4j Appender

Last updated：2022-03-08 13:10:29

Overview

CLS allows you to upload logs to CLS by using Log4j Appender.

Background

Log4j Appender is an open source project of Apache. It allows you to deliver logs to various destinations, including consoles, files, GUI components, and even socket servers, NT event loggers, and UNIX Syslog daemons. You can control the output format of each log. By defining the level of each log, you can further control the log generation process. In addition, you can have the flexibility to configure the logging behavior by editing a configuration file without modifying the application code.

Log4j Appender consists of the following components:

- Log information priory
  From high to low, log message priorities are ERROR, WARN, INFO, and DEBUG, which specify the importance of log messages.
- Log information output destination
  The output destination of a log specifies whether the log will be printed to the console or to a file.
- Log information output format
  The log information output format specifies the display content of log information.

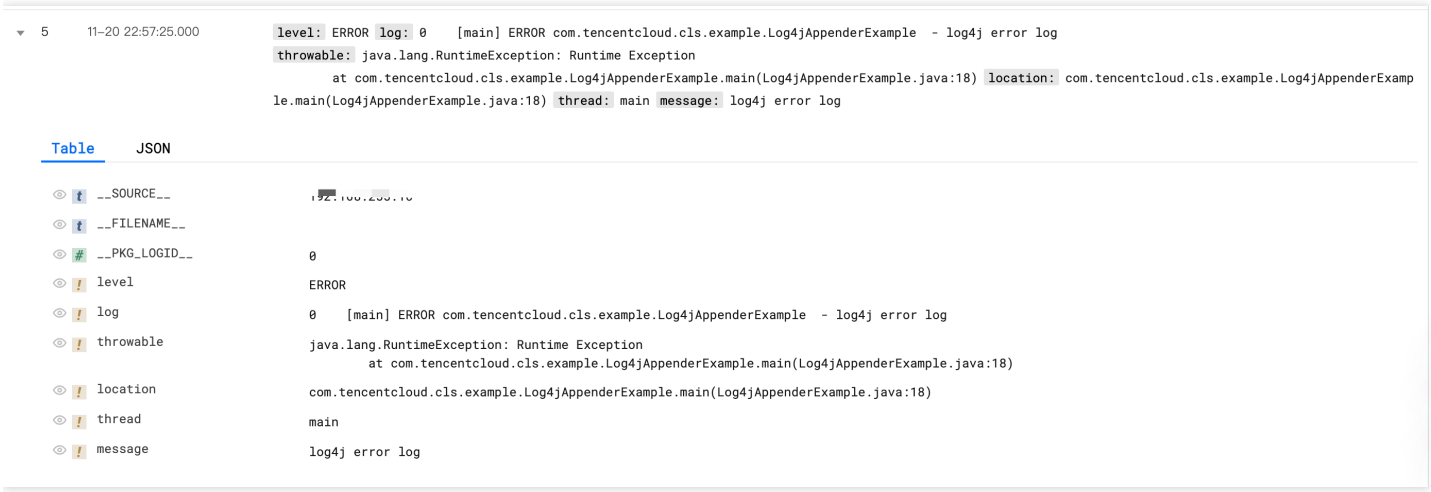
Advantages

- Logs are not stored on disks: generated log data is delivered to servers via the network.
- No reconstruction is required: for applications that are using Log4j Appender, you only need to perform simple configuration to enable log collection.
- Logs are delivered in async non-blocking mode: the high concurrency and backend async delivery design make Logback ideal for high write concurrency.
- Resources are controllable: you can use parameters to control the size of the memory used by the producer to cache data to be sent and the number of threads used to execute data sending tasks.
- Automatic retries: you can configure the number of retries for exceptions that allow retries.
- Graceful shutdown: Log4j Appender will deliver logs in full mode before exiting.

- Log reporting result response: exceptions that occur during running are recorded via `org.apache.log4j.helpers.LogLog` and, by default, will be output to the console.

Using Tencent CLS Log4j Appender

With Tencent CLS Log4j Appender, you can specify that logs are output to Tencent Cloud CLS in the format as shown in the figure below.



Field	Description
__SOURCE__	Source IP
__FILENAME__	File name
level	Log level
location	Code location of the log print statement
message	Log content
throwable	Log exception information (This field exists only when exception information is logged.)
thread	Thread name
time	Log print time (You can print the format and time zone via `timeFormat` and `timeZone` respectively.)
log	Custom log format

Project Introduction and Configuration

Introducing dependencies into a Maven project

```
<dependency>
<groupId>com.tencentcloudapi.cls</groupId>
<artifactId>tencentcloud-cls-log4j-appender</artifactId>
<version>1.0.2</version>
</dependency>
```

Modifying the Log4j configuration file

```
#loghubAppender
log4j.appender.loghubAppender=com.tencentcloud.cls.LoghubAppender
# CLS HTTP address. Required.
log4j.appender.loghubAppender.endpoint=ap-guangzhou.cls.tencentcs.com
# User ID. Required.
log4j.appender.loghubAppender.accessKeyId=
log4j.appender.loghubAppender.accessKeySecret=
# `log` field format. Required.
log4j.appender.loghubAppender.layout=org.apache.log4j.PatternLayout
log4j.appender.loghubAppender.layout.ConversionPattern=%-4r [%t] %-5p %c %x - %m%
n
# Log topic. Optional.
log4j.appender.loghubAppender.topicID =
# Log source. Optional.
log4j.appender.loghubAppender.source =
# Maximum size of logs cached by a single Producer instance. The default value is
100 MB.
log4j.appender.loghubAppender.totalSizeInBytes=104857600
# Maximum time for blocking a caller from using the `send` method if the Producer
has insufficient free space. The default value is 60 seconds. It is strongly reco
mmended that this value be set to 0 in order not to block the log print thread.
log4j.appender.loghubAppender.maxBlockMs=0
# Size of the thread pool for executing log sending tasks. The default value is t
he number of available processors.
log4j.appender.loghubAppender.sendThreadCount=8
# When the size of logs cached in ProducerBatch is greater than or equal to `batc
hSizeThresholdInBytes`, the batch will be sent. The default value is 512 KB, and
the maximum value can be set to 5 MB.
log4j.appender.loghubAppender.batchSizeThresholdInBytes=524288
# When the number of logs cached in ProducerBatch is greater than or equal to `ba
tchCountThreshold`, the batch will be sent. The default value is 4096, and the ma
ximum value allowed is 40960.
log4j.appender.loghubAppender.batchCountThreshold=4096
```

```
# Linger time of a ProducerBatch from creation to sending. The default value is 2
seconds, and the minimum value allowed is 100 milliseconds.
log4j.appender.loghubAppender.lingerMs=2000
# Number of retries that a ProducerBatch can be retries if it fails to be sent fo
r the first time. The default value is 10 retries.
# If `retries` is less than or equal to 0, the ProducerBatch directly enters the
failure queue when it fails to be sent for the first time.
log4j.appender.loghubAppender.retries=10
# A larger parameter value allows you to trace more information, but it also cons
umes more memory.
log4j.appender.loghubAppender.maxReservedAttempts=11
# Backoff time for the first retry. The default value is 100 milliseconds.
# The Producer adopts an exponential backoff algorithm. The scheduled wait time f
or the Nth retry is: baseRetryBackoffMs * 2^(N-1).
log4j.appender.loghubAppender.baseRetryBackoffMs=100
# Maximum backoff time for retries. The default value is 50 seconds.
log4j.appender.loghubAppender.maxRetryBackoffMs=50000
# Time format. Optional.
log4j.appender.loghubAppender.timeFormat=yyyy-MM-dd'T'HH:mm:ssZ
# Set the time zone to the UTC+08:00 time zone. Optional.
log4j.appender.loghubAppender.timeZone=Asia/Shanghai
# Output DEBUG and higher level messages
log4j.appender.loghubAppender.Threshold=DEBUG
```

Log4j Appender SDK

- Log4j 1.x: please use tencentcloud-cls-log4j-appender.
- Log4j 2.x: please use tencentcloud-cls-log4j2-appender.

Uploading Log via SDK

Last updated：2022-10-13 14:36:07

Overview

To help you use CLS more efficiently, we have created SDKs in multiple programming languages for log upload. You can choose an appropriate version based on your business needs.

Precautions

1. The SDK encapsulates the data access APIs of CLS uniformly to make log upload much easier.
2. The SDK implements the encapsulation of CLS logs in the Protobuf format, so you don't need to care about the specific details of this format when writing logs.
3. The SDK implements the compression methods defined in CLS APIs, so you don't need to care about the details of compression implementation. SDKs for certain programming languages support writing compressed logs by default.
4. The SDK provides unified features such as async sending, resource control, automatic retry, graceful shutdown, and log perception to make log reporting more comprehensive.

SDK List

The following table lists the source code of CLS SDKs for different programming languages at GitHub:

SDK Language	GitHub Source Code
Java	tencentcloud-cls-sdk-java
C++	tencentcloud-cls-sdk-c++
Go	tencentcloud-cls-sdk-go
JavaScript	tencentcloud-cls-sdk-js
Android	tencentcloud-cls-sdk-android
iOS	tencentcloud-cls-sdk-ios

Uploading Log via API

Last updated：2022-10-13 14:45:14

Feature Description

This API is used to write a log to the specified log topic.

CLS provides the following two modes:

- Load balancing mode
- Hash routing mode

In this mode, logs will be automatically written to a target partition among all readable/writable partitions under the current log topic based on the load balancing principle. This mode is suitable for scenarios where the sequential consumption is not needed.

Sample

```
POST /structuredlog?topic_id=xxxxxxxx-xxxx-xxxx-xxxx HTTP/1.1
Host: <Region>.cls.tencentyun.com
Authorization: <AuthorizationString>
Content-Type: application/x-protobuf
<`LogGroupList` content packaged as a PB file>
```

Private and public domain names

CLS request domain names divide into private domain names and public domain names:

- A private domain name is in the format of `${region}.cls.tencentyun.com`, which is only valid for access requests from the same region, that is, CVM or Tencent Cloud services access the CLS service in the same region through the private domain name.
- A public domain name is in the format of `${region}.cls.tencentcs.com`. After the access source is connected to the internet, the public domain name of CLS can be accessed under normal circumstances.

The `region` field is the abbreviation of a CLS service region, such as `ap-beijing` for the Beijing region. For the complete region list, see Available Regions.

```
ap-beijing - Beijing
ap-shanghai - Shanghai
ap-guangzhou - Guangzhou
```

```
ap-chengdu - Chengdu
...
```

In addition, CLS allows you to upload logs in the following two modes:

- Uploading compressed logs
- Uploading original logs

In this mode, logs are compressed in LZ4 format for collection, and then uploaded for retention. This mode reduces the log upload traffic (write traffic) and saves costs.

Sample

```
POST /structuredlog?topic_id=xxxxxxxx-xxxx-xxxx-xxxx HTTP/1.1
Host: <Region>.cls.tencentyun.com
Authorization: <AuthorizationString>
Content-Type: application/x-protobuf
x-cls-compress-type:lz4
<`LogGroupList` content packaged as a PB file>
```

Request

Request line

```
POST /structuredlog
```

Request headers

The `x-cls-hashkey` request header indicates that logs are written to the CLS topic partitions with a range corresponding to the hashkey route, strictly guaranteeing the write sequence of logs to each topic partition for sequential consumption.

Field Name	Type	Location	Required	Description
x-cls-hashkey	string	header	No	Specifies the topic partition to which the logs will be written based on `hashkey`

Request parameters

Field Name	Type	Location	Required	Description

Field Name	Type	Location	Required	Description
topic_id	string	query	Yes	ID of the target log topic to which data will be uploaded, which can be viewed on the log topic page
logGroupList	message	pb	Yes	The logGroup list, which describes the encapsulated log groups. No more than five `logGroup` values are recommended.

LogGroup description:

Field Name	Required	Description
logs	Yes	Log array, which is a set consisting of multiple `Log` values. A `Log` indicates a log, and `LogGroup` can contain up to 10,000 `Log` values
contextFlow	No	UID used to maintain context, which does not take effect currently
filename	No	Log filename
source	No	Log source, which is generally the server IP
logTags	No	Tag list of the log

Log description:

Field Name	Required	Description
time	Yes	UNIX timestamp of log time in seconds or milliseconds (recommended)
contents	No	Log content in `key-value` format. A log can contain multiple `key-value` pairs.

Content description:

Field Name	Required	Description
key	Yes	Key of a field group in one log, which cannot start with `_` .
value	Yes	Value of a field group, which cannot exceed 1 MB in one log. The total value cannot exceed 5 MB in `LogGroup` .

`LogTag` description:

Field Name	Required	Description
key	Yes	Key of a custom tag
value	Yes	Value corresponding to the custom tag key

Response

Sample response

```
HTTP/1.1 200 OK
Content-Length: 0
```

Response headers

No special response headers. Only common headers are used.

Response parameters

N/A

Error Codes

For more information, see Error Codes.

PB Compilation Sample

This sample describes how to use the protoc compiler to compile the PB description file into a log upload API in C++.

> Note：
> Currently, protoc supports compilation in multiple programming languages such as Java, C++, and Python. For more information, see protoc.

1. Install Protocol Buffer

Download Protocol Buffer, then decompress and install it. This document uses protobuf 2.6.1 running on CentOS 7.3 as an example.
Run the following command to decompress the `protobuf-2.6.1.tar.gz` package to `/usr/local` and access this directory:

```
[root@VM_0_8_centos]# tar -zxvf protobuf-2.6.1.tar.gz -C /usr/local/ && cd /usr/local/protobuf-2.6.1
```

Run the following commands to start compilation and installation and configure the environment variables:

```
[root@VM_0_8_centos protobuf-2.6.1]# ./configure
[root@VM_0_8_centos protobuf-2.6.1]# make && make install
[root@VM_0_8_centos protobuf-2.6.1]# export PATH=$PATH:/usr/local/protobuf-2.6.1/bin
```

After the compilation succeeds, run the following command to view the version:

```
[root@VM_0_8_centos protobuf-2.6.1]# protoc --version
liprotoc 2.6.1
```

2. Create a PB description file

A PB description file is an agreed-on data exchange format for communication. To upload logs, compile the specified protocol format to an API in the target programming language and add the API to the project code. For more information, see protoc.

Create a PB message description file `cls.proto` based on the PB data format content specified by CLS.

> Note：
> The PB description file content cannot be modified, and the filename must end with `.proto` .

The content of `cls.proto` (PB description file) is as follows:

```
package cls;
message Log
{
message Content
{
required string key = 1; // Key of each field group
required string value = 2; // Value of each field group
}
```

```
required int64 time = 1; // Unix timestamp
repeated Content contents = 2; // Multiple `key-value` pairs in one log
}
message LogTag
{
required string key = 1;
required string value = 2;
}
message LogGroup
{
repeated Log logs = 1; // Log array consisting of multiple logs
optional string contextFlow = 2; // This parameter does not take effect currently
optional string filename = 3; // Log filename
optional string source = 4; // Log source, which is generally the server IP
repeated LogTag logTags = 5;
}
message LogGroupList
{
repeated LogGroup logGroupList = 1; // Log group list
}
```

3. Compile and generate the API

This sample uses the proto compiler to generate a C++ file in the same directory as the `cls.proto` file. Run the following compilation commands:

```
protoc --cpp_out=./ ./cls.proto
```

Note：
`--cpp_out=./` indicates that the file will be compiled in cpp format and output to the current directory.
`./cls.proto` indicates the `cls.proto` description file in the current directory.

After the compilation succeeds, the code file in the corresponding programming language will be generated. This sample generates the `cls.pb.h` header file and `cls.pb.cc` code implementation file.

```
[root@VM_0_8_centos protobuf-2.6.1]# protoc --cpp_out=./ ./cls.proto
[root@VM_0_8_centos protobuf-2.6.1]# ls
cls.pb.cc cls.pb.h cls.proto
```

4. Call

Import the generated `cls.pb.h` header file into the code and call the API for data format encapsulation.

Importing Data
Importing COS Data

Last updated：2022-03-16 16:22:53

Overview

The shipping feature of CLS interconnects the upstream linkages of the product ecosystem to import logs from Tencent Cloud's Cloud Object Storage (COS) to CLS for further operations such as log data query and analysis and processing. You only need to complete simple configurations in the CLS console to import data.

Prerequisites

- Activate CLS, create a logset and a log topic, and collect log data.
- Activate COS and ensure that the files to be imported have already been uploaded to a COS bucket. For more information, please see Uploading Objects.
- Set the COS access permission for the current operation account, that is, authorize CLS to use the CLS_QcsRole role to access COS resources.

Configuration

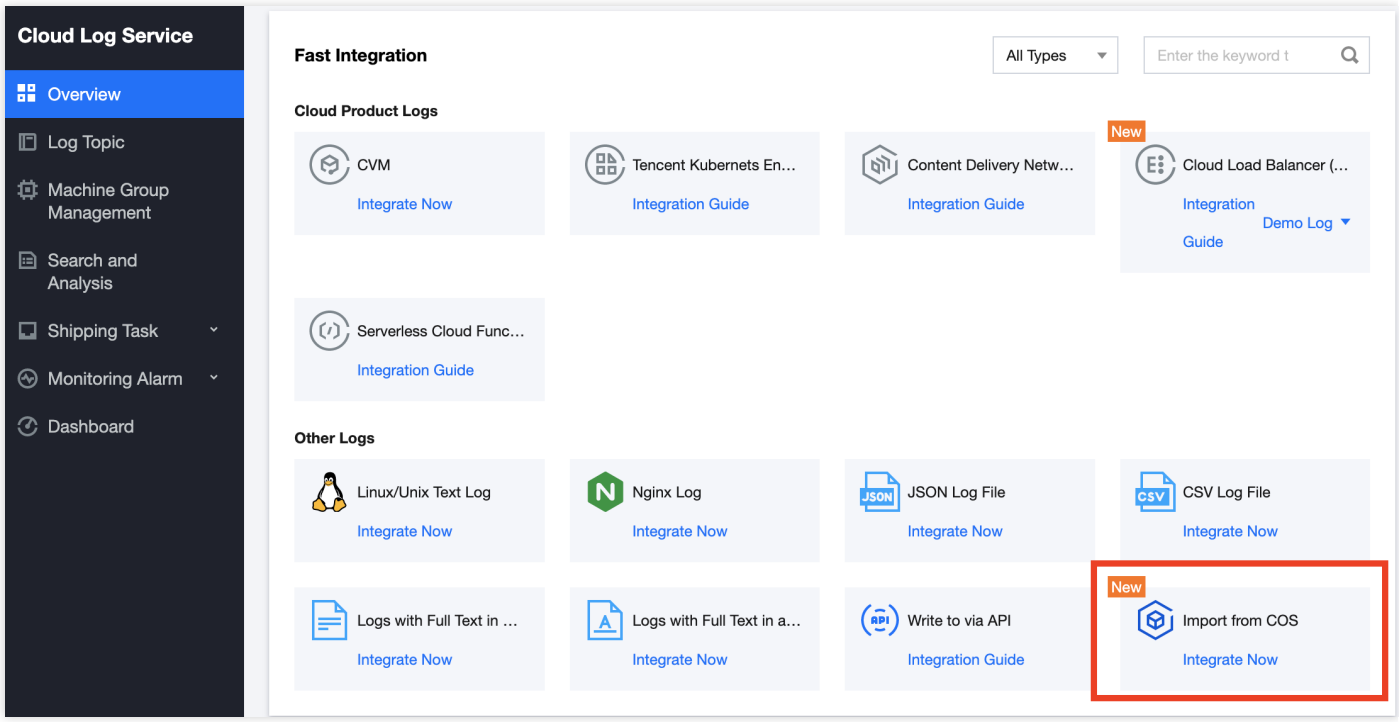
1. **Select a log topic**: select an existing log topic or create a log topic for storing the data to be imported from COS to CLS.
2. **Configure the data source**: path to the COS object to be imported and the corresponding compression mode (GZIP, LZOP, SNAPPY, or no compression).
3. **Configure parsing**: parsing format of the imported file. Currently, the following formats are supported: full text in a single line, JSON, and CSV.
4. **Configure indexes**: you need to configure indexes for the current topic, and enable index configuration before you can perform searches. If you select an existing log topic, the new index configuration takes effect only for the modified data.

Directions

Step 1. Select a log topic

- If you want to create a new log topic, perform the following operations:

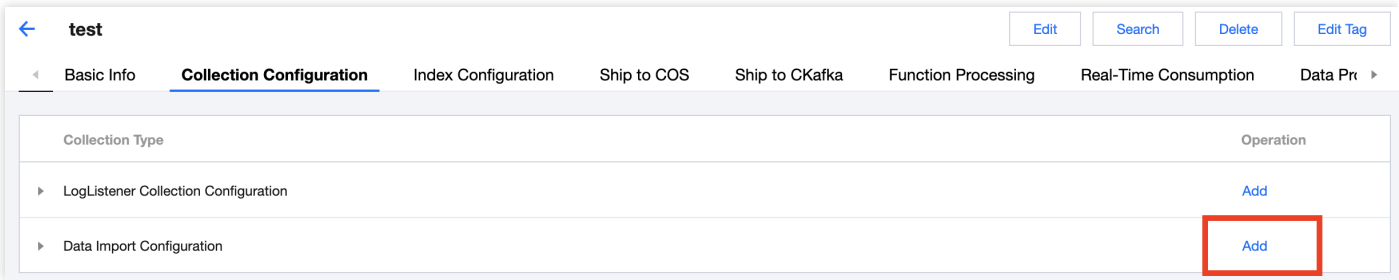
1. Log in to the CLS console.
2. On the left sidebar, click **Overview** to go to the overview page.
3. In the **Other Logs** area, locate **Import from COS** and click **Integrate Now**.



4. On the log topic creation page, configure the log topic information such as the log topic name and log retention period as needed, and click **Next**.

- If you want to select an existing log topic, perform the following operations:

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** and select a log topic to be shipped to go to the log topic management page.
3. Click the **Collection Configuration** tab and click **Add** in the **Data Import Configuration** area.



Step 2. Configure the data source

1. On the data source configuration page, configure the following information in sequence:

Configuration Item	Description	Rule	Required
Task Name	Set the name of the import task.	The value can contain letters, numbers, underscores (_), and hyphens (-).	Yes
Bucket Region	Set the region of the bucket where the file to be imported resides. If the file to be imported and the destination log topic are in different regions, public network fees will incur due to cross-region access.	Select an option from the list.	Yes
Bucket	Select the bucket where the file to be imported resides. The drop-down list box provides all buckets in the selected region for you to choose.	Select an option from the list.	Yes
File Prefix	Enter the prefix of the folder where the COS file to be imported resides for accurate locating. You can enter the file prefix **csv/** or the complete file path **csv/object.gz**.	Enter a value.	Yes
Compression Mode	Select the compression mode of the COS file to be imported. CLS decompresses the file and reads data according to the compression mode of the file. Supported compression modes are: GZIP, LZOP, SNAPPY, and no compression.	Select an option from the list.	Yes

2. Click **Preview**. The system selects an eligible path to display and provides the total number of files with the specified file prefix.

3. After confirming that the data for preview is correct, click **Next**.

Step 3. Configure parsing

1. On the parsing configuration page, configure the following information:

- Extraction mode: select **Full text in a single line**, **JSON**, or **CSV**.
  - Full text in a single line: each log will be parsed into a complete string with __CONTENT__ as the key value. If the index feature is enabled, you can search for log content via full-text search. The collection time is the log

time.

- JSON: you can extract key-value pairs in JSON format.
- CSV: you can specify a separator to split each log. You need to define the key name for each split field. Invalid fields (fields that do not need to be collected) can be left empty. However, it's not supported to leave all fields empty.

- Filter:
  - Filters are designed to help you extract valuable log data by adding log collection filter rules based on your business needs. If the filter rule is a Perl regular expression, the created filter rule will be used for matching; in other words, only logs that match the regular expression will be collected and reported.
  - For separator-formatted logs, you need to configure a filter rule according to the defined custom key-value pair. For example, if you want to collect all log data with a **status** field whose value is 400 or 500 after the sample log is parsed in separator mode, you need to configure `key` as `status` and the filter rule as `400|500`.

- Use Collection Time: when this option is toggled on, log time is marked by the collection time. When it is disabled, you need to specify a field as the log time.

  Note：
  - The log time is measured in seconds. If the log time is entered in an incorrect format, the collection time is used as the log time.
  - The time attribute of a log is defined in two ways: collection time and original timestamp.
  - Collection time: the time attribute of a log is determined by the time when the log is imported from COS to CLS.
  - Original timestamp: the time attribute of a log is determined by the timestamp in the raw log.
  - Use the original timestamp as the time attribute of logs.
  - Disable **Collection Time** and enter the time key of the original timestamp and the corresponding time parsing format in **Time Key** and **Time Parsing Format** respectively. For more information on the time parsing format, please see Configuring Time Format.

- Separator: the system segments the sample log according to the selected separator and displays it in the extraction result box. You need to define a unique key for each field. Currently, log collection supports a variety of separators. Common separators include space, tab, comma, semicolon, and vertical bar. If your log data uses other separators such as `:::`, it can also be parsed through custom delimiter.

2. Click **Next**.

Step 4. Configure indexes

1. On the index configuration page, configure the following information:

- Index Status: select whether to enable it.
- Full-Text Index: select whether to set it to case-sensitive.
  - Full-Text Delimiter: the default value is `@&()='",;:<>[]{}/ \n\t\r` and can be modified as needed.
  - Allow Chinese Characters: select whether to enable this feature.
- Key-value Index: disabled by default. You can configure the field type, delimiters, and whether to enable statistical analysis according to the key name as needed. To enable key-value index, you can set  to  .

> Note：
>
> - Index configuration must be enabled before you can perform searches.
> - The modified index rules take effect only for newly written logs. The existing data is not updated.

2. Click **Submit**.

Related Operations

Querying the import progress

1. If the current log topic contains a COS import task, click **Search** to go to the **Search and Analysis** page to view the progress of the import task.

2. The floating balloon in the upper-right corner of the **Search and Analysis** page shows the import progress. Click the balloon to view the details of the import task.

3. On the task details page, click **View Details** to redirect to the collection configuration page to query the detailed configuration of the import task.

Tencent Cloud Service Log Access

Last updated：2022-10-13 14:38:08

CLS supports collecting logs of many Tencent Cloud services, including SCF, CDN, TKE, and CLB. CLS allows you to query operation records, analyze operations data, monitor running status, and set alarms.

Currently, CLS can collect logs of the following Tencent Cloud services:

Service	Collection Configuration Directions
CLB	Configure log collection in the CLB console. For more information, see Configuring Access Logs.
CDN	Configure log collection in the CDN console. For more information, see Real-time Logs.
CVM	Install and configure LogListener. For more information, see Deploying LogListener on CVMs in Batches.
TKE	Configure log collection in the TKE console. For more information, see Configure Log Collection via the Console.
SCF	Configure log collection in the SCF console. For more information, see Log Delivery Configuration (Legacy).
CloudAudit	Configure log collection in the CloudAudit console. For more information, see Shipping Log with Tracking Set.
COS	Configure log collection in the COS console. For more information, see Enabling Real-Time Log Feature on COS.
Flow Logs	Configure log collection in the Flow Logs console. For more information, see Create flow logs.
TI-ONE	Configure log collection in the TI-ONE console. For more information, see here.
WAF	Configure log collection in the WAF console. For more information, see Log Shipping.
CKafka	Configure log collection in the CKafka console. For more information, see CLS.
IoT Hub	Configure log collection in the IoT Hub console. For more information, see Cloud Log.

Log Storage
Storage Class Overview

Last updated：2022-10-17 14:54:41

According to users' different requirements for log search latency and log processing capabilities, CLS provides two storage classes: **STANDARD** and **STANDARD_IA**.

> Note：
> Currently, STANDARD_IA log storage is available only in Beijing, Guangzhou, Shanghai, Hong Kong (China), Nanjing, Singapore, Silicon Valley, and Frankfurt regions. If it is not supported in the region of your log topic, contact smart customer service for application.

STANDARD

STANDARD storage is suitable for users who require statistical analysis and provides log search within seconds, real-time statistical analysis, real-time monitoring, streaming consumption, and other application capabilities.

Use cases

- Ops monitoring and troubleshooting: Implements real-time diagnosis of online problems by leveraging the capability of log search within seconds to quickly search the log content scattered on multiple machines for fault cause locating and recovery; calculates quality metrics based on logs in real time and reports alarms when quality metrics exceed thresholds, facilitating development and Ops personnel to discover and rectify faults in the first place.
- Streaming processing: Collects the tracking log data of petabyte scale scattered on multiple machines and streams the data to the user-built big data processing cluster in real time for subsequent data lake computing, for example, for the model data calculation business of a recommendation system.

STANDARD_IA

STANDARD_IA is suitable for infrequently accessed logs that do not require statistical analysis, such as archived audit logs. It provides the full-text log search capability, meeting users' requirements for backtracking and archiving historical logs. The overall usage costs of STANDARD_IA storage are 80% lower than those of **STANDARD storage**. For more information, see IA Storage.

Use cases

- Historical logs: The explosive growth of log data makes it expensive to store and analyze logs on a large scale over months or even years. This can cause users to delete valuable data and miss out on important insights that long-term data can yield. **STANDARD_IA** can meet the needs of users to conduct large-scale statistical analysis and backtracking of historical data with low costs.
- Non-critical business logs: During troubleshooting, developers need to pay more attention to ERROR and WARN logs and monitor them and generate alarms when necessary. Non-critical business logs, such as INFO logs, are only archived and need to be searched and analyzed in specific scenarios. Common users do not have specific requirements on the search latency of these logs. Using **STANDARD_IA** to store non-critical business logs can significantly reduce user costs and meet users' demands for infrequent search.
- Audit logs: Logs for operation and security audits are collected to **STANDARD_IA**, and access behaviors, such as operation records of an account or an object, are analyzed via CLS's infrequently accessed log search capability to determine whether there are illegal operations. In addition, logs can be stored for more than 180 days to meet compliance audit requirements.

Feature Comparison

Feature	STANDARD_IA	STANDARD
Index creation	✓ (supports only full-text indexes)	✓
Context search	✓	✓
Quick analysis	×	✓
Full-text search	✓ (responds in 2 seconds for searches in 100 million records)	✓ (responds in 0.5 second for searches in 100 million records)
Key-value search	×	✓
Log download	✓	✓
SQL analysis	×	✓
Dashboard	×	✓
Monitoring alarm	×	✓

Feature	STANDARD_IA	STANDARD
Shipping to COS	✓	✓
Shipping to CKafka	✓	✓
Shipping to ES	✓	✓
Shipping to SCF	✓	✓
Log consumption	✓	✓
Data processing	✓	✓

STANDARD_IA

Last updated：2022-10-17 14:54:41

CLS STANDARD_IA is a low-cost log storage solution to search for and store massive numbers of infrequently accessed logs. It applies to scenarios where users don't require statistical analysis and logs need to be stored for a long time. STANDARD_IA provides full-text search, context search, shipping to COS, shipping to CKafka, and log consumption capabilities, meeting user requirements for backtracking and archiving historical logs. STANDARD_IA doesn't support SQL analysis, monitoring alarm, and dashboard features.

Note：
Currently, STANDARD_IA log storage is available only in Beijing, Guangzhou, Shanghai, Hong Kong (China), Nanjing, Singapore, Silicon Valley, and Frankfurt regions. If it is not supported in the region of your log topic, contact smart customer service for application.

Advantages

- **Low cost:** Charges only log write traffic and storage fees, resulting in a total cost 73% lower than that of **CLS - STANDARD** storage.
- **Ease of use:** Compatible with the search syntax of Lucene, eliminating the cost for extra learning; allows users to search for data without configuring indexes.
- **Stability and reliability:** Provides a brand-new proprietary log system with separated computing and storage, supporting scale-out, high availability, and flexibility of use.

Use cases

Scenario	Description
Long-term storage	In audit/security log scenarios, long-term storage with STANDARD_IA can reduce fees by more than 80% compared with STANDARD.
Simple use	In scenarios that don't require frequent statistical analysis of data, such as Ops log analysis, the advanced features of dashboard and monitoring alarm are not needed.

Directions

1. Create a log topic and set **Storage Class** to **STANDARD_IA**. For more information, see Managing Log Topic.

2. Collect logs to the target topic. For more information, see Collection Overview.

3. Go to the target log topic search page and enter the full-text search statement, such as `a AND b NOT c`.

4. Click **Search and Analysis** to view the search result.

STANDARD_IA and STANDARD feature comparison

Feature	STANDARD_IA	STANDARD
Index creation	✓ (supports only full-text indexes)	✓
Context search	✓	✓
Quick analysis	×	✓
Full-text search	✓ (responds in 2 seconds for searches in 100 million records)	✓ (responds in 0.5 second for searches in 100 million records)
Key-value search	×	✓
Log download	✓	✓
SQL analysis	×	✓
Dashboard	×	✓
Monitoring alarm	×	✓
Shipping to COS	✓	✓

Feature	STANDARD_IA	STANDARD
Shipping to CKafka	✓	✓
Shipping to ES	✓	✓
Shipping to SCF	✓	✓
Log consumption	✓	✓
Data processing	✓	✓

Search and Analysis
Overview and Syntax Rules

Last updated：2022-09-19 14:27:24

Overview

CLS provides log search and analysis capabilities. You can use search statements to search for logs that match specific conditions, or use SQL statements to analyze matched logs to obtain statistical results such as the number of logs, average response time, and error log percentage.

A search statement consists of two parts: search condition and SQL statement, which are separated by a vertical bar (`|`).

```
[Search condition] | [SQL statement]
```

- Search condition: Specifies the condition for log search. Only logs that meet the condition will be returned. For example, you can use `status:404` to search for application request logs with response status code 404. For the corresponding syntax rules, see Search Condition Syntax Rules.
- SQL statement: Performs statistical analysis on logs that meet the search condition and returns the statistical analysis result. For example, you can use `status:404 | select count(*) as logCounts` to count the number of application request logs with response status code 404. SQL statements must comply with SQL-92. For the corresponding syntax rules, see SQL Statement Syntax Rules.

Note：

- To search for logs only without statistical analysis, omit the vertical bar `|` and SQL statement.
- If the search statement is empty, all logs in the specified time range will be searched for.

A search condition can be used for full-text search or key-value search, depending on whether a log field is specified:

- Full-text search: No field name needs to be specified. If the value of any field in a log meets the search condition, the log will be matched. For example, you can use `error` to search for all logs that contain `error` .
- Key-value search: A field name needs to be specified. If the value of a specified field in a log meets the search condition, the log will be matched. For example, you can use `level:error` to search for logs at the `error` log level.

Prerequisites

- **Using a search condition**:
- Full-text search: Full-text index is enabled in index configuration.
- Key-value search:
  - Log fields have been extracted as described in Collection Overview during log collection.
  - Key-value index is enabled for the field to be searched for during index configuration.
- **Using a SQL statement**:
- Log fields have been extracted as described in Collection Overview during log collection.
- Key-value index and **statistics** are enabled for the field to be searched for during index configuration.

Search Condition Syntax Rules

Syntax rules

Syntax	Description
AND	Logical AND operator, such as `level:ERROR AND pid:1234`.
OR	Logical OR operator, such as `level:ERROR OR level:WARNING`.
NOT	Logical NOT operator, such as `level:ERROR NOT pid:1234`.
()	Grouping operator, which controls the precedence of logical operations, such as `(ERROR OR WARNING) AND pid:1234`.
:	Colon, which is used for key-value search, such as `level:ERROR`.
""	Double quotation marks, which quote a phrase to match logs that contain all the words in the phrase and in the same sequence, such as `name:"john Smith"`.
*	Wildcard, which is used to replace zero, one, or more characters, such as `host:www.test*.com`. Prefix fuzzy queries are not supported. For more information, see Fuzzy Search. You can also use `key:*` to query logs where the specified field (`key`) exists. `key:*` is equivalent to `_exists_:key`.
?	Wildcard, which can match one single character, such as `host:www.te?t.com`. Similar to `*`, it does not support prefix fuzzy queries.
>	Range operator, which indicates the left operand is greater than the right operand, such as `status:>400`.

Syntax	Description
>=	Range operator, which indicates the left operand is greater than or equal to the right operand, such as `status:>=400` .
<	Range operator, which indicates the left operand is less than the right operand, such as `status:<400` .
<=	Range operator, which indicates the left operand is less than or equal to the right operand, such as `status:<=400` .
TO	Logical TO operator, such as `request_time:[0.1 TO 1.0]` .
[]	Range operator, which includes the upper and lower boundary values, such as `age:[20 TO 30]` .
{}	Range operator, which excludes the upper and lower boundary values, such as `age:{20 TO 30}` .
\	Escape character. An escaped character represents the literal meaning of the character, such as `url:\/images\/favicon.ico` . You can also use `""` to wrap special characters as a whole, such as `url:"/images/favicon.ico"` . Note that the characters in the double quotation marks are considered as a phrase to match logs that contain all the words in the phrase and in the same sequence.
exists	`\_exists\_:key` returns logs that contains `key` . For example, `_exists_:userAgent` means to return logs that contains the `userAgent` field.

Note：

- The syntax is case-sensitive. For example, `AND` and `OR` represent logical search operators, while `and` and `or` are regarded as common text.
- When multiple search conditions are connected with spaces, they are regarded as in the `OR` logic. For example, `warning error` is equivalent to `warning OR error` .
- The following special characters must be escaped: +, -, &&, ||, !, ( ), { }, [ ], ^, ", ~, *, ?, :, \
- Use `()` to group search conditions and clarify the precedency when using the "AND" and "OR" operators, such as `(ERROR OR WARNING) AND pid:1234` .

Example

Expected Search Result	Statement

Expected Search Result	Statement
Logs of a specified server	`__SOURCE__:127.0.0.1` or `__SOURCE__:192.168.0.*`
Logs from a specified file	`__FILENAME__:"/var/log/access.log"` or `__FILENAME__:\/var\/log\/*.log`
Logs containing `ERROR`	`ERROR`
Searching-failed logs (Status code > 400)	`status:>400`
Failed logs in the `GET` request (with a status code greater than 400)	`method:GET AND status:>400`
Logs at `ERROR` or `WARNING` level	`level:ERROR OR level:WARNING`
Logs except those at the `INFO` level	`NOT level:INFO`
Logs from `192.168.10.10` but except those at `INFO` level	`__SOURCE__:192.168.10.10 NOT level:INFO`
Logs from the `/var/log/access.log` file on `192.168.10.10` but except those at `INFO` level	`(__SOURCE__:192.168.10.10 AND __FILENAME__:"/var/log/access.log") NOT level:INFO`
Logs from `192.168.10.10` and at `ERROR` or `WARNING` level	`__SOURCE__:192.168.10.10 AND (level:ERROR OR level:WARNING)`
Logs with a status code of `4XX`	`status:[400 TO 500}`
Logs with the container name `nginx` in the metadata	`__TAG__.container_name:nginx`
Logs with the container name `nginx` in the metadata, and request latency greater than 1s	`__TAG__.container_name:nginx AND request_time:>1`
Logs that contain the `message` field	`message:*` or `_exists_:message`
Logs that do not contain the `message` field	`NOT _exists_:message`

Fuzzy Search

To perform a fuzzy search through CLS, you need to add wildcards to the middle or end of words, either by using the asterisk `*` to match zero, single, or multiple characters, or using the question mark `?` to match a single character. The following are examples:

- `IP:192.168.1.*` means to search for logs with an IP that starts with `192. 168.1` , such as `192. 168.1.1` and `192. 168.1.34` .
- `host:www.te?t.com` means to search for logs with a host name that starts with `www.te` , ends with `t.com` , and contains one character in the middle, such as `www.test.com` and `www.telt.com` .

Note：

- The asterisk `*` or question mark `?` cannot be used at the beginning of a word, that is, prefix fuzzy searches are not supported.
- Data of `long` or `double` type does not support an asterisk `*` or question mark `?` for fuzzy search, but it supports a value range for fuzzy search, such as `status:[400 TO 500}` .

If you need to use prefix fuzzy search, you can use the following methods.

- Adding a delimiter: For example, if the logs are `host:www.test.com` and `host:m.test.com` , and you need to query logs containing `test` in the middle, you can add the delimiter `.` to search for logs with `host:test` .
- Using the `LIKE` syntax: For example, you can use `* | select * where host like '%test%'` . However, this method has a lower performance than the search condition method and is not suitable for scenarios with a large volume of log data.

SQL Statement Syntax Rules

Syntax rules

Syntax	Description
SELECT	Selects data from a table. It selects eligible data from the current log topic by default. Example: `level:ERROR
AS	Specifies an alias for a column (KEY). Example: `level:ERROR
GROUP BY	Combines aggregate functions to group results based on one column (KEY) or more. Example: `level:*
ORDER BY	Sorts results according to the specified `KEY` . Example: `level:*
LIMIT	Limits the amount of data returned by the `SELECT` statement. Example: `level:*

Syntax	Description
WHERE	Filters the raw data found. Example: `level:ERROR
HAVING	Filters grouped and aggregated data. The difference between `HAVING` and `WHERE` is that `HAVING` is executed on data after grouping (`GROUP BY`) and before ordering (`ORDER BY`) while `WHERE` is executed on the raw data before aggregate. Example: `level:*
Nested subquery	In some complex statistical analysis scenarios, you need to perform statistical analysis on the raw data first and then perform secondary statistical analysis on the analysis results. In this case, you need to nest a `SELECT` statement into another `SELECT` statement. This query method is called nested subquery. Example: `*

Note：

- SQL statements are case insensitive, so `SELECT` is equivalent to `select` .
- Strings must be included in single quotation marks `''` , while characters that are unsigned or included in double quotation marks `""` indicate field or column names. For example, `'status'` indicates the string `status` , while `status` or `"status"` indicates the log field `status` .
- When a string contains a single quotation mark `'` , you need to use `''` (two single quotation marks) to represent the single quotation mark itself. For example `'{''version'': ''1.0''}'` indicates the raw string {'version': '1.0'}. No special processing is required if the string itself contains a double quotation mark `"` .
- You don't need to add a semicolon at the end of a SQL statement to indicate the end.

SQL functions

CLS supports a large number of SQL functions. For all the SQL functions, see Analytic Functions. The following lists some common functions.

Syntax	Description
String function	String concatenation, splitting, length calculation, case conversion, and more
Date and time functions	Time format conversion, statistics by time, time interval calculation, and more
IP geographic function	Parsing IPs to obtain geographic information and more

Syntax	Description
URL function	Obtaining domain names and parameters from URLs, encoding/decoding URLs, and more
General aggregate function	Calculating the log count, maximum value, minimum value, average value, and more
Estimation function	Calculating the number of unique values, percentile values (e.g., p95/p90), and more
Type conversion function	Variable type conversion; often used in functions that have special requirements on the variable types of parameters
Logical function	AND, OR, NOT, and other logical operations
Operator	Mathematical operators (+, -, *, /, etc.) and comparison operators (>, <, etc.)
Conditional expression	Condition determination expressions such as CASE WHEN and IF
Array function	Getting the elements in an array, and more
Interval-valued comparison and periodically-valued comparison functions	Comparing the calculation result of the current time period with the calculation result of a time period n seconds before
JSON function	Getting JSON objects, converting JSON types, and more

Example

Expected Search Result	Statement
Number of logs of failed `GET` requests (with a status code greater than 400)	`method:GET AND status:>400
Number of logs of failed `GET` requests (with a status code greater than 400) per minute	`method:GET AND status:>400
Top 5 URLs with the largest number of requests	`*
URLs with an average response time greater than 1,000 ms in descending order	`*
Percentage of failed requests	`*
Percentage of failed requests of each URL in descending order	`*
Number of requests of each province	`*

Use limits

Metric	Limit	Remarks
Number of SQL results	Each SQL execution can return up to 10,000 results.	The default value is 100. You can adjust the limit by using the LIMIT syntax.
Memory usage	Each SQL execution can occupy up to 3 GB of server memory.	Usually, this limit can be triggered when `group by`, `distinct()`, or `count(distinct())` is used, because the fields with statistics collected have too many values after deduplication via `group by` or `distinct()`. We recommend you optimize the query statement and use fields with fewer values for group statistics, or use `approx_distinct()` instead of `count(distinct())`.

Directions

1. Log in to the CLS console.
2. On the left sidebar, select **Search and Analysis** to enter the search and analysis page.
3. Select the **logset** and **log topic** for log search.
4. Enter a **search statement** and select a **time range** (choose the last hour, last 4 hours, last day, or last 3 days, or set a custom a time range).
5. Click **Search and Analysis**.

- If the search statement **contains only search conditions**, you can view the logs on the **Raw Data** tab. The logs are sorted in descending order by log time by default.
- If the search statement **contains SQL statements**, you can view the analysis result on the **Chart Analysis** tab and change the chart type as needed to view the statistical result more intuitively. You can compare the analysis result and the raw log by switching between the **Chart Analysis** and **Raw Data** tabs.

Note：

- On the **Chart Analysis** tab page, you can click **Add to Dashboard** to add the current chart to a new or existing dashboard.
- When entering a search statement in the input box, you can click the **Favorites** and **Add Alarm Policy** icons on the right of the input box to save the current statement and add an alarm policy respectively.

FAQs

Configuring Index

Last updated：2022-06-23 14:41:01

Overview

Index configuration is a necessary condition for using CLS for log search and analysis; that is, log search and analysis can be performed only after index is enabled. In addition, different index rules can lead to different search and analysis results. This document describes how to configure an index and how it works.

The core of index configuration is to segment raw logs so that logs can be quickly and conveniently searched based on specific search conditions. In addition, you can enable statistics for specific fields in index configuration to facilitate statistical analysis of logs using SQL. CLS provides the following three types of indexes:

Type	Description	Configuration Method
Full-text index	A raw log is split into multiple segments, and indexes are created based on the segments. You can query logs based on keywords (full-text search). For example, entering `error` means to search for logs that contain the keyword `error` .	Console: Enable full-text indexing on the index configuration page.
Key-value index	A raw log is split into multiple segments based on a field (key:value), and indexes are created based on the segments. You can query logs based on key-value (key-value search). For example, entering `level:error` means to search for logs with a `level` field whose value contains `error` .	Console: On the index configuration page, enable key-value indexing and enter the corresponding field name (key), such as `level` .
Metadata index	A metadata index is also a key-value index, but the field name is prefixed by `__TAG__` . Metadata indexes are usually used to classify logs. For example, entering `__TAG__.region:"ap-beijing"` means to search for logs with a `region` field whose value is `ap-beijing` .	Console: On the index configuration page, enable key-value indexing and enter the corresponding metadata field name (key), such as `__TAG__.region` .

Note：

- Index configuration will incur any index traffic and index storage fees. For more billing information, see Billing Overview. For how to save product use costs, see Saving Product Use Costs.
- Log data collected cannot be searched when index is disabled. It takes about one minute for the log search and analysis feature to become available after index is enabled.
- Only fields for which **Enable Statistics** is toggled on in the key-value index configuration support SQL statistical analysis.
- Index rule changes (including adding, modifying, and deleting fields, and adjusting delimiter configuration) take effect only for newly written logs. Existing data is not updated.

Prerequisites

For log collection using LogListener, if the extraction mode in the collection configuration is set to full text in a single line or full text in multi lines, the raw log is stored under the `__CONTENT__` field and supports only full-text index configuration. If you need to configure key-value indexes for some content in the log or enable statistics, you need to perform log structuring and use log extraction modes other than full text in a single line or full text in multi lines.

Full-Text Index

A raw log is split into multiple segments, and indexes are created based on the segments. You can query logs based on keywords (full-text search).

Configuration Item	Feature Description
Full-Text Delimiter	A set of characters that split the raw log into segments. Only English symbols are supported. Default delimiters in the console are `@&?|#()='",;:<>[]{}/ \n\t\r</code>.`
Case Sensitivity	Specifies whether log search is case-sensitive. For example, if a log is `Error` and log search is case-sensitive, the log cannot be searched by `error` .
Allow Chinese Characters	This feature can be enabled when logs contain Chinese characters and the Chinese characters need to be searched. For example, if the original text of a log is in Chinese, and this feature is disabled, you cannot query the log by using a Chinese keyword contained in the original text. The query can be successful only if you use the exact raw log text to query the log. However, if you enable this feature, you can query the log by using a Chinese keyword contained in the raw log text.

For example, a complete log is as shown below:

```
10.20.20.10;[2018-07-16 13:12:57];GET /online/sample HTTP/1.1;200
```

If you use the separator format to extract log fields, the structured log uploaded to CLS will be as follows:

```
IP: 10.20.20.10
request: GET /online/sample HTTP/1.1
status: 200
time: [2018-07-16 13:12:57]
```

If the full-text delimiter is `@&()='",;:<>[]{}/ \n\t\r` (including space), all field values in the raw log will be segmented into the following keywords (each line denotes a keyword):

```
10.20.20.10
GET
online
sample
HTTP
1.1
200
2018-07-16
13
12
57
```

Under the above index configuration, the following results are obtained using the following search conditions:

- Search condition A:

  ```
  \/online\/login
  ```

  - `\` is used to escape the `/` symbol (this symbol is a reserved symbol of the search syntax and therefore needs to be escaped).
  - The escaped `/` symbol is a delimiter, so the actual search condition is `online OR login`. A log containing `online` **or** `login` is considered to meet the search condition.
  - The example log provided above **meets** the search condition.

- Search condition B:

  ```
  "/online/login"
  ```

  - Being enclosed by double quotation marks, the `/` symbol does not need to be escaped.

- The content in the double quotation marks is also divided into two words. However, the double quotation marks indicate that only a log that **contains both the two words in the exact order** as that in the search condition is considered to meet the search condition.
- The example log provided above does not contain `login` and therefore **does not meet** the search condition.

- Search condition C:

```
"/online/sample"
```

  - The example log provided above contains both `online` and `sample` in the exact order as that in the search condition and therefore is considered to **meet** the search condition.

Key-Value Index

A raw log is split into multiple segments based on a field (key:value), and indexes are created based on the segments. You can query logs based on key-value (key-value search). To perform a key-value search, you must specify the field name in the syntax format of `key:value`, for example, `status:200`. If no field name is specified, a full-text search will be performed.

To meet basic log search requirements, CLS automatically creates key-value indexes for some built-in reserved fields, which does not incur index traffic fees. Details are as follows:

Built-in Reserved Field	Description
`__FILENAME__`	Filename for log collection, which can be used to search for logs in a specified file. For example, you can use `__FILENAME__:/"var/log/access.log"` to search for logs from the `/var/log/access.log` file.
`__SOURCE__`	Source IP for log collection, which can be used to search for logs of a specified server. For example, you can use `__SOURCE__:192.168.10.10` to search for the logs of the server whose IP is `192.168.10.10`.
`__TIMESTAMP__`	Log timestamp (UNIX timestamp in milliseconds). When a log is searched by time range, the system automatically searches for the log by this time and displays the time as the log time on the console.
`__PKG_LOGID__`	Log ID in a log group. This ID is used for context search. We recommend you not use this ID alone.

Configuration Item	Description	Remarks
Field Name	Field name in Log Structuring	-
Data Type	Data type of the field. There are three types: `text`, `long`, and `double`. The `text` type supports fuzzy search by wildcard, while the `long` and `double` types support range search.	long - integer (Int 64) double - floating point (64-bit) text - string
Delimiter	A set of characters that split the field value into segments. Only English symbols are supported.	Default delimiters in the console are `@&?|#()='",;:<>[]{}/ \n\t\r</code>.`
Allow Chinese Characters	This feature can be enabled when the field contains Chinese characters and the Chinese characters need to be searched. For example, if the original text of a log is in Chinese, and this feature is disabled, you cannot query the log by using a Chinese keyword contained in the original text. The query can be successful only if you use the exact raw log text to query the log. However, if you enable this feature, you can query the log by using a Chinese keyword contained in the raw log text.	-
Enable Statistics	After it is toggled on, SQL statistical analysis can be performed on the field, such as `group by ${key}` and `sum(${key})`.	This statistics feature is part of the key-value index feature and therefore is not charged independently.
Case Sensitivity	Specifies whether log search is case-sensitive. For example, if a log is `level:Error` and log search is case-sensitive, the log cannot be searched by `level:error`.	-

For example, a complete log is as shown below:

```
10.20.20.10;[2018-07-16 13:12:57];GET /online/sample HTTP/1.1;200
```

If you use the separator format to extract log fields, the structured log uploaded to CLS will be as follows:

```
IP: 10.20.20.10
request: GET /online/sample HTTP/1.1
```

```
status: 200
time: [2018-07-16 13:12:57]
```

Assume that the key-value index configuration is as follows:

Field Name	Field Type	Delimiter	Allow Chinese Characters	Enable Statistics
IP	text	`@&()='",;:<>[]{}/ \n\t\r`	No	Yes
request	text	`@&()='",;:<>[]{}/ \n\t\r`	No	Yes
status	long	None	No	Yes
time	text	`@&()='",;:<>[]{}/ \n\t\r`	No	Yes

Under the above index configuration, the following results are obtained using the following search conditions:

- Search condition A:

```
request:\/online\/login
```

  - `\` is used to escape the `/` symbol (this symbol is a reserved symbol of the search syntax and therefore needs to be escaped).
  - The escaped `/` symbol is a delimiter, so the actual search condition is `online OR login`. A log containing `online` **or** `login` is considered to meet the search condition.
  - The example log provided above **meets** the search condition.

- Search condition B:

```
request:"/online/login"
```

  - Being enclosed by double quotation marks, the `/` symbol does not need to be escaped.
  - The content in the double quotation marks is also divided into two words. However, the double quotation marks indicate that only a log that **contains both the two words in the exact order** as that in the search condition is considered to meet the search condition.
  - The example log provided above does not contain `login` and therefore **does not meet** the search condition.

- Search condition C:

```
request:"/online/sample"
```

- The example log provided above contains both `online` and `sample` in the exact order as that in the search condition and therefore is considered to **meet** the search condition.

For fields with the statistics feature enabled, you can also use SQL to perform statistical analysis on logs.

- Search and analysis statement A:

```
request:"/online/login" | select count(*) as logCounts
```

Count the number of logs whose value of `request` is "/online/login".

- Search and analysis statement B:

```
* | select count(*) as logCounts,request group by request order by count(*) desc limit 10
```

Get the top 10 requests with the largest number of log entries.

Metadata Index

When a log is uploaded to CLS, its metadata is passed through the `LogTag` field (for more information, see the `LogTag` field in Uploading Structured Log), while the raw log content is passed through the `Log` field. A metadata index needs to be configured for all data which is passed via `LogTag`. A metadata index is a key-value index in essence, adopting the same indexing rules and configuration methods as key-value indexes. The only difference is that the metadata field in a metadata index is identified by the specific prefix `__TAG__.`. For example, the `region` metadata field is indexed as `__TAG__.region`.

For example, a complete log is as shown below:

```
10.20.20.10;[2018-07-16 13:12:57];GET /online/sample HTTP/1.1;200
```

If you use the separator format to extract log fields with the metadata `region:ap-beijing`, the structured log uploaded to CLS will be as follows:

```
IP: 10.20.20.10
request: GET /online/sample HTTP/1.1
status: 200
```

```
time: [2018-07-16 13:12:57]
__TAG__.region:ap-beijing
```

If the rules for metadata indexing are as follows:

Field Name	Delimiter
__TAG__.region	`@&()='",;:<>[]{}/ \n\t\r`

Sample search: If you enter `__TAG__.region:"ap-beijing"` , the sample log can be returned.

Advanced Settings

To meet the needs in some special use cases, the index configuration feature provides the following advanced settings. We recommend you adopt the recommended configurations in practical uses, which will also be used by default when an index configuration is created in the console.

Configuration Item	Description	Recommended Configuration
Include built-in reserved fields in full-text index	**Contain**: The full-text index contains built-in fields `__FILENAME__` , `__HOSTNAME__` , and `__SOURCE__` , and log fields can be searched for directly with full-text search, such as `"/var/log/access.log"` . **Not contain**: The full-text index does not contain any built-in fields, and log fields can be searched for only with key-value search, such as `__FILENAME__:"/var/log/access.log"` .	Contain
Include metadata fields in full-text index	**Contain**: The full-text index contains metadata fields (those prefixed with `__TAG__`), and log fields can be searched for directly with full-text search, such as `ap-beijing` . **Not contain**: The full-text index does not contain any metadata fields, and log fields can be searched for only with key-value search, such as `__TAG__.region:ap-beijing` . Key-value search is not supported for infrequent log topics, and fields cannot be searched for in this case. **Contain only metadata fields with key-value index enabled**: The full-text index contains metadata fields with key-value index enabled but not metadata fields with key-value index disabled. This option is not available for infrequent log topics.	Contain

Configuration Item	Description	Recommended Configuration
Store logs with index creation exceptions	When a log index is created, if the raw log format is abnormal or the index configuration doesn't match the raw log, the creation may fail, making it unable to search for and view such logs. In this case, you can store the abnormal parts of logs to the specified field (which is `RAWLOG` by default) to avoid log loss. For handling rules, see Handling rule for log index creation exception	Enabled

Directions

Editing index configuration

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic list page.
3. Click the desired log topic ID/name to go to the log topic management page.
4. Click the **Index Configuration** tab and click **Edit** to go to the index configuration page.
5. Edit the index configuration as needed and click **OK**.
   When editing index configuration, you can also click **Auto Configure** to enable the system to automatically get the latest log collected as a sample and parse the fields in it into key-value indexes. You can perform fine tuning on the basis of automatic configuration to quickly obtain the final index configuration information.

Importing index configuration

1. Log in to the CLS console.
2. On the left sidebar, click **Log Topic** to go to the log topic list page.
3. Click the desired log topic ID/name to go to the log topic management page.
4. Click the **Index Configuration** tab and click **Import Configuration Rules**.

5. In the dialog box, select the log topic whose index configuration is to be imported and click **OK**. The index configuration of the selected the log topic is automatically filled into the index configuration of the current log topic.

6. After confirming that everything is correct, click **OK**.

Appendix

JSON field parsing rules

During the storage process, logs may fail to be stored because there are too many JSON field levels, objects, or object types. To solve this problem, CLS will parse nested JSON fields only to the levels for which indexes are configured (existing log topics whose index configuration remains unchanged will not be affected), and the rest levels will be stored and displayed as strings. This feature upgrade affects only the search results of raw logs (search statements contain only search criteria but not SQL statements) and does not affect the statistical analysis results (SQL results).

The following uses an actual log as an example to describe the parsing rule in detail.

Sample log:

The log contains three fields, where `kye1` is a common field, and `kye2` and `kye3` are nested JSON fields.

```
{
"kye1": "http://www.example.com",
"kye2": {
"address": {
"country": "China",
"city": {
"name": "Beijing",
"code": "065001"
}
},
"contact": {
"phone": {
"home": "188xxxxxxxx",
"work": "187xxxxxxxx"
},
"email": "xxx@xxx.com"
}
},
"kye3": {
"address": {
"country": "China",
"city": {
```

```
"name": "Beijing",
"code": "065001"
}
},
"contact": {
"phone": {
"home": "188xxxxxxxx",
"work": "187xxxxxxxx"
},
"email": "xxx@xxx.com"
}
}
}
```

Index configuration

The following figure shows the key-value index configuration. Key-value index is configured for the `kye1` and `kye2.address` fields but not the `kye3` field.

Search and analysis effect on the console

JSON code:

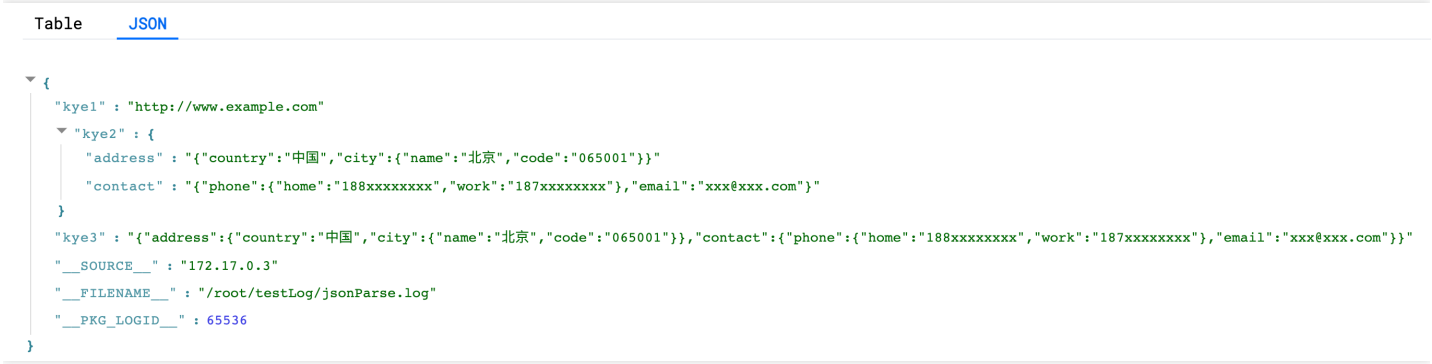
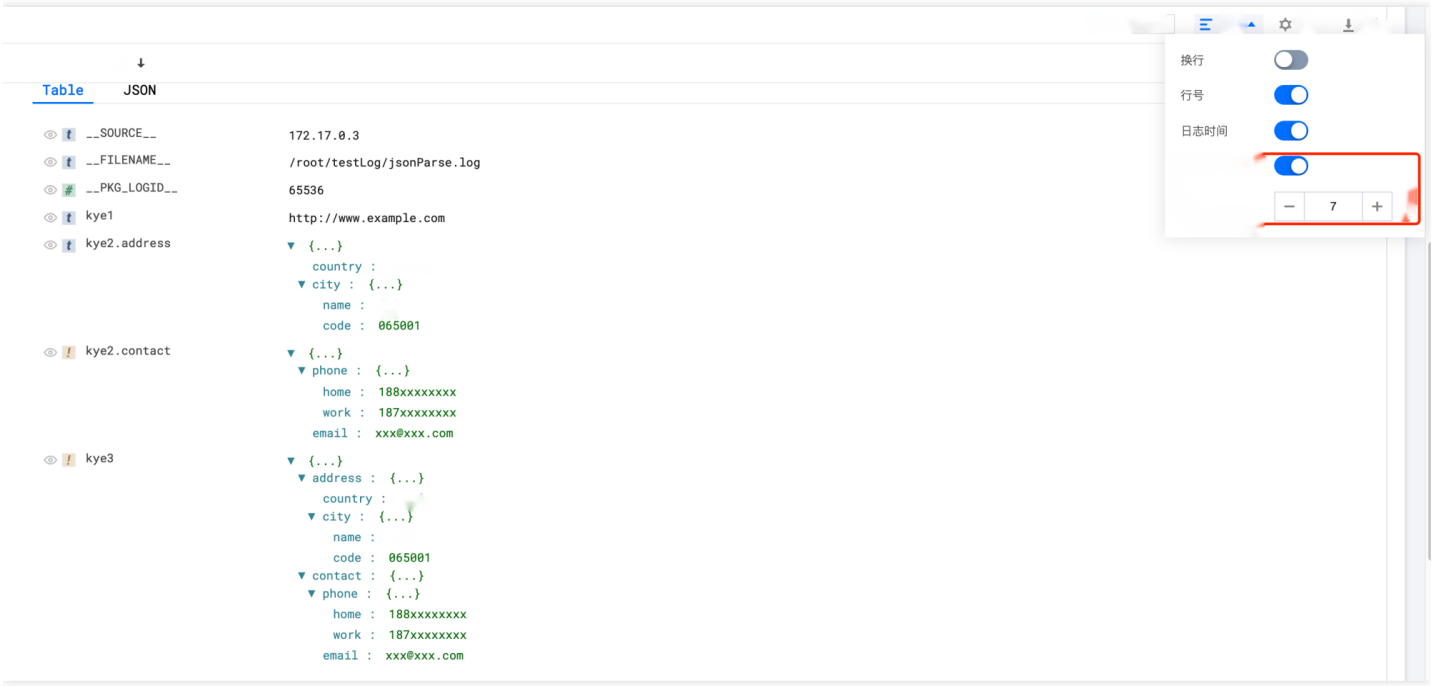


Table format:

- `kye2.address` is displayed as a string, and its attributes and objects are not further expanded.
- Although `kye2.contact` is not configured with a key-value index, because `kye2.address` is configured with an index, `kye2.contact` as an object at the same level as `kye2.address` is also displayed as a string.
- `kye3` is not configured with a key-value index, and therefore its attributes and objects are not expanded.

The console provides the JSON formatting feature to display string-type JSON fields in a hierarchical manner, but this feature is only a display effect on the console, and the actual fields are still strings, as shown in the **API-based log search and analysis effect** section below.



API-based log search and analysis effect

If you use the SearchLog API, the value of the `Results` parameter in the output parameters is as follows (other parameters are not affected and remain unchanged):

```
{
"Time": 1645065742008,
"TopicId": "f813385f-aee0-4238-xxxx-c99b39aabe78",
"TopicName": "TestJsonParse",
"Source": "172.17.0.2",
"FileName": "/root/testLog/jsonParse.log",
"PkgId": "5CB847DA620DB3D4-10D",
"PkgLogId": "65536",
"HighLights": [],
"Logs": null,
```

```
"LogJson": "{\"kye1\":\"http://www.example.com\",\"kye2\":{\"address\":\"{\\\"cou
ntry\\\":\\\"China\\\",\\\"city\\\":{\\\"name\\\":\\\"Beijing\\\",\\\"code\\\":\\
\"065001\\\"}}\",\"contact\":\"{\\\"phone\\\":{\\\"home\\\":\\\"188xxxxxxxx\\\",
\\\"work\\\":\\\"187xxxxxxxx\\\"},\\\"email\\\":\\\"xxx@xxx.com\\\"}\"},\"kye3\":
\"{\\\"address\\\":{\\\"country\\\":\\\"China\\\",\\\"city\\\":{\\\"name\\\":\\\"
Beijing\\\",\\\"code\\\":\\\"065001\\\"}},\\\"contact\\\":{\\\"phone\\\":{\\\"hom
e\\\":\\\"188xxxxxxxx\\\",\\\"work\\\":\\\"187xxxxxxxx\\\"},\\\"email\\\":\\\"xxx
@xxx.com\\\"}}\"}"
}
```


- `kye2.address` is a string, so its value is escaped as a string.
- `kye2.contact` is an object at the same level as `kye2.address`, and although `kye2.contact` is not configured with a key-value index, its value is also escaped as a string.
- `kye3` is not configured with a key-value index and is escaped as a string as a whole.

If you use code to process the output parameters of the SearchLog API, pay attention to the escape characters to avoid processing logic exceptions. To help you compare the API output parameters before and after the feature upgrade, the API output parameters before the upgrade are provided below:


```
{
"Time": 1645065742008,
"TopicId": "f813385f-aee0-4238-xxxx-c99b39aabe78",
"TopicName": "zhengxinTestJsonParse",
"Source": "172.17.0.2",
"FileName": "/root/testLog/jsonParse.log",
"PkgId": "25D0A12F620DBB64-D3",
"PkgLogId": "65536",
"HighLights": [],
"Logs": null,
"LogJson": "{\"kye1\":\"http://www.example.com\",\"kye2\":{\"address\":\"{\\\"cit
y\\\":{\\\"code\\\":\\\"065001\\\",\\\"name\\\":\\\"Beijing\\\"},\\\"country\\\":
\\\"China\\\"}\",\"contact\":{\"phone\":{\"work\":\"187xxxxxxxx\",\"home\":\"188x
xxxxxxx\"},\"email\":\"xxx@xxx.com\"}},\"kye3\":{\"address\":{\"country\":\"China
\",\"city\":{\"code\":\"065001\",\"name\":\"Beijing\"}},\"contact\":{\"phone\":{
\"work\":\"187xxxxxxxx\",\"home\":\"188xxxxxxxx\"},\"email\":\"xxx@xxx.com\"}}}"
}
```


Handling rule for log index creation exception

When a log index is created, if the raw log format is abnormal or the index configuration doesn't match the raw log, the creation may fail, making it unable to search for and view such logs. In this case, you can store the abnormal parts of logs to the specified field (which is `RAWLOG` by default) to avoid log loss.

The following uses an actual log as an example to describe the handling rule in detail.

Logs that will cause index creation exceptions

- **Sample log 1:**
  As shown in the following log, the `name` and `code` under the `city` object are not wrapped in double quotation marks.

```
{
"kye1": "http://www.example.com",
"kye2": {
"address": {
"country": "China",
"city": {
name: "Beijing", // The format is incorrect, as double quotation marks are miss
ing
code: "065001" // The format is incorrect, as double quotation marks are missin
g
}
}
}
}
```

- **Sample log 2:**
  As shown in the following log, the `kye2.address.city.name` field is added in the index configuration, but `city` is a string and has no sub-objects.

```
{
"kye1": "http://www.example.com",
"kye2": {
"address": {
"country": "China",
"city": "Beijing" // `city` is a string and has no sub-object `name`
}
}
}
```

- **Sample log 3:**
  As shown in the following log, the `kye2.address.city` field is added in the index configuration, but `address` is an array, and there is no sub-object `city`. CLS does not support creating indexes for objects in an array.

```
{
"kye1": "http://www.example.com",
"kye2": {
"address": [{ // `address` is an array, and there is no sub-object `city`
"country": "China",
"city": "Beijing"
}, {
"country": "China",
"city": "Shanghai"
}]
}
}
```

Handling rule

After you enable the storage of logs with index creation exceptions in the advanced settings of the index configuration, when CLS comes across the above abnormal logs, it will do its best to parse logs and create indices based on the index rule and store the abnormal parts of the logs in the specified field (which is `RAWLOG` by default).
For example, in the following log, the index configuration contains two fields `kye1` and `kye2.address.city`.

```
{
"kye1": "http://www.example.com",
"kye2": {
"address": [{ // `address` is an array, and there is no sub-object `city`
"country": "China",
"city": "Beijing"
}, {
"country": "China",
"city": "Shanghai"
}]
}
}
```

The `kye1` field can be parsed properly to create an index. However, as the `kye2` field doesn't match the index configuration, it cannot be parsed and will be converted to a string and stored in the `RAWLOG` field. You can see the following logs in the console:

```
kye1 : http://www.example.com
RAWLOG : {"kye2":"{\"address\":[{\"country\":\"China\",\"city\":\"Beijing\"},{\"c
ountry\":\"China\",\"city\":\"Shanghai\"}]}"}
```

You can directly use full-text search to search for such logs (e.g., `"China"`), or add a key-value index to `RAWLOG` and use it to search for such logs (e.g., `RAWLOG:"China"`). You can also search for all logs with

abnormal index creation through `RAWLOG:*` . This helps you adjust the log output format and index configuration reasonably.

Reindexing

Last updated：2022-10-18 11:58:57

Overview

As an edited index rule takes effect only for logs written after the rule is edited, if you want to reindex historical data according to the latest index rule, you need to use the reindexing feature. Below are common reindexing scenarios:

- A field is added to a key-value index, and historical data needs to be searched for by this field.
- The delimiter configuration is adjusted, and historical data needs to be searched for by the new delimiter.
- Statistics collection wasn't enabled for a field. After it is enabled in the index configuration, the statistics of this field in historical data needs to be collected (i.e., SQL).

During reindexing, the index of raw logs in the specified time range will be rebuilt, which will incur index traffic fees (write traffic fees and index storage fees won't be incurred). If the data volume is high, reindexing will be time-consuming and incur high fees. We recommend you avoid frequently modifying the index configuration and reindexing as much as possible.

Prerequisites

The index has been enabled, and the latest index configuration can meet future requirements for search and analysis.

Notes

- Only one reindexing task can be executed for a single log topic at any time, and each log topic can have up to ten reindexing task records. If there are already ten records, you can create a new reindexing task only after deleting an unwanted record.
- Logs for the same time range can be reindexed only once. You need to delete historical task records to reindex such logs again.
- After a reindexing task record is deleted, the index data before reindexing will be restored.
- You can only reindex logs for the time range with a write traffic below 500 MB in the console. If the limit is exceeded, we recommend you narrow down the time range or submit a ticket to increase the limit.
- The reindexing time range uses the log time. If the difference between the log upload time and the time range of logs to be reindexed is greater than one hour (for example, a log generated at 2:00 AM is uploaded at 4:00 PM, and logs between 12:00 AM and 12:00 PM need to be reindexed), the log won't be reindexed and cannot be searched

for subsequently. If a new log is reported within the time range for which logs have been reindexed, it won't be reindexed and cannot be searched for subsequently either.

Directions

1. Log in to the CLS console.

2. On the left sidebar, click **Log Topic** to enter the log topic list page.

3. Click the target log topic ID/name to enter the log topic management page.

4. Select the **Index Configuration** tab and click **Reindex** at the bottom.

5. Select the time range of logs to be reindexed and click **Start Reindexing**.

> Note：
> Here, the write traffic and time of the log data to be reindexed is estimated according to the selected time range. If the write traffic is too high and the time is too long, we recommend you narrow down the time range accordingly.

After reindexing starts, you can view the task progress.
6. After reindexing is completed, you can view the completed task in the list. You can also delete the specified task. Once a task is deleted, the index data before reindexing will be restored.

SQL Syntax
AS Syntax

Last updated：2022-01-20 14:08:30

The `AS` clause is used to specify an alias for a column (KEY).

Syntax Format

```
* | SELECT column name (KEY) AS alias
```

Syntax Sample

Counting access requests

```
* | SELECT COUNT(*) AS PV
```

GROUP BY Syntax

Last updated：2022-04-18 15:05:02

The `GROUP BY` syntax, together with an aggregate function, is used to group analysis results by one or more columns.

Syntax Format

```
* | SELECT column, aggregate function GROUP BY [ column name | alias | serial number ]
```

Note：
When executing a `SELECT` statement containing the `GROUP BY` syntax, you can select only the `GROUP BY` column or an aggregate calculation function, but not a non-GROUP BY column. For example, `* | SELECT status, request_time, COUNT(*) AS PV GROUP BY status` is an invalid analysis statement because **request_time** is not a `GROUP BY` column.

The `GROUP BY` syntax supports grouping by column name, alias, or serial number, as described in the following table:

Parameter	Description
Column name	Group data by log field name or aggregate function calculation result column. The syntax supports grouping data by one or multiple columns.
Alias	Group data by alias of the log field name or aggregate function calculation result.
Serial number	Serial number (starting from 1) of a column in the `SELECT` statement. For example, the serial number of the `status` column is 1, and therefore the following statements are equivalent: • `*
Aggregate function	The `GROUP BY` syntax is usually used together with aggregate functions such as `MIN`, `MAX`, `AVG`, `SUM`, and `COUNT`. For more information, please see Aggregate Function.

Syntax Example

- Count the number of access requests with different status codes:

```
* | SELECT status, count(*) AS pv GROUP BY status
```

- Calculate PV by the time granularity of 1 minute:

```
* |
SELECT
date_trunc(
'minute',
cast(__TIMESTAMP__ as timestamp)
) AS dt,
count(*) AS pv
GROUP BY
dt
ORDER BY
dt
limit
10
```

The `\_\_TIMESTAMP\_\_` field is the reserved field in CLS and indicates the time column. **dt** is the alias of `date_trunc('minute', cast(\_\_TIMESTAMP\_\_ as timestamp))` . For more information on the date_trunc() function, see Time Truncation Function.

Note：

- `limit 10` indicates up to 10 rows of results are obtained. If the `LIMIT` syntax is not used, CLS obtains 100 rows of results by default.
- If you enable the statistics feature for any field during index configuration, CLS will automatically enable the statistics feature for the `\_\_TIMESTAMP\_\_` field.

- Calculate PV and UV by the time granularity of 5 minutes:
  The date_trunc() function collects statistics only at fixed time intervals. You can use the histogram function to collect statistics at custom time intervals.

```
* |
SELECT
histogram(
```

```
cast(__TIMESTAMP__ as timestamp),
interval 5 minute
) as dt,
count(*) as pv,
count(
distinct(remote_addr)
) as uv
group by
dt
order by
dt
```

LIMIT Syntax

Last updated：2022-04-18 15:19:46

The `LIMIT` syntax is used to limit the number of rows in the output result.

Syntax Format

- Read the first N rows:

```
limit N
```

- Read N rows starting from row S:

```
offset S limit N
```

Syntax Example

- Get the first 10 rows of results:

```
* | select status, count(*) as pv group by status limit 10
```

- Get the results for rows 3 to 42 (40 rows in total):

```
* | select status, count(*) as pv group by status offset 2 limit 40
```

Restrictions

Metric	Restriction	Remarks
Number of SQL results	Each SQL returns up to 10,000 results.	Default: 100; Maximum: 10,000

ORDER BY Syntax

Last updated：2022-04-18 15:23:01

The `ORDER BY` syntax is used to sort analysis results by a specified column name.

Syntax Format

```
ORDER BY column name [DESC | ASC]
```

Note：

- You can specify multiple column names to sort analysis results in different sorting modes, for example, `ORDER BY column name 1[DESC | ASC], column name 2[DESC | ASC]`.
- If you do not specify the keyword `DESC` or `ASC`, the system sorts the analysis results in ascending order.
- If the target column for sorting contains duplicated values, the sorting result may be different each time. If you want the sorting result to remain the same in each sorting, you can specify multiple columns for sorting.

Parameter descriptions:

Parameter	Description
Column name	Group data by log field name or aggregate function calculation result column.
DESC	Sort data in descending order.
ASC	Sort data in ascending order.

Syntax Example

- Count the number of requests in different states and sort them in descending order by the number of requests:

```
* |
SELECT
status,
count(*) AS pv
```

```
GROUP BY
status
ORDER BY
pv DESC
```

- Calculate the average request time for each server and sort them in ascending order:

```
* |
SELECT
remote_addr,
avg(request_time) as request_time
group by
remote_addr
order by
request_time ASC
LIMIT
10
```

SELECT Syntax

Last updated：2022-10-13 15:02:25

The `SELECT` statement is used to select data from a table. It selects eligible data from the current log topic by default.

Syntax Format

```
* | SELECT [Column name(KEY)]
```

Syntax Example

Select values with columns (KEY) being `remote_addr` and `method` from the log data:

```
* | SELECT remote_addr, method
```

Select all columns (KEY) from the log data:

```
* | SELECT *
```

`SELECT` can also be followed by arithmetic expressions; for example, you can query the download speed of log data:

Download speed (`speed`) = total number of bytes sent (`body_bytes_sent`) / request time (`request_time`)

```
* | SELECT body_bytes_sent / request_time AS speed
```

Column Naming Conventions

In SQL specifications, a column name consists of letters, digits, and underscores and starts with a letter, such as `remote_addr` . If a field in a log has a non-compliant name, you need to surround the name by `""` . You can also specify an alias for the field with AS syntax in SQL.

If a log field is named `remote_addr`, which conforms to SQL's column naming conventions, it can be queried by SELECT:

```
* | SELECT remote_addr
```

If a log field is named `__TAG__.pod_label_qcloud-app`, which does not conform to SQL's column naming conventions, it needs to be surrounded by `""`:

```
* | SELECT "__TAG__.pod_label_qcloud-app"
```

If a log field is named `__TIMESTAMP__`, which does not conform to SQL's column naming conventions, it needs to be surrounded by `""` and specified with an alias through the AS syntax:

```
* | SELECT "__TIMESTAMP__" AS log_time
```

WHERE Syntax

Last updated：2022-04-18 15:19:46

The `WHERE` statement is used to extract the logs that meet the specified conditions.

Syntax Format

```
* | SELECT column (KEY) WHERE column (KEY) operator value
```

The operator can be `=` , `<>` , `>` , `<` , `>=` , `<=` , `BETWEEN` , `IN` , or `LIKE` .

Note：

- In SQL, search conditions deliver higher performance than filters. You are advised to use search conditions to meet data filtering requirements. For example, you can use `status:>400 | select count(*) as logCounts` instead of `* | select count(*) as logCounts where status>400` to get the statistical result faster.
- The `WHERE` statement does not allow the `AS` clause. For example, if `level:* | select level as log_level where log_level='ERROR'` is run, an error will be reported because the statement does not comply with the SQL-92 specifications.

Syntax Example

Query logs with status code greater than 400 in the log data:

```
* | SELECT * WHERE status > 400
```

Query the number of logs whose request method is GET and client IP is 192.168.10.101 in the log data:

```
* | SELECT count(*) as count WHERE method='GET' and remote_addr='192.168.10.101'
```

Count the average size of requests with the URL suffix of .mp4:

```
* | SELECT round(sum(body_bytes_sent) / count(body_bytes_sent), 2) AS avg_size WH
ERE url like '%.mp4'
```

HAVING Syntax

Last updated：2022-04-18 15:01:37

The `HAVING` syntax is used to filter grouped and aggregated data. The difference between `HAVING` and WHERE is that `HAVING` is executed on data after grouping (`GROUP BY`) and before ordering (`ORDER BY`) while `WHERE` is executed on the original data before aggregation.

Syntax Format

```
* | SELECT column, aggregate function GROUP BY [ column name | alias | serial number ] HAVING aggregate function operator value
```

The operator can be `=` , `<>` , `>` , `<` , `>=` , `<=` , `BETWEEN` , `IN` , or `LIKE` .

Syntax Example

Get URLs whose average response time is greater than 1,000 ms in descending order:

```
* |
select
avg(responseTime) as time_avg,
URL
group by
URL
having
avg(responseTime)> 1000
order by
avg(responseTime) desc
limit
10000
```

The filter condition is the average response time of each URL, which is the aggregate result, and therefore, WHERE cannot be used for data filtering.

Nested Subquery

Last updated：2022-04-18 15:21:14

This document introduces the basic syntax and examples of nested subqueries.

Syntax Format

In some complex statistical analysis scenarios, you need to perform statistical analysis on the original data first and then perform secondary statistical analysis on the analysis results. In this case, you need to nest a `SELECT` statement into another `SELECT` statement. This query method is called nested subquery.

```
* | SELECT key FROM (subquery)
```

- subquery: subquery, which needs to be enclosed in parentheses
- key: fields that need to be obtained from a subquery for secondary statistical analysis
- Two or more levels of nesting is supported.

Syntax Example

Calculate the ratio of the page views (PVs) of the current hour to the PVs of the same time period the day before: Set the time range for search and analysis to 1 hour and execute the following search and analysis statement, where `86400` indicates the current time minus 86400 seconds (1 day).

Search and analysis statement

```
* | SELECT compare(PV, 86400) FROM (SELECT count(*) AS PV)
```

- `SELECT count(*) AS PV` is level-1 statistical analysis: analyze the website PV based on raw logs.
- `SELECT compare(PV, 86400) FROM` is level-2 statistical analysis: perform secondary statistical analysis based on the PV result of the level-1 statistical analysis. Use the compare function to obtain the website PV of the day before.

Search and analysis result

- 1860: indicates the PVs of the current 1 hour.
- 1656: indicates the PVs of the same time period the day before.

- 1.1231884057971016: indicates the ratio of the PVs of the current hour to the PVs of the same time period the day before.

To display the search and analysis result in multiple columns, perform a further nested search:

Search and analysis statement

```
* |
SELECT compare[1] AS today, compare[2] AS yesterday, compare[3] AS ratio
FROM (
SELECT compare(PV, 86400) AS compare
FROM (
SELECT COUNT(*) AS PV
)
)
```

`SELECT compare[1] AS today, compare[2] AS yesterday, compare[3] AS ratio FROM` is to get the value of a specified position in the result of the `compare` function based on the array subscript.

Search and analysis result

SQL Functions
String Function

Last updated：2022-10-28 15:07:36

This document introduces the basic syntax and examples of string functions.

Note：

- Strings must be included in single quotation marks `''`, while characters that are unsigned or included in double quotation marks `""` indicate field or column names. For example, `'status'` indicates the string `status`, while `status` or `"status"` indicates the log field `status`.
- When a string contains a single quotation mark `'`, you need to use `''` (two single quotation marks) to represent the single quotation mark itself. For example `'{''version'': ''1.0''}'` indicates the raw string {'version': '1.0'}. No special processing is required if the string itself contains a double quotation mark `"`.
- In the following functions, all the `key` parameters indicate log field names.

Function	Description	Example
chr(number)	Returns characters that match the ASCII code point (bit) specified by the input parameter. The return value is of the VARCHAR type.	Return characters that match ASCII code bit 77: `*
codepoint(string)	Converts ASCII field values to BIGINT values. The return value is of the integer type.	Convert character values in ASCII code to their corresponding positions: `*
concat(key1, ..., keyN)	Concatenates strings key1, key2, ...keyN. The concatenation effect is consistent with that of the || connectors. The return value is of the VARCHAR type. Note that when the random string is `null`, the return value is `null`. To skip `null`, use `concat_ws`.	Concatenate multiple strings into one: `*

Function	Description	Example
concat_ws(split_string,key0, ..., keyN)	Concatenates strings key1, key2, ...keyN using `split_string` as the separator. `split_string` can be a string or variable. If `split_string` is null, null values in key1, key2, ...keyN are skipped. The return result is of the VARCHAR type.	Concatenate multiple strings using / as the separator: ``*
concat_ws(split_string, array(varchar))	Concatenates elements in an array into a string using `split_string` as the separator. If `split_string` is `null`, the result is null and null values in the array are skipped. The return result is of the VARCHAR type. Note: In this function, the `array(varchar)` parameter is an array, not a string.	Concatenate elements in an array into a string using # as the separator: (in this example, the output of the `split` function is an array) ``*
format(format, args...)	Formats the output of the `args` parameter using the `format` format. The return value is of the VARCHAR type.	Format the output of the `remote_addr` and `host` parameters using the format of `IP address: %s, Domain name: %s`: ``*
hamming_distance(key1, key2)	Returns the Hamming distance between the `key1` and `key2` strings. Note that the two strings must have the same length. The return value is of the BIGINT type.	Return the Hamming distance between the `remote_addr` and `remote_addr` strings: ``*
length(key)	Returns the length of a string. The return value is of the BIGINT type.	Return the length of the `http_user_agent` string: ``*
levenshtein_distance(key1, key2)	Returns the Levenshtein distance between the `key1` and `key2` strings. The return value is of the BIGINT type.	Return the Levenshtein distance between the `remote_addr` and `http_protocol` strings: ``*

Function	Description	Example
lower(key)	Converts a string to lowercase. The return value is of the VARCHAR type in lowercase.	Convert the `http_protocol` string to lowercase: `*
lpad(key, size, padstring)	Left pads `padString` to a string to `size` characters. If `size` is less than the length of `key` , the result is truncated to `size` characters. `size` must be non-negative, and `padstring` must be non-empty. The return value is of the VARCHAR type.	Left pad the '0' to the `remote_addr` string to 32 characters: `*
ltrim(key)	Removes all leading whitespace characters from a string. The return value is of the VARCHAR type.	Remove all leading whitespace characters from the `http_user_agent` string: `*
position(substring IN key)	Returns the position of `substring` in a string. Positions start with 1. If the position is not found, `0` is returned. This function takes the special syntax `IN` as a parameter. For other information, see strpos(). The return value is of the BIGINT type.	Return the position of the 'G' characters in `http_method` : `*
replace(key, substring)	Removes all `substring` from the `key` string. The return value is of the VARCHAR type.	Remove all 'Oct' from the `time_local` string: `*
replace(key, substring, replace)	Replaces all `substring` in a string with the `replace` string. The return value is of the VARCHAR type.	Replace all 'Oct' in the `time_local` string with '10': `*
reverse(key)	Reverses the `key` string. The return value is of the VARCHAR type.	Reverse the `host` string: `*

Function	Description	Example
rpad(key, size, padstring)	**Right** pads `padstring` to a string to `size` characters. If `size` is less than the length of `key`, the result is truncated to `size` characters. `size` must be non-negative, and `padstring` must be non-empty. The return value is of the VARCHAR type.	Right pad '0' to the `remote_addr` string to 32 characters: `*
rtrim(key)	Removes all trailing whitespace characters from a string. The return value is of the VARCHAR type.	Remove all trailing whitespace characters from the `http_user_agent` string: `*
split(key, delimiter)	Splits a string using a specified delimiter and returns a string array.	Split the `http_user_agent` string using the '/' delimiter and return a string array: `*
split(key, delimiter, limit)	Splits a string using a specified delimiter and returns a string array with the maximum length specified by `limit`. The last element in the string array always contains all the remaining part of `key`. `limit` must be a positive integer.	Split the `http_user_agent` string using the '/' delimiter and return a string array with the length of 10 characters: `*
split_part(key, delimiter, index)	Splits a string using a specified delimiter and returns the string at the `index` position in the array. Indexes start with 1. If the value of `index` is greater than the length of the array, `null` is returned. The return value is of the VARCHAR type.	Split the `http_user_agent` string using the '/' delimiter and return the string at position 1: `*
strpos(key, substring)	Returns the position of `substring` in a string. Positions start with 1. If the position is not found, `0` is returned. The return value is of the BIGINT type.	Return the position of 'org' in the `host` string: `*

Function	Description	Example
strpos(key, substring, instance)	Returns the position of the N-th `instance` of `substring` in the string. If `instance` is a negative number, the position is counted starting from the end of the string. Positions start with 1. If the position is not found, `0` is returned. The return value is of the BIGINT type.	Return the position of the first instance of 'g' in the `host` string: `*
substr(key, start)	Returns the rest of a string from the starting position `start` . Positions start with 1. A negative starting position is interpreted as being relative to the end of the string, for example, [...]. The return value is of the VARCHAR type.	Return the rest of the `remote_user` string from the second character: `*
substr(key, start, length)	Returns a substring from a string of `length` length from the starting position `start` . Positions start with 1. A negative starting position is interpreted as being relative to the end of the string. The return value is of the VARCHAR type.	Return the 2nd to 5th characters of the `remote_user` string: `*
translate(key, from, to)	Replaces all characters in `key` that appear in `from` with characters at the corresponding position in `to` . If `from` contains repeated characters, only the first character is counted. If the characters in `from` do not exist in the source, the source is copied directly. If the length of `from` is greater than that of `to` , the corresponding characters will be deleted. The return value is of the VARCHAR type.	Replace the '123' characters in the `remote` string with the 'ABC' characters: `*
trim(key)	Removes leading and trailing whitespace characters from a string. The return value is of the VARCHAR type.	Remove leading and trailing whitespace characters from the `http_cookies` string: `*
upper(key)	Converts a string to uppercase. The return value is of the VARCHAR type in uppercase.	Convert the lowercase characters in the `host` string to uppercase characters: `*

Function	Description	Example
word_stem(word)	Returns the stem of `word` in the English language. The return value is of the VARCHAR type.	Return the English word of 'Mozilla': `*
word_stem(word, lang)	Returns the stem of `word` in the `lang` language. The return value is of the VARCHAR type.	Return the stem of `selects` in English: `*

Unicode functions

Function	Description
normalize(string)	Converts a string to the NFC standard format. The return value is of the VARCHAR type.
normalize(string, form)	Converts `string` to the `form` format. The `form` parameter must be keywords (NFD, NFC, NFKD, or NFKC) instead of a string. The return value is of the VARCHAR type.
to_utf8(string)	Converts `string` to a UTF-8 binary string varbinary. The return value is of the VARCHAR type.
from_utf8(binary)	Converts a binary string to a UTF-8 string. Invalid UTF-8 characters will be replaced with "U+FFFD". The return value is of the VARCHAR type.
from_utf8(binary, replace)	Converts a binary string to a UTF-8 string. Invalid UTF-8 characters will be replaced with `replace` . The return value is of the VARCHAR type.

Examples

This section provides samples of the query and analysis statements based on the following log example.

Raw log data sample:

```
10.135.46.111 - - [05/Oct/2015:21:14:30 +0800] "GET /my/course/1 HTTP/1.1" 127.0.0.1 200 782 9703 "http://127.0.0.1/course/explore?filter%5Btype%5D=all&filter%5Bprice%5D=all&filter%5BcurrentLevelId%5D=all&orderBy=studentNum" "Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Firefox/64.0" 0.354 0.354
```

After configuring the "Single-line - Full regular expression" collection mode, custom key names are as follows:

```
body_bytes_sent: 9703
http_host: 127.0.0.1
http_protocol: HTTP/1.1
http_referer: http://127.0.0.1/course/explore?filter%5Btype%5D=all&filter%5Bprice%5D=all&filter%5BcurrentLevelId%5D=all&orderBy=studentNum
```

```
http_user_agent: Mozilla/5.0 (Windows NT 10.0; WOW64; rv:64.0) Gecko/20100101 Fir
efox/64.0
remote_addr: 10.135.46.111
request_length: 782
request_method: GET
request_time: 0.354
request_url: /my/course/1
status: 200
time_local: [05/Oct/2015:21:14:30 +0800]
upstream_response_time: 0.354
```

Analysis statement sample:

- Split the value of the **request_url** field using the question mark (?), return the first string (the file path part), and then count the number of requests corresponding to different paths:

```
* | SELECT count(*) AS pv, split_part(request_url, '?', 1) AS Path GROUP BY Pat
h ORDER BY pv DESC LIMIT 3
```

- Extract the first 4 characters (the HTTP part) of the value of the **http_protocol** field, and then count the number of requests corresponding to the HTTP protocol:

```
* | SELECT substr(http_protocol,1,4) AS http_protocol, count(*) AS count group
by http_protocol
```

- Replace the '123' characters in the **remote_user** string with the `ABC` characters and return a result of the VARCHAR type:

```
* | SELECT translate(remote_user, '123', 'ABC')
```

- Extract the 2nd to 5th characters from the value of the **remote_user** field:

```
* | SELECT substr(remote_user, 2, 5)
```

- Return the position of the 'H' letter in the value of the **http_protocol** field:

```
* | SELECT strpos(http_protocol, 'H')
```

- Split the value of the **http_protocol** field into 2 substrings using a slash (/) and return the collection of the substrings:

```
* | SELECT split(http_protocol, '/', 2)
```

- Replace 'Oct' in the value of the **time_local** field with '10':

```
* | select replace(time_local, 'Oct', '10')
```

Date and Time Functions

Last updated：2022-10-13 15:02:25

CLS provides time grouping, time truncation, time interval, and time sequence completion functions, and supports format conversion, grouping and aggregation, and other processing of date and time values in logs.

Note：
Among date and time functions, except the `histogram` and `time_series` functions that adopt the UTC+8 time zone, other Unix timestamp (`unixtime`) conversion functions adopt the UTC+0 time zone. To use another time zone, you need to use a function with the specified time zone feature, for example, such as `from_unixtime(__TIMESTAMP__/1000, 'Asia/Shanghai')` , or manually add the time zone offset for `unixtime` , for example, `date_trunc('second', cast(__TIMESTAMP__+8*60*60*1000 as timestamp))` .

Basic Functions

Function	Description	Example
current_date	Returns the current date. • Return value format: YYYY-MM-DD, such as `2021-05-21` • Return value type: DATE	`*
current_time	Returns the current time. • Return value format: HH:MM:SS.Ms Time zone, such as `17:07:52.143+08:00` • Return value type: TIME	`*
current_timestamp	Returns the current timestamp. • Return value format: YYYY-MM-DDTHH:MM:SS.Ms Time zone, such as `2021-07-15T17:10:56.735+08:00[Asia/Shanghai]` • Return value type: TIMESTAMP	`*
current_timezone()	Returns the time zone defined by IANA (America/Los_Angeles) or the offset from UTC (+08:35). Return value type: VARCHAR, such as `Asia/Shanghai`	`*

Function	Description	Example
localtime	Returns the local time. • Return value format: HH:MM:SS.Ms, such as `19:56:36` • Return value type: TIME	`*
localtimestamp	Returns the local date and time. • Return value format: YYYY-MM-DD HH:MM:SS.Ms, such as `2021-07-15 19:56:26.908` • Return value type: TIMESTAMP	`*
now()	Returns the current date and time. This function is used in the same way as the current_timestamp function. • Return value format: YYYY-MM-DDTHH:MM:SS.Ms Time zone, such as `2021-07-15T17:10:56.735+08:00[Asia/Shanghai]` • Return value type: TIMESTAMP	`*
last_day_of_month(x)	Returns the last day of a month. • Return value format: YYYY-MM-DD, such as `2021-05-31` • Return value type: DATE	`*
from_iso8601_date(string)	Parses an ISO 8601 formatted string into a date. • Return value format: YYYY-MM-DD, such as `2021-05-31` • Return value type: DATE	`*
from_iso8601_timestamp(string)	Parses an ISO 8601 formatted string into a timestamp with a time zone. • Return value format: HH:MM:SS.Ms Time zone, such as `17:07:52.143+08:00` • Return value type: TIMESTAMP	`*
from_unixtime(unixtime)	Parses a Unix formatted string into a timestamp. • Return value format: YYYY-MM-DD HH:MM:SS.Ms, such as `2017-05-17 01:41:15.000` • Return value type: TIMESTAMP	Example 1: `*
from_unixtime(unixtime, zone)	Parses a Unix formatted string into a timestamp with a time zone. • Return value format: YYYY-MM-DD HH:MM:SS.Ms Time zone, such as `2017-05-17T09:41:15+08:00[Asia/Shanghai]` • Return value type: TIMESTAMP	Example 1: `*

Function	Description	Example
to_unixtime(timestamp)	Parses a timestamp formatted string into a Unix timestamp. Return value type: LONG, such as `1626347592.037`	`*
to_milliseconds(interval)	Returns a time interval in milliseconds. Return value type: BIGINT, such as `300000`	`*
to_iso8601(x)	Parses a date and time expression of the DATE or TIMESTAMP type into a date and time expression in the ISO8601 format.	`*
timezone_hour(timestamp)	Returns the hour offset of the timestamp's time zone.	`*
timezone_minute(timestamp)	Returns the minute offset of the timestamp's time zone.	`*

Time Grouping Function

The time grouping function can be used to group and aggregate the log data at a given interval. For example, you can use it to count page views (PV) every 5 minutes.

Function format

```
histogram(time_column, interval)
```

Parameter description

Parameter	Description
time_column	Time column (KEY), such as `\_\_TIMESTAMP\_\_` . The value in this column must be a UNIX timestamp of the LONG type or a date and time expression of the TIMESTAMP type in milliseconds. If a value does not meet the requirement, use the `cast` function to convert the ISO 8601 formatted time string into the TIMESTAMP type, for example, `cast('2020-08-19T03:18:29.000Z' as timestamp)` , or use the `[date_parse](#date_parse)` function to convert a time string of another custom type. If the time column adopts the TIMESTAMP type, the corresponding date and time expression must be in the UTC+0 time zone. If the date and time expression itself is in a different time zone, adjust it to UTC+0 by calculation. For example, if the time zone of the original time is UTC+8, use `cast('2020-08-19T03:18:29.000Z' as timestamp) - interval 8 hour` to adjust the time zone.

Parameter	Description
interval	Time interval. The following time units are supported: SECOND, MINUTE, HOUR, and DAY. For example, `INTERVAL 5 MINUTE` indicates an interval of 5 minutes.

Sample

Count the PV value every 5 minutes:

```
* | select histogram(__TIMESTAMP__, INTERVAL 5 MINUTE) AS dt, count(*) as PV grou
p by dt order by dt limit 1000
```

Time Completion Function

The `time_series()` function can be used to group and aggregate the log data at a given interval. Its main difference from the `histogram()` function is that it can complete missing data in your query time window.

> Note：
> The time_series() function must be used with the GROUP BY and ORDER BY syntax, and ORDER BY syntax does not support `desc` sorting.

Function format

```
time_series(time_column, interval, format, padding)
```

Parameter description

Parameter	Description

Parameter	Description
time_column	Time column (KEY), such as `\_\_TIMESTAMP\_\_`. The value in this column must be a UNIX timestamp of the LONG type or a date and time expression of the TIMESTAMP type in milliseconds. If a value does not meet the requirement, use the `cast` function to convert the ISO 8601 formatted time string into the TIMESTAMP type, for example, `cast('2020-08-19T03:18:29.000Z' as timestamp)`, or use the `[date_parse](#date_parse)` function to convert a time string of another custom type. If the time column adopts the TIMESTAMP type, the corresponding date and time expression must be in the UTC+0 time zone. If the date and time expression itself is in a different time zone, adjust it to UTC+0 by calculation. For example, if the time zone of the original time is UTC+8, use `cast('2020-08-19T03:18:29.000Z' as timestamp) - interval 8 hour` to adjust the time zone.
interval	Time interval. Valid values are `s` (second), `m` (minute), `h` (hour), and `d` (day). For example, `5m` indicates 5 minutes.
format	Time format of the return result.
padding	Value used to complete missing data. Valid values include: • 0: Complete a missing value with `0` • null: Complete a missing value with `null` • last: Complete a missing value with the value of the previous point in time • next: Complete a missing value with the value of the next point in time • avg: Complete a missing value with the average value of the previous and next points in time

Sample

Complete data with a time unit of 2 minutes:

```
* | select time_series(__TIMESTAMP__, '2m', '%Y-%m-%dT%H:%i:%s+08:00', '0') as time, count(*) as count group by time order by time limit 1000
```

Time Truncation Function

The date_trunc() function truncates a date and time expression based on the date part you specify, supporting alignment by second, minute, hour, day, month, and year. This function is often used in scenarios that require statistical analysis based on time.

Function	Description	Example

Function	Description	Example
date_trunc(unit,x)	Truncates `x` to `unit`. `x` is of the TIMESTAMP type.	`*

The date_trunc() function supports the following units:

Unit	Example Truncated Value	Description
second	2021-05-21 05:20:01.000	-
minute	2021-05-21 05:20:00.000	-
hour	2021-05-21 05:00:00.000	-
day	2021-05-21 00:00:00.000	Returns the zero o'clock of a specified date.
week	2021-05-17 00:00:00.000	Returns the zero o'clock on Monday of a specified week.
month	2021-05-01 00:00:00.000	Returns the zero o'clock on the first day of a specified month.
quarter	2021-04-01 00:00:00.000	Returns the zero o'clock on the first day of a specified quarter.
year	2021-01-01 00:00:00.000	Returns the zero o'clock on the first day of a specified year.

Time Extraction Functions

Time extraction functions are used to extract the specified time fields, such as the year and month, from date and time expressions.

Function	Description	Example
extract(field FROM x)	Extracts the specified fields from the date and time expression (x).	`*

`field` supports the following values: year, quarter, month, week, day, day_of_month, day_of_week, dow, day_of_year, doy, year_of_week, yow, hour, minute, second.

`extract(field FROM x)` can be simplified to `field()`; for example, `extract(hour from cast('2021-05-21 05:20:01.100' as timestamp))` can be simplified to `hour(cast('2021-05-21 05:20:01.100' as timestamp))`.

Field	Extraction Result	Description	Simplified Format

Field	Extraction Result	Description	Simplified Format
year	2021	Extracts the year from the target date.	year(x)
quarter	2	Extracts the quarter from the target date.	quarter(x)
month	5	Extracts the month from the target date.	month(x)
week	20	Calculates the week of the year the target date is in.	week(x)
day	21	Extracts the day from the target date by month, which is equivalent to `day_of_month`.	day(x)
day_of_month	21	Equivalent to `day`.	day(x)
day_of_week	5	Calculates the day of the week for the target date, which is equivalent to `dow`.	day_of_week(x)
dow	5	Equivalent to `day_of_week`.	day_of_week(x)
day_of_year	141	Calculates the day of the year for the target date, which is equivalent to `doy`.	day_of_year(x)
doy	141	Equivalent to `day_of_year`.	day_of_year(x)
year_of_week	2021	Returns the year for the target date in ISO week date, which is equivalent to `yow`.	year_of_week(x)
yow	2021	Equivalent to `year_of_week`.	year_of_week(x)
hour	5	Extracts the hour from the target date.	hour(x)
minute	20	Extracts the minute from the target date.	minute(x)
second	1	Extracts the second from the target date.	second(x)

Time Interval Functions

Time interval functions perform time period-related operations, such as adding or subtracting a specified interval from a date or counting the time between two dates.

Function	Description	Example

Function	Description	Example
date_add(unit,value,timestamp)	Adds N time units (`unit`) to timestamp. If `value` is a negative value, subtraction is performed.	`*
date_diff(unit, timestamp1, timestamp2)	Returns the time difference between two time expressions, for example, calculates the number of time units (`unit`) between `timestamp1` and `timestamp2` .	`*

The following units (`unit`) are supported:

unit	Description
millisecond	Millisecond
second	Second
minute	Minute
hour	Hour
day	Day
week	Week
month	Month
quarter	Quarter of a year
year	Year

Sample

Return the interval value in seconds between '2020-03-01 00:00:00' and '2020-03-02 00:00:00':

```
* | SELECT date_diff('second', TIMESTAMP '2020-03-01 00:00:00', TIMESTAMP '2020-03-02 00:00:00')
```

Duration Functions

Function	Description	Example

Function	Description	Example
parse_duration(string)	Parses a unit value string into a duration expression. Return value type: INTERVAL, such as `0 00:00:00.043 (D HH:MM:SS.Ms)`	`*
human_readable_seconds(double)	Parses a unit value string into a duration expression. Return value type: VARCHAR, such as `1 minutes` and `36 seconds`	`*

The following units are supported:

Unit	Description
ns	Nanosecond
us	Microsecond
ms	Millisecond
s	Second
m	Minute
h	Hour
d	Day

Sample

Parse the unit value string '3.81 d' into a duration string:

```
* | SELECT parse_duration('3.81 d')
```

Time Formatting Function

Function	Description	Example
date_format(timestamp, format)	Parses a date and time string of the `timestamp` type into a string in the `format` format.	`*

Function	Description	Example
date_parse(string, format)	Parses a date and time string in the `format` format into the `timestamp` type.	`*

The following formats (`format`) are supported:

Format	Description
%a	Abbreviated names of the days of the week, such as Sun and Sat
%b	Abbreviated month name, such as Jan and Dec
%c	Month, numeric. Value range: 1-12
%d	Day of the month, decimal. Value range: 01-31
%e	Day of the month, decimal. Value range: 1-31
%f	Millisecond. Value range: 0-000000
%H	Hour, in the 24-hour time system
%h	Hour, in the 12-hour time system
%I	Hour, in the 12-hour time system
%i	Minute, numeric. Value range: 00-59
%j	Day of the year. Value range: 001-366
%k	Hour. Value range: 0-23
%l	Hour. Value range: 1-12
%M	Month name in English, such as January and December
%m	Month name in digits, such as 01 and 02
%p	AM or PM
%r	Time, in the 12-hour time system. Format: `hh:mm:ss AM/PM`
%S	Second. Value range: 00-59
%s	Second. Value range: 00-59
%T	Time, in the 24-hour time system. Format: `hh:mm:ss`

Format	Description
%v	Week of the year, where Monday is the first day of the week. Value range: 01-53
%W	Names of the days of the week, such as Sunday and Saturday
%Y	Year (4-digit), such as 2020
%y	Year (2-digit), such as 20
%%	Escape character of %

Sample

Parse the time string '2017-05-17 09:45:00' in `format` into a date and time expression of the TIMESTAMP type, i.e., '2017-05-17 09:45:00.0':

```
* | SELECT date_parse('2017-05-17 09:45:00','%Y-%m-%d %H:%i:%s')
```

IP Geographic Function

Last updated：2022-10-13 15:02:25

IP geographic functions can be used to determine whether an IP address belongs to a private or public network or analyze the country, province, or city to which an IP address belongs. This document introduces the basic syntax and examples of IP geographic functions.

IP Address Function

Note：

- The `KEY` field in the following functions indicates the log field (for example, `ip`) and its value is an IP address. If the value is an internal IP address or an invalid field, the value cannot be parsed and is displayed as `NULL` or `Unknown` .
- Currently, only IPv4 addresses are supported.
- Due to the limitations of the IP address assignment mechanism, the IP address database cannot accurately cover all the geographic information of IP addresses. For a few IP addresses, the detailed geographic information may fail to be queried or the geographic information found may be incorrect.

Function	Description	Example
ip_to_domain(KEY)	Determines whether an IP address belongs to a private or public network. Valid values are `intranet` (private network IP address), `internet` (public network IP address), and `invalid` (invalid IP address).	`*
ip_to_country(KEY)	Analyzes the country or region to which an IP address belongs. The country's or region's name is returned.	`*
ip_to_country_code(KEY)	Analyzes the code of the country or region to which an IP address belongs. The country's or region's code is returned.	`*
ip_to_country_geo(KEY)	Analyzes the latitude and longitude of the country or region to which an IP address belongs. The country's or region's latitude and longitude are returned.	`*
ip_to_province(KEY)	Analyzes the province to which an IP address belongs. The province's name is returned.	`*

Function	Description	Example
ip_to_province_code(KEY)	Analyzes the code of the province to which an IP address belongs. The province's administrative zone code is returned.	`*
ip_to_province_geo(KEY)	Analyzes the latitude and longitude of the province to which an IP address belongs. The province's latitude and longitude are returned.	`*
ip_to_city	Analyzes the city to which an IP address belongs. The city's name is returned.	`*
ip_to_city_code	Analyzes the code of the city to which an IP address belongs. The city's administrative zone code is returned. Currently, cities in Taiwan (China) and outside China are not supported.	`*
ip_to_city_geo	Analyzes the latitude and longitude of the city to which an IP address belongs. The city's latitude and longitude are returned. Currently, cities in Taiwan (China) and outside China are not supported.	`*
ip_to_provider(KEY)	Analyzes the ISP to which an IP address belongs. The ISP's name is returned.	`*

IP Range Function

Note：

- The `KEY` field in the following functions indicates the log field (for example, `ip`) and its value is an IP address.
- In the `ip_subnet_min` , `ip_subnet_max` , and `ip_subnet_range` functions, the value of the `KEY` field is an IP address with a subnet mask (for example, 192.168.1.0/24). If the value field is a general IP address, you need to use the `cancat` function to convert it to an IP address with a subnet mask.

Function	Description	Example
ip_prefix(KEY,prefix_bits)	Gets the prefix of an IP address. An IP address with a subnet mask is returned, for example, `192.168.1.0/24` .	`*
ip_subnet_min(KEY)	Gets the smallest IP address in an IP range. The return value is an IP address, for example, `192.168.1.0` .	`*

Function	Description	Example
ip_subnet_max(KEY)	Gets the largest IP address in an IP range. The return value is an IP address, for example, `192.168.1.255`.	`*
ip_subnet_range(KEY)	Gets the range of an IP range. The return value is an IP address of the Array type, for example, `[[192.168.1.0, 192.168.1.255]]`.	`*
is_subnet_of	Determines whether an IP address is in a specified IP range. The return value is of the Boolean type.	`*
is_prefix_subnet_of	Determines whether an IP range is a subnet of a specified IP range. The return value is of the Boolean type.	`*

Examples

The following are query and analysis statement examples of IP geographic functions. After performing such query and analysis operations, you can select appropriate statistics charts to display the query and analysis results.

> Note：
> In the following examples, the log field is `ip`.

- Count the total number of requests that are not from the private network:

```
* | SELECT count(*) AS PV where ip_to_domain(ip)!='intranet'
```

- Find the top 10 provinces with the largest total number of requests:

```
* | SELECT ip_to_province(ip) AS province, count(*) as PV GROUP BY province ORD
ER BY PV desc LIMIT 10
```

If the result includes requests from the private network and you want to exclude them, use the following query and analysis statement:

```
* | SELECT ip_to_province(ip) AS province, count(*) as PV where ip_to_domain(ip)!
='intranet' GROUP BY province ORDER BY PV desc LIMIT 10
```

- Collect the longitude and latitude statistics of IP addresses to determine client distribution:

```
* | SELECT ip_to_geo(ip) AS geo, count(*) AS pv GROUP BY geo ORDER BY pv DESC
```

URL Function

Last updated：2022-09-19 12:04:17

This document introduces the basic syntax and examples of URL functions.

Syntax Format

URL functions can extract fields from standard HTTP URLs. The following is an example of a standard URL:

```
[protocol:][//host[:port]][path][?query][#fragment]
```

Note：
The extracted fields do not include URL delimiters `:` and `?`.

Common URL Functions

Function	Description	Example	Output
url_extract_fragment(url)	Extracts `fragment` from the URL. The result is of the varchar type.	`*	select url_extract_fragment('https://console.intl.clou demo/categoryList')`
url_extract_host(url)	Extracts `host` from the URL. The result is of the varchar type.	`*	select url_extract_host('https://console.intl.cloud.ter
url_extract_parameter(url, name)	Extracts the value of `query` from the URL. The result is of the varchar type.	`*	select url_extract_parameter('https://console.intl.clc chongqing','region')`

Function	Description	Example	Output
url_extract_path(url)	Extracts `path` from the URL. The result is of the varchar type.	`*	select url_extract_path('https://console.intl.cloud.ter
url_extract_port(url)	Extracts `port` from the URL. The result is of the bigint type.	`*	select url_extract_port('https://console.intl.cloud.ten
url_extract_protocol(url)	Extracts `protocol` from the URL. The result is of the varchar type.	`*	select url_extract_protocol('https://console.intl.cloud chongqing')`
url_extract_query(url)	Extracts the key of `query` from the URL. The result is of the varchar type.	`*	select url_extract_query('https://console.intl.cloud.te

Function	Description	Example	Output
url_encode(value)	Escapes `value` so that it can be used in `URL_query`. • Letters will not be decoded. • .-*_ will not be encoded. • Spaces are decoded as +. • Other characters are decoded into the UTF-8 format.	`*	select url_encode('https://console.intl.cloud.tencent
url_decode(value)	Decodes the URL.	`*	select url_decode('https%3A%2F%2Fconsole.cloud.tence chongqing')`

Mathematical Calculation Functions

Last updated：2022-10-13 15:02:26

This document introduces the basic syntax and examples of mathematical calculation functions.

CLS's log analysis feature allows you to analyze logs by analyzing fields of int, long, and double types via mathematical calculation functions and mathematical statistical functions.

Note：

- Mathematical calculation functions support operators +-*/%.
- `x` and `y` in the following functions can be numbers, log fields, or expressions with numerical calculation results.

Basic Syntax

Function	Description
abs(x)	Returns the absolute value of `x`.
cbrt(x)	Returns the cube root of `x`.
sqrt(x)	Returns the square root of `x`.
cosine_similarity(x,y)	Returns the cosine similarity between the vectors `x` and `y`. For example, `*
degrees(x)	Converts angle `x` in radians to degrees.
radians(x)	Converts angle `x` in degrees to radians.
e()	Returns the natural logarithm of the number.
exp(x)	Returns the exponent of the natural logarithm.
ln(x)	Returns the natural logarithm of `x`.
log2(x)	Returns the base-2 logarithm of `x`.
log10(x)	Returns the base-10 logarithm of `x`.

Function	Description
log(x,b)	Returns the base-b logarithm of `x`.
pi()	Returns the value of Pi, accurate to 14 decimal places.
pow(x,b)	Returns `x` raised to the power of `b`.
rand()	Returns a random value.
random(0,n)	Returns a random number within the [0,n) range.
round(x)	Returns the rounded value of `x`.
round(x, N)	Returns `x` rounded to `N` decimal places.
floor(x)	Returns `x` rounded down to the nearest integer.
ceiling(x)	Returns `x` rounded up to the nearest integer.
from_base(varchar, bigint)	Converts a string into a number based on BASE encoding.
to_base(x, radix)	Converts a number into a string based on BASE encoding.
truncate(x)	Returns `x` rounded to an integer by dropping digits after the decimal point.
acos(x)	Returns the arc cosine of `x`.
asin(x)	Returns the arc sine of `x`.
atan(x)	Returns the arc tangent of `x`.
atan2(y,x)	Returns the arc tangent of the result of dividing `y` by `x`.
cos(x)	Returns the cosine of `x`.
sin(x)	Returns the sine of `x`.
cosh(x)	Returns the hyperbolic cosine of `x`.
tan(x)	Returns the tangent of `x`.
tanh(x)	Returns the hyperbolic tangent of `x`.
infinity()	Returns the constant representing positive infinity.
is_nan(x)	Determines if the target value is Not a Number (NaN).

Function	Description
nan()	Returns a "Not a Number" (NaN) value.
mod(x, y)	Returns the remainder when `x` is divided by `y`.
sign(x)	Returns the sign of `x` represented by 1, 0, or -1.
width_bucket(x, bound1, bound2, n)	Returns the bucket number of `x` in an equi-width histogram, with `n` buckets within bounds of bound1 and bound2. For example, `*
width_bucket(x, bins)	Returns the bin number of `x` with specific bins specified by the array `bins`. For example, `*

Examples

To compare the PV values of today and yesterday and express the result as a percentage, the query and analysis statement is as follows:

```
* | SELECT diff [1] AS today, round((diff [3] -1.0) * 100, 2) AS growth FROM (SEL
ECT compare(pv, 86400) as diff FROM (SELECT COUNT(*) as pv FROM log))
```

Mathematical Statistical Function

Last updated：2021-12-30 14:18:01

This document introduces the basic syntax and examples of mathematical statistical functions.

Basic Syntax

Function	Description
corr(key1, key2)	Returns the correlation coefficient of two columns. The calculation result range is [0,1].
covar_pop(key1, key2)	Returns the population covariance of two columns.
covar_samp(key1, key2)	Returns the sample covariance of two columns.
regr_intercept(key1, key2)	Returns linear regression intercept of input values. `key1` is the dependent value. `key2` is the independent value.
regr_slope(key1, key2)	Returns linear regression slope of input values. `key1` is the dependent value. `key2` is the independent value.
stddev(key)	Returns the sample standard deviation of the `key` column. This function is equivalent to the `stddev_samp` function.
stddev_samp(key)	Returns the sample standard deviation of the `key` column.
stddev_pop(key)	Returns the population standard deviation of the `key` column.
variance(key)	Returns the sample variance of the `key` column. This function is equivalent to the `var_samp` function.
var_samp(key)	Returns the sample variance of the `key` column.
var_pop(key)	Returns the population variance of the `key` column.

Examples

- Example 1: calculate the correlation coefficient of two columns

```
* | SELECT corr(request_length, request_time)
```

- Example 2: calculate the sample standard deviation and population standard deviation of the request length

```
* | SELECT stddev(request_length) as "sample standard deviation", stddev_pop(re
quest_length) as " population standard deviation", time_series(__TIMESTAMP__,
'1m', '%Y-%m-%d %H:%i:%s', '0') AS dt GROUP BY dt
```

General Aggregate Functions

Last updated：2022-05-18 15:01:54

This document introduces the basic syntax and examples of aggregate functions.

An aggregate function calculates a set of values and returns the calculation result. CLS supports the following aggregate functions.

Note：
In CLS analysis statements, strings must be included in single quotes (''), and field names and column names are unsigned or included in double quotes (""). For example, 'status' indicates the string **'status'**, and **status** or **"status"** indicates the log field `status` .

Function	Description	Example
arbitrary(KEY)	Returns an arbitrary non-null value of `KEY` .	`*
avg(KEY)	Returns the average (arithmetic mean) of the `KEY` column.	`*
bitwise_and_agg(KEY)	Returns the bitwise AND result of all input values of the `KEY` column.	`*
bitwise_or_agg(KEY)	Returns the bitwise OR result of all input values of the `KEY` column.	`*
checksum(KEY)	Returns the checksum of the `KEY` column. The return result is of Base64 encoding type.	`*
count(*)	Returns the number of input rows.	`*
count(1)	Returns the number of input rows. This function is equivalent to count(*).	`*
count(KEY)	Returns the number of non-null input values of the `KEY` column.	`*
count_if(boolean)	Returns the number of logs that meet specified conditions.	`*
geometric_mean(KEY)	Returns the geometric mean of the `KEY` column.	`*
max(KEY)	Returns the maximum value of `KEY` .	`*
max_by(x,y)	Returns the value of `x` associated with the maximum value of `y` over all input values.	`*

Function	Description	Example
max_by(x,y,n)	Returns `n` values of `x` associated with the `n` largest of all input values of `y` in descending order of `y`.	`*
min(KEY)	Returns the minimum value of `KEY`.	`*
min_by(x,y)	Returns the value of `x` associated with the minimum value of `y` over all input values.	`*
min_by(x,y,n)	Returns `n` values of `x` associated with the `n` smallest of all input values of `y` in descending order of `y`.	`*
sum(KEY)	Returns the sum of the `KEY` column.	`*
bool_and(boolean)	Returns `TRUE` if all logs meet the specified condition or `FALSE` otherwise.	`*
bool_or(boolean)	Returns `TRUE` if any log meets the specified condition or `FALSE` otherwise.	`*
every(boolean)	Equivalent to `bool_and(boolean)`.	`*
`		

Parameter description

Parameter	Description
KEY	Name of the log field.
x	The parameter value can be of any data type.
y	The parameter value can be of any data type.
n	An integer greater than 0.

Geospatial Function

Last updated：2022-05-07 11:38:51

This document introduces the basic syntax and examples of geospatial functions.

Concepts

Geospatial functions support Well-Known Text (WKT) and Well-Known Binary (WKB) forms of geometries. For related concepts, see Well-known text representation of geometry - Wikipedia.

Geometry	WKT Format
Point	POINT (0 0)
LineString	LINESTRING (0 0, 1 1, 1 2)
Polygon	POLYGON ((0 0, 4 0, 4 4, 0 4, 0 0), (1 1, 2 1, 2 2, 1 2, 1 1))
MultiPoint	MULTIPOINT (0 0, 1 2)
MultiLineString	MULTILINESTRING ((0 0, 1 1, 1 2), (2 3, 3 2, 5 4))
MultiPolygon	MULTIPOLYGON (((0 0, 4 0, 4 4, 0 4, 0 0), (1 1, 2 1, 2 2, 1 2, 1 1)), ((-1 -1, -1 -2, -2 -2, -2 -1, -1 -1)))
GeometryCollection	GEOMETRYCOLLECTION (POINT(2 3), LINESTRING (2 3, 3 4))

Geometries default to plane geometries, in which the shortest distance between two points is a straight line. Geometries also support spherical geometries, where the shortest distance between two points is a great circle arc. You can use `to_spherical_geography()` to convert a plane geometry into a spherical geometry.
For example:
`ST_Distance(ST_Point(-71.0882, 42.3607), ST_Point(-74.1197, 40.6976))` calculates the distance between two points on a plane, and the result is 3.4577.
`ST_Distance(to_spherical_geography(ST_Point(-71.0882, 42.3607)), to_spherical_geography(ST_Point(-74.1197, 40.6976)))` calculates the distance between two points on a sphere, and the result is 312822.179.

When a length is calculated (for example, `ST_Distance()` and `ST_Length()`), the unit is meter. When an area is calculated (for example, `ST_Area()`), the unit is square meter.

Constructing a Geometry

Function	Return Value Type	Description
ST_Point(double, double)	Point	Constructs a point.
ST_LineFromText(varchar)	LineString	Constructs a LineString based on WKT text.
ST_Polygon(varchar)	Polygon	Constructs a polygon based on WKT text.
ST_GeometryFromText(varchar)	Geometry	Constructs a geometry based on WKT text.
ST_GeomFromBinary(varbinary)	Geometry	Constructs a geometry based on WKB representation.
ST_AsText(Geometry)	varchar	Converts a geometry into WKT format.
to_spherical_geography(Geometry)	SphericalGeography	Converts a plane geometry into a spherical geometry.
to_geometry(SphericalGeography)	Geometry	Converts a spherical geometry into a plane geometry.

Relationship Tests

Function	Return Value Type	Description
ST_Contains(Geometry, Geometry)	boolean	Returns `true` if and only if no points of the second geometry lie in the exterior of the first geometry, and at least one point of the interior of the first geometry lies in the interior of the second geometry. Returns `false` if the second geometry lies exactly on the boundary of the first geometry.
ST_Crosses(Geometry, Geometry)	boolean	Returns `true` if the given geometries have some, but not all, interior points in common.
ST_Disjoint(Geometry, Geometry)	boolean	Returns `true` if the given geometries do not spatially intersect.
ST_Equals(Geometry, Geometry)	boolean	Returns `true` if the given geometries represent the same geometry.

Function	Return Value Type	Description
ST_Intersects(Geometry, Geometry)	boolean	Returns `true` if the given geometries spatially intersect in two dimensions.
ST_Overlaps(Geometry, Geometry)	boolean	Returns `true` if the given geometries are of the same dimension, but are not completely contained by each other.
ST_Relate(Geometry, Geometry)	boolean	Returns `true` if the first geometry is spatially related to the second geometry.
ST_Touches(Geometry, Geometry)	boolean	Returns `true` if a geometry spatially touches another geometry, but their interiors do not intersect.
ST_Within(Geometry, Geometry)	boolean	Returns `true` if first geometry is completely inside the second geometry. Return `false` if their boundaries intersect.

Operations

Function	Return Value Type	Description
geometry_nearest_points(Geometry, Geometry)	row(Point, Point)	Returns the two closest points between two geometries.
geometry_union(array(Geometry))	Geometry	Combines multiple geometries into one.
ST_Boundary(Geometry)	Geometry	Returns the boundary (closure) of a geometry.
ST_Buffer(Geometry, distance)	Geometry	Returns a geometric object that represents the union of all points whose distance from a geometry is less than or equal to a specified value.
ST_Difference(Geometry, Geometry)	Geometry	Returns the geometry value that represents the point set difference of the two given geometries.
ST_Envelope(Geometry)	Geometry	Returns the bounding rectangular polygon of the geometry.
ST_ExteriorRing(Geometry)	Geometry	Returns the exterior ring of the input polygon.

Function	Return Value Type	Description
ST_Intersection(Geometry, Geometry)	Geometry	Returns the geometry value that represents the point set intersection of two given geometries.
ST_SymDifference(Geometry, Geometry)	Geometry	Returns the geometry value that represents the point set symmetric difference of two geometries.

Accessors

Function	Return Value Type	Description
ST_Area(Geometry)	double	Returns the area of a polygon in a plane geometry.
ST_Area(SphericalGeography)	double	Returns the area of a polygon in a spherical geometry.
ST_Centroid(Geometry)	Geometry	Returns the point value that is the mathematical centroid of a geometry.
ST_CoordDim(Geometry)	bigint	Returns the coordinate dimension of the geometry.
ST_Dimension(Geometry)	bigint	Returns the inherent dimension of this geometry, which must be less than or equal to the coordinate dimension.
ST_Distance(Geometry, Geometry)	double	Returns the minimum distance between two geometries.
ST_Distance(SphericalGeography, SphericalGeography)	double	Returns the smallest distance between two spherical geographies.
ST_IsClosed(Geometry)	boolean	Returns `true` if the start and end points of the given geometry are the same.
ST_IsEmpty(Geometry)	boolean	Returns `true` if the geometry is an empty GeometryCollection, polygon, point etc.
ST_IsRing(Geometry)	boolean	Returns `true` if and only if the geometry is a closed and simple line.
ST_Length(Geometry)	double	Returns the length of a LineString or MultiLineString on a plane geometry.

Function	Return Value Type	Description
ST_Length(SphericalGeography)	double	Returns the length of a LineString or MultiLineString on a spherical geometry.
ST_XMax(Geometry)	double	Returns the X maxima of a bounding box of a geometry.
ST_YMax(Geometry)	double	Returns the Y maxima of a bounding box of a geometry.
ST_XMin(Geometry)	double	Returns the X minima of a bounding box of a geometry.
ST_YMin(Geometry)	double	Returns the Y minima of a bounding box of a geometry.
ST_StartPoint(Geometry)	point	Returns the first point of a LineString geometry.
ST_EndPoint(Geometry)	point	Returns the last point of a LineString geometry.
ST_X(Point)	double	Returns the X coordinate of the point.
ST_Y(Point)	double	Returns the Y coordinate of the point.
ST_NumPoints(Geometry)	bigint	Returns the number of points in a geometry.
ST_NumInteriorRing(Geometry)	bigint	Returns the number of the interior rings of a polygon.

Binary String Function

Last updated：2021-12-30 12:26:06

This document introduces the basic syntax and examples of binary string functions.

The binary string type varbinary is different from the string type varchar.

Statement	Description
Concatenation function ||	The result of `a
length(binary) → bigint	Returns a binary length.
concat(binary1, ..., binaryN) → varbinary	Concatenates binary strings. This function provides the same functionality as ||.
to_base64(binary) → varchar	Converts a binary string into a base64 string.
from_base64(string) → varbinary	Converts a base64 string into a binary string.
to_base64url(binary) → varchar	Converts a binary string into a base64 string with a URL safe alphabet.
from_base64url(string) → varbinary	Converts a base64 string with a URL safe alphabet into a binary string.
to_hex(binary) → varchar	Converts a binary string into a hexadecimal string.
from_hex(string) → varbinary	Converts a hexadecimal string into a binary string.
to_big_endian_64(bigint) → varbinary	Converts a bigint number into a big endian binary string.
from_big_endian_64(binary) → bigint	Converts a big endian binary string into a number.
md5(binary) → varbinary	Computes the MD5 hash of a binary string.
sha1(binary) → varbinary	Computes the SHA1 hash of a binary string.
sha256(binary) → varbinary	Computes the SHA256 hash of a binary string.
sha512(binary) → varbinary	Computes the SHA512 hash of a binary string.
xxhash64(binary) → varbinary	Computes the xxHash64 hash of a binary string.

Estimation Function

Last updated：2021-12-30 12:26:06

This document introduces the basic syntax and examples of estimation functions.

Function	Syntax	Description
approx_distinct	approx_distinct(x)	Returns the approximate number of distinct input values (column x).
approx_percentile	approx_percentile(x,percentage)	Sorts the values in the x column in ascending order and returns the value approximately at the given `percentage` position.
	approx_percentile(x,array[percentage01, percentage02...])	Sorts the values in the x column in ascending order and returns the values approximately at the given `percentage` positions (percentage01, percentage02...).

approx_distinct

The `approx_distinct` function is used to get the approximate number of distinct input values of a field.

Syntax

```
approx_distinct(x)
```

Parameter description

Parameter	Description
x	The parameter value can be of any type.

Return value type

bigint

Example

Use the `count` function to calculate the PV value and use the `approx_distinct` function to get the approximate number of distinct input values of the `client_ip` field and use it as the UV value.

```
* | SELECT count(*) AS PV, approx_distinct(ip) AS UV
```

approx_percentile

The `approx_percentile` function is used to sort the values of a target field in ascending order and return the values approximately at the given `percentage` position.

Syntax

- Return the value (double) approximately at the given `percentage` position

```
approx_percentile(x, percentage)
```

- Return the value (array) approximately at the given `percentage` positions (percentage01,percentage02...)

```
approx_percentile(x, array[percentage01,percentage02...])
```

Parameter description

Parameter	Description
x	Value type: double
percentage	Value range: [0,1]

Return value type

double or array

Example

Example 1: sort the values of the **resTotalTime** column and return the value of **resTotalTime** approximately at the 50% position

```
* | select approx_percentile(resTotalTime,0.5)
```

Example 2: sort the values of the **resTotalTime** column and return the values of **resTotalTime** approximately at the 10%, 20%, and 60% positions

```
* | select approx_percentile(resTotalTime, array[0.2,0.4,0.6])
```

Type Conversion Function

Last updated：2022-05-07 17:59:15

This document introduces the basic syntax and examples of type conversion functions.

If you need to distinguish more detailed data types when querying and analyzing data, you can use type conversion functions for data type conversion in query and analysis statements.

Function	Syntax	Description
cast	cast(x as type)	Parses the data type of `x`. During `cast` execution, if a value fails to be parsed, the system terminates the entire query and analysis operation.
try_cast	try_cast(x as type)	Parses the data type of `x`. During `try_cast` execution, if a value fails to be parsed, the system returns `NULL` and continues processing by skipping the value.
typeof	typeof(x)	Returns the data type of `x`.

Note：
When dirty data may exist in logs, you are advised to use the `try_cast` function to avoid query and analysis failures caused by dirty data.

Function cast

The `cast` function is used to parse the data type of `x`. During `cast` execution, if a value fails to be parsed, the system terminates the entire query and analysis operation.

Syntax

```
cast(x as type)
```

Parameter description

Parameter	Description
x	The parameter value can be of any type.

Parameter	Description
type	SQL data type. Valid values: `bigint`, `varchar`, `double`, `boolean`, `timestamp`, `decimal`, `array`, or `map`. For the mappings between index and SQL data types, please see Appendix: Data Type Mappings.

If `type` is `timestamp`, `x` must be a timestamp in milliseconds (such as 1597807109000) or a time string in the ISO 8601 time format (such as 2019-12-25T16:17:01+08:00).

Return value type

The return value type is determined by the `type` parameter.

Example

1. Parse the numeric value 0.01 into a BIGINT value:

```
* | select cast(0.01 as bigint)
```

2. Convert the CLS log collection time `__TIMESTAMP__` to `TIMESTAMP`.

```
* | select cast(__TIMESTAMP__ as timestamp)
```

Function try_cast

The `try_cast` function is used to parse the data type of `x`. During `try_cast` execution, if a value fails to be parsed, the system returns `NULL` and continues processing by skipping the value.

Syntax

```
try_cast(x as type)
```

Parameter description

Parameter	Description
x	The parameter value can be of any type.

Parameter	Description
type	SQL data type. Valid values: `bigint`, `varchar`, `double`, `boolean`, `timestamp`, `decimal`, `array`, or `map`. For the mappings between index and SQL data types, please see Appendix: Data Type Mappings.

Return value type

The return value type is determined by the `type` parameter.

Example

Parse the **remote_user** field value into a VARCHAR value:

```
* | select try_cast(remote_user as varchar)
```

Appendix: Data Type Mappings

The mappings between index and SQL data types are as follows:

Index Data Type	SQL Data Type
long	bigint
text	varchar
double	double
json	varchar

Logical Function

Last updated：2022-02-23 16:52:51

This document introduces the basic syntax and examples of logic functions.

Logical operators

Operator	Description	Example
AND	The result is TRUE only if both the left and right operands are TRUE.	a AND b
OR	The result is TRUE if either of the left and right operands is TRUE.	a OR b
NOT	The result is FALSE only if the right operand is FALSE.	NOT a

NULL-related logical operations

The following truth tables demonstrate the processing of cases where `a` and `b` are TRUE, FALSE, and NULL:

AND and OR truth table

a	b	a AND b	a OR b
TRUE	TRUE	TRUE	TRUE
TRUE	FALSE	FALSE	TRUE
TRUE	NULL	NULL	TRUE
FALSE	TRUE	FALSE	TRUE
FALSE	FALSE	FALSE	FALSE
FALSE	NULL	FALSE	NULL
NULL	TRUE	NULL	TRUE
NULL	FALSE	FALSE	NULL
NULL	NULL	NULL	NULL

NOT truth table

a	NOT a

a	NOT a
TRUE	FALSE
FALSE	TRUE
NULL	NULL

Operators

Last updated：2022-05-18 15:01:54

An operator is a reserved word or a character used primarily to specify conditions in a SQL statement and to serve as conjunctions for multiple conditions in a SQL statement.

Mathematical Operators

Mathematical operators are symbols used to process four arithmetic operations. They are the simplest and most commonly used operators, especially for number processing. Almost all number processing involves mathematical operators.

Assume variable `a` holds 1 and variable `b` holds 2, then:

Operator	Description	Example
+ (Addition)	Adds values on either side of the operator.	a + b
- (Subtraction)	Subtracts the right hand operand from the left hand operand.	a - b
* (Multiplication)	Multiplies values on either side of the operator.	a * b
/ (Division)	Divides the left hand operand by the right hand operand.	b / a
% (Modulus)	Divides the left hand operand by the right hand operand and returns the remainder.	b % a

Comparison Operators

Comparison operators are used to determine the size relationships of values and support any value type that can be compared, such as int, long, double, and text.

Assume variable `a` holds 1 and variable `b` holds 2, then:

Operator	Description	Example

Operator	Description	Example
=	Checks if the values of two operands are equal or not. If yes, the condition is true.	a = b
!=	Checks if the values of two operands are equal or not. If no, the condition is true.	a != b
<>	Checks if the values of two operands are equal or not. If no, the condition is true.	a <> b
>	Checks if the value of the left operand is greater than the value of the right operand. If yes, the condition is true.	a > b
<	Checks if the value of the left operand is less than the value of the right operand. If yes, the condition is true.	a < b
>=	Checks if the value of the left operand is greater than or equal to the value of the right operand. If yes, the condition is true.	a >= b
<=	Checks if the value of the left operand is less than or equal to the value of the right operand. If yes, the condition is true.	a <= b
IN	The IN operator is used to compare a value with a specified list of values.	status IN (200,206,404)
NOT IN	The NOT IN operator is used to compare a value with values that are not in a specified list. It is the opposite of the IN operator.	status NOT IN (200,206,404)
BETWEEN AND	The BETWEEN operator tests if a value is within a specified range (BETWEEN min AND max).	status between 200 AND 400
LIKE	The LIKE operator is used to compare a value with a similar value using the wildcard operator. The percent sign (%) represents zero, one, or multiple characters. The underscore (_) represents a single digit or character.	url LIKE '%.mp4'
IS NULL	The NULL operator compares a value with NULL. If the value is null, the condition is true.	status IS NULL
IS NOT NULL	The NULL operator compares a value with NULL. If the value is not null, the condition is true.	status IS NOT NULL

Operator	Description	Example
DISTINCT	Syntax: `x IS DISTINCT FROM y` or `x IS NOT DISTINCT FROM y`. The DISTINCT operator checks if x equals to y. Unlike <>, it can compare nulls. For more information, see Differences between <> and DISTINCT.	NULL IS NOT DISTINCT FROM NULL
LEAST	Syntax: `LEAST(x, y...)`. Returns the minimum value among x,y...	LEAST(1,2,3)
GREATEST	Syntax: `GREATEST(x, y...)`. Returns the maximum value among x,y...	GREATEST(1,2,3)
ALL	Syntax: `x expression operator ALL ( subquery )` Returns `true` if x meets all conditions. Supported operators are `<, >, <=, >=, =, <>, !=`.	Example 1: 21 < ALL (VALUES 19, 20, 21) Example 2: * | SELECT 200 = ALL(SELECT status)
ANY / SOME	Syntax: `x expression operator ANY ( subquery )` or `x expression operator SOME ( subquery )`. Returns `true` if x meets any condition. Supported operators are `<, >, <=, >=, =, <>, !=`.	Example 1: 'hello' = ANY (VALUES 'hello', 'world') Example 2: * | SELECT 200 = ANY(SELECT status)

Differences between <> and DISTINCT:

x	y	x = y	x <> y	x IS DISTINCT FROM y	x IS NOT DISTINCT FROM y
1	1	true	false	false	true
1	2	false	true	true	false
1	null	null	null	true	false
null	null	null	null	false	true

Logical Operators

Operator	Description
AND	The AND operator determines that the result is true if the conditions on both sides of the operator exist at the same time.
OR	The OR operator determines that the result is true if either of the conditions on both sides of the operator exists.
NOT	The NOT operator is the opposite of the logical operator used. Examples: NOT EXISTS, NOT BETWEEN, NOT IN

Bitwise Operation

Last updated：2022-03-08 14:03:26

This document introduces the basic syntax and examples of bitwise operation functions.

Function	Syntax	Description
bit_count	bit_count(x, bits)	Returns the number of ones in `x` in binary representation.
bitwise_and	bitwise_and(x, y)	Returns the result of the bitwise AND operation on `x` and `y` in binary representation.
bitwise_not	bitwise_not(x)	Inverts all bits of `x` in binary representation.
bitwise_or	bitwise_or(x, y)	Returns the result of the bitwise OR operation on `x` and `y` in binary representation.
bitwise_xor	bitwise_xor(x, y)	Returns the result of the bitwise XOR operation on `x` and `y` in binary representation.

bit_count

The `bit_count` function is used to return the number of ones in `x`.

Syntax

```
bit_count(x, bits)
```

Parameter description

Parameter	Description
x	The parameter value is of the bigint type.
bits	Number of bits, for example, 64 bits.

Return value type

Bigint

Example

Compute the binary representation of the number 24 and return the number of ones in the binary number.

- Query and analysis statement

```
* | SELECT bit_count(24, 64)
```

- Query and analysis result

bitwise_and

The `bitwise_and` function is used to return the result of the bitwise AND operation on `x` and `y` in binary representation.

Syntax

```
bitwise_and(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the bigint type.
y	The parameter value is of the bigint type.

Return value type

Bigint

Example

Perform an AND operation on numbers 3 and 5 in binary form.

- Query and analysis statement

```
* | SELECT bitwise_and(3, 5)
```

- Query and analysis result

bitwise_not

The `bitwise_not` function is used to invert all bits of `x` in binary representation.

Syntax

```
bitwise_not(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the bigint type.

Return value type

Bigint

Example

Invert all bits of the number 4 in binary form.

- Query and analysis statement

```
* | SELECT bitwise_not(4)
```

- Query and analysis result

bitwise_or

The `bitwise_or` function is used to return the result of the bitwise OR operation on `x` and `y` in binary representation.

Syntax

```
bitwise_or(x, y)
```

Parameter description

Parameter	Description

Parameter	Description
x	The parameter value is of the bigint type.
y	The parameter value is of the bigint type.

Return value type

Bigint

Example

Perform an OR operation on numbers 3 and 5 in binary representation.

- Query and analysis statement

```
* | SELECT bitwise_or(3, 5)
```

- Query and analysis result

bitwise_xor

The `bitwise_xor` function is used to return the result of the bitwise XOR operation on `x` and `y` in binary representation.

Syntax

```
bitwise_xor(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the bigint type.
y	The parameter value is of the bigint type.

Return value type

Bigint

Example

Perform an XOR operation on numbers 3 and 5 in binary representation.

- Query and analysis statement

```
* | SELECT bitwise_xor(3, 5)
```

- Query and analysis result

Regular Expression Function

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This document introduces the basic syntax and examples of regular expression functions.

CLS supports the following regular expression functions:

Function	Syntax	Description
regexp_extract_all	regexp_extract_all(x, regular expression)	Extracts the substrings that match a specified regular expression from a specified string and returns a collection of all matched substrings.
	regexp_extract_all(x, regular expression, n)	Extracts the substrings that match a specified regular expression from a specified string and returns a collection of substrings that match the target capture group.
regexp_extract	regexp_extract(x, regular expression)	Extracts and returns the first substring that matches a specified regular expression from a specified string.
	regexp_extract(x, regular expression, n)	Extracts the substrings that match a specified regular expression from a specified string and returns the first substring that matches the target capture group.
regexp_like	regexp_like(x, regular expression)	Checks whether a specified string matches a specified regular expression.
regexp_replace	regexp_replace(x, regular expression)	Deletes the substrings that match a specified regular expression from a specified string and returns the substrings that are not deleted.
	regexp_replace(x, regular expression, replace string)	Replaces the substrings that match a specified regular expression in a specified string and returns the new string after the replacement.
regexp_split	regexp_split(x, regular expression)	Splits a specified string into multiple substrings by using a specified regular expression and returns a collection of the substrings.

regexp_extract_all

The `regexp_extract_all` function is used to extract the substrings that match a specified regular expression from a specified string.

Syntax

- Extract the substrings that match a specified regular expression from a specified string and return a collection of all matched substrings.

```
regexp_extract_all(x, regular expression)
```

- Extract the substrings that match a specified regular expression from a specified string and return a collection of substrings that match the target capture group.

```
regexp_extract_all(x, regular expression, n)
```

Parameter description

Parameter	Description
x	The parameter value is of the varchar type.
regular expression	The regular expression that contains capture groups. For example, `(\d)(\d)(\d)` indicates three capture groups.
n	The nth capture group. `n` is an integer that starts from 1.

Return value type

Array

Example

Extract all numbers from the value of the `http_protocol` field.

- Query and analysis statement

```
* | SELECT regexp_extract_all(http_protocol, '\d+')
```

- Query and analysis result

regexp_extract

The `regexp_extract` function is used to extract the first substring that matches a specified regular expression from a specified string.

Syntax

- Extract and return the first substring that matches a specified regular expression from a specified string.

```
regexp_extract(x, regular expression)
```

- Extract the substrings that match a specified regular expression from a specified string and return the first substring that matches the target capture group.

```
regexp_extract(x, regular expression, n)
```

Parameter description

Parameter	Description
x	The parameter value is of the varchar type.
regular expression	The regular expression that contains capture groups. For example, `(\d)(\d)(\d)` indicates three capture groups.
n	The nth capture group. `n` is an integer that starts from 1.

Return value type

Varchar

Example

Example 1. Extract the first number from the value of the `http_protocol` field

- Query and analysis statement

```
* | SELECT regexp_extract_all(http_protocol, '\d+')
```

- Query and analysis result

Example 2. Extract the file information from the value of the `request_uri` field and count the number of times each file is accessed

- Query and analysis statement

```
* | SELECT regexp_extract(request_uri, '.*\/(index.*)', 1) AS file, count(*) AS count GROUP BY file
```

- Query and analysis result

regexp_like

The `regexp_like` function is used to check whether a specified string matches a specified regular expression.

Syntax

```
regexp_like (x, regular expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the varchar type.
regular expression	Regular expression.

Return value type

Boolean

Example

Check whether the value of the `server_protocol` field contains digits.

- Query and analysis statement

```
* | select regexp_like(server_protocol, '\d+')
```

- Query and analysis result

regexp_replace

The `regexp_replace` function is used to delete or replace the substrings that match a specified regular expression in a specified string.

Syntax

- Delete the substrings that match a specified regular expression from a specified string and return the substrings that are not deleted.

```
regexp_replace (x, regular expression)
```

- Replace the substrings that match a specified regular expression in a specified string and return the new string after the replacement.

```
regexp_replace (x, regular expression, replace string)
```

Parameter description

Parameter	Description
x	The parameter value is of the varchar type.
regular expression	Regular expression.
replace string	Substring that is used to replace the matched substring.

Return value type

String

Example

Delete the version number in the value of the `server_protocol` field and calculate the number of requests for each communication protocol.

- Query and analysis statement

```
* | select regexp_replace(server_protocol, '.\d+') AS server_protocol, count(*) AS count GROUP BY server_protocol
```

- Query and analysis result

regexp_split

The `regexp_split` function is used to split a specified string into multiple substrings and return a collection of the substrings.

Syntax

```
regexp_split (x, regular expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the varchar type.
regular expression	Regular expression.

Return value type

Array

Example

Split the value of the `server_protocol` field with forward slashes (/).

- Query and analysis statement

```
* | select regexp_split(server_protocol, '/')
```

- Query and analysis result

Lambda Function

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This document introduces the basic syntax and examples of Lambda functions.

CLS allows you to define Lambda expressions in SQL analysis statements and pass them to specified functions to enrich the expressions of functions.

Syntax

Lambda expressions need to be used together with functions such as filter, reduce, transform, and zip_with. The syntax of a Lambda expression is as follows:

```
parameter -> expression
```

Parameter	Description
parameter	Identifier used to pass the parameter.

expression	Expression. Most MySQL expressions can be used in Lambda expressions, such as:
	`x -> x + 1`
	`(x, y) -> x + y`
	`x -> regexp_like(x, 'a+')`
	`x -> x[1] / x[2]`
	`x -> if(x > 0, x, -x)`
	`x -> coalesce(x, 0)`
	`x -> cast(x AS JSON)`
	`x -> x + try(1 / 0)`

Example

Example 1. Using the Lambda expression "x-> x is not null"

Return non-null elements in the [5, null, 7, null] array.

- Query and analysis statement

```
* | SELECT filter(array[5, null, 7, null], x -> x is not null)
```

- Query and analysis result

Example 2. Using the Lambda expression "0, (s, x) -> s + x, s -> s"

Return the sum of the elements in array [5, 20, 50].

- Query and analysis statement

```
* | SELECT reduce(array[5, 20, 50], 0, (s, x) -> s + x, s -> s)
```

- Query and analysis result

Example 3. Using the Lambda expression "(k, v) -> v> 10"

Map two arrays to a map with a key value greater than 10.

- Query and analysis statement

```
* | SELECT map_filter(map(array['class01', 'class02', 'class03'], array[11, 10,
9]), (k,v) -> v > 10)
```

- Query and analysis result

Example 4. Using the Lambda expression "(x, y) -> (y, x)"

Swap the positions of two elements in an array and extract the elements with the same index to form a new two-dimensional array.

- Query and analysis statement

```
* | SELECT zip_with(array['a', 'b', 'c'], array['d', 'e', 'f'], (x, y) -> conca
t(x, y))
```

- Query and analysis result

Example 5. Using the Lambda expression "x -> coalesce (x, 0) +1"

Increment each element in the [5, NULL, 6] array by 1 and return. If the array contains a null element, the null element is converted to 0 and then incremented by 1.

- Query and analysis statement

```
* | SELECT transform(array[5, NULL, 6], x -> coalesce(x, 0) + 1)
```

- Query and analysis result

Other examples

```
* | SELECT filter(array[], x -> true)
* | SELECT map_filter(map(array[],array[]), (k, v) -> true)
* | SELECT reduce(array[5, 6, 10, 20], -- calculates arithmetic average: 10.25
cast(row(0.0, 0) AS row(sum double, count integer)),
(s, x) -> cast(row(x + s.sum, s.count + 1) AS row(sum double, count integer)),
s -> if(s.count = 0, null, s.sum / s.count))
* | SELECT reduce(array[2147483647, 1], cast(0 AS bigint), (s, x) -> s + x, s ->
s)
* | SELECT reduce(array[5, 20, null, 50], 0, (s, x) -> s + x, s -> s)
* | SELECT transform(array[array[1, null, 2], array[3, null]], a -> filter(a, x -
> x is not null))
```

Conditional Expressions

Last updated：2022-03-03 12:08:34

This document introduces the basic syntax and examples of conditional expressions.

Expression	Syntax	Description
CASE WHEN	CASE WHEN condition1 THEN result1 [WHEN condition2 THEN result2] [ELSE result3] END	Classifies data according to specified conditions.
IF	IF(condition, result1)	If `condition` is `true`, returns `result1`. Otherwise, returns `null`.
	IF(condition, result1, result2)	If `condition` is `true`, returns `result1`. Otherwise, returns `result2`.
NULLIF	NULLIF(expression1, expression2)	Determines whether the values of two expressions are equal. If the values are equal, returns `null`. Otherwise, returns the value of the first expression.
TRY	TRY(expression)	Captures exception information to enable the system to continue query and analysis operations.
COALESCE	COALESCE(expression1, expression2...)	Gets the first non-null value in multiple expressions.

CASE WHEN

The `CASE WHEN` expression is used to classify data.

Syntax

```
CASE WHEN condition1 THEN result1
[WHEN condition2 THEN result2]
[ELSE result3]
END
```

Parameter description

Parameter	Description

Parameter	Description
condition	Conditional expression
result	Return result

Example

- Example 1. Extract browser information from the `http_user_agent` field, classify the information into the Chrome, Safari, and unknown types, and calculate the PVs of the three types.
  - Query and analysis statement

```
* |
SELECT
CASE
WHEN http_user_agent like '%Chrome%' then 'Chrome'
WHEN http_user_agent like '%Safari%' then 'Safari'
ELSE 'unknown'
END AS http_user_agent,
count(*) AS pv
GROUP BY
http_user_agent
```

  - Query and analysis result

- Example 2. Get the statistics on the distribution of different request times.
  - Query and analysis statement

```
* |
SELECT
CASE
WHEN request_time < 0.001 then 't0.001'
WHEN request_time < 0.01 then 't0.01'
WHEN request_time < 0.1 then 't0.1'
WHEN request_time < 1 then 't1'
ELSE 'overtime'
END AS request_time,
count(*) AS pv
GROUP BY
request_time
```

- Query and analysis result

IF

The `IF` expression is used to classify data. It is similar to the `CASE WHEN` expression.

Syntax

- If `condition` is `true`, return `result1`. Otherwise, return `null`.

```
IF(condition, result1)
```

- If `condition` is `true`, return `result1`. Otherwise, return `result2`.

```
IF(condition, result1, result2)
```

Parameter description

Parameter	Description
condition	Conditional expression
result	Return result

Example

Calculate the proportion of requests with status code 200 to all requests.

- Query and analysis statement

```
* |
SELECT
sum(IF(status = 200, 1, 0)) * 1.0 / count(*) AS status_200_percentag
```

- Query and analysis result

NULLIF

The `NULLIF` expression is used to determine whether the values of two expressions are equal. If the values are equal, return `null`. Otherwise, return the value of the first expression.

Syntax

```
NULLIF(expression1, expression2)
```

Parameter description

Parameter	Description
expression	Any valid scalar expression

Example

Determine whether the values of the `server_addr` and `http_host` fields are the same. If the values are different, return the value of the `server_addr`.

- Query and analysis statement

```
* | SELECT NULLIF(server_addr,http_host)
```

- Query and analysis result

TRY

The `TRY` expression is used to capture exception information to enable the system to continue query and analysis operations.

Syntax

```
TRY(expression)
```

Parameter description

Parameter	Description

Parameter	Description
expression	Expression of any type

Example

When an exception occurs during the `regexp_extract` function execution, the `TRY` expression captures the exception information, continues the query and analysis operation, and returns the query and analysis result.

- Query and analysis statement

```
* |
SELECT
TRY(regexp_extract(uri, '.*\/(index.*)', 1))
AS file, count(*)
AS count
GROUP BY
file
```

- Query and analysis result

COALESCE

The `COALESCE` expression is used to get the first non-null value in multiple expressions.

Syntax

```
COALESCE(expression1, expression2...)
```

Parameter description

Parameter	Description
expression	Any valid scalar expression

Example

- Query and analysis statement

```
* | select COALESCE(null, 'test')
```

- Query and analysis result

Array Functions

Last updated：2022-05-18 15:11:53

This document introduces the basic syntax and examples of array functions.

Function	Syntax	Description
Subscript operator: []	[x]	Returns an element from an array. Equivalent to the `element_at` function.
array_agg	array_agg(x)	Returns all values in `x` as an array.
array_distinct	array_distinct(x)	Deduplicates an array and returns unique values from the array.
array_except	array_except(x, y)	Returns the difference between the `x` and `y` arrays.
array_intersect	array_intersect(x, y)	Returns the intersection between the `x` and `y` arrays.
array_join	array_join(x, delimiter)	Concatenates the elements in an array using the specified delimiter. If the array contains a null element, the null element is ignored. **Note:** For the `array_join` function, the maximum return result supported is 1 KB, and data exceeding 1 KB will be truncated.
	array_join(x, delimiter, null_replacement)	Concatenates the elements in an array using `delimiter` and uses `null_replacement` to replace null values. **Note:** For the `array_join` function, the maximum return result supported is 1 KB, and data exceeding 1 KB will be truncated.
array_max	array_max(x)	Returns the maximum value of an array.
array_min	array_max(x)	Returns the minimum value of an array.
array_position	array_position(x, element)	Returns the subscript (starting from 1) of a specified element. If the specified element does not exist, return `0`.
array_remove	array_remove(x, element)	Removes a specified element from an array.
array_sort	array_sort(x)	Sorts elements in an array in ascending order. If there are null elements, the null elements will be placed at the end of the returned array.
array_union	array_union(x, y)	Returns the union of two arrays.
cardinality	cardinality(x)	Calculates the number of elements in an array.

concat	concat(x, y...)	Concatenates multiple arrays into one.
contains	contains(x, element)	Determines whether an array contains a specified element and returns `true` if the array contains the element.
element_at	element_at(x, y)	Returns the yth element of an array.
filter	filter(x, lambda_expression)	Filters elements in an array and returns only the elements that comply with the Lambda expression.
flatten	flatten(x)	Converts a two-dimensional array to a one-dimensional array.
reduce	reduce(x, lambda_expression)	Adds the elements in the array as defined by the Lambda expression and returns the result.
reverse	reverse(x)	Reverses the elements in an array.
sequence	sequence(x, y)	Returns an array of consecutive and increasing values within the specified starting value range. The increment interval is the default value 1.
	sequence(x, y, step)	Returns an array of consecutive and increasing values within the specified starting value range. The increment interval is `step`.
shuffle	shuffle(x)	Randomizes the elements in an array.
slice	slice(x, start, length)	Returns a subset of an array.
transform	transform(x, lambda_expression)	Applies a Lambda expression to each element of an array.
zip	zip(x, y)	Combines multiple arrays into a two-dimensional array (elements with the same subscript in each original array form a new array).
zip_with	zip_with(x, y, lambda_expression)	Merges two arrays into one as defined by a Lambda expression.

Subscript Operator []

The subscript operator ([]) is used to return the xth element in an array. It is equivalent to the `element_at` function.

Syntax

```
[x]
```

Parameter description

Parameter	Description
x	Array subscript, starting from 1. The parameter value is of the bigint type.

Returned value type

Return the data type of the specified element.

Sample

Return the second element of the `number` field value.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT cast(json_parse(array) as array(bigint)) [2]
```

- Search and analysis result

array_agg

The `array_agg` function is used to return all values in `x` as an array.

Syntax

```
array_agg(x)
```

Parameter description

Parameter	Description
x	The parameter value can be of any data type.

Returned value type

Array

Sample

Return the values of the `status` field as an array.

- Search and analysis statement

```
* | SELECT array_agg(status) AS array
```

- Search and analysis result

array_distinct

The `array_distinct` function is used to delete duplicate elements from an array.

Syntax

```
array_distinct(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Array

Sample

Delete duplicate elements from the `array` field.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT array_distinct(cast(json_parse(array) as array(bigint)))
```

- Search and analysis result

array_except

The `array_except` function is used to calculate the difference between two arrays.

Syntax

```
array_except(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.

Returned value type

Array

Sample

Calculate the difference between arrays [1,2,3,4,5] and [1,3,5,7].

- Search and analysis statement

```
* | SELECT array_except(array[1,2,3,4,5],array[1,3,5,7])
```

- Search and analysis result

array_intersect

The `array_intersect` function is used to calculate the intersection between two arrays.

Syntax

```
array_intersect(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.

Returned value type

Array

Sample

Calculate the difference between arrays [1,2,3,4,5] and [1,3,5,7].

- Search and analysis statement

```
* | SELECT array_intersect(array[1,2,3,4,5],array[1,3,5,7])
```

- Search and analysis result

array_join

The `array_join` function is used to concatenate the elements in an array into a string using the specified delimiter.

Syntax

- Concatenate the elements in an array into a string using the specified delimiter. If the array contains null elements, the null elements are ignored.

```
array_join(x, delimiter)
```

- Concatenate the elements in an array into a string using the specified delimiter. If the array contains null elements, the null elements are replaced with `null_replacement` .

```
array_join(x, delimiter, null_replacement)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
delimiter	Connector, which can be a string.
null_replacement	String used to replace a null element.

Returned value type

Varchar

Sample

Use spaces to concatenate the elements in the [null,'China','sh'] array as a string, and replace the null element with `region`.

- Search and analysis statement

```
* | SELECT array_join(array[null,'China','sh'],'/','region')
```

- Search and analysis result

array_max

The `array_max` function is used to get the maximum value of an array.

Syntax

```
array_max(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Same as the element data type of the parameter value.

Sample

Get the maximum value 48 from the [12,23,26,48,26] array.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT array_max(try_cast(json_parse(array) as array(bigint))) AS max_numbe
r
```

- Search and analysis result

array_min

The `array_min` function is used to get the minimum value of an array.

Syntax

```
array_min(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Same as the element data type of the parameter value.

Sample

Get the minimum value 12 from the [12,23,26,48,26] array.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT array_min(try_cast(json_parse(array) as array(bigint))) AS min_numbe
r
```

- Search and analysis result

array_position

The `array_position` function is used to get the subscript (starting from 1) of a specified element. If the specified element does not exist, return `0` .

Syntax

```
array_position(x, element)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
element	Element in an array.

Returned value type

Bigint

Sample

Return the subscript of 46 in the [23,46,35] array.

- Search and analysis statement

```
* | SELECT array_position(array[23,46,35],46)
```

- Search and analysis result

array_remove

The `array_remove` function is used to delete a specified element from an array.

Syntax

```
array_remove(x, element)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
element	Element in an array.

Returned value type

Array

Sample

Delete 23 from the [23,46,35] array.

- Search and analysis statement

```
* | SELECT array_remove(array[23,46,35],23)
```

- Search and analysis result

array_sort

The `array_sort` function is used to sort elements in an array in ascending order.

Syntax

```
array_sort(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Array

Sample

Sort elements in the ['b', 'd', null, 'c', 'a'] array in ascending order.

- Search and analysis statement

```
* | SELECT array_sort(array['b','d',null,'c','a'])
```

- Search and analysis result

array_union

The `array_union` function is used to calculate the union of two arrays.

Syntax

```
array_union(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.

Returned value type

Array

Sample

Calculate the union of the arrays [1,2,3,4,5] and [1,3,5,7].

- Search and analysis statement

```
* | SELECT array_union(array[1,2,3,4,5],array[1,3,5,7])
```

- Search and analysis result

cardinality

The `cardinality` function is used to calculate the number of elements in an array.

Syntax

```
cardinality(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Bigint

Sample

Calculate the number of elements in the `number` field value.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT cardinality(cast(json_parse(array) as array(bigint)))
```

- Search and analysis result

concat

The `concat` function is used to concatenate multiple arrays into one.

Syntax

```
concat(x, y...)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.

Returned value type

Array

Sample

Concatenate the arrays ['red','blue'] and ['yellow','green'] into one array.

- Search and analysis statement

```
* | SELECT concat(array['red','blue'],array['yellow','green'])
```

- Search and analysis result

contains

The `contains` function is used to determine whether an array contains a specified element and return `true` if the array contains the element.

Syntax

```
contains(x, element)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
element	Element in an array.

Returned value type

Boolean

Sample

Determine whether the `array` field value contains 23.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT contains(cast(json_parse(array) as array(varchar)),'23')
```

- Search and analysis result

element_at

The `element_at` function is used to return the yth element in an array.

Syntax

```
element_at(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
element	Array subscript, starting from 1. The parameter value is of the bigint type.

Returned value type

Any data type

Sample

Return the second element of the `number` field value.

- Field sample

```
array:[12,23,26,48,26]
```

- Search and analysis statement

```
* | SELECT element_at(cast(json_parse(number) AS array(varchar)), 2)
```

- Search and analysis result

filter

The `filter` function is used to filter elements in an array and return only the elements that comply with a specified Lambda expression

Syntax

```
filter(x, lambda_expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
lambda_expression	Lambda expression. For more information, see Lambda Function.

Returned value type

Array

Sample

Return elements greater than 0 in the [5,-6,null,7] array, where `x -> x > 0` is the Lambda expression.

- Search and analysis statement

```
* | SELECT filter(array[5,-6,null,7],x -> x > 0)
```

- Search and analysis result

flatten

The `flatten` function is used to convert a two-dimensional array to a one-dimensional array.

Syntax

```
flatten(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Array

Sample

Convert the two-dimensional array "array[1,2,3,4],array[4,3,2,1]" into a one-dimensional array.

- Search and analysis statement

```
* | SELECT flatten(array[array[1,2,3,4],array[4,3,2,1]])
```

- Search and analysis result

reduce

The `reduce` function is used to add the elements in an array as defined by the Lambda expression and return the result.

Syntax

```
reduce(x, lambda_expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
lambda_expression	Lambda expression. For more information, see Lambda Function.

Returned value type

Bigint

Sample

Return the sum of the elements in array [5, 20, 50].

- Search and analysis statement

```
* | SELECT reduce(array[5,20,50],0,(s, x) -> s + x, s -> s)
```

- Search and analysis result

reverse

The `reverse` function is used to reverse the elements in an array.

Syntax

```
reverse(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Array

Sample

Reverse the elements in array [1,2,3,4,5].

- Search and analysis statement

```
* | SELECT reverse(array[1,2,3,4,5])
```

- Search and analysis result

sequence

The `sequence` function is used to return an array of consecutive and increasing values within the specified starting value range.

Syntax

- The increment interval is the default value `1` .

```
sequence(x, y)
```

- The increment interval is custom.

```
sequence(x, y, step)
```

Parameter description

Parameter	Description
x	The parameter value is of the bigint or timestamp type (UNIX timestamp or date and time expression).
y	The parameter value is of the bigint or timestamp type (UNIX timestamp or date and time expression).

Parameter	Description
step	Value interval. If the parameter value is a date and time expression, the format of `step` is as follows: - interval 'n' year to month: the interval is `n` years. - interval 'n' day to second: the interval is `n` days.

Returned value type

Array

Sample

Example 1. Return even numbers between 0 and 10.

- Search and analysis statement

```
* | SELECT sequence(0,10,2)
```

- Search and analysis result

Example 2. Return dates between 2017-10-23 and 2021-08-12 at an interval of one year.

- Search and analysis statement

```
* | SELECT sequence(from_unixtime(1508737026),from_unixtime(1628734085),interva
l '1' year to month )
```

- Search and analysis result

Example 3. Return UNIX timestamps between 1628733298 and 1628734085 at an interval of 60 seconds.

- Search and analysis statement

```
* | SELECT sequence(1628733298,1628734085,60)
```

- Search and analysis result

shuffle

The `shuffle` function is used to randomize the elements in an array.

Syntax

```
shuffle(x)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Returned value type

Array

Sample

Randomize the elements in the [1,2,3,4,5] array.

- Search and analysis statement

```
* | SELECT shuffle(array[1,2,3,4,5])
```

- Search and analysis result

slice

The `slice` function is used to return a subset of an array.

Syntax

```
slice(x, start, length)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.

Parameter	Description
start	Index start position. - If `start` is negative, start from the end. - If `start` is positive, start from the beginning.
length	Number of elements in a subset.

Returned value type

Array

Sample

Return a subset of the [1,2,4,5,6,7,7] array, starting from the third element and consisting of two elements.

- Search and analysis statement

```
* | SELECT slice(array[1,2,4,5,6,7,7],3,2)
```

- Search and analysis result

transform

The `transform` function is used to apply a Lambda expression to each element of an array.

Syntax

```
transform(x, lambda_expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
lambda_expression	Lambda expression. For more information, see Lambda Function.

Returned value type

Array

Sample

Increment each element in the [5,6] array by 1 and return.

- Search and analysis statement

```
* | SELECT transform(array[5,6],x -> x + 1)
```

- Search and analysis result

zip

The `zip` function is used to combine multiple arrays into a two-dimensional array, and elements with the same subscript in each original array form a new array.

Syntax

```
zip(x, y)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.

Returned value type

Array

Sample

Combine the arrays [1,2] and [3,4] into a two-dimensional array.

- Search and analysis statement

```
* | SELECT zip(array[1,2], array[3,4])
```

- Search and analysis result

```
["{1, 3}","{2, 4}"]
```

zip_with

The `zip_with` function is used to merge two arrays into one as defined by a Lambda expression.

Syntax

```
zip_with(x, y, lambda_expression)
```

Parameter description

Parameter	Description
x	The parameter value is of the array type.
y	The parameter value is of the array type.
lambda_expression	Lambda expression. For more information, see Lambda Function.

Returned value type

Array

Sample

Use Lambda expression `(x, y) -> x + y` to add the elements in arrays [1,2] and [3,4], respectively, and return the sum results as an array.

- Search and analysis statement

```
* | SELECT zip_with(array[1,2], array[3,4],(x,y) -> x + y)
```

- Search and analysis result

Interval-Valued Comparison and Periodicity-Valued Comparison Functions

Last updated：2022-03-08 11:46:12

This document introduces the basic syntax and examples of interval-valued comparison and periodicity-valued comparison functions.

CLS supports the interval-valued comparison and periodicity-valued comparison functions listed in the table below.

Function	Syntax	Description
compare	compare(x,n)	Compares the calculation result of the current time period with the calculation result of a time period n seconds before.
	compare(x,n1,n2,n3...)	Compares the calculation result of the current time period with the calculation results of time periods n1, n2, and n3 seconds before.

compare

The `compare` function is used to compare the calculation result of the current time period with the calculation result of a time period n seconds before.

Syntax

- Compare the calculation result of the current time period with the calculation result of a time period n seconds before:

```
compare (x, n)
```

- Compare the calculation result of the current time period with the calculation results of time periods n1, n2, and n3 seconds before:

```
compare (x, n1, n2, n3...)
```

Parameter description

Parameter	Description

Parameter	Description
x	The parameter value is of the double or long type.
n	Time window. Unit: seconds. Example: 3600 (1 hour), 86400 (1 day), 604800 (1 week), or 31622400 (1 year).

Return value type

JSON array in the following format: [the current calculation result, the calculation result n seconds before, the ratio of the current calculation result to the calculation result of n seconds before].

Example

Example 1. Calculate the ratio of the page views (PVs) of the current hour to the PVs of the same time period the day before.

Set the time range for query and analysis to 1 hour and execute the following query and analysis statement, where `86400` indicates the current time minus 86400 seconds (1 day).

- Query and analysis statement

```
* | SELECT compare(PV, 86400) FROM (SELECT count(*) AS PV)
```

- Query and analysis result
- 1860: indicates the PVs of the current 1 hour.
- 1656: indicates the PVs of the same time period the day before.
- 1.1231884057971016: indicates the ratio of the PVs of the current hour to the PVs of the same time period the day before.
- To display the query and analysis result in multiple columns, execute the following query and analysis statement:

```
* |
SELECT compare[1] AS today, compare[2] AS yesterday, compare[3] AS ratio
FROM (
SELECT compare(PV, 86400) AS compare
FROM (
SELECT COUNT(*) AS PV
```

```
)
)
```

- Query and analysis result

Example 2. Calculate the trend of the PVs of every 5 minutes today to the trend of the PVs of the same time period the day before.

Set the time range for query and analysis to Today and execute the following query statement. `86400` indicates the current time minus 86400 seconds (1 day), and `current_date` indicates the date of the current day.

> Note：
> The time range cannot span days. The reason is as follows: in this example, the log time is truncated to `%H:%i:%s`, which contains only the hour, minute, and second but does not contain the date. If the time range spans days, data statistics errors will occur.

- Query and analysis statement

```
* |
select concat(cast(current_date as varchar),' ',time) as time,compare[1] as tod
ay,compare[2] as yesterday from (
select time,compare(pv, 86400) as compare from (
select time_series(__TIMESTAMP__, '5m', '%H:%i:%s', '0') as time, count(*) as p
v group by time limit 1000)
limit 1000)
order by time limit 1000
```

- Query and analysis result

JSON Functions

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This document introduces the basic syntax and examples of JSON functions.

Function	Syntax	Description
json_array_contains	json_array_contains(x, value)	Determines whether a JSON array contains a given value.
json_array_get	json_array_get(x, index)	Returns the element with the specified index in a given JSON array.
json_array_length	json_array_length(x)	Returns the number of elements in a given JSON array. If `x` is not a JSON array, `null` will be returned.
json_extract	json_extract(x, json_path)	Extracts a set of JSON values (array or object) from a JSON object or array.
json_extract_scalar	json_extract_scalar(x, json_path)	Extracts a set of scalar values (strings, integers, or Boolean values) from a JSON object or array. Similar to the `json_extract` function.
json_format	json_format(x)	Converts a JSON value into a string value.
json_parse	json_parse(x)	Converts a string value into a JSON value.
json_size	json_size(x, json_path)	Calculates the number of elements in a JSON object or array.

json_array_contains

The `json_array_contains` function is used to determine whether a JSON array contains a specified value.

Syntax

```
json_array_contains(x, value)
```

Parameter description

Parameter	Description

Parameter	Description
x	The parameter value is a JSON array.
value	Value.

Return value type

Boolean

Example

Determine whether the JSON array [1, 2, 3] contains 2.

- Search and analysis statement

```
* | SELECT json_array_contains('[1, 2, 3]', 2)
```

- Search and analysis result

json_array_get

The `json_array_get` function is used to get the element with a specified index in a JSON array.

Syntax

```
json_array_get(x, index)
```

Parameter description

Parameter	Description
x	The parameter value is a JSON array.
index	JSON subscript (index), starting from 0.

Return value type

Varchar

Example

Return the element with index 1 in the JSON array ["a", [3, 9], "c"].

- Search and analysis statement

```
* | SELECT json_array_get('["a", [3, 9], "c"]', 1)
```

- Search and analysis result

json_array_length

The `json_array_length` function is used to calculate the number of elements in a JSON array. If `x` is not a JSON array, `null` will be returned.

Syntax

```
json_array_length(x)
```

Parameter description

Parameter	Description
x	The parameter value is a JSON array.

Return value type

Bigint

Example

- Example 1. Calculate the number of JSON elements in the **apple.message** field
  - Field sample

```
apple.message:[{"traceName":"StoreMonitor"},{"topicName":"persistent://apache/pulsar/test-partition-17"},{"producerName":"pulsar-mini-338-36"},{"localAddr":"pulsar://pulsar-mini-broker-5.pulsar-mini-broker.pulsar.svc.cluster.local:6650"},{"sequenceId":826},{"storeTime":1635905306062},{"messageId":"19422-24519"},{"status":"SUCCESS"}]
```

- Search and analysis statement

```
* | SELECT json_array_length(apple.message)
```

- Search and analysis result

json_extract

The `json_extract` function is used to extract a set of JSON values (array or object) from a JSON object or array.

Syntax

```
json_extract(x, json_path)
```

Parameter description

Parameter	Description
x	The parameter value is a JSON object or array.
json_path	JSONPath, such as `$.store.book[0].title`. Note: JSON syntax requiring array element traversal is not supported, such as the following: `$.store.book[*].author`, `$..book[(@.length-1)]`, `$..book[?(@.price<10)]`.

Return value type

JSON string

Example

Get the value of **epochSecond** in the **apple.instant** field.

- Field sample

```
apple.instant:{"epochSecond":1635905306,"nanoOfSecond":63001000}
```

- Search and analysis statement

```
* | SELECT json_extract(apple.instant, '$.epochSecond')
```

- Search and analysis result

json_extract_scalar

The `json_extract_scalar` function is used to extract a set of scalar values (strings, integers, or Boolean values) from a JSON object or array.

Syntax

```
json_extract_scalar(x, json_path)
```

Parameter description

Parameter	Description
x	The parameter value is a JSON array.
json_path	JSONPath, such as `$.store.book[0].title`. Note: JSON syntax requiring array element traversal is not supported, such as the following: `$.store.book[*].author`, `$..book[(@.length-1)]`, `$..book[?(@.price<10)]`.

Return value type

Varchar

Example

Get the value of **epochSecond** from the **apple.instant** field and convert the value into a bigint value for summation.

- Field sample

```
apple.instant:{"epochSecond":1635905306,"nanoOfSecond":63001000}
```

- Search and analysis statement

```
* | SELECT sum(cast(json_extract_scalar(apple.instant,'$.epochSecond') AS bigint) )
```

- Search and analysis result

json_format

The `json_format` function is used to convert a JSON value into a string value.

Syntax

```
json_format(x)
```

Parameter description

Parameter	Description
x	The parameter value is of JSON type.

Return value type

Varchar

Example

Convert the JSON array [1,2,3] into a string [1, 2, 3].

- Search and analysis statement

```
* | SELECT json_format(json_parse('[1, 2, 3]'))
```

- Search and analysis result

json_parse

The `json_parse` function is used to convert a string value into a JSON value and determine whether it complies with the JSON format.

Syntax

```
json_parse(x)
```

Parameter description

Parameter	Description
x	The parameter value is a string.

Return value type

JSON

Example

Convert the JSON array [1,2,3] into a string [1, 2, 3].

- Search and analysis statement

```
* | SELECT json_parse('[1, 2, 3]')
```

- Search and analysis result

json_size

The `json_size` function is used to calculate the number of elements in a JSON object or array.

Syntax

```
json_size(x, json_path)
```

Parameter description

Parameter	Description
x	The parameter value is a JSON object or array.
json_path	JSON path, in the format of `$.store.book[0].title` .

Return value type

Bigint

Example

Convert the JSON array [1,2,3] into a string [1, 2, 3].

- Search and analysis statement

```
* | SELECT json_size(json_parse('[1, 2, 3]'),'$')
```

- Search and analysis result

Window Functions

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This document introduces the basic syntax and examples of window functions.

A window function calculates the data of multiple rows and returns the calculation result. Unlike GROUP BY, it only appends the calculation result to each row of data and does not merge the rows.

Syntax

```
window_function (expression) OVER (
[ PARTITION BY part_key ]
[ ORDER BY order_key ]
[ { ROWS | RANGE } BETWEEN frame_start AND frame_end ] )
```

Parameters

Parameter	Description
window_function	Specifies the window value calculation method. Aggregate functions, ranking functions and value functions are supported.
PARTITION BY	Specifies how a window is partitioned.
ORDER BY	Specifies how the rows in each window partition are ordered.
{ ROWS	RANGE } BETWEEN frame_start AND frame_end

General Aggregate Functions

All general aggregate functions are supported, such as sum() and avg(), can be used to calculate the statistics of each row of data in window frames.

Ranking Functions

Ranking functions cannot use window frames.

Function	Description
rank()	Returns the rank of each row in a window partition. Rows that have the same field value are assigned the same rank, and therefore ranks may not be consecutive. For example, if two rows have the same rank of 1, the rank of the next row is 3.
dense_rank()	Similar to rank(). The difference is that the ranks in this function are consecutive. For example, if two rows have the same rank of 1, the rank of the next row is 2.
cume_dist()	Returns the cumulative distribution of each value in a window partition, that is, the proportions of rows whose field values are less than or equal to the current field value to the total number of rows in the window partition.
ntile(n)	Divides the rows for a window partition into `n` groups. If the number of rows in the partition is not divided evenly into `n` groups, the remaining values are distributed one per group, starting with the first group. For example, if there are 6 rows of data, and they need to be divided into 4 groups, the numbers of each row of data are: 1, 1, 2, 2, 3, 4.
percent_rank()	Calculates the percentage ranking of each row in a window partition. The calculation formula is: (r - 1) / (n - 1), where `r` is the rank value obtained via rank() and `n` is the total number of rows in the window partition.
row_number()	Calculates the rank of each row (after ranking based on ranking rules) in a window partition. The ranks are unique and start from 1.

Value Functions

Function	Description
first_value(key)	Returns the first value of `key` of the window partition.
last_value(key)	Returns the last value of `key` of the window partition.
nth_value(key, offset)	Returns the value of `key` in the row at the specified offset of the window partition. Offsets start from 1 and cannot be 0 or negative. If `offset` is `null` or exceeds the number of rows in the window partition, `null` is returned.
lead(key[, offset[, default_value]])	Returns the value of `key` in the row that is at the specified offset after the current row of the window partition. Offsets start from 0, indicating the current row. `offset` is 1 by default. If `offset` is `null`, `null` is returned. If the offset row exceeds the window partition, `default_value` is returned. If `default_value` is not specified, `null` is returned. When using this function, you must specify the ranking rule (ORDER BY) within the window partition and cannot use window frames.

Function	Description
lag(key[, offset[, default_value]])	Similar to `lead(key[, offset[, default_value]])`. The only difference is that this function returns the value at `offset` rows before the current row.

Example

Example 1. Query the 5 slowest requests and their IDs of each API in the last hour

Select the last hour as the time range and run the following query and analysis statement, where `action` indicates the API name, `timeCost` indicates the API response time, and `seqId` indicates the request ID.

- Query and analysis statement

```
* | select * from (select action,timeCost,seqId,rank() over (partition by action order by timeCost desc) as ranking order by action,ranking,seqId) where ranking<=5 limit 10000
```

- Query and analysis result

action	timeCost	seqId	ranking
ModifyXXX	151	d75427b3-c562-6d7a-354f-469963aab689	1
ModifyXXX	104	add0d353-1099-2c73-e9c9-19ad02480474	2
CreateXXX	1254	c7d591f0-2da6-292c-8abf-98a0716ff8c6	1
CreateXXX	970	d920cf7a-7e7b-524b-68e9-a957c454c328	2
CreateXXX	812	16357f6d-33b3-83ea-0ae3-b1a2233d4858	3
CreateXXX	795	0efdab5e-af5f-4a4a-0618-7961420d17a1	4
CreateXXX	724	fb0481f2-dcfc-9500-cb44-a139b774aceb	5
DescribeXXX	55242	4129dcda-46d7-9213-510e-f58cba29daf5	1
DescribeXXX	17413	e36cdeb0-cbc5-ce2b-dec7-f485818ab6c7	2
DescribeXXX	10171	cd6228f7-4644-ba45-f539-0fce7b09455b	3

action	timeCost	seqId	ranking
DescribeXXX	9475	48b6f6e3-6d08-5a31-cd68-89006a346497	4
DescribeXXX	9337	940b5398-e2ae-9141-801b-b7f0ca548875	5

Example 2. Query the 3-day moving average trend of the application throughput

Select the last 7 days as the query and analysis time range and run the following query and analysis statement, where `pv` indicates the daily application throughput and `avg_pv_3` indicates the application throughput after 3-day moving average.

- Query and analysis statement

```
* | select avg(pv) over(order by analytic_time rows between 2 preceding and cur
rent row) as avg_pv_3,pv,analytic_time from (select histogram( cast(__TIMESTAMP
__ as timestamp),interval 1 day) as analytic_time, count(*) as pv group by anal
ytic_time order by analytic_time)
```

- Query and analysis result

Quick Analysis

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Overview

CLS provides quick statistical analysis of fields. You can quickly analyze field value distribution, trends over time, and numerical statistics without writing query statements. For example, you can quickly collect statistics on the top 5 request APIs and API response time trends.

Prerequisite

You have enabled quick analysis feature for fields in index configuration.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Search and Analysis** to go to the search and analysis page.
3. Click the drop-down lists of **Logset** and **Log Topic** to select the log topic to be searched.
4. Click **Log Time** and select a log time for search.
   You can select **Recent Time** or **Relative Time** or customize the time range.
5. On the left sidebar, click the field name.

Note：

- The quick analysis feature for fields of the string type (text) is slightly different from that for fields of the numeric type (long and double):
  - String: supports field value distributed statistics, intelligent aggregated time line charts and top 5 values
  - Numeric: supports intelligent aggregated time line charts and top 5 values
- Gray fields, such as `__PKG_LOGID__` in the above figure, cannot be clicked because statistics are not enabled for them.

6. In the pop-up quick analysis window, click a statistics chart to automatically generate the corresponding search statement and chart. You can query chart details here, and you can further modify the search statement and chart configuration to get an analysis chart that better fits your specific needs.

Sampling Analysis

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Overview

When using the statistical analysis feature as described in Overview and Syntax Rules, if the number of raw logs is very high or the search statement (SQL) is complex, the analysis may be slow or even time out. In this case, you can use the sampling analysis feature to sample raw logs first and then perform statistical analysis.

CLS samples raw logs randomly. According to relevant statistical principles, under a reasonable sample rate and a large number of samples, the statistical results after sampling are very close to the accurate full statistical results, which can satisfy the needs of big data analysis in most cases.

Sampling Method and Accuracy

Sampling method

Statistical analysis adopts the "precise analysis" method by default, i.e., no sampling. If sampling is required, you can choose either of the following two sampling methods:

- Automatic sampling: The sample rate is automatically determined based on the number of raw log entries, so that the number of samples is about 1 million, and statistical analysis is performed on such samples. For example, if raw logs contain 10 billion entries, and automatic sampling is used to get 1 million samples, then the sample rate is 1:10,000.
- Fixed-rate sampling: You can manually set the sample rate to get samples from raw logs accordingly. For example, if the raw logs contain 10 billion entries and are sampled at the rate of 1:100,000, then the number of samples is 100,000. The sample rate can range from 1:1,000,000 to 1 (no sampling).

Regardless of the sampling method used, the final actual sample rate can be viewed in the statistical analysis results.

Estimating the true value

Sampling analysis results can largely reflect the true value. Based on the value calculation method, the true value can be estimated in the following ways:

- For calculation methods related to averages such as `avg` and `geometric_mean`, the sample statistical result can directly represent the true value.
- For calculation methods related to values such as `count(*)`, `sum`, and `count_if`, the sample statistical result divided by the sample rate can represent the true value. For example, if the sample rate for pv(`count(*)`)

is 1:10,000 and the statistical result is 232, then the true value is about 232 / (1:10000) = 2320000.

Examples

To sample at 1:10,000, the search statement is:

```
* | select count(*)/(1.0/10000) as pv,avg(response_time) as response_time_avg
```

- `pv` calculation: `count(*)` is to calculate the number of log entries and involves sum calculation. You can divide the sample statistical result by the sample rate to get the true value. Here, `(1.0/10000)` is the sample rate, and the calculated `pv` is the estimated true value of `pv` .
- `response_time_avg` calculation: `avg(response_time)` is to calculate the average of `response_time` and involves average calculation. The result can be directly used as the estimated true value of `response_time_avg` .

Sampling analysis accuracy

In statistics, the confidence level and confidence interval are used to measure the accuracy of the sampling results. The former represents the reliability of the sampling results, and the latter represents the interval of the true value at the specified confidence level. For example, if the confidence level of a certain sample statistical result is 95%, and the confidence interval is [212,478], then the true value has a 95% probability of being between 212 and 478.

The higher the confidence level, the larger the confidence interval. The commonly used confidence level is 95% (in statistics, a probability below 5% is generally considered as a small probability). The confidence interval is calculated as follows:

Here, $\bar{x}$ is the sample average, s is the sample standard deviation, and n is the number of samples.

In case of statistical analysis using automatic sampling:

```
* | select avg(response_time) as x,count(response_time) as n,stddev_samp(response
_time) as s
```

The statistical analysis result of the samples is:

- x: The sample average, which is 544.4656932942215.
- n: The number of samples, which is 995,097.
- s: The sample standard deviation, which is 1,382.618439585749.

Then, if the confidence level is 95%, the true value of `avg(response_time)` is within the confidence interval of [541.75,547.18]. The `avg(response_time)` value obtained by accurate statistical calculation in this case is 545.16, which is within the confidence interval.

Note：
The above is a strict sampling accuracy measurement method. In actual use, when there are more than 1,000 samples, the results obtained by sampling generally are highly accurate.

During statistical analysis by dimension (i.e., `group by`), as the samples will be divided into multiple groups by the specified dimension, and the statistical value will be calculated in each group, the number of samples in a single group will be lower than the total number of samples. This will result in less accurate statistics for groups with a small sample size.
In case of sampling statistical analysis:

```
* | select avg(response_time) as response_time,count(*) as sampleCount,url group by url order by count(*) desc
```

The statistical analysis result of the samples is:

url	response_time	sampleCount
/user	45.23	7845
/user/list	78.45	6574
/user/login	45.85	5235
/user/logout	45.48	1245
/book/new	125.78	987
/book/list	17.23	658
/book/col	10.21	23
/order	12.13	2

Here, the number of samples of the two URLS `/book/col` and `/order` is too low, so the statistical results are less accurate. To get more accurate statistical results for these two URLs, you can increase the overall sample rate or perform statistical analysis on them separately, for example:

```
url:"/book/col" OR url:"/order" | select avg(response_time) as response_time,count(*) as sampleCount,url group by url order by count(*) desc
```

Directions

1. Log in to the CLS console.

2. On the left sidebar, click **Search and Analysis** to enter the log topic search and analysis page.

3. At the top of the page, select the log topic for search and analysis.

4. After entering the search statement (with SQL included), set whether sampling analysis is required and select the corresponding sample rate below the **Search and Analysis** button on the right.

5. Click **Search and Analysis**.
   After the search and analysis is completed, the sample rate used for this analysis will be displayed at the top of the chart.

Context Search and Analysis

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This document describes how to view the context of a log in the original file in the CLS console.

Overview

Log context search refers to searching for the log's context, that is, several logs before or after the log itself. This feature allows you to troubleshoot quickly whenever an error occurs.

Advantages

- Log context search frees you from the hassles associated with machine logins. On the log search page, you can quickly view the log context of any file/machine.
- Knowing the actual error occurrence time, you can specify a time range on the log search page to quickly locate the suspicious log and query its context for troubleshooting.
- Storage capacity of the server or data loss caused by log rotation will not be a problem. The data history can be viewed on the log search page anytime.

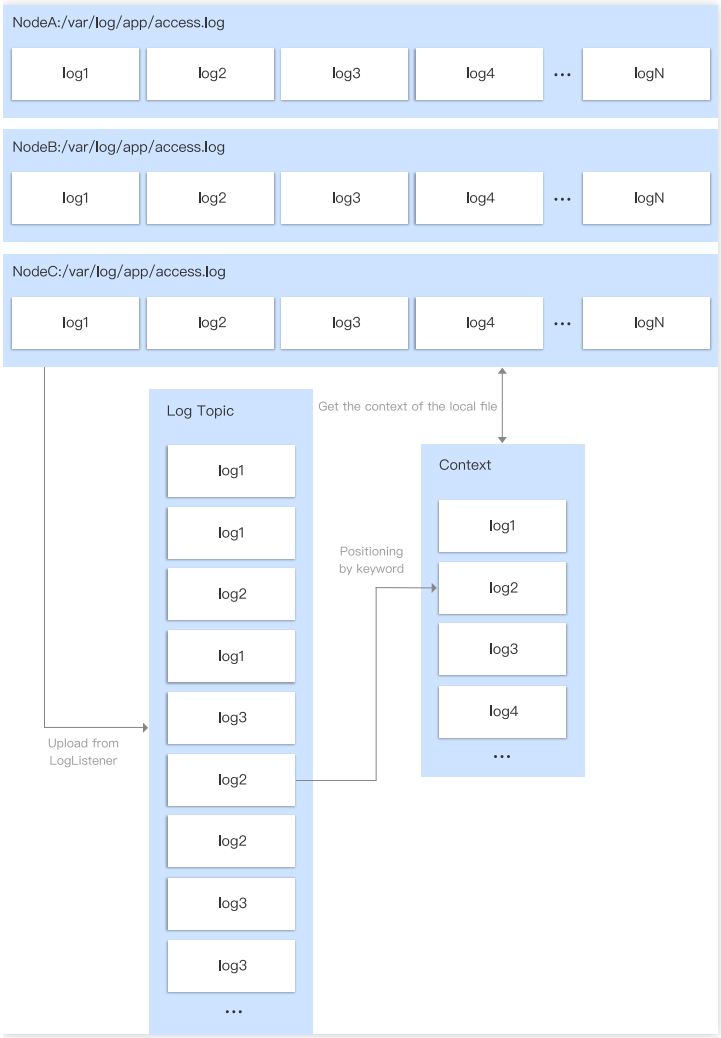
Prerequisites

- Log context search and analysis are available only for version 2.3.5 and above. You are advised to install or upgrade to the latest version.
- Context search is supported for only logs collected by LogListener.
- You have enabled and configured index. For more information, please see Configuring Index.

Example

The common process of an order is as follows: log in > browse merchandise > select merchandise> add merchandise to the shopping cart > place an order > pay for the order > make a deduction > generate the order.
Use case: if one of the orders of a user fails, you can query the error log using the order number. Then, locate the log's context to find out the cause (for example, order deduction failed).
You can troubleshoot in CLS as follows:

1. Log in to the CLS console and go to the **Search and Analysis** page. Then, specify a time range based on the error occurrence time and enter the **keyword** (order number) to locate the error log of the order.
2. Scroll up/down based on the error log until you locate the desired context of the log.



Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Log Search** to go to the **Search and Analysis** page.
3. Select the **Region**, **Logset**, and **Log Topic** as needed.
4. Enter the search syntax, select a time range, and click **Search and Analysis**.

5. On the **Raw Data** tab, find the time of the error log and click to go to the context search and analysis page.
6. On the context search and analysis page, 10 logs before and after the error log will be displayed.

On this page, you can:

- Scroll up/down to view the context.
  - Click **Show Earlier** to page up. Up to 20 previous logs can be displayed at a time.
  - Click **Show More** to page down. Up to 20 later logs can be displayed at a time.
- Enter the keyword in the **Highlight** text box to fill the keyword in yellow.
- Enter a string in the **Filter Logs** text box to highlight the string.

Downloading Log

Last updated：2022-10-28 15:03:47

Overview

CLS allows you to export the collected log data, so you can download the data to view it locally.
The log download feature is as described below:

- Up to 50 million logs can be downloaded at a time.
- Search conditions and search time range can be specified.
- JSON and CSV export formats are supported.

Note：

Only raw logs can be downloaded. To download statistical analysis results (SQL execution results), click  in the upper-right corner.

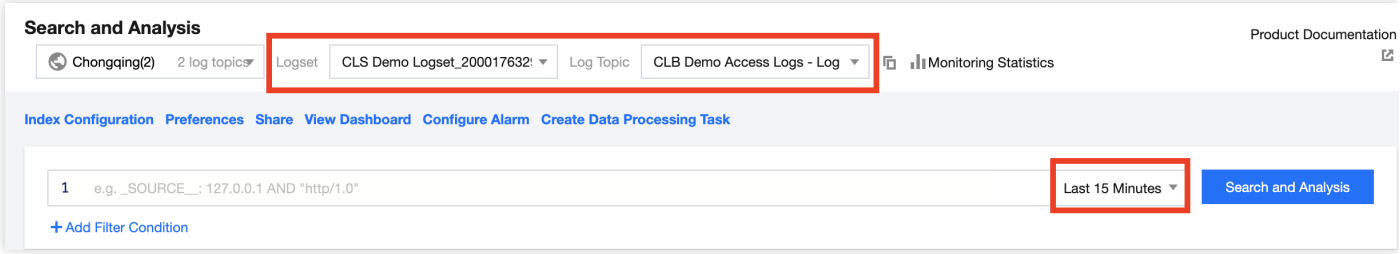
Billing description

Log download incurs public network read traffic fees, which CLS charges based on the size after gzip compression. If your raw log is 100 GB, around 40–70 GB will be billable after compression (due to raw log differences). As the public network read traffic price is 0.141 USD/GB, the fees will be 5.64–9.87 USD.

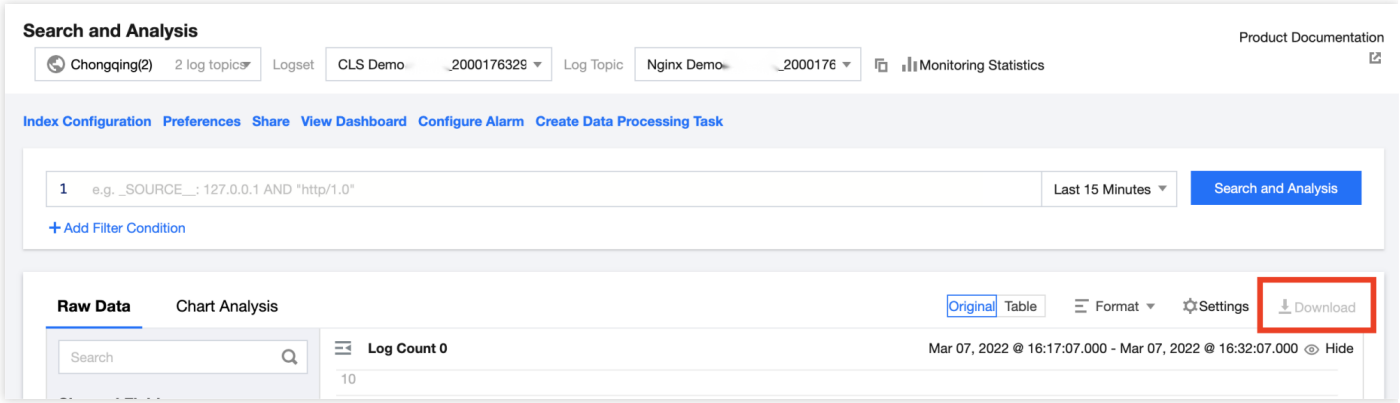
Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Search and Analysis** to go to the search and analysis management page.

3. Click the drop-down lists of **Logset** and **Log Topic** to select the content to be searched.



4. Click **Log Time** and select a log time for search.
   You can select **Recent Time** or **Relative Time** or customize the time range.
5. Click **Search and Analysis**.
6. After the log data is returned, click to **download logs**.



> Note：
> If no log data is returned, you cannot download logs.

7. In the pop-up window, confirm the time range of the logs to be downloaded and the search statement and download log data according to the following settings:

- Data format: "CSV format" or "JSON format" can be selected as needed.
- Log sorting: Logs can be sorted in "ascending" or "descending" (default) order by time.
- Log quantity: "All logs" are exported by default. You can also select a "custom log quantity".

>? > - For the CSV format, only fields with configured indexes can be exported, and the downloaded logs may be empty. > - For the JSON format, all fields can be exported, regardless of index configuration. > - If the number of logs to be downloaded exceeds 50 million, we recommend you narrow the search scope (for example, use more precise

search conditions or narrow the search time range) or download only a specified number of logs. > - If you do need to download more than 50 million logs, you can set the log search time range to create multiple download tasks and download logs in batches. > 8. Click **Export** to switch to the **Export Logs** page.

Note：
A download task can be in any of the following states: **Waiting**, **File generating**, and **File generated**. A newly created download task waits for a while before entering the **File generating** state and starts generating data files in the background. If multiple download tasks are created at the same time, the system executes them in sequence based on the creation time. Tasks that are created later are in the **Waiting** state.

9. After the **File Name/Task ID** status changes to **File generated successfully**, click **Download** to export the logs.

Note：
The exported log file is retained for only 3 days.

Visual Analysis
Chart Analysis
Chart Overview

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CLS provides a great variety of chart types. You can use SQL to flexibly collect system and business metrics in logs and display them in charts. You can also save chart analysis results to dashboards for long-term monitoring.

Chart Types

Chart Type	Use Cases	Details
Table	A table is the most common type of data display, where data is organized for comparison and counting. It is suitable for most scenarios.	Table
Sequence diagram	A sequence diagram requires statistics to have a time series field, so that it can organize and aggregate the metric in chronological order. It visually reflects the change trend of a metric over time. It is suitable for trend analysis scenarios, for example, analyzing the trend of the daily number of 404 errors in the past week.	Sequence Diagram
Bar chart	A bar chart describes categorical data. It visually reflects the comparison of each category in size. It is suitable for category statistics scenarios, for example, collecting the numbers of each type of error codes in the last 24 hours.	Bar Chart
Pie chart	A pie chart describes the proportions of different types. It measures the proportion of each type by the slice size. It is suitable for proportion statistics scenarios, for example, analyzing the proportions of different error codes.	Pie Chart
Individual value plot	An individual value plot describes a single metric, typically a key metric of business value. It is suitable for collecting daily, weekly, or monthly metrics such as PV and UV.	Individual Value Plot
Gauge chart	A gauge chart describes a single metric. Unlike an individual value plot, it is generally used with a threshold to measure the metric status. It is suitable for rating scenarios, such as system health monitoring.	Gauge Chart

Chart Type	Use Cases	Details
Map	A map shows the geographic location of data through the position of graphics. It is generally used to display the distribution of data in different geographic locations. It is suitable for geographic statistics scenarios, such as the geographic distribution of attacker IPs.	Map
Sankey diagram	A Sankey diagram is a special type of flow diagram used to describe the flow of one set of values to another set. It is suitable for directional statistics scenarios, such as firewall source and destination IP traffic.	Sankey Diagram
Word cloud	A word cloud is a visual representation of the frequency of words. It is suitable for audit statistics scenarios, such as high-frequency operations.	Word Cloud

Common Features

Feature	Description	Details
Data conversion	Data conversion allows you to perform further processing of search results, including modifying data types, selecting fields for chart creation, and merging groups. This satisfies your chart creation needs without modifying SQL statements.	Data Conversion
Unit conversion	Charts support automatic unit conversion. After you select an original unit, when the value meets the conversion factor, it will be automatically converted to the next higher unit. Units support decimal place configuration.	Unit Configuration
Adding chart to dashboard	You can save chart analysis results to a dashboard for long-term monitoring.	Adding Chart

Table

Last updated：2022-07-12 16:39:04

A table is the most common type of data display, where data is organized for comparison and counting. It is suitable for most scenarios.

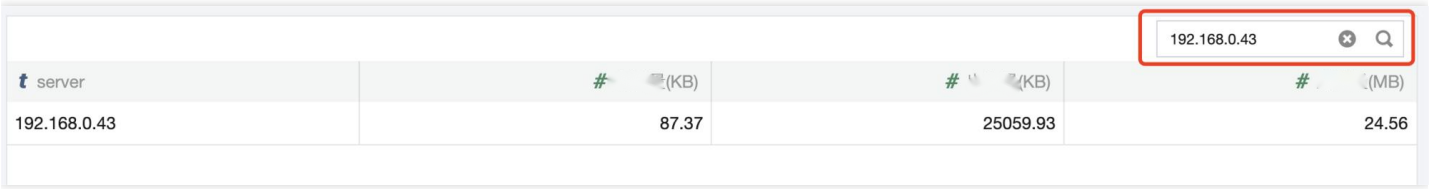
Chart Configuration

Configuration Item	Description
Basic information	Chart name: Set the display name of the table, which can be left empty.
Table	Alignment: Set the alignment mode of table content in the cells. By default, metric-type fields are aligned to the right, and dimension-type fields are aligned to the left.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Chart Operations

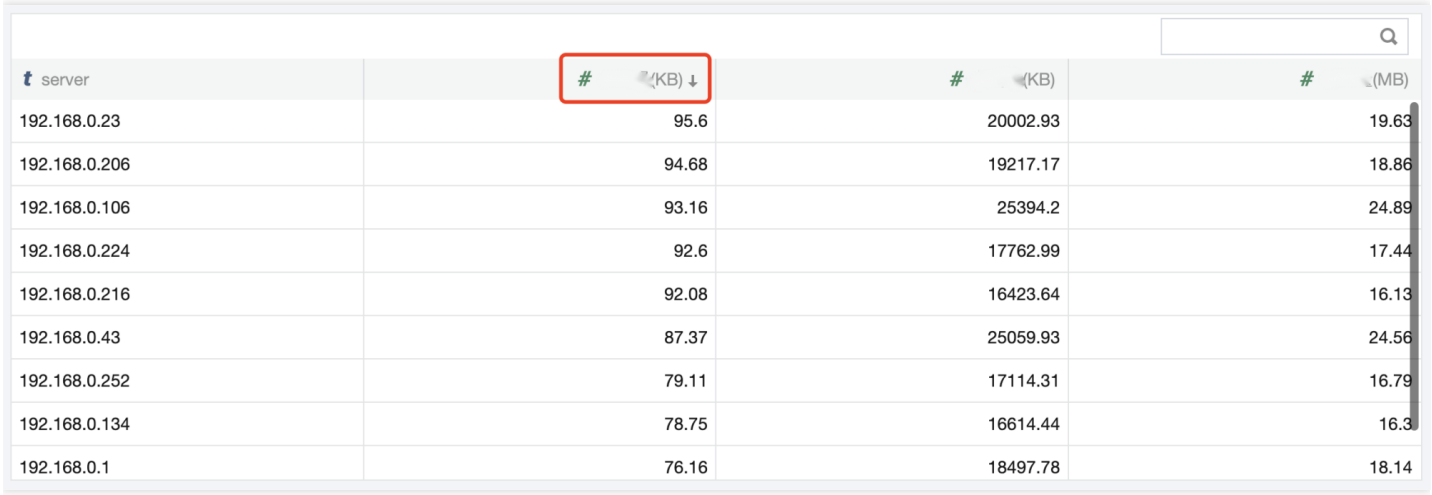
Searching for table content

Enter a keyword in the **search box** at the top of the table and click **Search**.



Sorting by column

Click the **header** of the target column to sort rows in the column in ascending order. Click it again to sort rows in descending order.



server	# (KB) ↓	# (KB)	# (MB)
192.168.0.23	95.6	20002.93	19.63
192.168.0.206	94.68	19217.17	18.86
192.168.0.106	93.16	25394.2	24.89
192.168.0.224	92.6	17762.99	17.44
192.168.0.216	92.08	16423.64	16.13
192.168.0.43	87.37	25059.93	24.56
192.168.0.252	79.11	17114.31	16.79
192.168.0.134	78.75	16614.44	16.3
192.168.0.1	76.16	18497.78	18.14

Sequence Diagram

Last updated：2022-09-19 14:26:16

A sequence diagram requires statistics to have a time series field, so that it can organize and aggregate the metric in chronological order. It visually reflects the change trend of a metric over time. It is suitable for trend analysis scenarios, for example, analyzing the trend of the daily number of 404 errors in the past week.

Chart Configuration

General configuration

Configuration Item	Description
Chart Name	Set the display name of the table, which can be left empty.
Legend	Set the chart legends. You can control the legend styles and positions and add comparison data to legends.
Tooltip	Control the content style of the bubble tip displayed when the mouse is hovered over.
Unit	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Changes

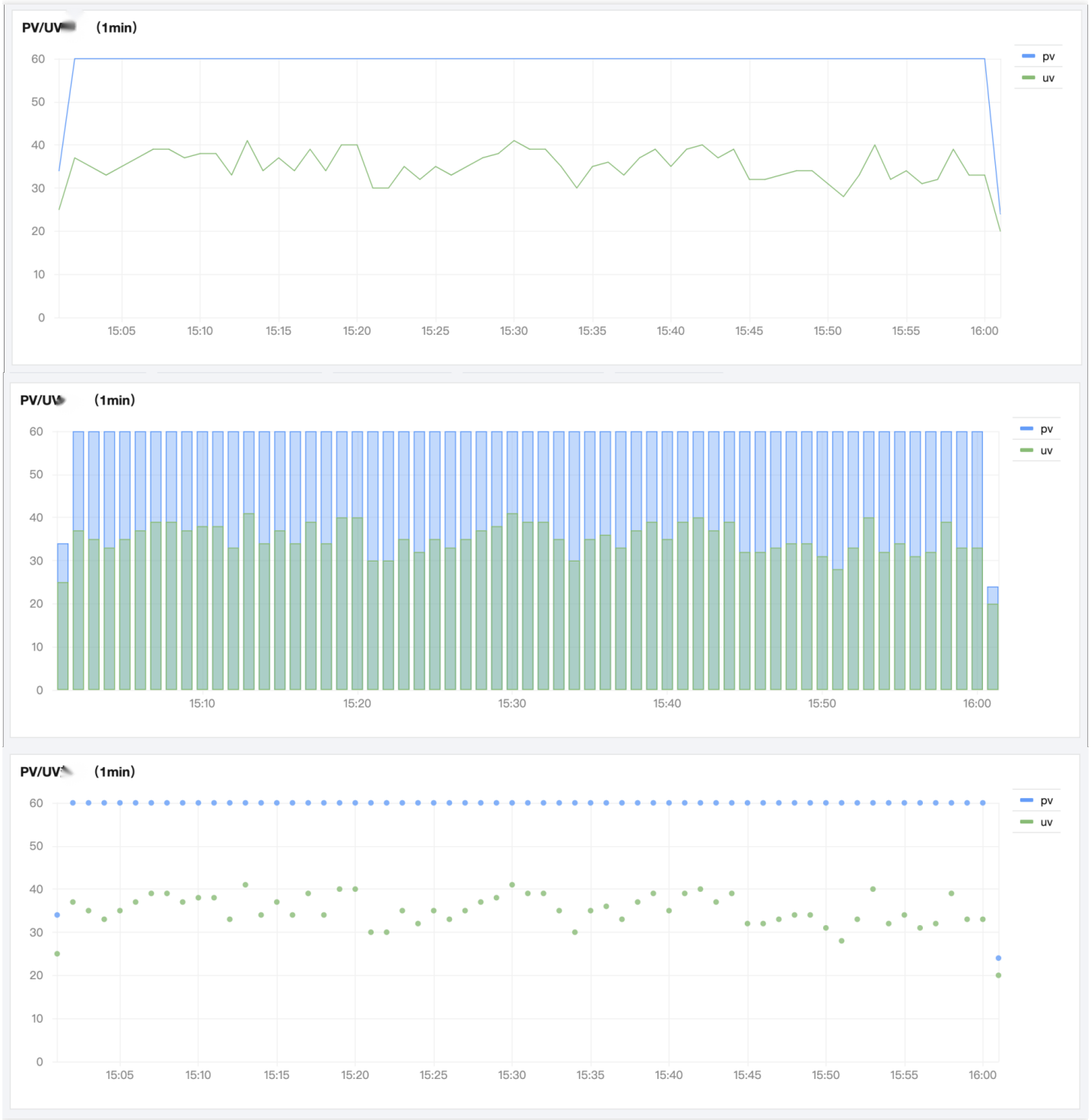
Configuration Item	Description
Changes	After the changes feature is enabled, you can compare the data in a time period with the data in the same period X hours, days, months, or years ago. The comparison data is displayed as dotted lines in the chart.

Sequence diagram configuration

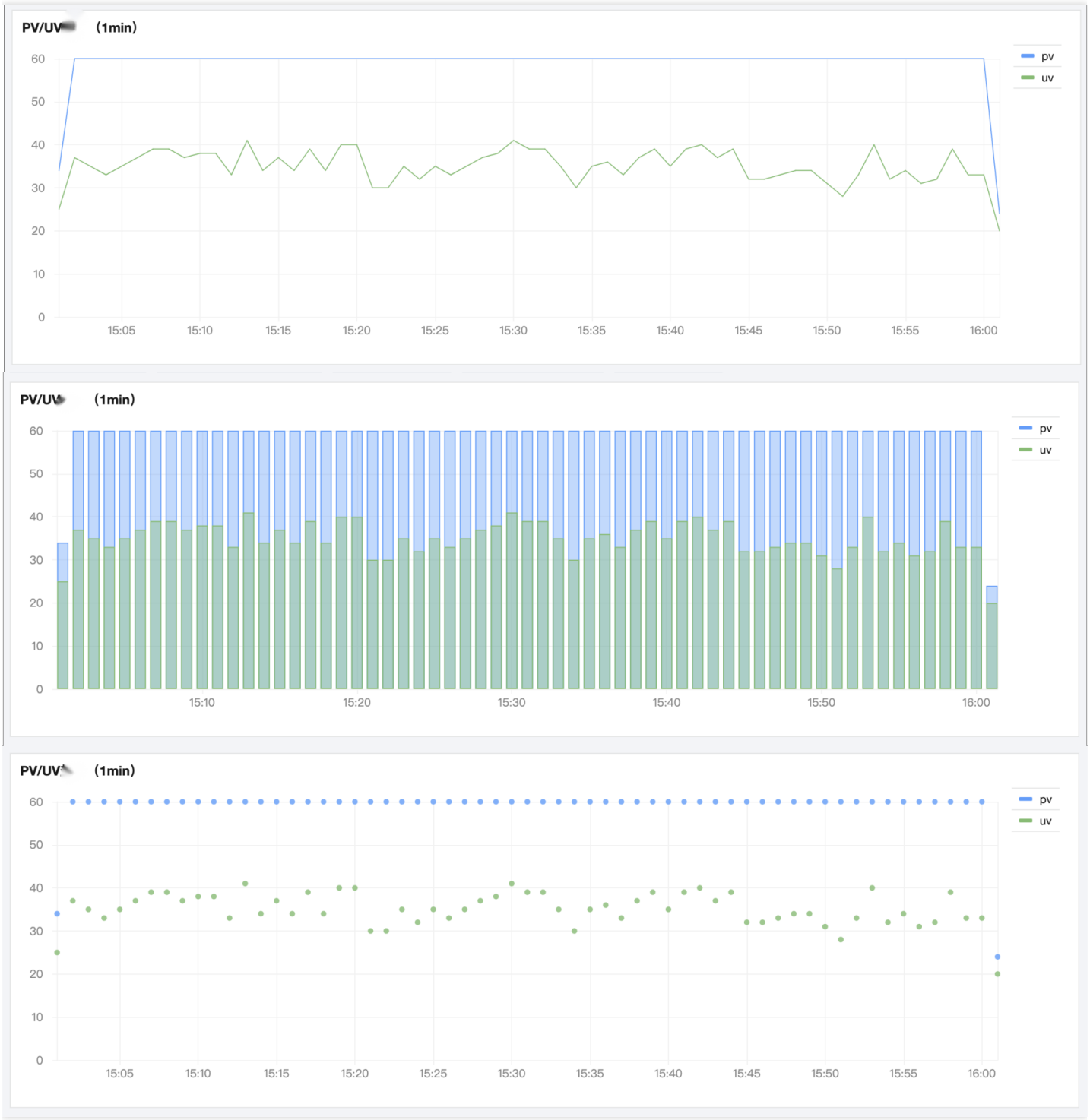
Configuration Item	Description

Configuration Item	Description
Sequence diagram	Drawing Style: Set the display style of data on coordinate axes. If you select a line, column, or dot, it will be a line chart, histogram, or scatter plot respectively. Linear: Set whether to smooth the connections between points. Line Width: Control the thickness of lines. Fill: Control the transparency of the fill area. If this value is 0, there will be no fill. Display Point: Display data points. If there is no data, no points will be displayed. Null: Control the processing of a sequence point if there is no data on the point. This value is 0 by default. Stack: Control whether to display data in a stack.
Axes	Show: Show/Hide axes. MAX/MIN: Control the maximum and minimum values displayed on coordinate axes. Coordinate areas greater than the maximum value or smaller than the minimum value will not be displayed.

Sample drawing style:



Sample fill:



Sample null value:

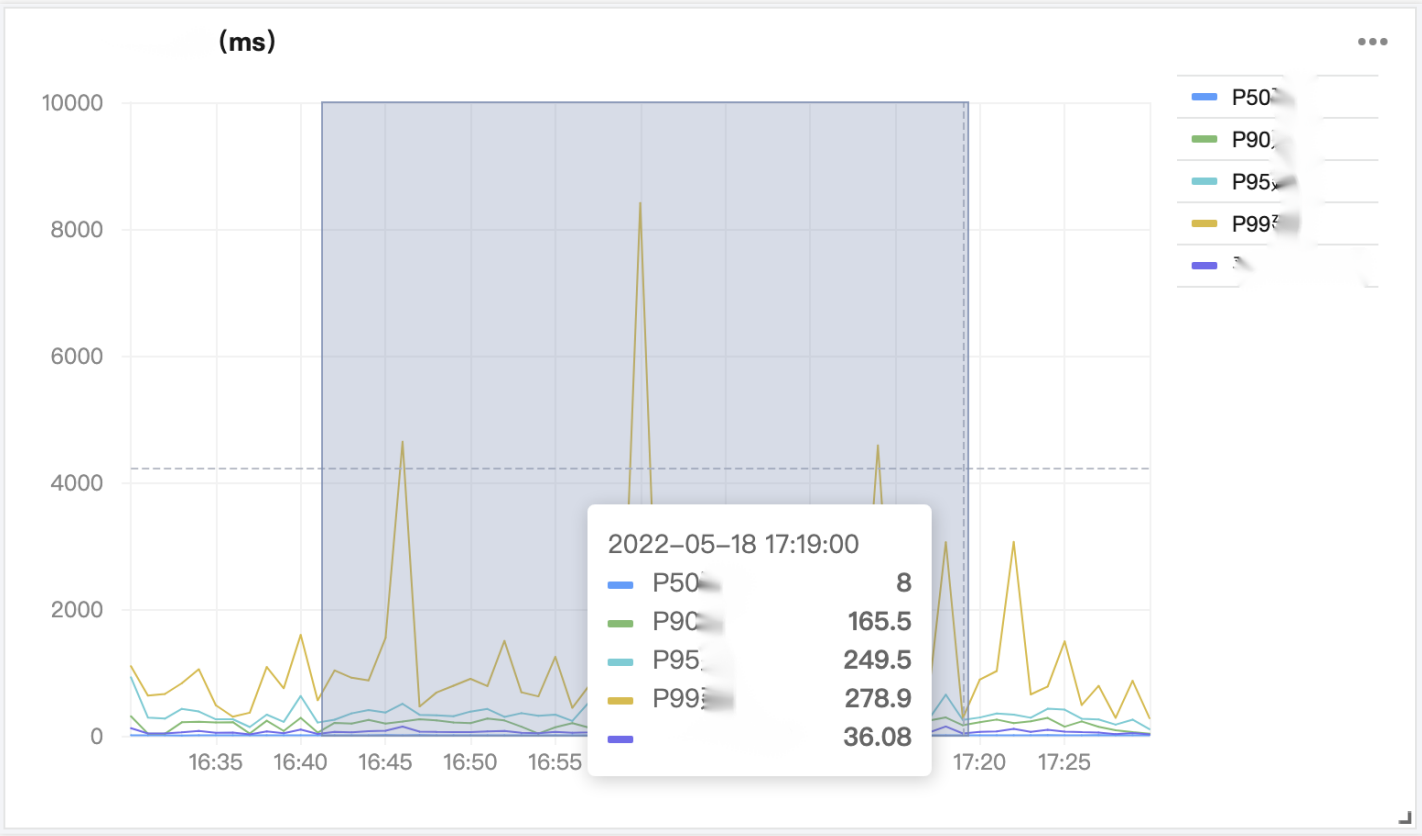
Threshold configuration

Configuration Item	Description

Configuration Item	Description
Threshold configuration	Threshold Point: Set the threshold points. You can add multiple threshold intervals. You can click a threshold color to open the color picker to customize the color. Threshold Display: Control the style of threshold display, including three modes: threshold line, area filling, and both. If this option is disabled, no threshold will be used.

Chart Operations

Time range



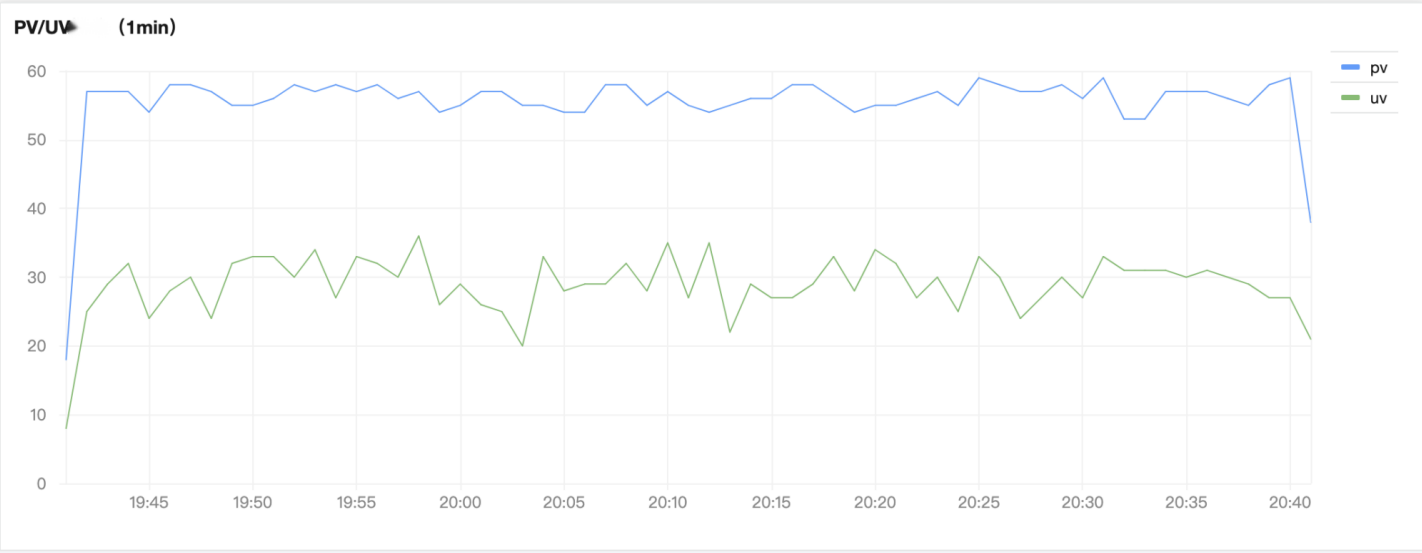
Hover over the chart, press and hold the left mouse button, and drag to trigger the selector and use time in the selected area as the time range. This is suitable for scenarios such as drilling down into the time range of abnormal points.

Use Cases

A sequence diagram requires fields of time type during creation and depends on various functions to process time fields during use. For more time functions for sequence diagram, see Time and Date Functions.

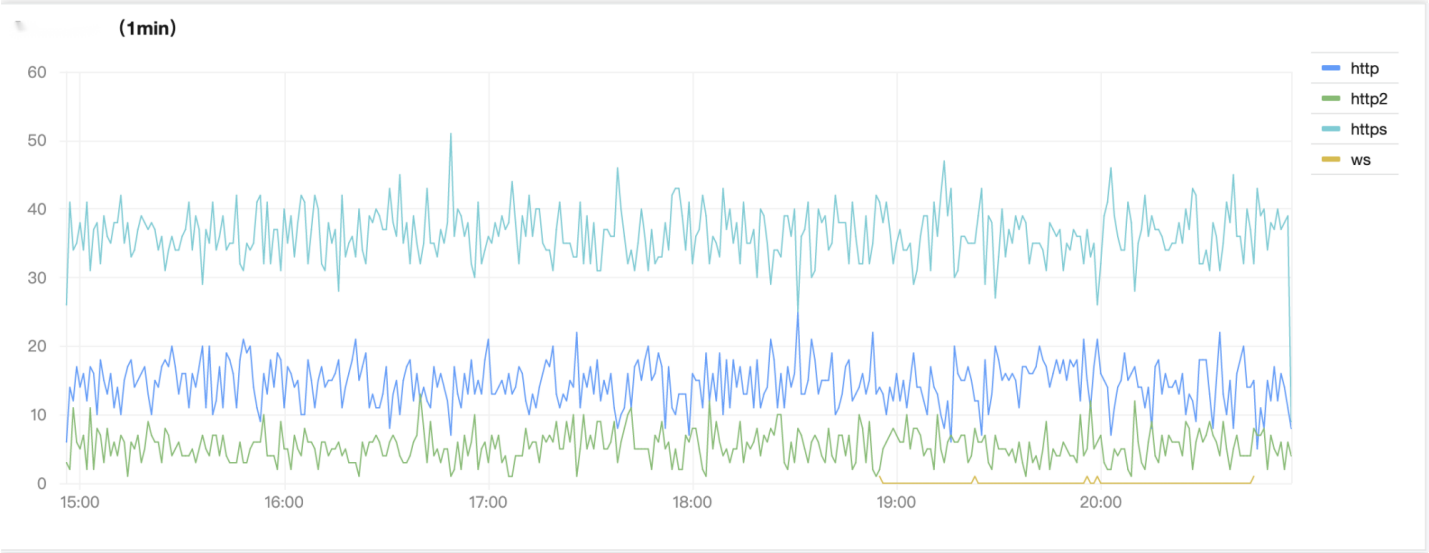
Calculate the PV and UV per minute:

```
* | select histogram( cast(__TIMESTAMP__ as timestamp),interval 1 minute) as time
, count(*) as pv,count( distinct remote_addr) as uv group by time order by time d
esc limit 10000
```



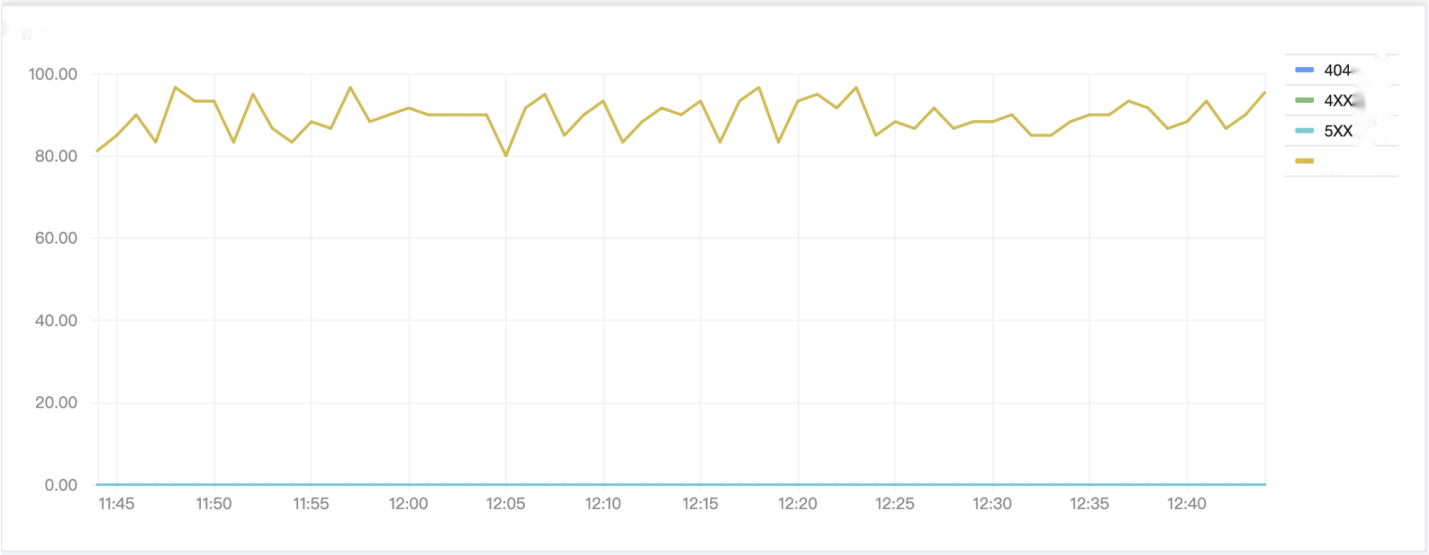
Calculate the PV for each protocol type per minute:

```
* | select histogram( cast(__TIMESTAMP__ as timestamp),interval 1 minute) as time
, protocol_type, count(*) as pv group by time, protocol_type order by time desc l
imit 10000
```



Calculate the request failure rate (%) per minute:

```
* | select date_trunc('minute', __TIMESTAMP__) as time, round(sum(case when statu
s = 404 then 1.00 else 0.00 end)/ cast(count(*) as double)*100,3) as "404 proport
ion", round(sum(case when status >= 500 then 1.00 else 0.00 end)/cast(count(*) as
double)*100,3) as "5XX proportion", round(sum(case when status >= 400 and status
< 500 then 1.00 else 0.00 end)/cast(count(*) as double)*100,3) as "4XX proportio
n", round(sum(case when status >= 400 then 1.00 else 0.00 end)/cast(count(*) as d
ouble)*100,3) as "total failure rate" group by time order by time limit 10000
```



Bar Chart

Last updated：2022-07-12 16:22:19

A bar chart describes categorical data. It visually reflects the comparison of each category in size. It is suitable for category statistics scenarios, for example, collecting the numbers of each type of error codes in the last 24 hours.

Chart Configuration

General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Bar chart configuration

Configuration Item	Description
Bar chart	Direction: Control the bar/column direction. A bar chart is horizontal, while a column chart is vertical. Sort By: Control the bar/column sorting order, which can be ascending or descending by metric. If there are multiple metrics, you need to select one for sorting. Sorting is disabled by default. Display Value: Control whether to display the value label of each bar/column. Bar/Column Mode: Grouped and stacked display modes are supported.

Bar/Column mode example:

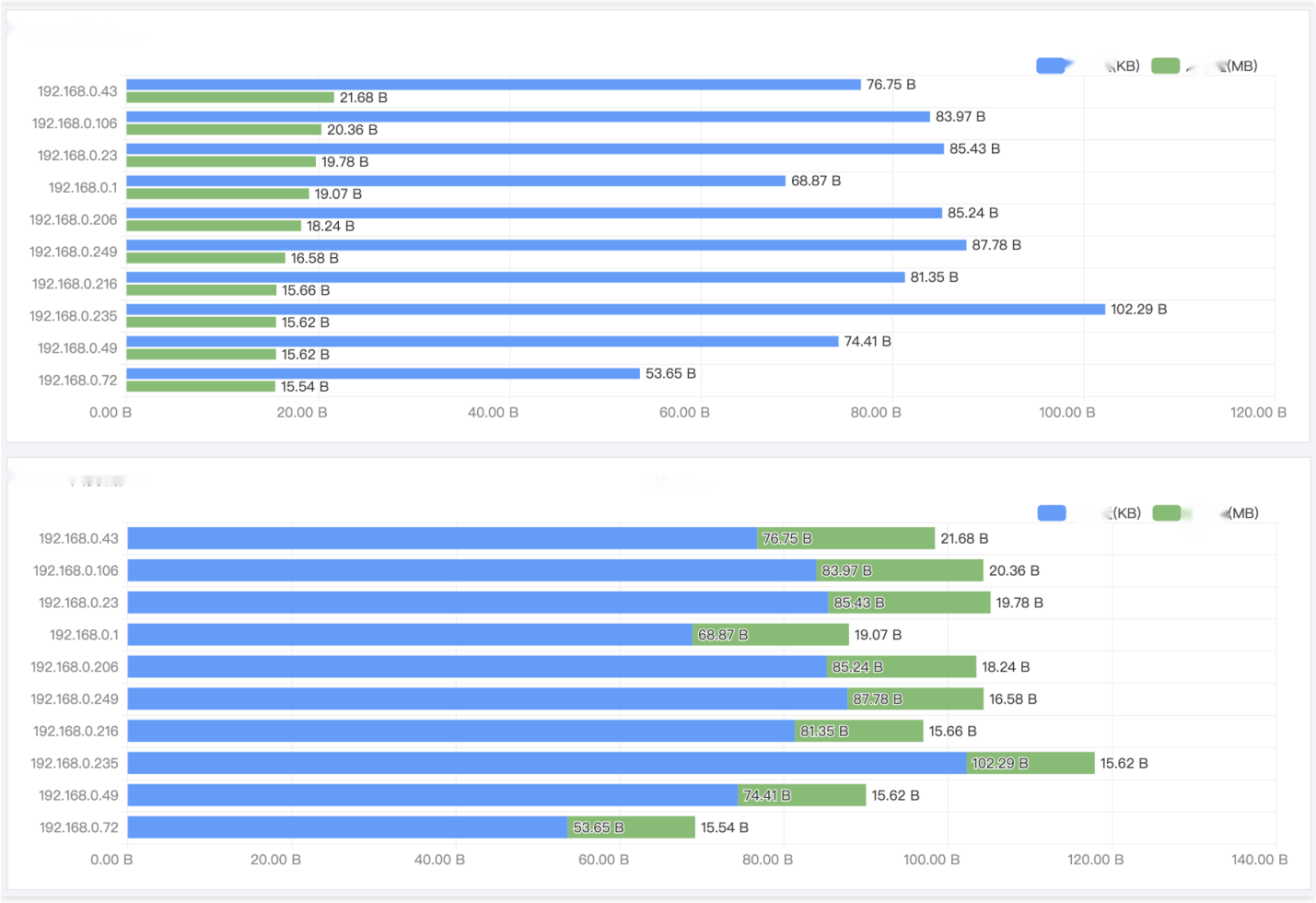
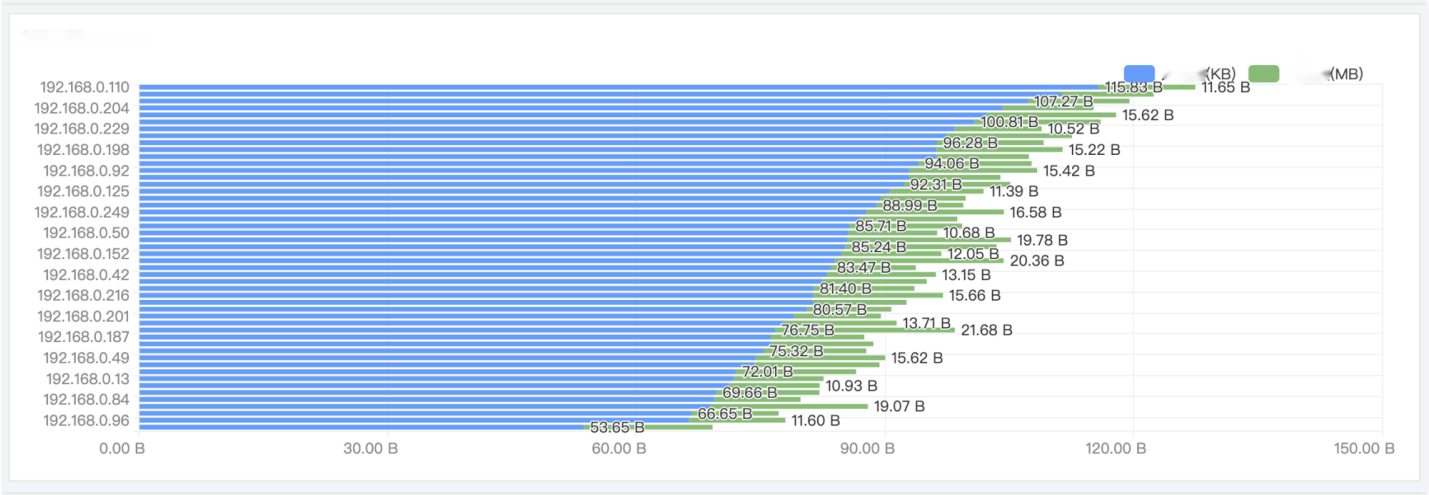


Chart Operations

Local zoom-out



If there are too many statistical results, the bars/columns will be too dense and labels will overlap each other as shown above, which will affect the analysis. In this case, you can hover over the chart and scroll the mouse wheel to zoom in/out the displayed area. This allows you to focus on the local content and display the complete information.

Pie Chart

Last updated：2022-07-12 16:22:19

A pie chart describes the proportions of different types. It measures the proportion of each type by the slice size. It is suitable for proportion statistics scenarios, for example, analyzing the proportions of different error codes.

Chart Configuration

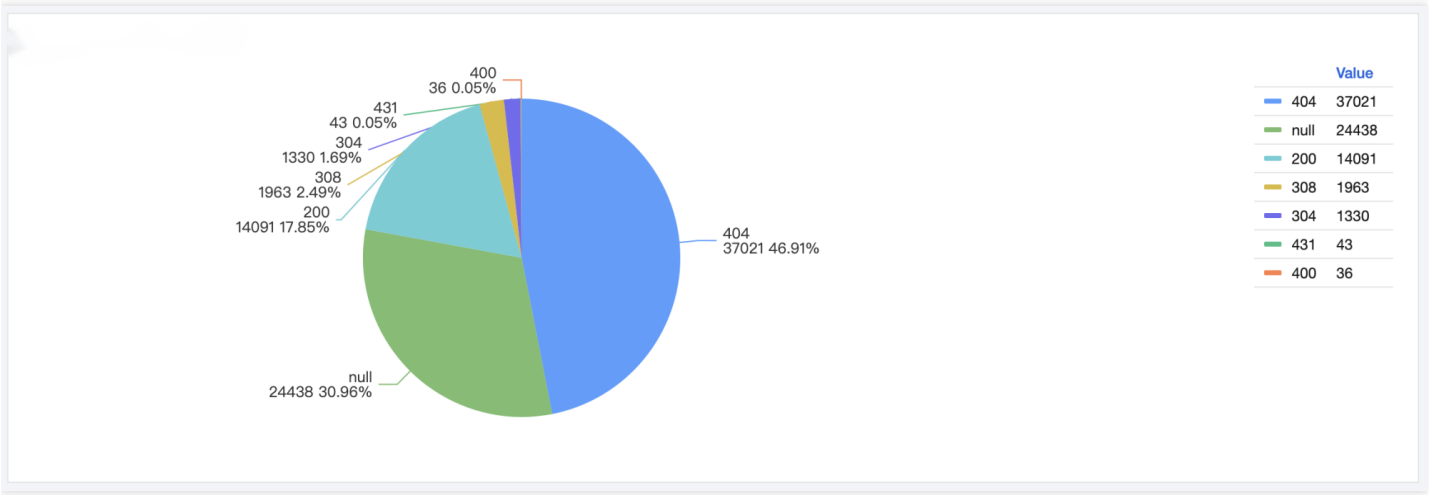
General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Legend	Set the chart legends. You can control the legend styles and positions and add comparison data to legends.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Pie chart configuration

Configuration Item	Description
Pie chart	Display Mode: Control the pie chart style. A solid chart is a pie chart, and a hollow chart is a donut chart. Sort By: Control the slice sorting order, which can be ascending and descending. Sorting is disabled by default. Merge Slices: Merge slices other than top N slices into the "Others" slice. If there are too many slices, you can use this feature to focus on top N slices. Label: Display pie chart labels. You can set name, value, and/or percentage as tags.

Label examples:



Individual Value Plot

Last updated：2022-07-12 16:22:19

An individual value plot describes a single metric, typically a key metric of business value. It is suitable for collecting daily, weekly, or monthly metrics such as PV and UV.

Chart Configuration

General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Changes

Configuration Item	Description
Changes	After the changes feature is enabled, you can compare the data in a time period with the data in the same period X hours, days, months, or years ago. You can choose to compare absolute values or percentages.

Individual value plot configuration

Configuration Item	Description
Individual value plot	Display: Control whether to display metric names on the individual value plot. Value: If a metric has multiple statistical results, they need to be aggregated to one value or one of them needs to be selected for display on the individual value plot. By default, the latest non-null value will be used. Metric: Set the target statistical metric, which is **Auto** by default, in which case the first metric field in the returned data will be selected.

Statistical method example:

Three data entries are returned, and the latest non-null value will be selected by default, that is, the last value `383`

will be displayed. If you set **Value** to **Sum**, the sum of the three data entries will be displayed.

Threshold configuration

Configuration Item	Description
Threshold configuration	Threshold point: Set the threshold points. You can add multiple threshold intervals. You can click a threshold color to open the color picker to customize the color.

Gauge Chart

Last updated：2022-07-12 16:22:19

A gauge chart describes a single metric. Unlike an individual value plot, it is generally used with a threshold to measure the metric status. It is suitable for rating scenarios, such as system health monitoring.

Chart Configuration

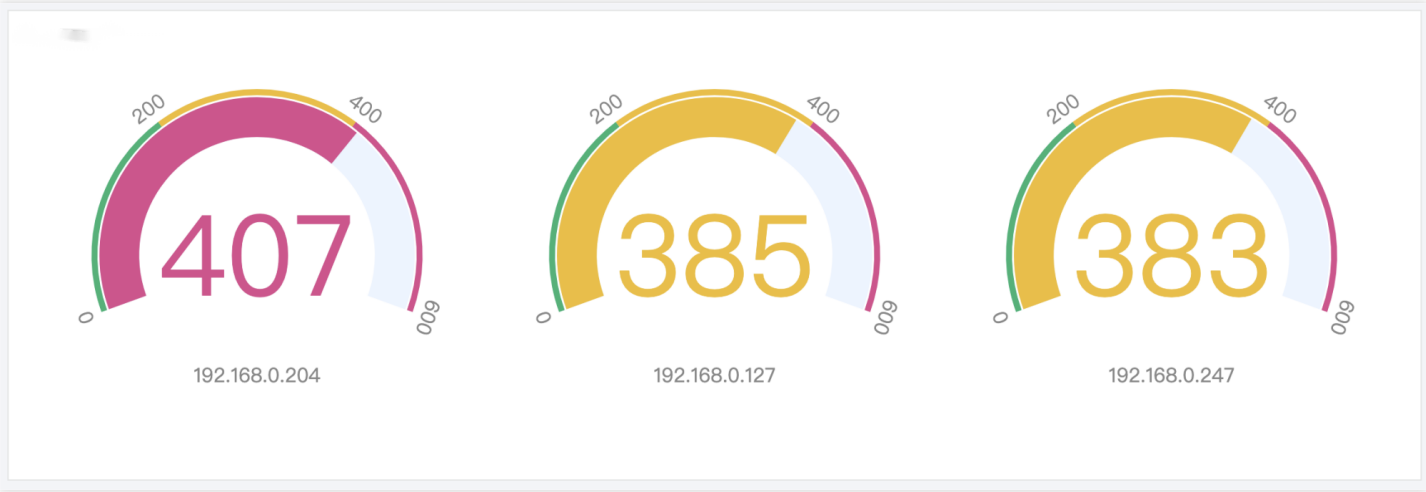
General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Threshold configuration

Configuration Item	Description
Threshold configuration	Threshold point: Set the threshold points. You can add multiple threshold intervals. You can click a threshold color to open the color picker to customize the color. MAX/MIN: Control the maximum and minimum values on the gauge. Data outside the range will not be displayed on the chart.

Threshold configuration example:



Map

Last updated：2022-07-12 16:22:19

A map shows the geographic location of data through the position of graphics. It is generally used to display the distribution of data in different geographic locations. It is suitable for geographic statistics scenarios, such as the geographic distribution of attacker IPs.

Chart Configuration

General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Map	Location: Set the region range displayed on the map. You can select China map or world map. It is set to **Auto** by default, in which case the map is automatically adapted to the region information contained in the data.
Legend	Set the chart legends. You can control the legend styles and positions and add comparison data to legends.

Chart Operations

Filtering regions by value

You can drag the value range in the bottom-left corner of the map to display regions in the specified value range.

Sankey diagram

Last updated：2022-07-12 16:22:19

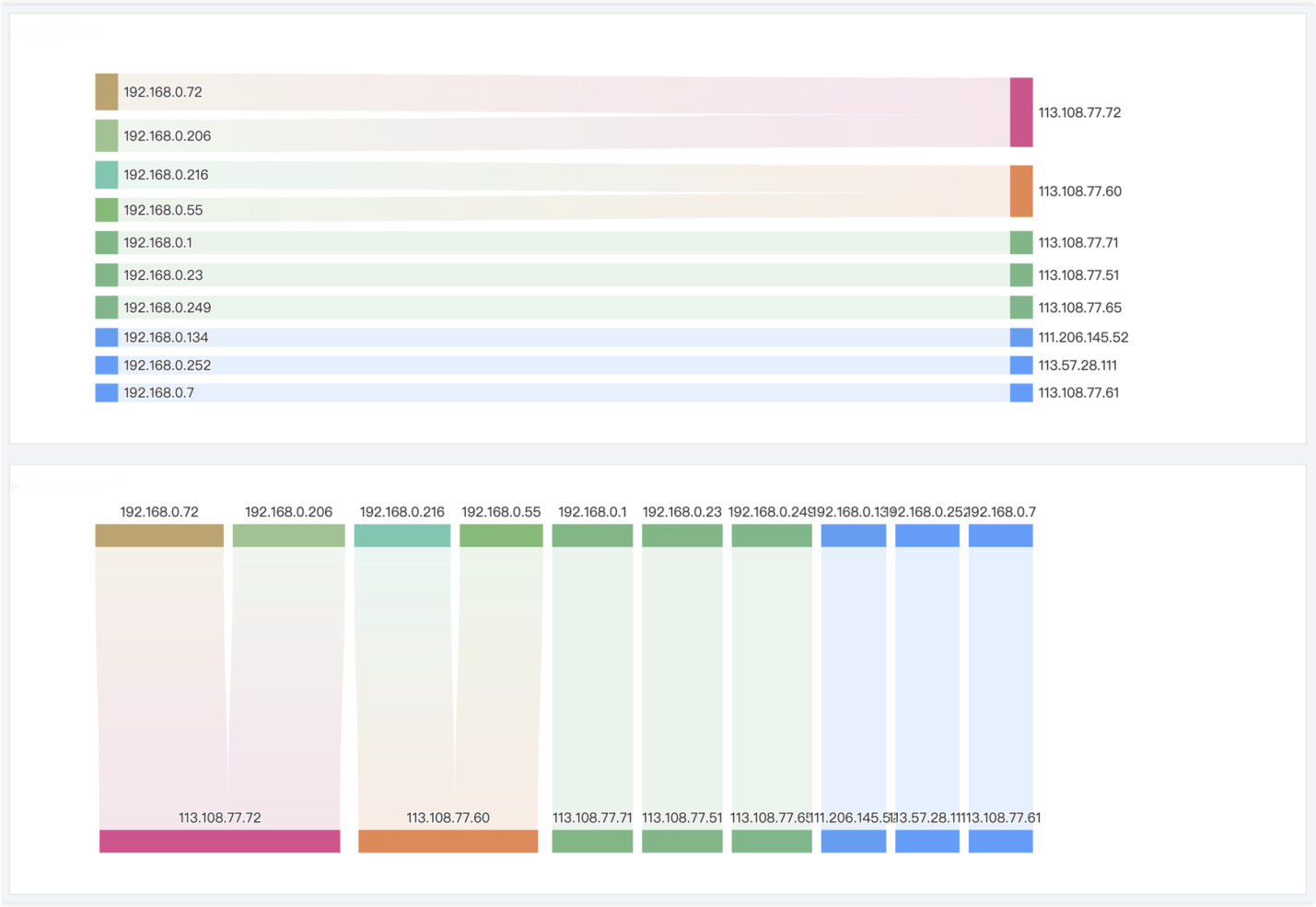
A Sankey diagram is a special type of flow diagram used to describe the flow of one set of values to another set. It is suitable for directional statistics scenarios, such as firewall source and destination IP traffic.

Chart Configuration

General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Sankey diagram	Direction: Set the display direction of the Sankey diagram.

Sankey diagram direction examples:



Word Cloud

Last updated：2022-07-12 16:22:19

A word cloud is a visual representation of the frequency of words. It is suitable for audit statistics scenarios, such as high-frequency operations.

Chart Configuration

General configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Word cloud	Max Words: Control the maximum number of words to be displayed, i.e., top N words. Up to 100 words can be displayed. Font Size: Control the font size range of words in the word cloud.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Funnel Chart

Last updated：2022-09-19 14:26:16

A funnel chart is suitable for business processes with one single flow direction and path. It collects the statistics of each stage and uses a trapezoidal area to represent the business volume difference between two stages.

Chart Configuration

General configuration

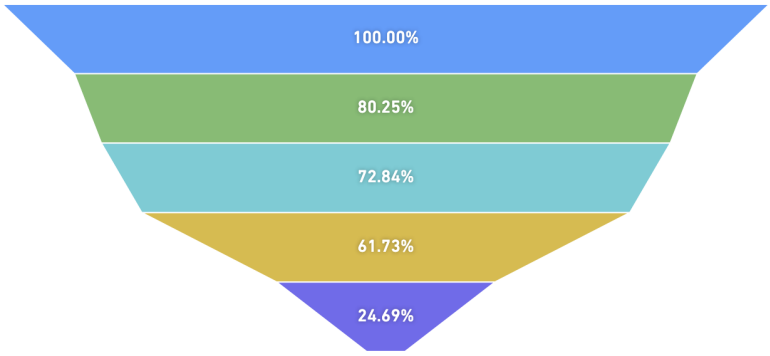
Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Legend	Set the chart legends. You can control the legend styles and positions and configure the data to be displayed as legends.
Standard configuration	Set the unit of all metric-type fields in the chart. For more information, see Unit Configuration.

Funnel chart configuration

Configuration Item	Description
Funnel chart	Display Value: Set the label display form of each stage in the funnel chart, which can be **Value** or **Conversion rate**. Max Rendered Stages: Set the number of rendered stages in the funnel chart, which can be up to 20. Conversion Rate: Set the calculation method of the conversion rate, which can be **Percentage of the first stage** or **Percentage of the previous stage**.

Sample funnel chart:

```
* | select url, count(*) as pv group by url limit 5
```



	Value	Percent
/overview	81	100.00%
/overview/books	65	80.25%
/overview/books/detail	59	72.84%
/overview/books/detail/like	50	61.73%
/overview/books/detail/like/buy	20	24.69%

Log

Last updated：2022-10-28 15:01:54

Log charts allow you to save raw logs to the dashboard. You can quickly view the analysis result and the associated log content on the dashboard page, with no need to redirect to the search and analysis page.

Chart Configuration

Configuration Item	Description
Basic information	Chart Name: Set the display name of the table, which can be left empty.
Log	• Layout: Select the original layout to display logs as text, or select the table layout to display logs as structured fields and field values in a table. • Showed Field: Select the fields to be displayed. If this parameter is left empty, all fields will be displayed. • Line Break: After it is enabled, log text in the original layout will be divided into lines by field, where each field occupies a line. • Line No.: After it is enabled, the log number will be displayed. • Log Time: After it is enabled, the log time will be displayed.

Chart Operations

Adding a log chart to the dashboard

Option 1: Select **Search and Analysis** > **Raw Data** and click **Add to Dashboard** in the top-right corner to add the current log to the dashboard.

Option 2: Click **Dashboard** > **Add Chart**, select the **Log** chart type on the dashboard chart edit page, and enter the search statement.

Loading more logs

A log chart displays the first 20 logs by default, and more logs will be loaded automatically when you scroll down the page.

Data conversion

Last updated：2022-07-12 16:22:19

Data conversion allows you to perform further processing of search results, including modifying data types, selecting fields for chart creation, and merging groups. This satisfies your chart creation needs without modifying SQL statements.

Enabling Data Conversion

1. Log in to the CLS console.

2. On the left sidebar, click **Search and Analysis** to go to the search and analysis page.

3. Select the **Chart Analysis** tab and set **Data Conversion** below to  .

4. On the **Dashboard Chart Editing** page, select the **Data Conversion** tab and set **Data Conversion** to  .

Use Cases

After executing a SQL analysis statement, you may want to visualize the results on different types of charts. As different charts require different attributes and numbers of fields, a problem will occur if the attributes and number of fields of the statement results are different from those required by the chart. In this case, you can modify the SQL statement to adapt it to the requirements of the chart. You can also configure data conversion to further process the results in order to meet the requirements for chart creation.

Using Data Conversion

Selecting fields for chart creation

After using a SQL statement to find the results in the above list, you can select fields from the field list to create a chart based on the selected fields. This operation is equivalent to `SELECT` . Below is the result after some fields are selected:

Converting the field type

In the SQL statistics results, each field has a default type. Fields of the `# (numeric)` type will be identified as metrics, fields of the `t (string)` type will be identified as common dimensions, and fields of the `time type` will be identified as time dimensions based on the chart type. Then, they will be matched with the field attributes required for chart creation. For example, in a sequence diagram, the time dimension field needs to be the X-axis, and the metric field needs to be the Y-axis.

The `time` field in the above figure is treated as a common dimension, which doesn't meet the requirements for field attributes of a sequence diagram. If you modify the `time` field attribute to the time type, you can see that the `time` field changes to the time format (this operation is equivalent to the `CAST` function). At this point, you can use a sequence diagram.

The `histogram` function is usually used to process fields, and the result can be in a non-standard time format. Therefore, if the default field attribute is common dimension, the sequence diagram cannot be used. You need to use the `CAST` function to convert the field to the time type or use data conversion to change the field attribute to the time dimension.

Merging groups

After using a SQL statement to find the above results, you can group them by `server_addr` and `server_name` and collect the PV and UV of each group. If you want to merge the results by `server_name`, you can hide the `server_addr` field and merge the results in the selected `server_name` dimension. This operation is equivalent to the `GROUP BY` function.

Unit Configuration

Last updated：2022-10-14 15:56:29

Automatic unit conversion is available in charts. When you select an original unit, the value is automatically converted to the next higher unit if it meets the conversion factor. Units can be configured to display decimal places.

Overview

The results of SQL aggregation are unitless values by default. In the following cases, you need to use unit conversion to make the data more readable.

Selecting a unit and automatically converting it

In CLS chart analysis, SQL aggregation results are unitless raw values by default, and you need to specify a basic unit, such as byte in the example. After a basic unit is selected, if a value is great enough to be converted to a value with a higher-level unit, it will be automatically converted. In this example, the value in bytes is automatically converted to a value in GiB.

In unit configuration, the precision decides the number of decimal places. By default, if `Auto` is selected, two decimal places will be retained. You can modify the precision as needed.

Manually entering a unit

If data has a special unit that cannot be found in the unit configuration options, you can manually add a custom unit with the `custom` prefix. However, note that the custom unit is fixed and cannot be automatically converted. Therefore, if you want to use the raw unit in a unified manner without triggering automatic unit conversion, you can manually add a fixed unit.

Dashboard

Creating a Dashboard

Last updated：2022-03-07 18:03:01

The dashboard provides a global view of data analysis and monitoring. You can view multiple statistical charts based on query and analysis results in the dashboard. This document describes how to create a dashboard and related operations.

Directions

1. Log in to the CLS console.
2. Select **Dashboard** on the left sidebar to enter the dashboard list page.
3. On the dashboard list page, click **Create**.
4. In the pop-up window, enter the dashboard name and click **OK**.
5. Click **Save**.

Related Operations

After creating a dashboard, you can perform the following operations in the dashboard:

Operation	Description
Adding a chart	A dashboard also provides an entry for creating statistical charts, supporting simple chart creation and custom chart creation. For more information, please see Adding a Chart.
Deleting a chart	You can delete an existing chart.
Editing a chart	You can edit a chart on the chart editing page.
Copying a chart	You can copy a chart to the current or another dashboard.
Exporting chart data	You can export chart data in CSV format.

Operation	Description
Viewing data on the search and analysis page	You can quickly add search statements, log topics, and other information for the current chart on the search and analysis page.
Quickly adding an alarm	You can quickly add search statements, log topics, and other information for the current chart on the alarm editing page.
Full-screen browsing	Full-screen browsing of a single chart or the entire dashboard is supported.
Refreshing	Automatically periodic data refreshing and manual data refreshing are supported.
Adding a template variable	Template variables allow you to define and modify data query and filtering parameters in the dashboard more flexibly, which improves the reuse rate of the dashboard and the granularity of analysis. For more information, please see Template Variables.
Viewing/Editing a dashboard	You can view a dashboard and edit the dashboard layout.

On the dashboard management page, you can perform the following operations:

Operation	Description
Creating a dashboard	You can create a dashboard on the dashboard creation page.
Deleting a dashboard	You can delete an existing dashboard.
Modifying dashboard tags	You can modify a single dashboard tag or multiple dashboard tags at a time.
Opening a dashboard	You can open a dashboard and go to the dashboard viewing/editing page.
Searching for or filtering dashboards	You can search for or filter dashboards by a combination of dashboard attributes such as the dashboard ID, name, region, and tag.

Adding Chart

Last updated：2022-10-17 14:50:59

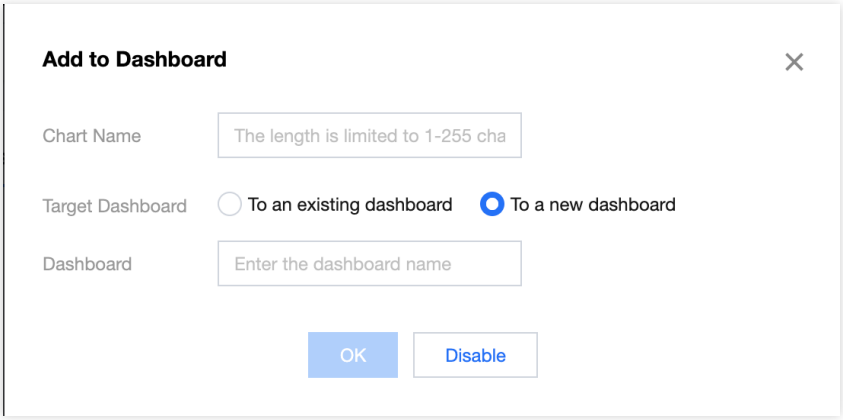
CLS supports visual chart statistics of search and analysis results, and saves statistical charts to dashboards for continuous monitoring and viewing. A dashboard also provides an entry for creating statistical charts, supporting simple chart creation and custom chart creation.

Directions

Adding a chart via the Search and Analysis page

Note：
In this mode, you need to search for data to generate chart content. For more information, see here.

1. Log in to the CLS console.
2. On the left sidebar, click **Search and Analysis** to go to the search and analysis management page.
3. Click the **Chart Analysis** tab and click **Add to Dashboard**.
4. In the pop-up window, enter information and click **OK**.



Form Element	Description
Chart Name	The chart name.

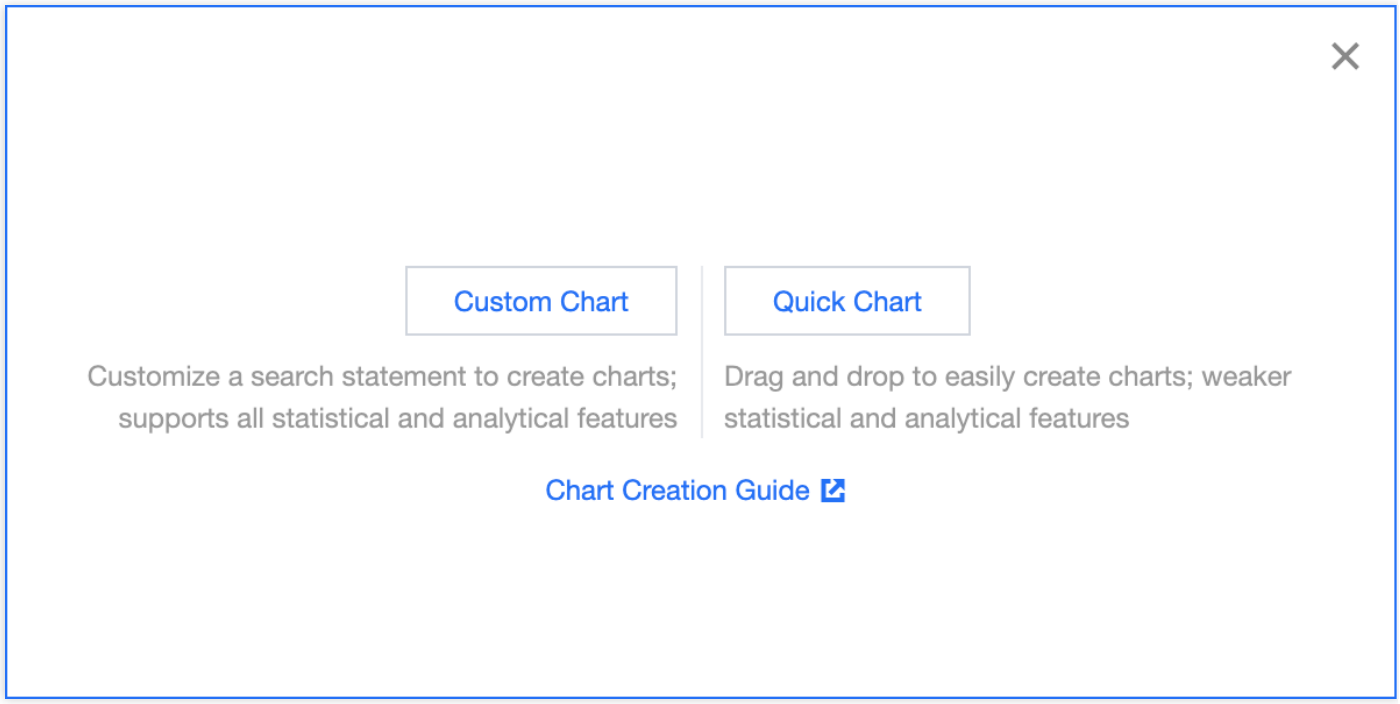
Form Element	Description
Target Dashboard	The dashboard type of the chart. If you select **To an existing dashboard**, the chart will be added to an existing dashboard. If you select **Create Dashboard**, you need to create a dashboard and add the chart to it.
Dashboard	The dashboard name.

Adding a chart via the Dashboard page

1. Log in to the CLS console.
2. On the left sidebar, click **Dashboard** to enter the dashboard management page.
3. Click the ID/name of the target dashboard to enter the dashboard details page.

> Note：
> If you do not have a dashboard, create one.

4. Click **Create** and select a chart type as needed to create a chart.



- Quick Chart: You can drag and drop to easily create charts. However, this mode supports weaker statistical and analytical features.

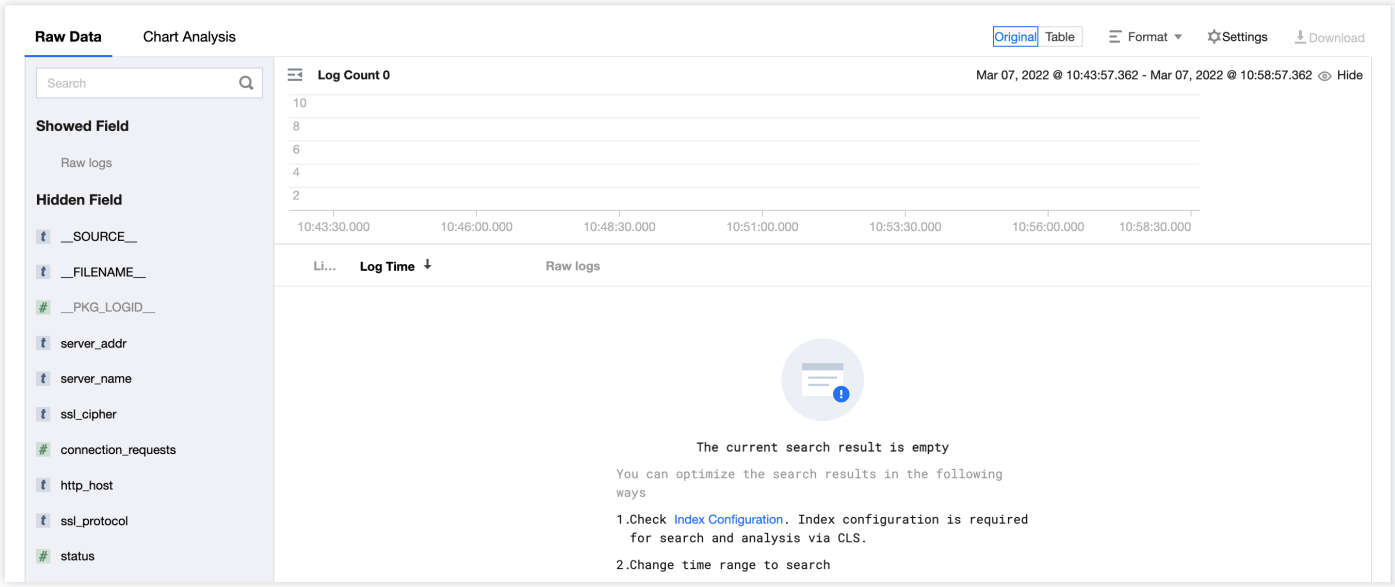
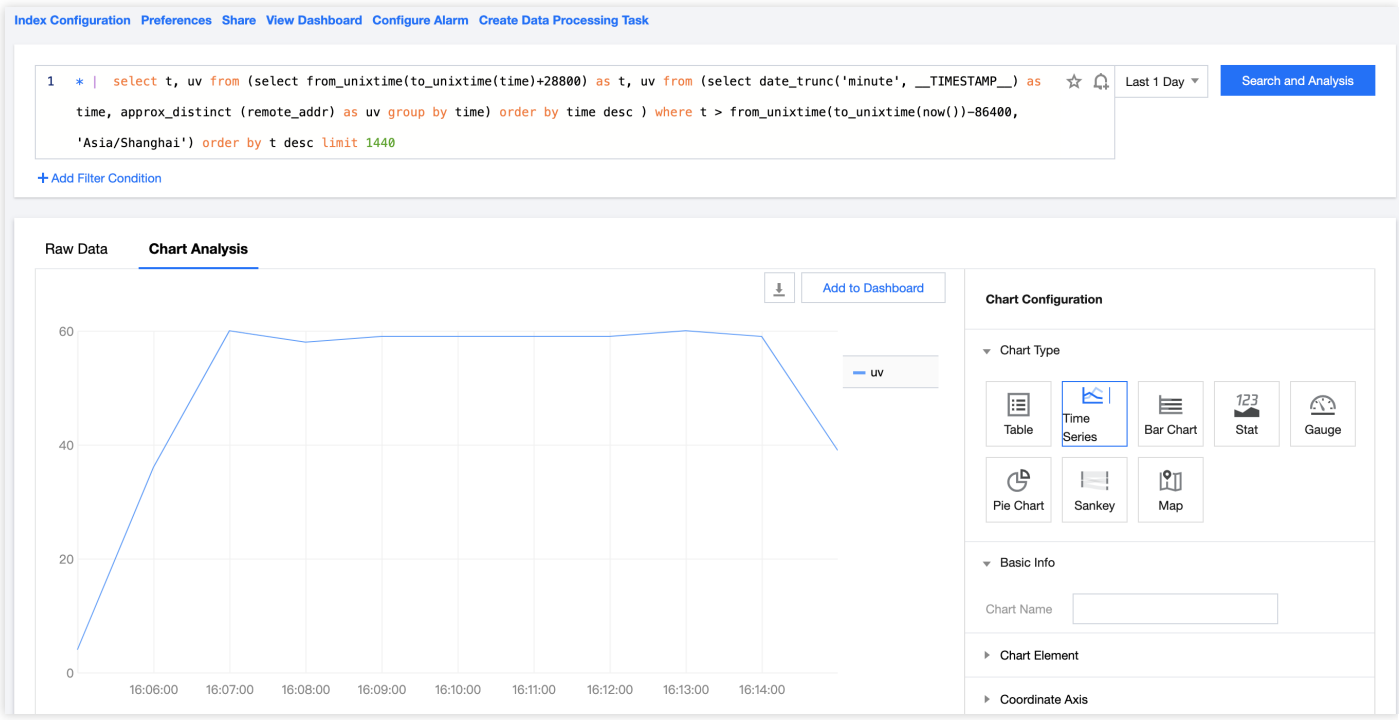


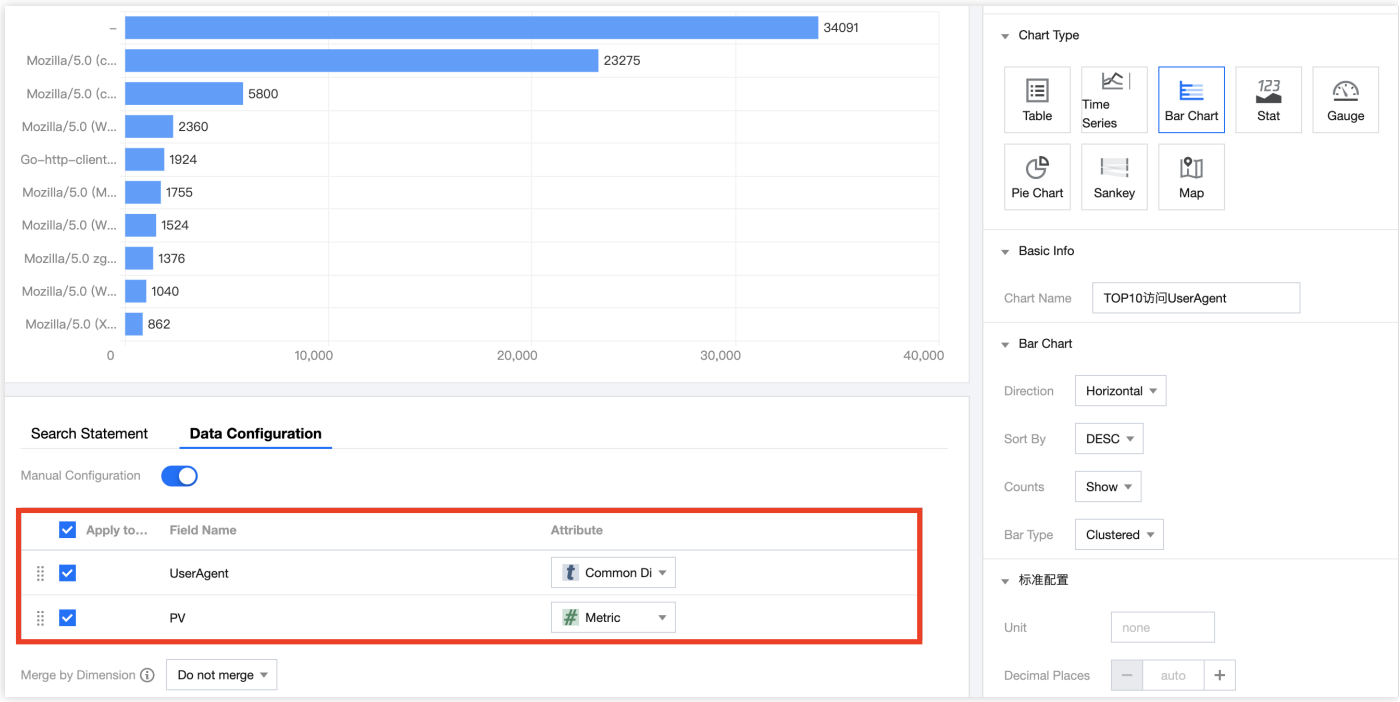
Chart Element	Description
Field	The list of current log topic fields. You can click or drag and drop a field to the condition input box on the right.
Metric	A metric measures a certain characteristic of an item, generally a numeric field. You can drag and drop a field from the field list on the left or click the "+" icon to display a drop-down list to select a field. After adding a field, you can click the settings icon next to the field to modify the field's aggregate calculation mode, which is "AVG" by default.
Dimension	A dimension is the perspective for analyzing a metric. It is generally a string-type field describing the attributes of an item. You can drag and drop a field from the field list on the left or click the "+" icon to display a drop-down list to select a field.
Filter	A filter field filters data attributes. You can drag and drop a field from the field list on the left or click the "+" icon to display a drop-down list to select a field. After adding a field, you can click the settings icon next to the field to modify the field filter mode, which is "Exist" by default.
Sort	A sorting field sorts statistical results. Only specified condition fields can be sorted. We recommend you click the "+" icon to display a drop-down list to select a field. After adding a field, you can click the settings icon next to the field to modify the sorting mode, which is "Ascending" by default.
Row quantity limit	Row quantity limit filters the number of statistical results. After it is set, a certain number of statistical results will be displayed in reverse order. The valid range is 1–1,000, and the default value is `1000`.

- Custom Chart: You can customize a search statement to create charts. This mode supports all statistical and analytical features.
  Enter the search statement to automatically generate a chart.



5. Check whether the data configuration meets the requirements. The system will automatically fill in data based on the chart data structure. If the data type doesn't match, you need to **convert the data** manually and adjust the

configuration. For more information, see Data conversion.



6. Click **Save**.

Template Variables

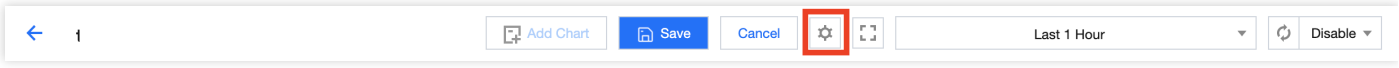
Last updated：2022-03-24 16:20:05

Variable Type	Description	Effective Scope
Data source	A data source variable allows you to batch switch data sources of charts in the dashboard. It is suitable for scenarios where a dashboard is applied to multiple log topics, data on the dashboard is compared in blue and green, and more.	Charts that use the variable on the dashboard
Quick filtering	A quick filtering variable allows you to filter data of all charts on the dashboard by specified fields, which is equivalent to adding filter criteria in chart query statements.	All charts on the dashboard

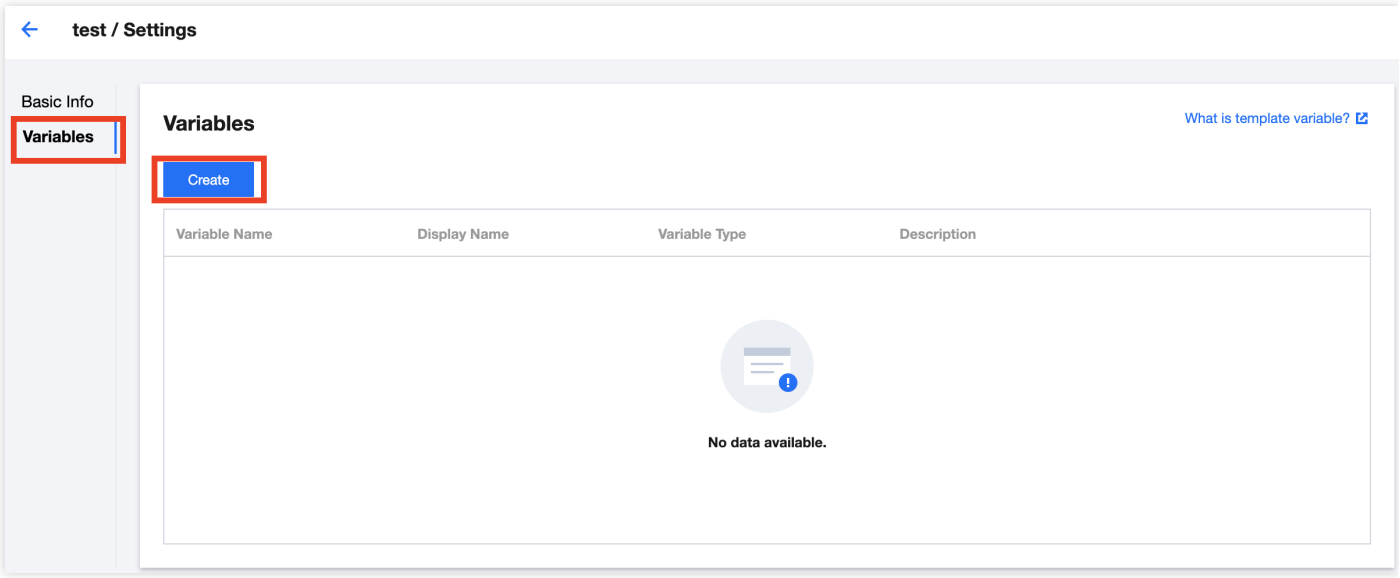
Configuring a Data Source Variable

Directions

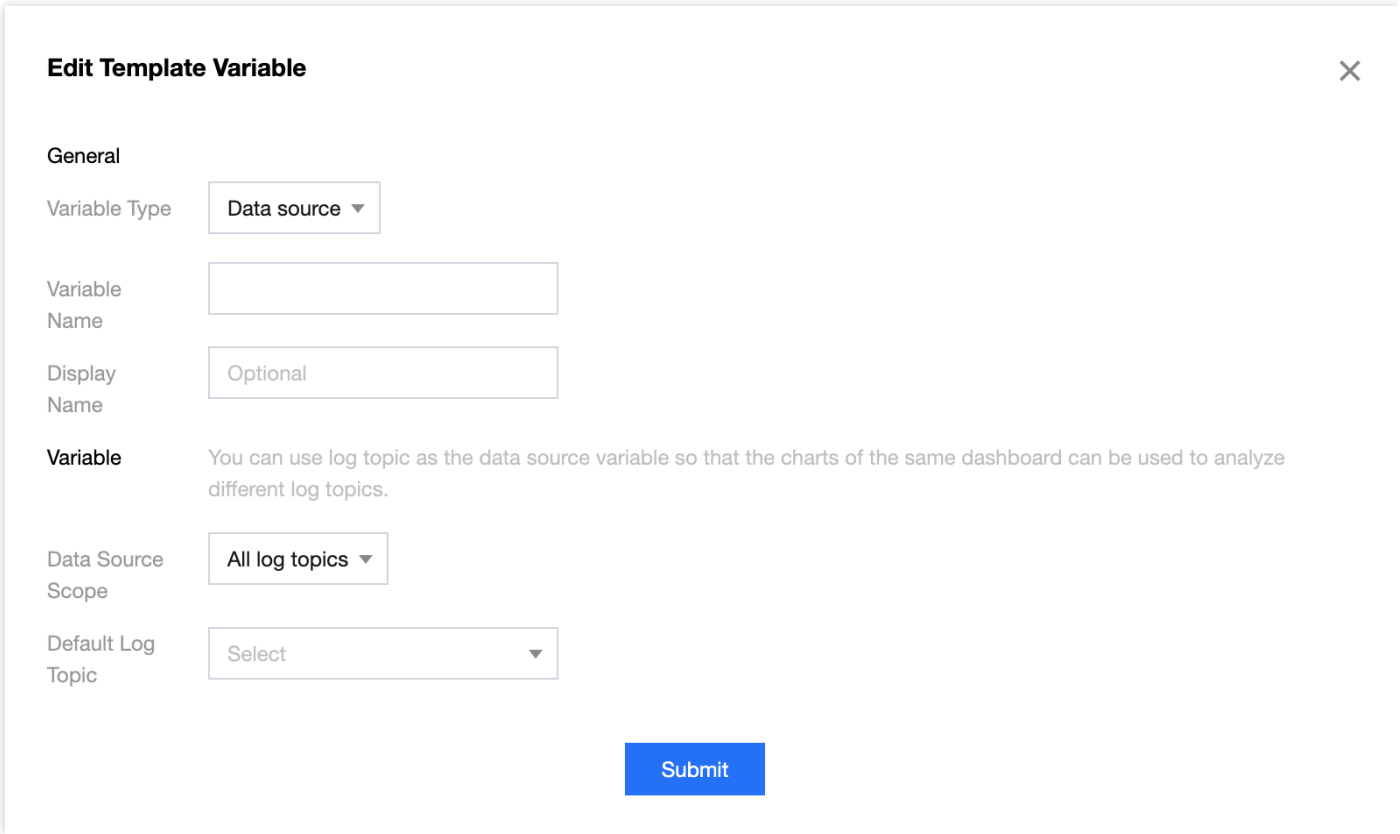
1. Log in to the CLS console.
2. On the left sidebar, click **Dashboard** to enter the dashboard management page.
3. Click the ID/name of the target dashboard to enter the dashboard details page.
4. Click  at the top to enter the configuration page.



5. Click **Template Variable** and click **Create**.



6. In the pop-up window, configure the template variable information and click **Submit**.



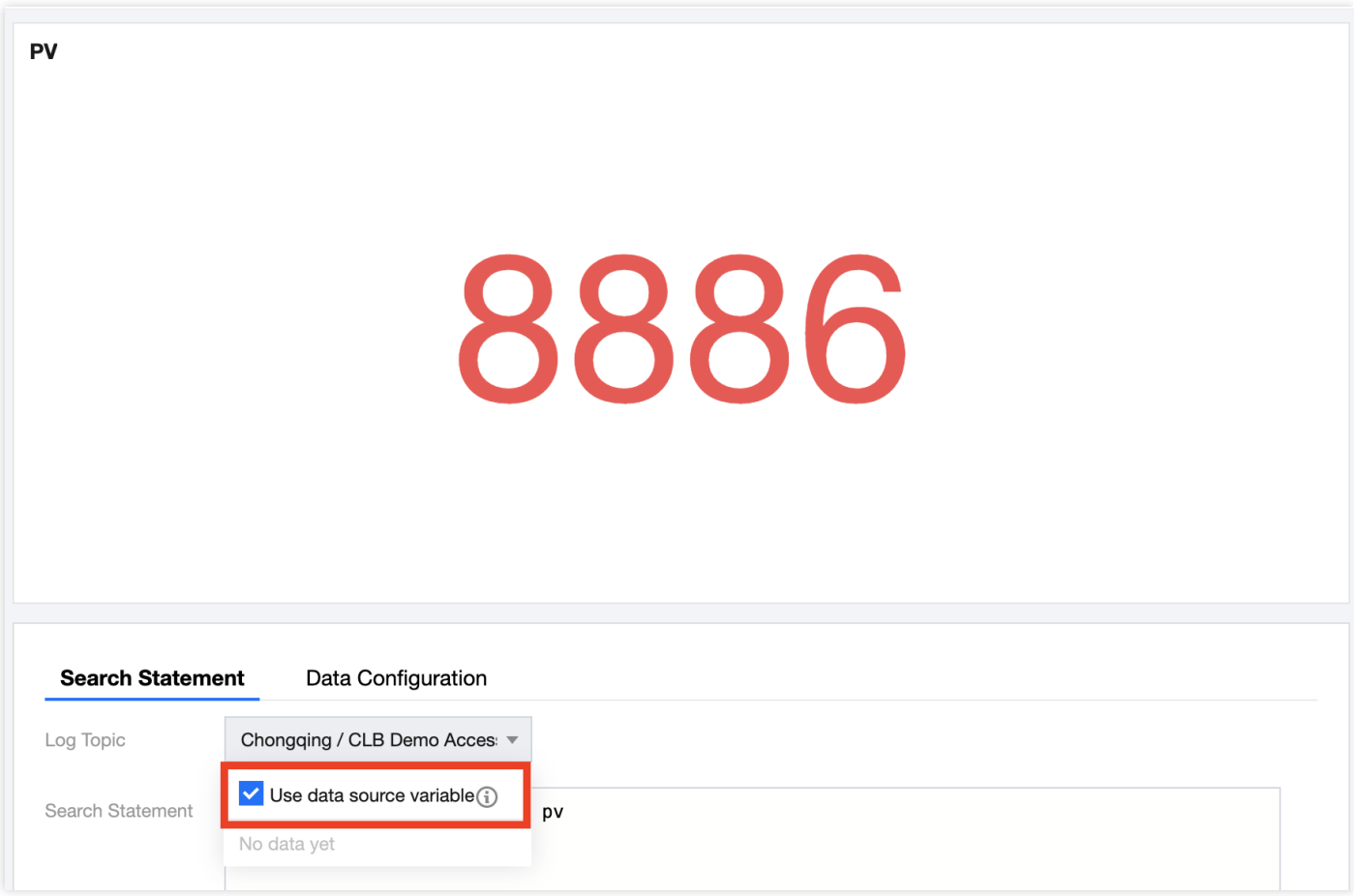
Parameter	Description
Variable Type	Variable category. Different categories correspond to different configuration items and application scenarios. Here, select **Data Source**.

Variable Name	Name of the variable in the query/search statement. The value can contain only letters and digits.
Display Name	Name of the variable displayed on the dashboard. This parameter is optional. If it is empty, the system automatically uses the variable name as the display name.
Data Source Scope	Value range of the variable. Currently, only option **All Log Topics** is supported, that is, there is no limit on the data source range.
Default Log Topic	Log topic used by default.

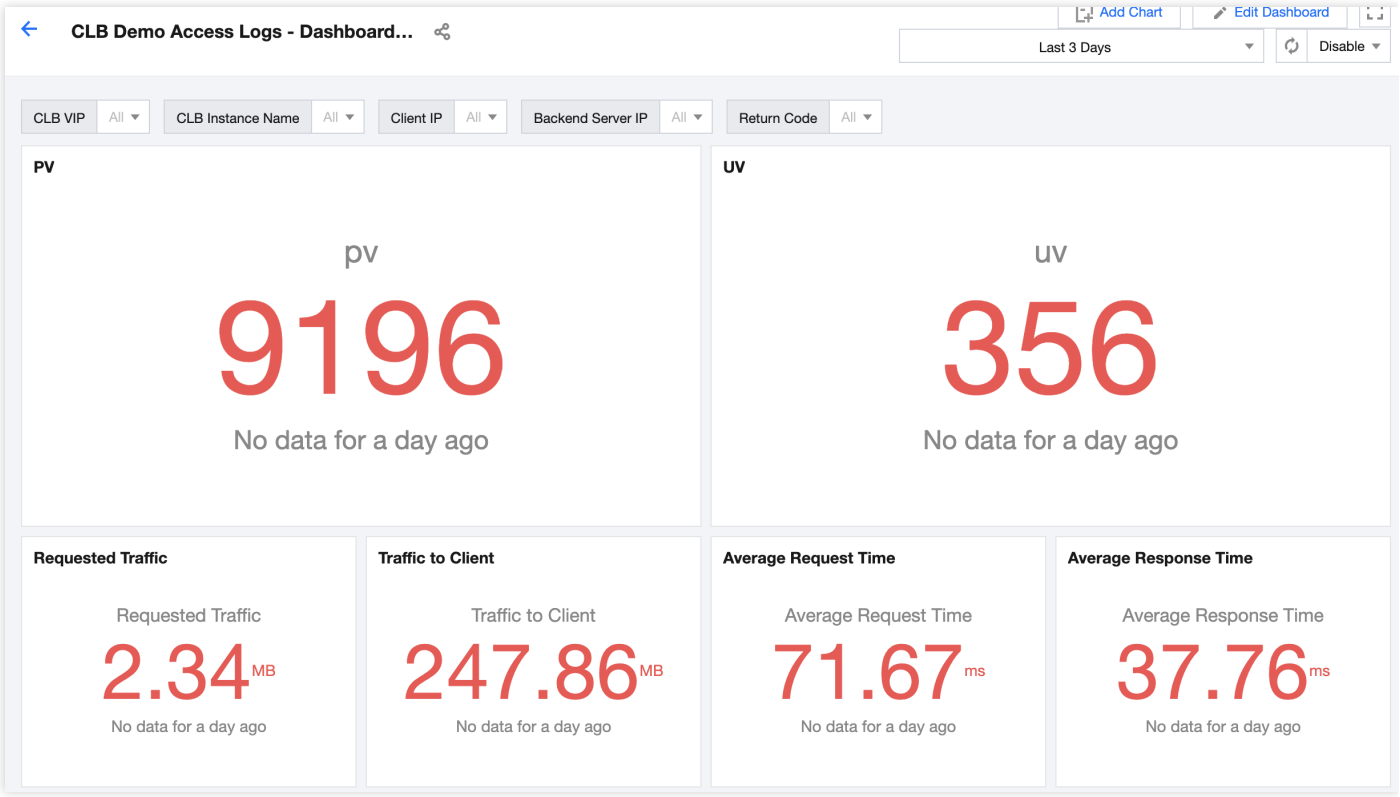
7. On the dashboard details page, click **More** > **Edit** to edit charts.

> Note：
> If there are no charts on your dashboard, please add charts.

8. At the top of the edited chart, click **Log Topic**, select **Use Data Source Variable**, and select the template variable created just now.



9. Click **Save**.
0. On the dashboard details page, click the **Data Source** drop-down list and select another log topic. Then the system changes automatically changes the data source of the chart using the variable accordingly.



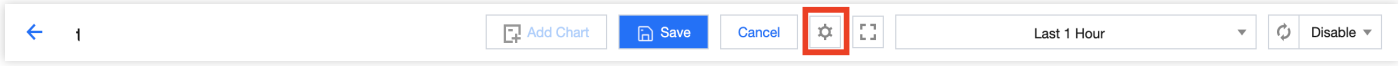
FAQs

Why does a configured data source variable not take effect or take effect only on some charts?

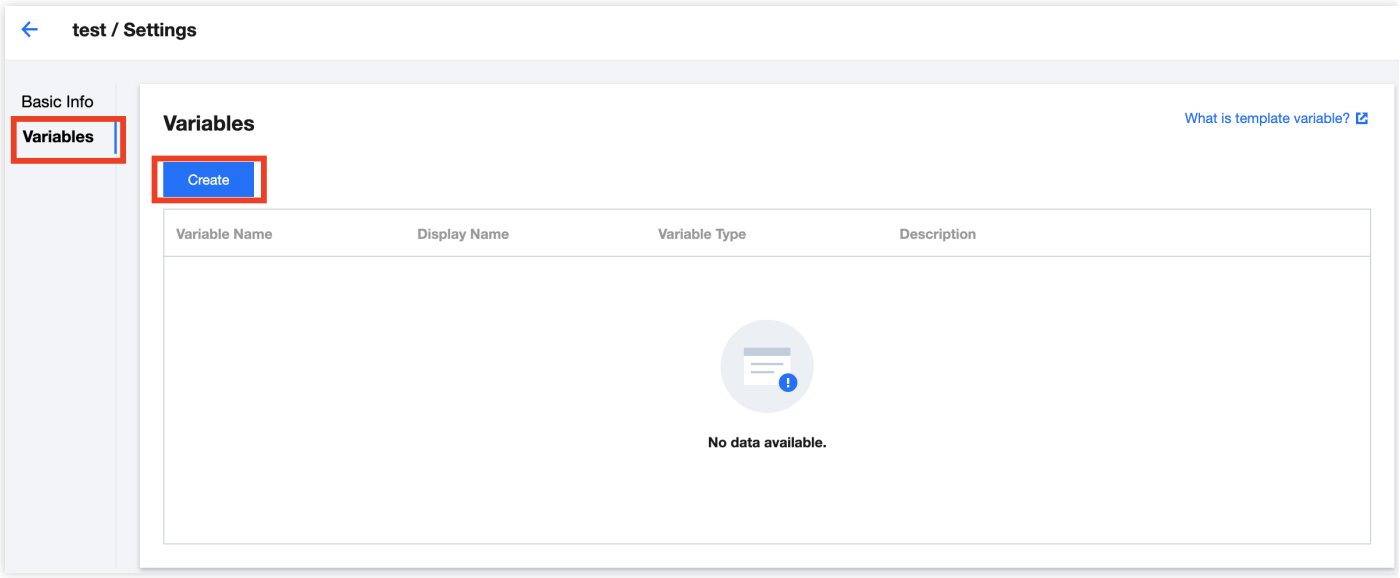
A data source variable does not apply directly to all charts on the dashboard. It applies only to those charts that use it on the chart editing page.

Configuring a Quick Filtering Variable

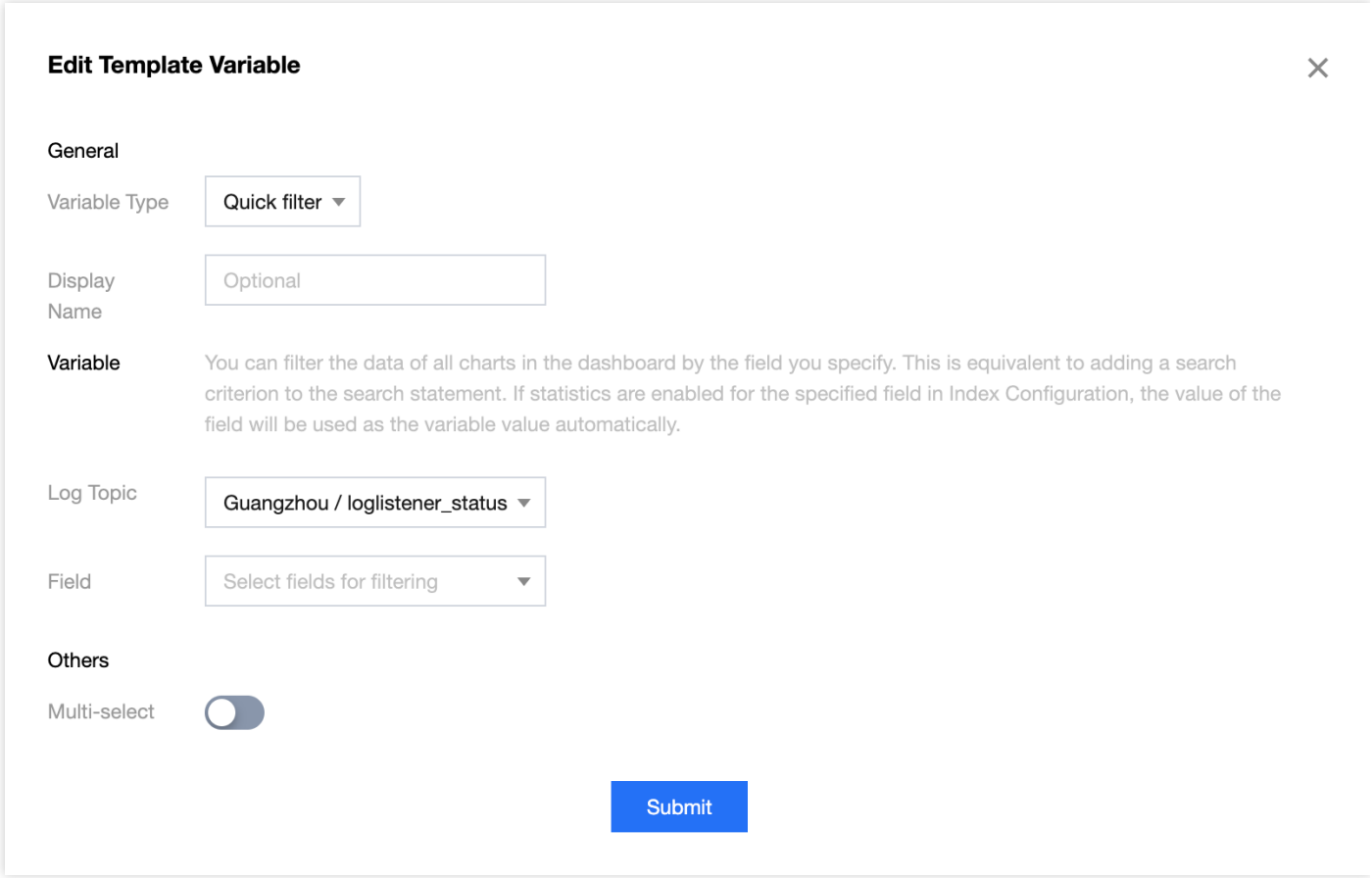
1. Log in to the CLS console.
2. On the left sidebar, click **Dashboard** to enter the dashboard management page.
3. Click the ID/name of the target dashboard to enter the dashboard details page.
4. Click  at the top to enter the configuration page.



5. Click **Template Variable** and click **Create**.



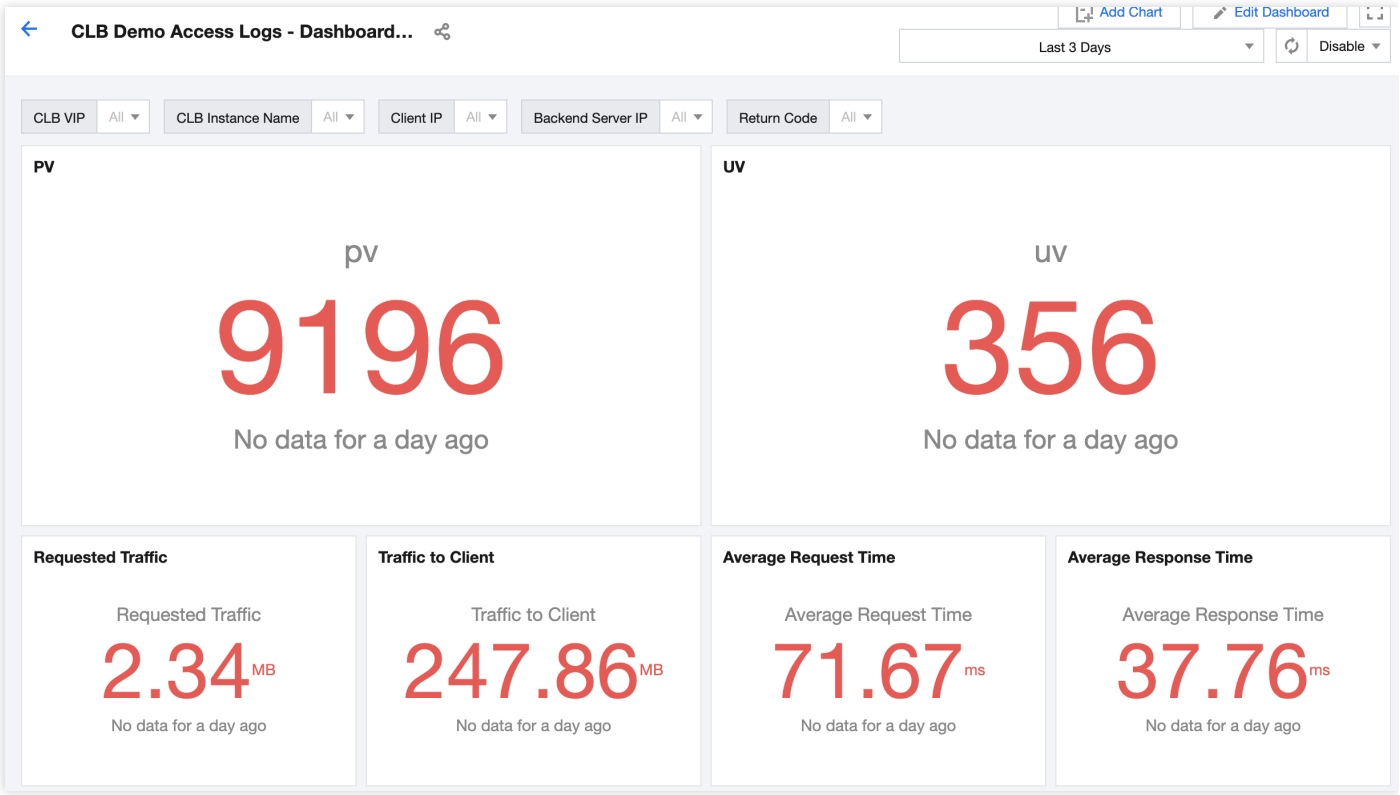
6. In the pop-up window, configure the template variable information and click **Submit**.



Parameter	Description
Variable Type	Variable category. Different categories correspond to different configuration items and

	application scenarios. Here, select **Quick Filtering**.
Display Name	Name of the variable control on the UI. This parameter is optional. If it is empty, the system automatically uses the variable name as the display name.
Log Topic	Source log topic of the variable field.
Select Field	Filter field.
Support Multiple-Selection	If this parameter is toggled on, you can select multiple variable values as filter conditions.

7. On the dashboard details page, click the variable console and select the filter field. Then the data on the dashboard is refreshed to the filtered content.



Examples

Analyzing performance metrics of different APIs on the dashboard (quick variable filtering)

Requirement

Log topic A stores NGINX access logs of an application, and you are to use the dashboard to view the throughput, number of error requests, and response time of the **entire application** and **a specified API**. The following is the sample log information:

```
body_bytes_sent:1344
client_ip:127.0.0.1
host:www.example.com
http_method:POST
http_referer:www.example.com
http_user_agent:Mozilla/5.0
proxy_upstream_name:proxy_upstream_name_4
remote_user:example
req_id:5EC4EE87A478DA3436A79550
request_length:13506
request_time:1
http_status:201
time:27/Oct/2021:03:25:24
upstream_addr:219.147.70.216
upstream_response_length:406
upstream_response_time:18
upstream_status:200
interface:proxy/upstream/example/1
```

Solution

1. Create a dashboard.
2. Create three charts (sequence diagrams) based on the application performance metrics. The corresponding query statements are as follows:

- Throughput

```
* | select histogram( cast(__TIMESTAMP__ as timestamp),interval 1 minute) as an
alytic_time, count(*) as pv group by analytic_time order by analytic_time limit
1000
```

- Number of error requests

```
http_status:>=400 | select histogram( cast(__TIMESTAMP__ as timestamp),interval
1 minute) as analytic_time, count(*) as pv_lost group by analytic_time order by
analytic_time limit 1000
```

- Average response time

```
* | select histogram( cast(__TIMESTAMP__ as timestamp),interval 1 minute) as an
alytic_time, avg(request_time) as response_time group by analytic_time order by
analytic_time limit 1000
```

3. Add template variables.

- Variable Type: Quick Filtering
- Display Name: API name
- Log Topic: Log topic A
- Select field: interface

4. Go back to the dashboard details page, and you can see this variable on the top of the page.

- If **API Name** is not specified, data is not filtered, and the charts on the dashboard display all data, that is, the overall performance metrics of the application.

- If **API Name** is specified, all charts on the dashboard use the specified API as the filter condition to filter data and display the performance metrics of the API.

Viewing the production and test environment performance metrics on the dashboard separately (variable Data Source)

Requirement

An application has a production environment and a test environment, and logs are collected to **Log topic A (production environment)** and **Log topic B (test environment)**. Therefore, during application development, testing, and Ops, you need to pay attention to the performance metrics of the two environments.

Solution

1. Create a dashboard.
2. Add template variables.

- Variable Type: Data Source
- Variable Name: env
- Display Name: Application Environment
- Data Source Scope: All log topics
- Default Log Topic: Log topic A (production environment)

3. Add charts.
   In the **Log Topic** drop-down list, select **Use Data Source Variable** and select the `${env}` variable created in the previous step. Then, charts will use the value of the variable as the data source, that is, **Log topic A (production environment)**.

4. Repeat **Step 3** to add other charts.

5. Go back to the dashboard details page, click the data source variable **Application Environment** at the top of the page, and switch the log topic in the drop-down list of the variable. Then, the charts that use the variable will switch the log topic accordingly.

Custom Chart Time

Last updated：2022-10-17 14:50:59

Overview

Dashboard charts support custom time.

In addition to custom time, global dashboard time is also supported, which is used by default when a dashboard chart is created and determines the data scope of the chart. If the global dashboard time changes, the time ranges of all the associated charts will change.

After a custom time is configured, the chart time becomes independent and doesn't change as the global time changes. In the dashboard, different charts can use different times to support more diversified comparisons.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **View Dashboard** to enter the dashboard page.
3. Click **Edit Chart** or **Add Chart** to enter the chart editing page.
4. Click **Time Range** and enable **Custom Chart Time**.
5. View the chart. You can see that the chart uses a different time from the dashboard.

Preset Dashboard

Last updated：2022-10-28 15:01:54

Overview

CLS supports accessing the standard logs of multiple Tencent Cloud products and provides out-of-the-box dashboards for quick log analysis. For more information, see Tencent Cloud Service Log Access.

In addition, CLS provides free demos for you to try out preset dashboards.

List of Preset Dashboards

Tencent Cloud Product	Preset Dashboard
CLB	CLB access log dashboard
NGINX	NGINX access dashboard NGINX monitoring dashboard
CDN	CDN access log - quality monitoring and analysis dashboard CDN access log - user behavior analysis dashboard
COS	COS access log analysis dashboard
FL	ENI flow log - advanced analysis dashboard CCN flow log - advanced analysis dashboard
TKE	TKE audit log - overview dashboard TKE audit log - node operation dashboard TKE audit log - Kubernetes object operation overview dashboard TKE event log - overview dashboard TKE event log - abnormal event aggregation search dashboard

Directions

Viewing a preset dashboard

1. Log in to the CLS console.

2. Select **Dashboard** on the left sidebar to enter the dashboard list page.

3. On the dashboard list page, expand **Preset Dashboards** and select the target dashboard.

4. Select the log topic of the target Tencent Cloud product.

Editing a preset dashboard

If the current preset dashboards cannot meet your needs, you can add statistical charts based on them. Click **Copy** to copy a preset dashboard to the list of custom dashboards for customization.

Subscribing to Dashboard

Last updated：2022-10-17 14:50:59

Overview

CLS allows you to subscribe to a dashboard and export it as an image. Daily, weekly, and monthly reports can be emailed to specified recipients regularly.

Usage Limits

Each account can have up to 100 subscription tasks.

Directions

Creating a subscription task

1. Log in to the CLS console.
2. On the left sidebar, click **View Dashboard** to enter the dashboard page.
3. Click **Subscription** at the top and select **Create Subscription Task** to enter the subscription configuration page.
4. Enter the **Task Name** and select the **Time Range** of the subscribed dashboard.
5. Set the **Variables** of the subscribed dashboard.

- If you select **Default Configuration**, the default configuration items will be used for the variables of the subscribed dashboard. When the default variables change, the subscribed dashboard will also change.
- If you select **Custom Configuration**, you can customize variables to render the subscribed dashboard.

6. Click **Preview Content** to preview the subscribed dashboard.
7. Select the subscription period, which can be by day, week, or month. Multiple weeks and months can be selected.
8. Configure the subscription method:

Type	Description
Tencent Cloud user	Select a Tencent Cloud user as the email recipient of the subscribed dashboard. Users with no email address configured cannot receive email notifications.
Custom email address	Enter one or multiple custom email addresses.

9. Click **Send Immediately**, and CLS will send a subscription email to all the configured recipients.

Managing a subscription task

1. Log in to the CLS console.
2. On the left sidebar, click **View Dashboard** to enter the dashboard page.
3. Click **Subscription** at the top and select **Manage Subscription Task** to enter the subscription task management page.

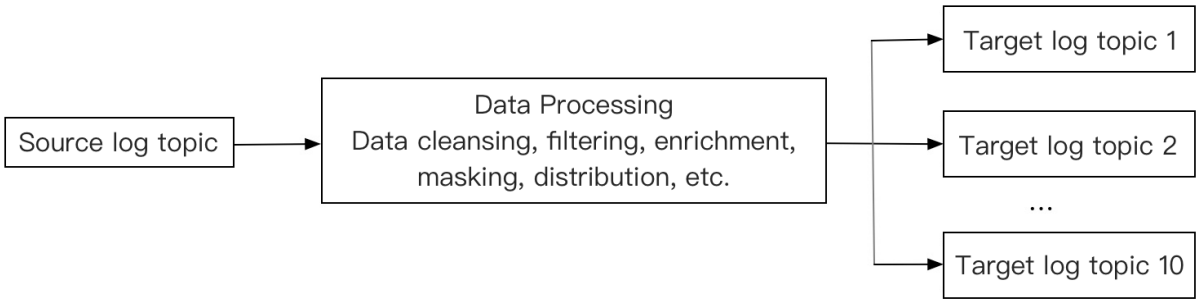
You can create, edit, or delete dashboard subscription tasks and view the last operation.

Data Processing documents
Data Processing
Creating Processing Task

Last updated：2022-11-21 17:22:56

Overview

The data processing feature provides the capabilities to filter, cleanse, mask, enrich, and distribute log data. It can be benchmarked against the open-source component Logstash, but its input and output are CLS log topics.



You can select a source log topic and write Domain Specific Language (DSL) processing function statements to process logs line by line and send logs that meet certain requirements to specified target log topics.
If your business uses only processed logs, we recommend you configure the log retention period of the source log topic as one day and not enable the index in order to reduce costs.

Billing

Data processing incurs fees. For example, if you have a log topic in Guangzhou and 100 GB raw data that becomes 50 GB after being filtered, and the target topic is written (with index not enabled), you need to pay:

- Data processing fees: 100 GB * 0.026 USD/GB = 2.6 USD
- Write traffic fees of the target topic: 50 GB * 0.3 (compression ratio) * 0.032 USD/GB = 0.48 USD

- Storage fees of the target topic: 50 GB * 0.3 (compression ratio) * 0.0024 USD/GB = 0.036 USD

The total is 3.116 USD, which is generally the case for regions in the Chinese mainland. For billing details in special regions, see Product Pricing.

Use cases

For most users, data processing can achieve the following:

- Extract structured data to facilitate future operations such as search, analysis, and dashboard generation.
- Simplify logs to reduce use costs. Unnecessary logs will be discarded to reduce storage and traffic costs.
- Mask sensitive data, such as users' ID numbers and phone numbers.
- Ship logs by category. For example, logs are categorized by ERROR, WARNING, or INFO and then distributed to different log topics.

Common DSL functions

The following describes some DSL functions that are commonly used for data processing. The corresponding use cases can be viewed in **DSL Statement Generator** on the **Create Data Processing Task** > **Edit Processing Statement** page in the console. You can directly copy the sample code and modify parameters as needed for quick use.

- Extracting structured data: `ext_sep()` for extracting by separator, `ext_json` or `ext_json_jmes` for extracting by JSON, and `ext_regex()` for extracting by regular expression
- Simplifying logs: `log_drop` for discarding a line of log and `fields_drop()` for discarding log fields
- Masking sensitive data: `regex_replace()`
- Classifying logs: `t_if_else()` and `t_switch()` for determining conditions, and `log_output()` for distributing logs
- Editing fields: `fields_set()` for adding/resetting fields, and `fields_rename()` for renaming fields
- Determining the presence of a field or data in logs: `has_field()` for determining whether a field exists and `regex_match()` for determining whether certain data exists
- Comparing numerical values in logs: `op_gt()` (greater than), `op_ge()` (greater than or equal to), and `op_eq()` (equal to); functions for addition, subtraction, multiplication, and division, such as `op_mul()` for multiplication and `op_add()` for addition
- Processing text in logs: `str_uppercase()` for uppercase or lowercase switching and `str_replace()` for text replacement
- Processing time values in logs: `dt_to_timestamp()` for converting a time value to a UTC timestamp

The preceding are common DSL functions used in data processing scenarios. The DSL statement generator also provides other DSL functions for your reference. You can copy a desired function to the DSL function editing box, modify parameters, and use it.

The following describes how to create a data processing task.

Prerequisites

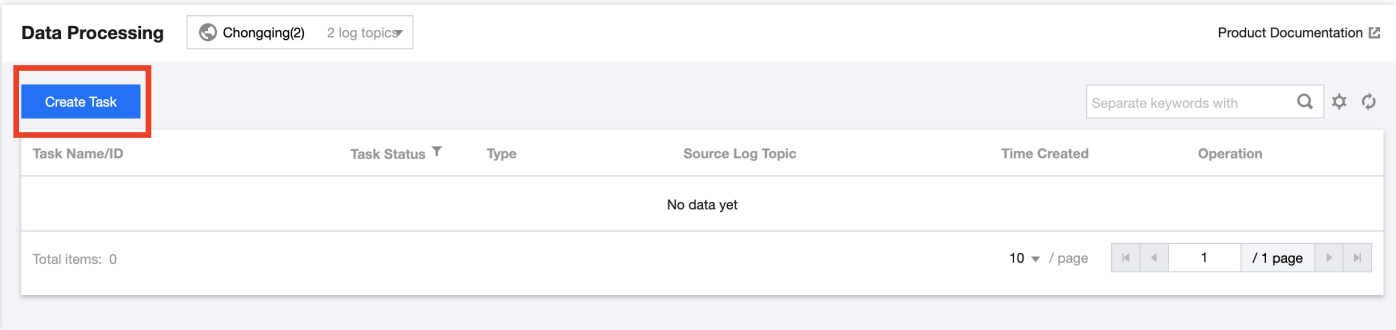
- You have activated CLS, created a source log topic, and successfully collected log data.
- You have created a target log topic, which is recommended to be empty to allow the writing of processed data.
- The current account has the permission to configure data processing tasks.

Note：

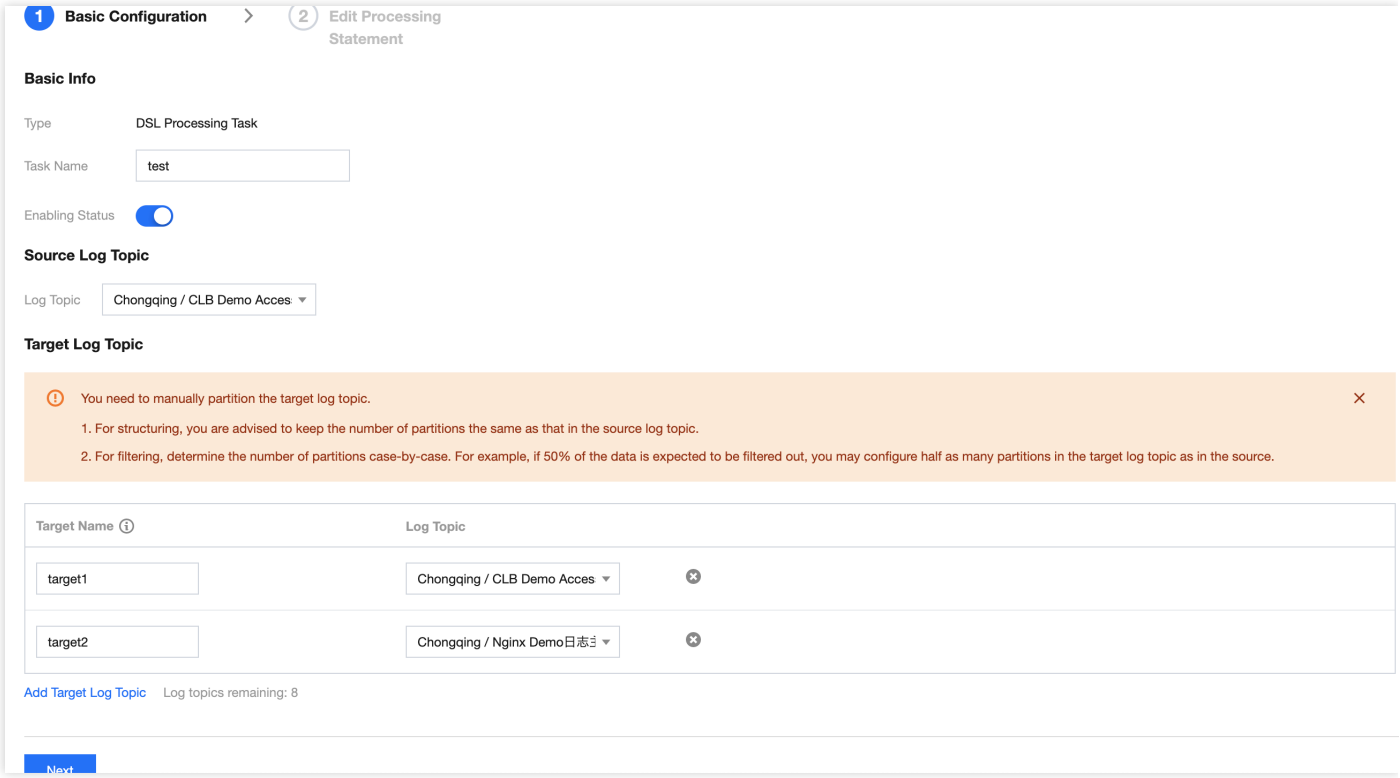
- Data processing can process only real-time log streams but not historical logs.
- If the data processing console does not automatically load raw log data, the possible cause is that your log topic does not have real-time log streams. In that case, you need to manually add custom logs in JSON format to complete writing the data processing script.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Data Processing**.
3. Click **Create Processing Task**.



4. On the **Basic Info** page, configure the following information:



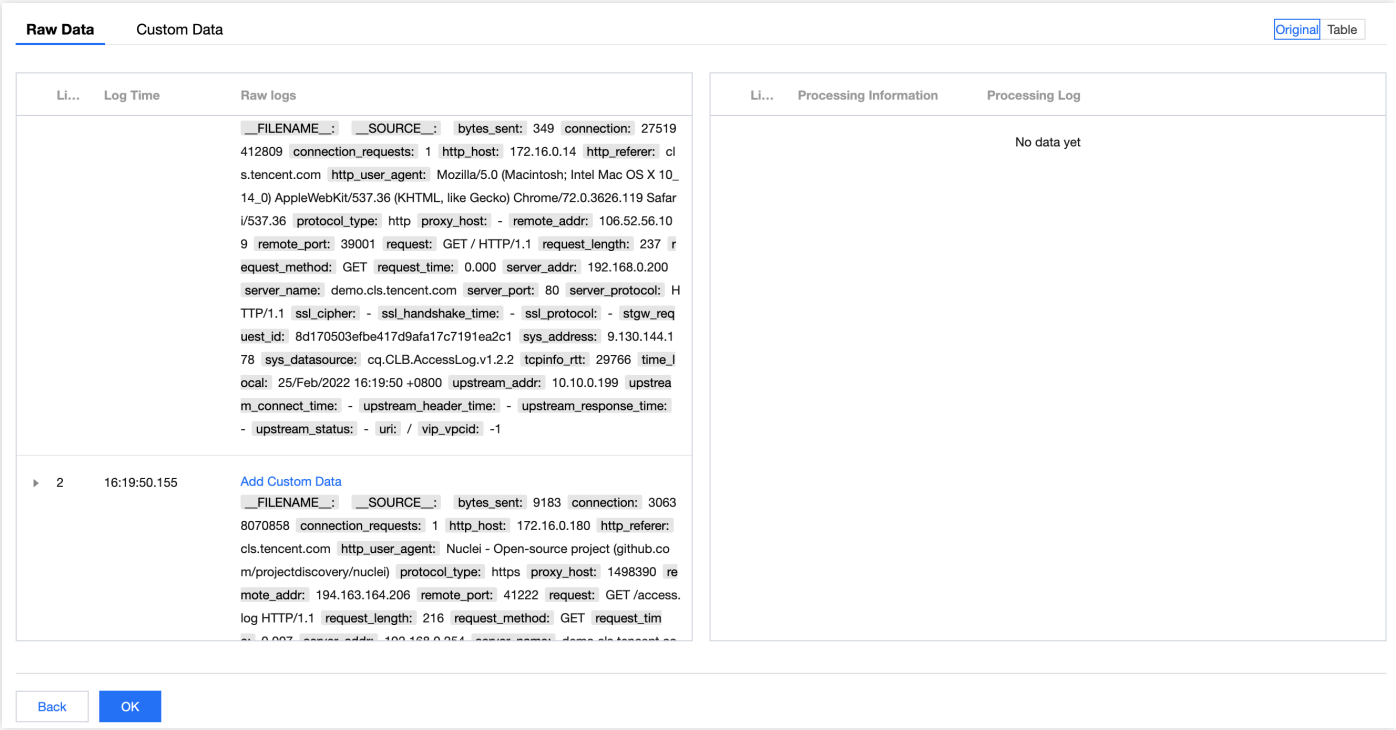
- Task Name: Enter the custom task name.
- Source Log Topic: Select the source log topic.
- Target Log Topic: Enter the target name and select the log topic. Here, the target name can be the alias of the target log topic and used as an input parameter of the written DSL function. You can configure up to ten target log topics.

5. Click **Next**.

6. On the **Edit Processing Statement** page, perform the following operations:

7. A DSL function can be tested by two types of data: raw log data and custom data. The system automatically loads raw log data, 100 records by default. If you think the raw log data is insufficient for testing the DSL function, you can directly enter custom data on the **Custom Data** tab. Alternatively, you can click **Add Custom Data** on the **Raw**

Data tab, modify the data, and use it as your custom data.



Note：

Custom data must be in JSON format.

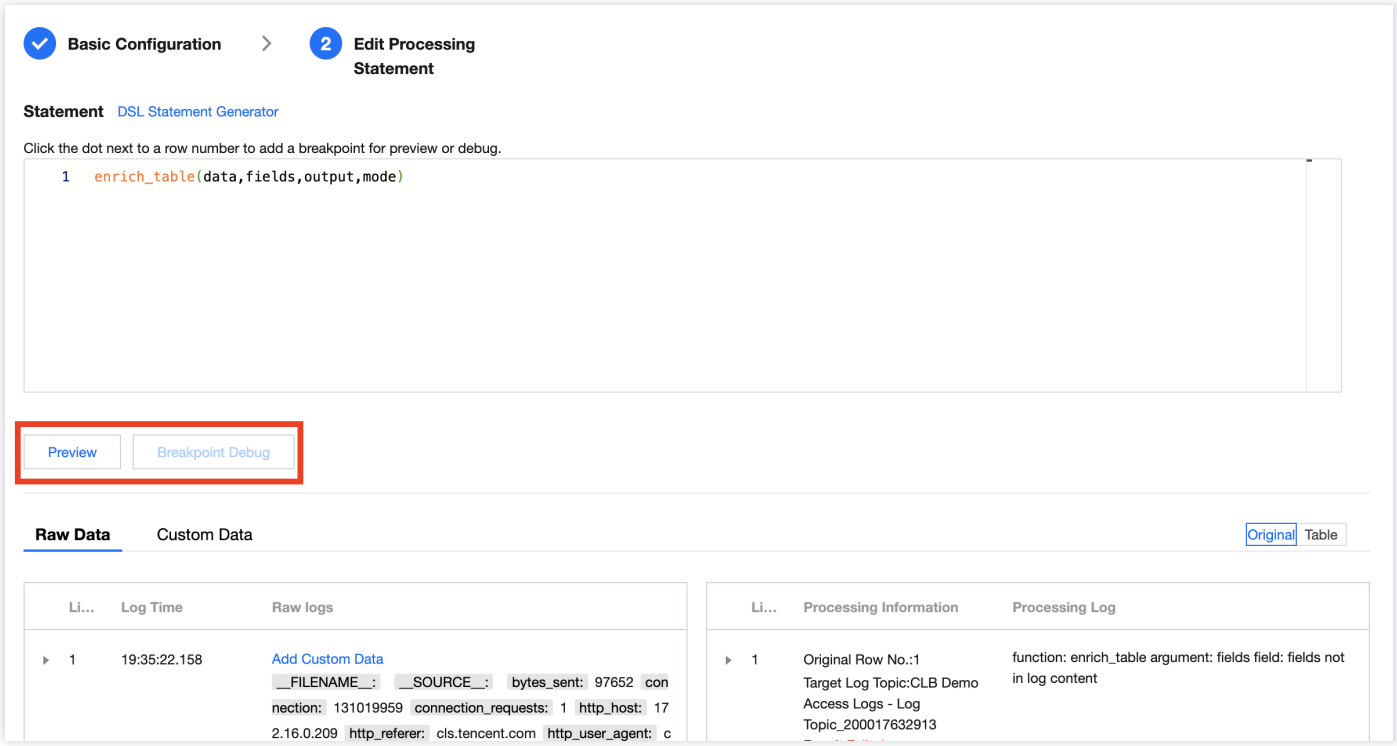
If there are multiple entries of custom data, add them in the following format:

```
[
{
"content": "2021-10-07 13: 32: 21|100|Customer not checked in|Jack|Beijing|101123199001230123|"
},
{
"content": "2021-10-07 13: 32: 21|500|Checked in successfully|Jane|Sanya|501123199001230123|"
},
{
"content": "2021-10-07 13: 32: 21|1000|Checked out|Lily|Sanya|101123196001230123|"
}
]
```

8. Click **DSL Statement Generator**.

9. In the pop-up window, select a function, and click **Insert Function**.
   The DSL statement generator provides the descriptions and examples of multiple types of functions. You can copy and paste the examples to the processing statement editing box and modify parameters as needed to write your own DSL functions. You can also refer to Processing Example to quickly understand how to write a DSL function.

0. After writing the DSL processing statement, click **Preview** or **Checkpoint Debugging** to run and debug the DSL function.
   The running result will be displayed at the bottom right of the page. You can adjust the DSL statement according to the running result until it meets your requirements.



1. Click **OK** to submit the data processing task.

Viewing Data Processing Details

Last updated：2022-03-08 14:03:27

Overview

The data processing details page displays the number of lines of logs are processed, processing results, and failure causes. The following describes how to enter the data processing details page to view the processing content of a processing task.

Directions

Viewing task execution details

1. Log in to the CLS console.
2. On the left sidebar, click **Data Processing** to enter the data processing management page.
3. Click the ID/name of the target processing task to enter the task details page.
4. Click the **Execution Details** tab. On the tab page, you can view the task execution details by time segment.
   Task execution details are collected in a statistical period of 10 minutes and include the numbers of input lines, output lines, and failed lines of log data processing. If the execution details include a failure, you can click **View Failure Details** to view the failure details.

Viewing basic task information

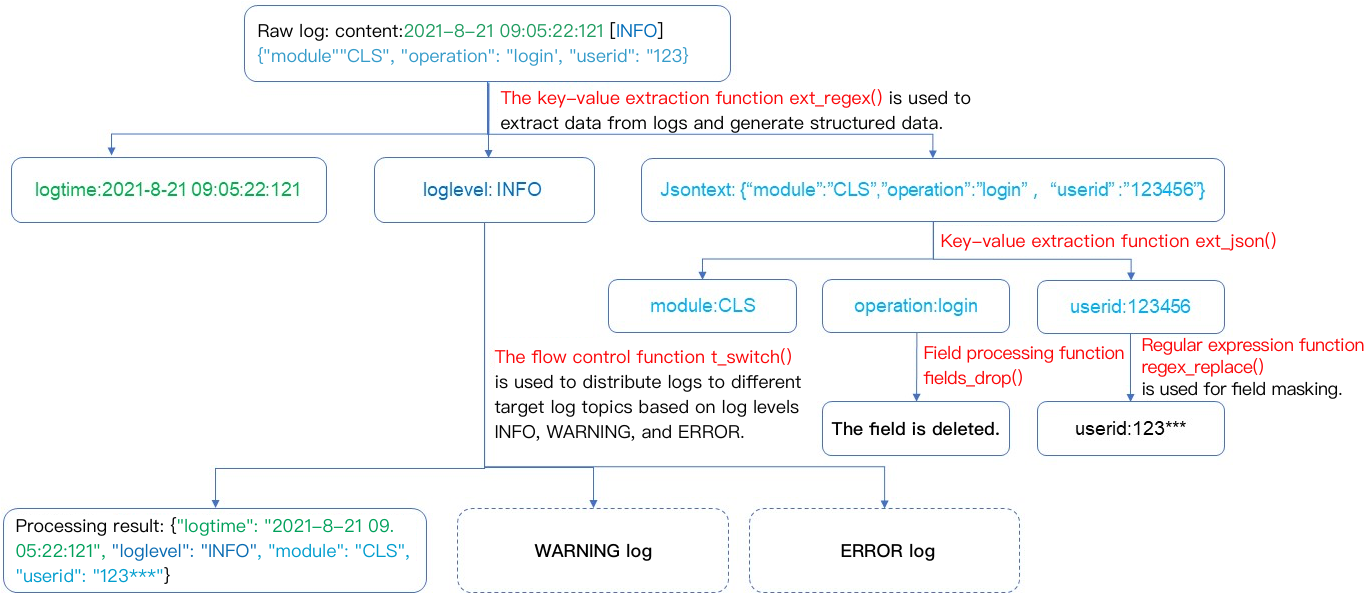
1. Log in to the CLS console.
2. On the left sidebar, click **Data Processing** to enter the data processing management page.
3. Click the ID/name of the target processing task to enter the task details page.
4. Click the **Basic Info** tab. On the tab page, you can view the task's basic configuration, source log topic, target log topic, and processing statement.
   In addition, you can click the target log topic to enter the index analysis page. (You can view the data of the target log topic only when index configuration is enabled.)

Data Processing Functions
Function Overview

Last updated：2022-04-19 16:22:14

CLS's data processing functions can be flexibly combined and used to cleanse, structure, filter, distribute, mask log data and more.
The figure below shows how a log containing JSON data is processed: the log data is processed and transformed into structured data, and then a field in the log is masked before the processed log is distributed.

DSL Data Processing Principle



The following is an overview of data processing functions.

- **Key-value extraction functions**: extracting field-value pairs from log text

Function	Description	Syntax Description	Return Value Type
ext_sep	Extracts field value content based on a separator.	ext_sep("Source field name", "Target field 1,Target field 2,Target field...", sep="Separator", quote="Non-segmentation part"", restrict=False, mode="overwrite")	Log after extraction (LOG)

ext_sepstr	Extracts field value content based on specified characters (string).	ext_sepstr("Source field name","Target field 1,Target field 2,Target field...", sep="abc", restrict=False, mode="overwrite")	Log after extraction (LOG)
ext_json	Extracts field values from JSON data.	Log after extraction (LOG) ext_json("Source field name",prefix="",suffix="",format="full",exclude_node="JSON nodes not to expand")	Log after extraction (LOG)
ext_json_jmes	Extracts a field value based on a JMES expression.	ext_json_jmes("Source field name", jmes= "JSON extraction expression", output="Target field", ignore_null=True, mode="overwrite")	Log after extraction (LOG)
ext_kv	Extracts key-value pairs by using two levels of separators.	ext_kv("Source field name", pair_sep=r"\s", kv_sep="=", prefix="", suffix="", mode="fill-auto")	Log after extraction (LOG)
ext_regex	Extracts the value of a field by using a regular expression.	ext_regex("Source field name", regex="Regular expression", output="Target field 1,Target field 2,Target field.....", mode="overwrite")	Log after extraction (LOG)

- **Enrichment functions**: adding fields to existing fields according to rules

Function	Description	Syntax Description	Return Value Type
enrich_table	Uses CSV structure data to match fields in logs and, when matched fields are found, the function adds other fields and values in the CSV data to the source logs.	enrich_table("CSV source data", "CSV enrichment field", output="Target field 1,Target field 2,Target field....", mode="overwrite")	Mapped log (LOG)

enrich_dict	Uses dict structure data to match a field value in a log. If the specified field and value match a key in the dict structure data, the function assigns the value of the key to another field in the log.	enrich_dict("JSON dictionary", "Source field name", output=Target field name, mode="overwrite")	Mapped log (LOG)

- **Flow control functions**: condition determination

Function	Description	Syntax Description	Return Value Type
compose	Combines multiple operation functions. Providing combination capabilities similar to those of branch code blocks, this function can combine multiple operation functions and execute them in sequence. It can be used in combination with branches and output functions.	compose("Function 1","Function 2", ...)	Log (LOG)
t_if	Executes a corresponding function if a condition is met and does not perform any processing if the condition is not met.	t_if("Condition", Function)	Log (LOG)
t_if_not	Executes a corresponding function if a condition is not met and does not perform any processing if the condition is met.	t_if_not("Condition",Function)	Log (LOG)
t_if_else	Executes a function based on the evaluation result of a condition.	t_if_else("Condition", Function 1, Function 2)	Log (LOG)
t_switch	Executes different functions depending on whether branch conditions are met. If	t_switch("Condition 1", Function 1, "Condition 2", Function 2, ...)	Log (LOG)

	all conditions are not met, the data is deleted.		

- **Row processing functions**: log distribution, deletion, and splitting

Function	Description	Syntax Description	Return Value Type
log_output	Outputs a row of log to a specified log topic. This function can be used independently or together with branch conditions.	log_output(Log topic alias) (The alias here is the target log topic alias specified when the data processing task is created.)	No return value
log_split	Splits a row of log into multiple rows of logs based on the value of a specified field by using a separator and JMES expression.	log_split(Field name, sep=",", quote="\"", jmes="", output="")	Log (LOG)
log_drop	Deletes logs that meet a specified condition.	log_drop(Condition 1)	Log (LOG)
log_keep	Retains logs that meet a specified condition.	log_keep(Condition 1)	Log (LOG)

- **Field processing functions**: field Create/Read/Update/Delete/Rename

Function	Description	Syntax Description	Return Value Type
fields_drop	Deletes the fields that meet a specified condition.	fields_drop(Field name 1, Field name 2, ..., regex=False,nest=False)	Log (LOG)
fields_keep	Retains the fields that meet a specified condition.	fields_keep(Field name 1, Field name 2, ..., regex=False)	Log (LOG)
fields_pack	Matches field names based on a regular expression and encapsulates the matched fields into a new field whose value is in JSON format.	fields_pack(Target field name, include=".*", exclude="", drop_packed=False)	Log (LOG)
fields_set	Sets field values or adds	fields_set(Field name 1, Field value 1,	Log (LOG)

	fields.	Field name 2, Field value 2, mode="overwrite")	
fields_rename	Renames fields.	fields_rename(Field name 1, New field name 1, Field name 2, New field name 2, regex=False)	Log (LOG)
has_field	If the specified field exists, returns `True`. Otherwise, returns `False`.	has_field(Field name)	Condition value (BOOL)
not_has_field	If the specified field does not exist, returns `True`. Otherwise, returns `False`.	not_has_field(Field name)	Condition value (BOOL)
v	Gets the value of a specified field and returns the corresponding string.	v(Field name)	Value string type (STRING)

- **Value structuring functions**: JSON data processing

Function	Description	Syntax Description	Return Value Type
json_select	Extracts a JSON field value with a JMES expression and returns the JSON string of the extraction result.	json_select(v(Field name), jmes="")	Value string type (STRING)
xml_to_json	Parses and converts an XML-formatted value to a JSON string. The input value must be an XML string. Otherwise, a conversion exception will occur.	xml_to_json(Field value)	Value string type (STRING)
json_to_xml	Parses and converts a JSON string value to an XML string.	json_to_xml(Field value)	Value string type (STRING)
if_json	Checks whether a value is a JSON string.	if_json(Field value)	Condition value (BOOL)

- **Regular expression functions**: matching and replacing characters in text by using regular expressions

Function	Description	Syntax Description	Return Value Type
regex_match	Matches data in full or partial match mode based on a regular expression and returns whether the match is successful.	regex_match(Field value, regex="", full=True)	Condition value (BOOL)
regex_select	Matches data based on a regular expression and returns the corresponding partial match result. You can specify the sequence number of the matched expression and the sequence number of the group to return (partial match + sequence number of the specified matched group). If no data is matched, an empty string is returned.	regex_select(Field value, regex="", index=1, group=1)	Value string type (STRING)
regex_split	Splits a string and returns a JSON array of the split strings (partial match).	regex_split(Field value, regex=\"\", limit=100)	Value string type (STRING)
regex_replace	Matches data based on a regular expression and replaces the matched data (partial match).	regex_replace(Field value, regex="", replace="", count=0)	Value string type (STRING)
regex_findall	Matches data based on a regular expression and returns a JSON array of the matched data (partial match).	regex_findall(Field value, regex="")	Value string type (STRING)

- **Date value processing functions**

Function	Description	Syntax Description	Return Value Type
dt_str	Converts a time field value (a date string in a	dt_str(Value, format="Formatted string", zone="")	STRING

	specific format or timestamp) to a target date string of a specified time zone and format.		
dt_to_timestamp	Converts a time field value (a date string in a specified format; time zone specified) to a UTC timestamp.	dt_to_timestamp(Value, zone="")	STRING
dt_from_timestamp	Converts a timestamp field value to a time string in the specified time zone.	dt_from_timestamp(Value, zone="")	STRING
dt_now	Obtains the current datetime of the processing calculation.	dt_now(format="Formatted string", zone="")	STRING

- **String processing functions**

Function	Description	Syntax Description	Return Value Type
str_count	Searches for a substring in a specified range of a value and returns the number of occurrences of the substring.	str_count(Value, sub="", start=0, end=-1)	INT
str_len	Returns the length of a string.	str_len(Value)	INT
str_uppercase	Converts a string to uppercase.	str_uppercase(Value)	STRING
str_lowercase	Converts a string to lowercase.	str_lowercase(Value)	STRING
str_join	Concatenates input values by using a concatenation string.	str_join(Concatenation string 1, Value 1, Value 2, ...)	STRING
str_replace	Replaces an old string with a new string.	str_replace(Value, old="", new="", count=0)	STRING

str_format	Formats strings.	str_format(Formatting string, Value 1, Value 2, ...)	STRING
str_strip	Deletes specified characters from a string concurrently from the start and end of the string, and returns the remaining part.	str_strip(Value, chars="\t\r\n")	STRING
str_lstrip	Deletes specified characters from a string from the start of the string, and returns the remaining part.	str_strip(Value, chars="\t\r\n")	STRING
str_rstrip	Deletes specified characters from a string from the end of the string, and returns the remaining part.	str_strip(Value, chars="\t\r\n")	STRING
str_find	Checks whether a string contains a specified substring and returns the position of the first occurrence of the substring in the string.	str_find(Value, sub="", start=0, end=-1)	INT
str_start_with	Checks whether a string starts with a specified prefix.	str_start_with(Value, sub="", start=0, end=-1)	BOOL
str_end_with	Checks whether a string ends with a specified prefix.	str_end_with(Value, sub="", start=0, end=-1)	BOOL

- **Logical expression functions**

Function	Description	Syntax Description	Return Value Type
op_if	Returns a value based on a specified condition.	op_if(Condition 1, Value 1, Value 2)	If the condition is met, value 1 is returned. Otherwise, value 2 is returned.

op_ifnull	Returns the first non-null and non-empty result value.	op_ifnull(Value 1, Value 2, ...)	First non-null result value in the parameter
op_and	Performs the AND operation on values. If all the specified parameter values are evaluated to true, `True` is returned. Otherwise, `False` is returned.	op_and(Value 1, Value 2, ...)	BOOL
op_or	Performs the OR operation on values. If one or more of the specified parameter values are evaluated to false, `False` is returned. Otherwise, `True` is returned.	op_or(Value 1, Value 2, ...)	BOOL
op_not	Performs the NOT operation on values.	op_not(Value)	BOOL
op_eq	Compares two values. If the values are equal, `True` is returned.	op_eq(Value 1, Value 2)	BOOL
op_ge	Compares two values. If `Value 1` is greater than or equal to `Value 2`, `True` is returned.	op_ge(Value 1, Value 2)	BOOL
op_gt	Compares two values. If `Value 1` is greater than `Value 2`, `True` is returned.	op_gt(Value 1, Value 2)	BOOL
op_le	Compares two values. If `Value 1` is less than or equal to `Value 2`, `True` is returned.	op_le(Value 1, Value 2)	BOOL
op_lt	Compares two values. If `Value 1` is less than `Value 2`, `True` is returned.	op_lt(Value 1, Value 2)	BOOL
op_add	Returns the sum of two specified values.	op_add(Value 1, Value 2)	Calculation result
op_sub	Returns the difference	op_sub(Value 1, Value 2)	Calculation result

	between two specified values.		
op_mul	Returns the product of two specified values.	op_mul(Value 1, Value 2)	Calculation result
op_div	Returns the quotient of two specified values.	op_div(Value 1, Value 2)	Calculation result
op_sum	Returns the sum of multiple specified values.	op_sum(Value 1, Value 2, ...)	Calculation result
op_mod	Returns the remainder of a specified value divided by the other specified value.	op_mod(Value 1, Value 2)	Calculation result

- **Type conversion functions**

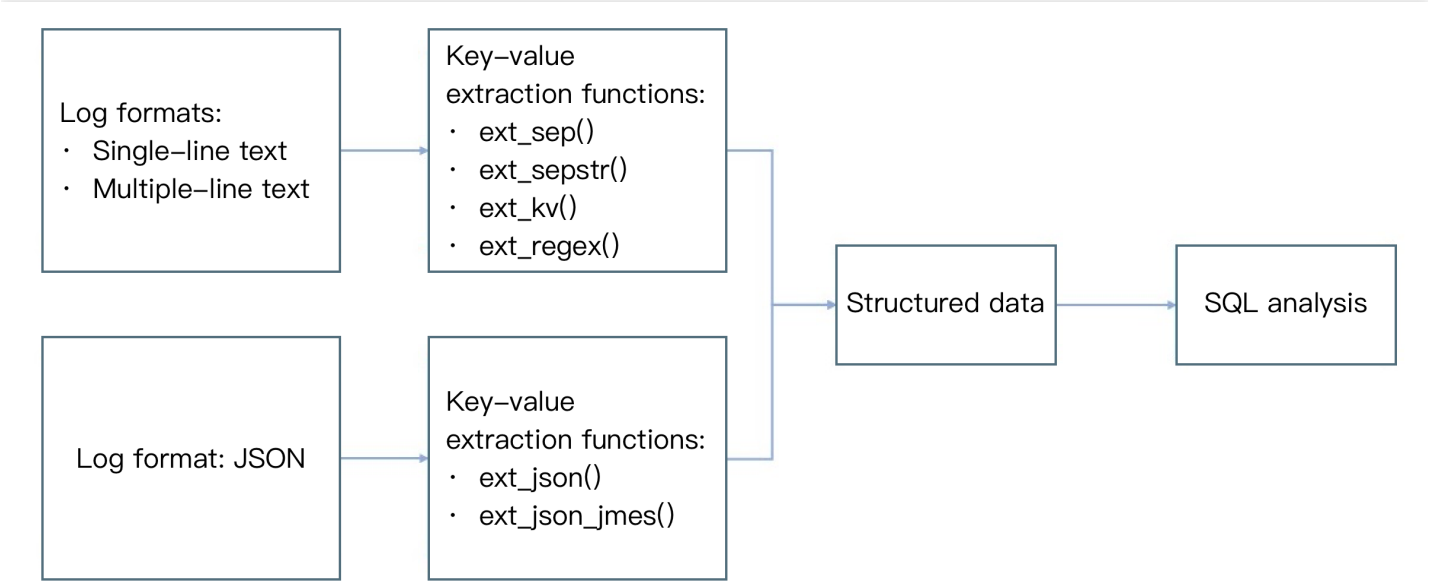
Function	Description	Syntax Description	Return Value Type
ct_int	Converts a value (whose base can be specified) to a decimal integer.	ct_int(Value 1, base=10)	Calculation result
ct_float	Converts a value to a floating-point number.	ct_float(Value)	Calculation result
ct_str	Converts a value to a string.	ct_str(Value)	Calculation result
ct_bool	Converts a value to a Boolean value.	ct_bool(Value)	Calculation result

Key-Value Extraction Functions

Last updated：2022-10-28 15:09:09

Overview

The figure below shows the common use cases of key-value extraction functions. After key-value extraction, logs are processed into structured data, which can be used for SQL analysis.



Function ext_sep()

Function definition

This function is used to extract field value content based on a separator (single character).

Syntax description

```
ext_sep("Source field name", "Target field 1,Target field 2,Target field...", sep
="Separator", quote="Non-segmentation part"", restrict=False, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	Name of an existing field in the user log
output	A single field name or multiple new field names concatenated with commas	string	Yes	-	-
sep	Separator	string	No	,	Any single character
quote	Characters that enclose the value	string	No	-	-
restrict	Handling mode when the number of extracted values is inconsistent with the number of target fields entered by the user: True: Ignore the extraction function and do not perform any extraction processing. False: Try to match the first few fields	bool	No	False	-
mode	Write mode of the new field	string	No	overwrite	-

Examples

- Example 1. Extract values from logs by using a comma as the separator

  Raw log:

```
{"content": "hello Go,hello Java,hello python"}
```

Processing rule:

```
// Use a comma as the separator to divide the `content` field into three parts, corresponding to the `f1`, `f2`, and `f3` fields separately.
ext_sep("content", "f1, f2, f3", sep=",", quote="", restrict=False, mode="overwrite")
// Delete the `content` field.
fields_drop("content")
```

Processing result:

```
{"f1":"hello Go","f2":"hello Java","f3":"hello python"}
```

- Example 2. Process the `content` string as a whole by using `quote`

  Raw log:

  ```
  {"content": " Go,%hello ,Java%,python"}
  ```

Processing rule:

```
ext_sep("content", "f1, f2", quote="%", restrict=False)
```

Processing result:

```
// Though `%hello ,Java%` does contain a comma, it does not participate in separa
tor extraction as a whole.
{"content":" Go,%hello ,Java%,python","f1":" Go","f2":"hello ,Java"}
```

- Example 3: `restrict=True` indicates the number of divided values is different from the target fields, the function is not executed.

  Raw log:

  ```
  {"content": "1,2,3"}
  ```

Processing rule:

```
ext_sep("content", "f1, f2", restrict=True)
```

Processing result:

```
{"content":"1,2,3"}
```

Function ext_sepstr()

Function definition

This function is used to extract field value content based on multiple characters (string).

Syntax description

```
ext_sepstr("Source field name","Target field 1,Target field 2,Target field...", s
ep="abc", restrict=False, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	Name of an existing field in the user log
output	A single field name or multiple new field names concatenated with commas	string	Yes	-	-
sep	Separator (string)	string	No	,	-
restrict	Handling mode when the number of extracted values is inconsistent with the number of target fields entered by the user: True: Ignore the extraction function and do not perform any extraction processing. False: Try to match the first few fields	bool	No	False	-
mode	Write mode of the new field	string	No	overwrite	-

Examples

Raw log:

```
{"message":"1##2##3"}
```

Processing rule:

```
// Use "##" as the separator to extract key-values.
ext_sepstr("message", "f1,f2,f3,f4", sep="##")
```

Processing result:

```
// If the number of target fields is greater than the number of divided values,
`""` is returned for the excessive fields.
```

```
{"f1":"1","f2":"2","message":"1##2##3","f3":"3","f4":""}
```

Function ext_json()

Function definition

This function is used to extract field values from JSON data.

Syntax description

```
ext_json("Source field name",prefix="",suffix="",format="full",exclude_node="JSON nodes not to expand")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	-
prefix	Prefix of the new field	string	No	-	-
suffix	Suffix of the new field	string	No	-	-
format	`full` : The field name format is in full path format (parent + sep + prefix + key + suffix). `simple` : Non-full path format (prefix + key + suffix)	string	No	simple	-
sep	Concatenation character, used to concatenate node names	string	No	#	-
depth	Depth to which the function expands the source field, beyond which nodes will not be expanded any more	number	No	100	1-500
expand_array	Whether to expand an array node	bool	No	False	-
include_node	Allowlist of node names that match the specified regular expression	string	No	-	-
exclude_node	Blocklist of node names that match the specified regular expression	string	No	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
include_path	Allowlist of node paths that match the specified regular expression	string	No	-	-
exclude_path	Blocklist of node paths that match the specified regular expression	string	No	-	-
retain	Retains some special symbols without escaping them, such as \n and \t.	string	No	-	-
escape	Whether to escape data. Default value: `True`. If special symbols are contained, escaping cannot be performed.	bool	No	True	-

Examples

- Example 1. Extract the key-values of all nodes and construct new fields based on the extracted values. The example log is multi-level nesting, but the extraction does not distinguish hierarchy.
  Raw log:

```
{
"data": "{ \"k1\": 100, \"k2\": { \"k3\": 200, \"k4\": { \"k5\": 300}}}"
}
```

Processing rule:

```
ext_json("data")
```

Processing result:

```
{"data":"{ \"k1\": 100, \"k2\": { \"k3\": 200, \"k4\": { \"k5\": 300}}}","k1":"100","k3":"200","k5":"300"}
```

- Example 2. Perform extraction excluding `sub_field1`
  Raw log:

```
{"content": "{\"sub_field1\":1,\"sub_field2\":\"2\"}"}
```

Processing rule:

```
// `exclude_node=subfield1` indicates not to extract the node.
ext_json("content", format="full", exclude_node="sub_field1")
```

Processing result:

```
{"sub_field2":"2","content":"{\"sub_field1\":1,\"sub_field2\":\"2\"}"}
```

- Example 3. Add `prefix` to subnodes

  Raw log:

  ```
  {"content": "{\"sub_field1\":{\"sub_sub_field3\":1},\"sub_field2\":\"2\"}"}
  ```

Processing rule 1:

```
// When `sub_field2` is extracted, the prefix `udf\_` is automatically added to i
t, making it `udf\_\_sub\_field2`.
ext_json("content", prefix="udf_", format="simple")
```

Processing result 1:

```
{"content":"{\"sub_field1\":{\"sub_sub_field3\":1},\"sub_field2\":\"2\"}","udf_su
b_field2":"2","udf_sub_sub_field3":"1"}
```

Processing rule 2:

```
// `format=full` indicates to retain the hierarchy of the extracted field name. W
hen `sub_field2` is extracted, the name of its parent node is automatically to it
, making it `#content#__sub_field2`.
ext_json("content", prefix="__", format="full")
```

Processing result 2:

```
{"#content#__sub_field2":"2","#content#sub_field1#__sub_sub_field3":"1","content"
:"{\"sub_field1\":{\"sub_sub_field3\":1},\"sub_field2\":\"2\"}"}
```

- Example 4. Support special symbols

  Raw log 1:

  ```
  {"content": "{\"sub_field1\":1,\"sub_field2\":\"\\n2\"}"}
  ```

Processing rule 1:

```
ext_json("content",retain="\n")
```

Processing result 1:

```
{"sub_field2":"\\n2","content":"{\"sub_field1\":1,\"sub_field2\":\"\\n2\"}","sub_
field1":"1"}
```

Raw log 2:

```
{"content": "{\"sub_field1\":1,\"sub_field2\":\"\\n2\\t\"}"}
```

Processing rule 2:

```
ext_json("content",retain="\n,\t")
```

Processing result 2:

```
{"sub_field2":"\\n2\\t","content":"{\"sub_field1\":1,\"sub_field2\":\"\\n2\\t\"}"
,"sub_field1":"1"}
```

- Example 5. Specify whether to escape

  Raw log:

  ```
  {"message":"{\"ip\":\"183.6.104.157\",\"params\":\"[{\\\"tokenType\\\":\\\"RESE
  RVED30\\\",\\\"otherTokenInfo\\\":{\\\"unionId\\\":\\\"123\\\"},\\\"unionId\\\"
  :\\\"adv\\\"}]\"}"}
  ```

Processing rule:

```
ext_json("message", escape=False)
fields_drop("message")
```

Processing result:

```
{"ip":"183.6.104.157", "params":"[{\"tokenType\":\"RESERVED30\",\"otherTokenInfo
\":{\"unionId\":\"123\"},\"unionId\":\"adv\"}]"}
```

Function ext_json_jmes()

Function definition

This function is used to extract field values from JSON data.

Syntax description

```
ext_json_jmes("Source field name", jmes= "JSON extraction expression", output="Target field", ignore_null=True, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	-
jmes	JMES expression. For more information, see JMESPath.	string	Yes	-	-
output	Output field name. Only a single field is supported.	string	Yes	-	-
ignore_null	Whether to ignore a node whose value is null. The default value is `True`, ignoring fields whose value is null. Otherwise, an empty string is returned.	bool	No	True	-
mode	Write mode of the new field. Default value: `overwrite`	string	No	overwrite	-

Examples

- Example 1. Extract only one node from multi-layer JSON data

  Raw log:

  ```
  {"content": "{\"a\":{\"b\":{\"c\":{\"d\":\"value\"}}}}"}
  ```

Processing rule:

```
// `jmes="a.b.c.d"` means to extract the value of `a.b.c.d`.
ext_json_jmes("content", jmes="a.b.c.d", output="target")
```

Processing result:

```
{"content":"{\"a\":{\"b\":{\"c\":{\"d\":\"value\"}}}}","target":"value"}
```

- Example 2

  Raw log:

```
{"content": "{\"a\":{\"b\":{\"c\":{\"d\":\"value\"}}}}"}
```

Processing rule:

```
// `jmes="a.b.c.d"` means to extract the value of `a.b.c`.
ext_json_jmes("content", jmes="a.b.c", output="target")
```

Processing result:

```
{"content":"{\"a\":{\"b\":{\"c\":{\"d\":\"value\"}}}}","target":"{\"d\":\"value\"}"}
```

Function ext_regex()

Function definition

This function is used to extract the value of a field by using a regular expression.

Syntax description

```
ext_regex("Source field name", regex="Regular expression", output="Target field 1,Target field 2,Target field.......", mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	-
regex	Regular expression. If the expression contains a special character, escaping is required. Otherwise, syntax error is reported.	string	Yes	-	-
output	A single field name or multiple new field names concatenated with commas	string	No	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
mode	Write mode of the new field. Default value: `overwrite`	string	No	overwrite	-

Examples

- Example 1. Match digits

  Raw log:

```
{"content": "1234abcd5678"}
```

Processing rule:

```
ext_regex("content", regex="\d+", output="target1,target2")
```

Processing result:

```
{"target2":"5678","content":"1234abcd5678","target1":"1234"}
```

- Example 2. The regular expression contains named capturing group, and some field values are automatically filled

  Raw log:

```
{"content": "1234abcd"}
```

Processing rule:

```
ext_regex("content", regex="(?<target1>\d+)(.*)", output="target2")
```

Processing result:

```
{"target2":"abcd","content":"1234abcd","target1":"1234"}
```

Function ext_kv()

Function definition

This function is used to extract key-value pairs by using two levels of separators.

Syntax description

```
ext_kv("Source field name", pair_sep=r"\s", kv_sep="=", prefix="", suffix="", mode="fill-auto")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	-
pair_sep	Level-1 separator, separating multiple key-value pairs	string	Yes	-	-
kv_sep	Level-2 separator, separating keys and values	string	Yes	-	-
prefix	Prefix of the new field	string	No	-	-
suffix	Suffix of the new field	string	No	-	-
mode	Write mode of the new field. Default value: `overwrite`	string	No	-	-

Examples

The raw log contains two levels of separators: "|" and "=".

Raw log:

```
{"content": "a=1|b=2|c=3"}
```

Processing rule:

```
ext_kv("content", pair_sep="|", kv_sep="=")
```

Processing result:

```
{"a":"1","b":"2","c":"3","content":"a=1|b=2|c=3"}
```

Function ext_first_notnull()

Function definition

This function is used to return the first non-null and non-empty result value.

Syntax description

```
ext_first_notnull(value 1, value 2, ...)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
Variable parameter list	Parameters or expressions that participate in the calculation	string	Yes	-	-

Examples

Raw log:

```
{"data1": null, "data2": "", "data3": "first not null"}
```

Processing rule:

```
fields_set("result", ext_first_notnull(v("data1"), v("data2"), v("data3")))
```

Processing result:

```
{"result":"first not null","data3":"first not null","data2":"","data1":"null"}
```

Enrichment Functions

Last updated：2022-04-19 16:22:14

Function enrich_table

Function definition

This function uses CSV structure data to match fields in logs and, when matched fields are found, the function adds other fields and values in the CSV data to the source logs.

Syntax description

```
enrich_table(CSV data string, CSV column name string, output=Target field name or list, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Input CSV data, where the first row is column names and the rest rows are corresponding values. Example: region,count\nbj, 200\ngz, 300	string	Yes	-	-
fields	Column name to match. If the field name in the CSV data is the same as the field with the same name in the log, the matching is successful. The value can be a single field name or multiple new field names concatenated with commas.	string	Yes	-	-
output	Output field list. The value can be a single field name or multiple new field names concatenated with commas.	string	Yes	-	-
mode	Write mode of the new field. Default value: `overwrite`	string	No	overwrite	-

Example

Raw log:

```
{"region": "gz"}
```

Processing rule:

```
enrich_table("region,count\nbj,200\ngz,300", "region", output="count")
```

Processing result:

```
{"count":"300","region":"gz"}
```

Function enrich_dict

Function definition

This function uses dict structure data to match a field value in a log. If the specified field and value match a key in the dict structure data, the function assigns the value of the key to another field in the log.

Syntax description

```
enrich_dict(Dict data string, Source field name, output=Target field, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Input dict data, which must be the escaped string of a JSON object. Example: enrich_dict("{"200":"SUCCESS","500":"FAILED"}", "status", output="message")	string	Yes	-	-
fields	Field name to match. If the value of the key in the dict data is the same as the value of the specified field, the matching is successful. The value can be a single field name or multiple new field names concatenated with commas.	string	Yes	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
output	Target field list. After successful matching, the function writes the corresponding values in the dict data to the target field list. The value can be a single field name or multiple new field names concatenated with commas.	string	Yes	-	-
mode	Write mode of the new field.	string	No	overwrite	-

Example

Raw log:

```
{"status": "500"}
```

Processing rule:

```
enrich_dict("{\"200\":\"SUCCESS\",\"500\":\"FAILED\"}", "status", output="messag
e")
```

Processing result:

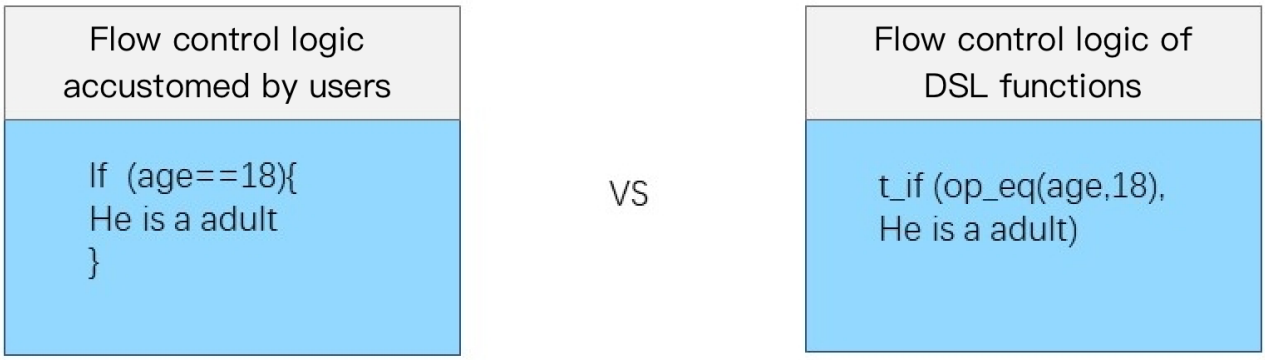
```
{"message":"FAILED","status":"500"}
```

Flow Control

Last updated：2022-04-19 16:22:15

Overview

The writing method of the flow control logic in commonly used programming languages is different from that in DSL functions. See the figure below.



Function compose

Function definition

This function is used to combine multiple operation functions. Providing combination capabilities similar to those of branch code blocks, this function can combine multiple operation functions and execute them in sequence. It can be used in combination with branches and output functions.

Syntax description

```
compose(Function 1,Function 2, ...)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter, function	The parameter must be a function whose return value type is LOG.	string	At least one function parameter	-	-

Example

- Example 1. Call functions in sequence, executing the `enrich` function first and then the `fields_set` function

  Raw log:

```
{"status": "500"}
```

Processing rule:

```
// 1. `enrich` function: use the data in `dict` to enrich the raw log, where `sta
tus` is `500`, and generate a field (field `message` with value `Failed`) after t
he enrichment.
//2. `fields_Set` function: add a field `new` and assign value `1` to it.
compose(enrich_dict("{\"200\":\"SUCCESS\",\"500\":\"FAILED\"}", "status", output
="message"), fields_set("new", 1))
```

Processing result:

```
// The final log contains 3 fields:
{"new":"1","message":"FAILED","status":"500"}
```

- Example 2

  Raw log:

```
{"status": "500"}
```

Processing rule:

```
compose(fields_set("new", 1))
```

Processing result:

```
{"new":"1","status":"500"}
```

- Example 3

  Raw log:

```
{"condition1": 0,"condition2": 1, "status": "500"}
```

Processing rule:

```
t_if_else(v("condition2"), compose(fields_set("new", 1),log_output("target")), log_output("target2"))
```

Processing result, `target` output:

```
{"new":"1","condition1":"0","condition2":"1","status":"500"}
```

Function t_if

Function definition

This function is used to execute a corresponding function if a condition is met and does not perform any processing if the condition is not met.

Syntax description

```
t_if(Condition 1, Function 1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
condition	Function expression whose return value is of bool type	bool	Yes	-	-
function	Function expression whose return value is of LOG type	string	Yes	-	-

Example

- Example 1

  Raw log:

```
{"condition": 1, "status": "500"}
```

Processing rule:

```
t_if(True, fields_set("new", 1))
```

Processing result:

```
{"new":"1","condition":"1","status":"500"}
```

- Example 2

  Raw log:

  ```
  // If the value of `condition` is `1` (true), add a field `new` and assign valu
  e `1` to it.
  {"condition": 1, "status": "500"}
  ```

Processing rule:

```
t_if(v("condition"), fields_set("new", 1))
```

Processing result:

```
{"new":"1","condition":"1","status":"500"}
```

Function t_if_not

Function definition

This function is used to execute a corresponding function if a condition is not met and does not perform any processing if the condition is met.

Syntax description

```
t_if_not(Condition 1, Function 1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
condition	Function expression whose return value is of bool type	bool	Yes	-	-
function	Function expression whose return value is of LOG type	string	Yes	-	-

Example

Raw log:

```
{"condition": 0, "status": "500"}
```

Processing rule:

```
t_if_not(v("condition"), fields_set("new", 1))
```

Processing result:

```
{"new":"1","condition":"0","status":"500"}
```

Function t_if_else

Function definition

This function is used to execute a function based on the evaluation result of a condition.

Syntax description

```
t_if_else("Condition 1", Function 1, Function 2)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
condition	Function expression whose return value is of bool type	bool	Yes	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
function	Function expression whose return value is of LOG type	string	Yes	-	-
function	Function expression whose return value is of LOG type	string	Yes	-	-

Example

Raw log:

```
{"condition": 1, "status": "500"}
```

Processing rule:

```
t_if_else(v("condition"), fields_set("new", 1), fields_set("new", 2))
```

Processing result:

```
{"new":"1","condition":"1","status":"500"}
```

unction t_switch

Function definition

This function is used to execute different functions depending on whether branch conditions are met. If all conditions are not met, the data is deleted.

Syntax description

```
t_switch("Condition 1", Function 1, "Condition 2", Function 2, ...)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter, which is a list of condition-function expression pairs	Similar to a combination of multiple t_if functions. For more information, see Function t_if.	-	-	-	-

Example

Raw log:

```
{"condition1": 0,"condition2": 1, "status": "500"}
```

Processing rule:

```
// If `condition1` is `1` (true), add a field `new` and assign value `1` to it. H
ere, `False` is returned for `condition1`, and therefore the `new` field (value:
`1`) is not added; `True` is returned for `condition2`, and therefore the `new` f
ield (value: `2`) is added.
t_switch(v("condition1"), fields_set("new", 1), v("condition2"), fields_set("ne
w", 2))
```

Processing result:

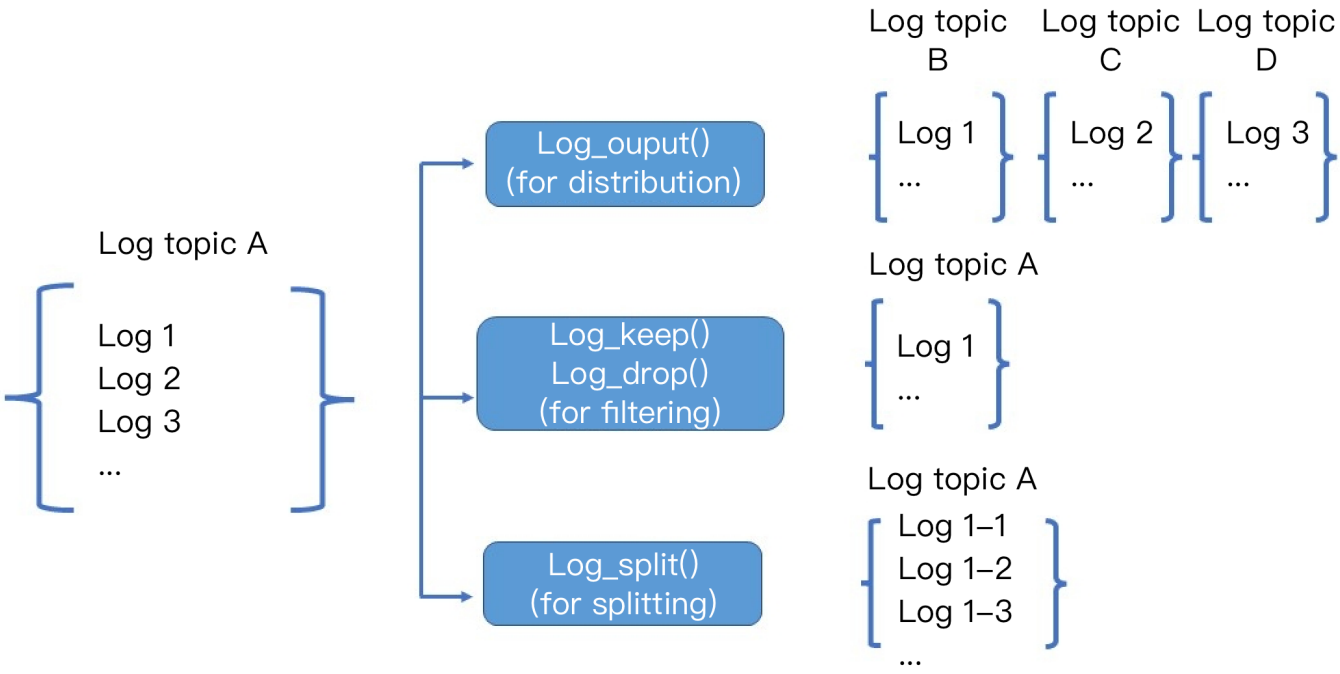
```
{"new":"2","condition1":"0","condition2":"1","status":"500"}
```

Row Processing Functions

Last updated：2022-04-19 16:22:15

Overview

Row processing functions process log rows, such as filtering, distributing, and splitting log rows.



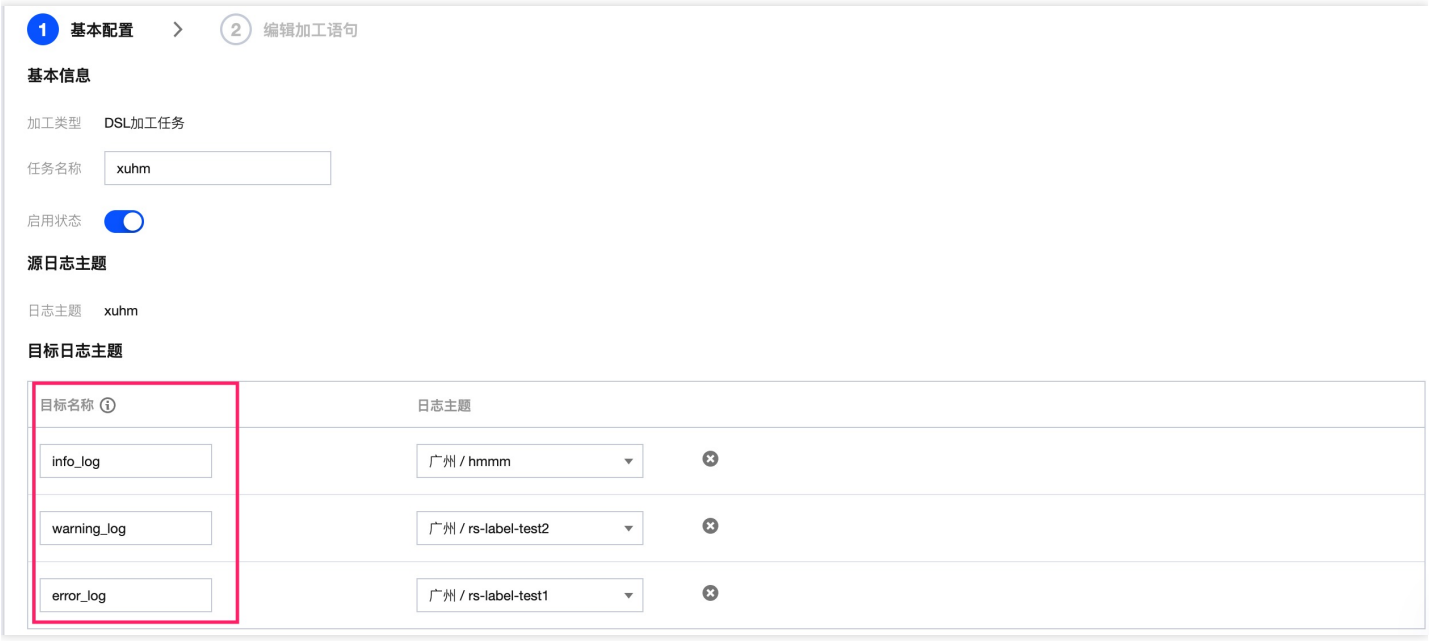
Function log_output

Function definition

This function is used to output a row of log to a specified log topic. It can be used independently or together with branch conditions.

Syntax description

log_output(Alias) (The alias is defined during processing task configuration, as shown in the figure below.)



Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
alias	Log topic alias	string	Yes	-	-

Example

Distribute the log to 3 different log topics according to the values (`waring` , `info` , and `error`) of the `loglevel` field.

Raw log:

```
[
{
"loglevel": "warning"
},
{
"loglevel": "info"
},
{
"loglevel": "error"
}
]
```

Processing rule:

```
// The `loglevel` field has 3 values (`waring`, `info`, and `error`) and therefor
e the log is distributed to 3 different log topics accordingly.
t_switch(regex_match(v("loglevel"),regex="info"),log_output("info_log"),regex_mat
ch(v("loglevel"),regex="warning"),log_output("warning_log"),regex_match(v("loglev
el"),regex="error"),log_output("error_log"))
```

Processing result:

行号	加工信息	加工日志
1	原始行号：1 目标日志主题：rs-label-test2 加工结果：成功	loglevel: warning
2	原始行号：2 目标日志主题：hmmm 加工结果：成功	loglevel: info
3	原始行号：3 目标日志主题：rs-label-test1 加工结果：成功	loglevel: error

Function log_split

Function definition

This function is used to split a row of log into multiple rows of logs based on the value of a specified field by using a separator and JMES expression.

Syntax description

```
log_split(Field name, sep=",", quote="\"", jmes="", output="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field to extract	string	Yes	-	-
sep	Separator	string	No	,	Any single character
quote	Characters that enclose the value	string	No	-	-
jmes	JMES expression. For more information, see JMESPath.	string	No	-	-
output	Name of a single field	string	Yes	-	-

Example

- Example 1. Split a log whose `field` has multiple values

```
{"field": "hello Go,hello Java,hello python","status":"500"}
```

Processing rule:

```
// Use the separator "," to split the log into 3 logs.
log_split("field", sep=",", output="new_field")
```

Processing result:

```
{"new_field":"hello Go","status":"500"}
{"new_field":"hello Java","status":"500"}
{"new_field":"hello python","status":"500"}
```

- Example 2. Use a JMES expression to split a log

```
{"field": "{\"a\":{\"b\":{\"c\":{\"d\":\"a,b,c\"}}}}", "status": "500"}
```

Processing rule:

```
// The value of `a.b.c.d` is `a,b,c`.
log_split("field", jmes="a.b.c.d", output="new_field")
```

Processing result:

```
{"new_field":"a","status":"500"}
{"new_field":"b","status":"500"}
{"new_field":"c","status":"500"}
```

- Example 3. Split a log that contains a JSON array

```
{"field": "{\"a\":{\"b\":{\"c\":{\"d\":[\"a\",\"b\",\"c\"]}}}}", "status": "50
0"}
```

Processing rule:

```
log_split("field", jmes="a.b.c.d", output="new_field")
```

Processing result:

```
{"new_field":"a","status":"500"}
{"new_field":"b","status":"500"}
{"new_field":"c","status":"500"}
```

Function log_drop

Function definition

This function is used to delete logs that meet a specified condition.

Syntax description

```
log_drop(Condition 1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
condition	Function expression whose return value is of bool type	bool	Yes	-	-

Example

Delete logs where `status` is `200` and retain other logs.

Raw log:

```
{"field": "a,b,c", "status": "500"}
{"field": "a,b,c", "status": "200"}
```

Processing rule:

```
log_drop(op_eq(v("status"), 200))
```

Processing result:

```
{"field":"a,b,c","status":"500"}
```

Function log_keep

Function definition

This function is used to retain logs that meet a specified condition.

Syntax description

```
log_keep(Condition 1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
condition	Function expression whose return value is of bool type	bool	Yes	-	-

Example

Retain logs where `status` is `500` and delete other logs.

Raw log:

```
{"field": "a,b,c", "status": "500"}
{"field": "a,b,c", "status": "200"}
```

Processing rule:

```
log_keep(op_eq(v("status"), 500))
```

Processing result:

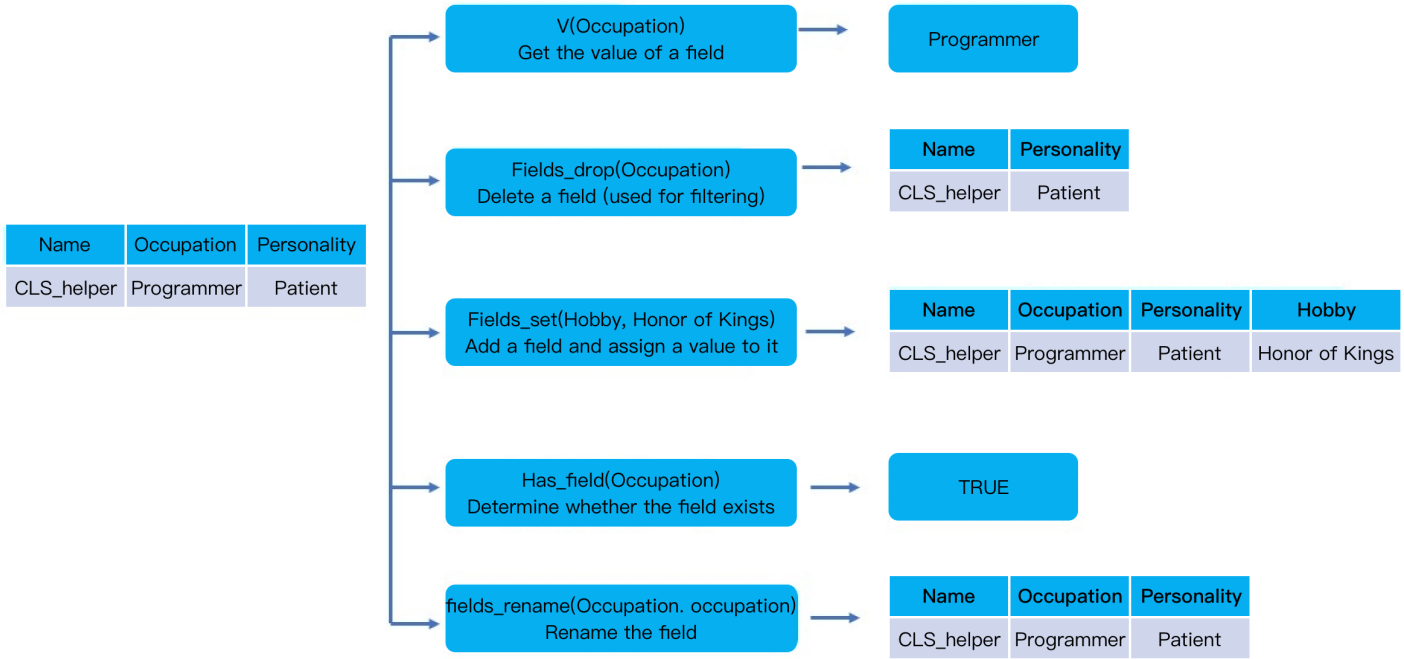
```
{"field":"a,b,c","status":"500"}
```

Field Processing Functions

Last updated：2022-04-19 16:22:15

Overview

Field processing functions are used to process fields in logs. See the figure below.



Function v

Function definition

This function is used to get the value of a specified field and return the corresponding string.

Syntax description

```
v(Field name)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field name	string	Yes	-	-

Example

Get the value of the "message" field and assign the value to a new field "new_message".

Raw log:

```
{"message": "failed", "status": "500"}
```

Processing rule:

```
fields_set("new_message", v("message"))
```

Processing result:

```
{"message": "failed", "new_message": "failed","status": "500"}
```

Function fields_drop

Function definition

This function is used to delete the fields that meet a specified condition.

Syntax description

```
fields_drop(Field name 1, Field name 2, ..., regex=False,nest=False)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter, which can be a field name or regular expression of the field name	Variable parameter, which can be a field name or regular expression of the field name	string	Yes	-	-
regex	Whether to enable regular expression and use the full match mode	bool	No	False	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
nest	Whether the field is a nested field	bool	No	False	-

Example

- Example 1. Delete the field whose name is "field"

  Raw log:

```
{"field": "a,b,c", "status": "500"}
```

Processing rule:

```
fields_drop("field")
```

Processing result:

```
{"status":"500"}
```

- Example 2. Nested field processing

  Raw log:

```
{"condition":"{\"a\":\"aaa\", \"c\":\"ccc\", \"e\":\"eee\"}","status":"500"}
```

Processing rule:

```
// `nest=True` indicates that the field is a nested field. After `condition.a` and `condition.c` are deleted, only the `condition.e` field is left.
t_if(if_json(v("condition")), fields_drop("condition.a", "condition.c", nest=True))
```

Processing result:

```
{"condition":"{\"e\":\"eee\"}","status":"500"}
```

- Example 3. Nested field processing

  Raw log:

```
{"App": "thcomm","Message": "{\"f_httpstatus\": \"200\",\"f_requestId\": \"2021-11-09 08:40:17.832\tINFO\tservices/http_service.go:361\tbb20ac02-fcbc-4a56-b1f
```

```
1-4064853b79da\",\"f_url\": \"wechat.wecity.qq.com/trpcapi/MbpsPaymentServer/scanCode\"}"}
```

Processing rule:

```
// `nest=True` indicates that the filed is a nested field. After `Message.f_requestId` and `Message.f_url` are deleted, only the `f_httpstatus` field is left.
t_if(if_json(v("Message")), fields_drop("Message.f_requestId", "Message.f_url", nest=True))
```

Processing result:

```
{"App":"thcomm","Message":"{\"f_httpstatus\":\"200\"}"}
```

Function fields_keep

Function definition

This function is used to retain the fields that meet a specified condition.

Syntax description

```
fields_keep(Field name 1, Field name 2, ..., regex=False)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter, which can be a field name or regular expression of the field name	Variable parameter, which can be a field name or regular expression of the field name	string	Yes	-	-
regex	Whether to enable regular expression and use the full match mode	bool	No	False	-

Example

Retain the field whose name is "field" and delete the other fields.

Raw log:

```
{"field": "a,b,c", "status": "500"}
```

Processing rule:

```
fields_keep("field")
```

Processing result:

```
{"field":"a,b,c"}
```

Function fields_pack

Function definition

This function is used to match field names based on a regular expression and encapsulate the matched fields into a new field whose value is in JSON format.

Syntax description

```
fields_pack(Target field name, include=".*", exclude="", drop_packed=False)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
output	Name of the new field after encapsulation	string	Yes	-	-
include	Regular expression to include the field name	string	No	-	-
exclude	Regular expression to exclude the field name	string	No	-	-
drop_packed	Whether to delete the original fields that are encapsulated	bool	No	False	-

Example

Raw log:

```
{"field_a": "a,b,c","field_b": "abc", "status": "500"}
```

Processing rule:

```
fields_pack("new_field","field.*", drop_packed=False)
```

Processing result:

```
{"new_field":"{\"field_a\":\"a,b,c\",\"field_b\":\"abc\"}","field_a":"a,b,c","field_b":"abc","status":"500"}
```

Function fields_set

Function definition

This function is used to set field values or add fields.

Syntax description

```
fields_set(Field name 1, Field value 1, Field name 2, Field value 2, mode="overwrite")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter	List of key-value pairs	string	-	-	-
mode	Field overwrite mode	string	No	overwrite	-

Example

- Example 1. Change the log level from Info to Waring

  Raw log:

  ```
  {"Level": "Info"}
  ```

Processing rule:

```
fields_set("Level", "Warning")
```

Processing result:

```
{"Level", "Warning"}
```

- Example 2. Add two fields: `new` and `new2`

  Raw log:

  ```
  {"a": "1", "b": "2", "c": "3"}
  ```

Processing rule:

```
fields_set("new", v("b"), "new2", v("c"))
```

Processing result:

```
{"a":"1","b":"2","c":"3","new":"2","new2":"3"}
```

Function fields_rename

Function definition

This function is used to rename fields.

Syntax description

```
fields_rename(Field name 1, New field name 1, Field name 2, New field name 2, regex=False)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
Variable parameter	List of original-new field name pairs	string	-	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
regex	Whether to enable regular expression match for field names. If yes, use a regular expression to match the original field name. If no, use equal match.	bool	No	False	-

Example

Raw log:

```
{"regieeen": "bj", "status": "500"}
```

Processing rule:

```
fields_rename("reg.*", "region", regex=True)
```

Processing result:

```
{"region":"bj","status":"500"}
```

Function has_field

Function definition

If the specified field exists, the function returns `True`. Otherwise, the function returns `False`.

Syntax description

```
has_field(Field name)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field name	string	Yes	-	-

Example

Raw log:

```
{"regiooon": "bj", "status": "500"}
```

Processing rule:

```
t_if(has_field("regiooon"), fields_rename("regiooon", "region"))
```

Processing result:

```
{"region":"bj","status":"500"}
```

Function not_has_field

Function definition

If the field does not exist, the function returns `True` . Otherwise, the function returns `False` .

Syntax description

```
not_has_field(Field name)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
field	Field name	string	Yes	-	-

Example

Raw log:

```
{"status": "500"}
```

Processing rule:

```
t_if(not_has_field("message"), fields_set("no_message", True))
```

Processing result:

```
{"no_message":"TRUE","status":"500"}
```

Value Structuring Functions

Last updated：2022-04-19 16:22:15

Overview

Value structuring functions can be used to extract values of specified JSON nodes, convert XML data to JSON data and vice versa, and determine whether a value is a JSON string.

Function json_select

Function definition

This function is used to extract a JSON field value with a JMES expression and return the JSON string of the extraction result.

Syntax description

```
json_select(v(Field name), jmes="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value, which can be extracted by other functions	string	Yes	-	-
jmes	JMES expression	string	Yes	-	-

Example

Raw log:

```
{"field": "{\"a\":{\"b\":{\"c\":{\"d\":\"success\"}}}}", "status": "500"}
```

Processing rule:

```
fields_set("message", json_select(v("field"), jmes="a.b.c.d"))
```

Processing result:

```
{"field":"{\"a\":{\"b\":{\"c\":{\"d\":\"success\"}}}}","message":"success","statu
s":"500"}
```


Function xml_to_json

Function definition

This function is used to parse and convert an XML-formatted value to a JSON string. The input value must be an XML string. Otherwise, a conversion exception will occur.

Syntax description

```
xml_to_json(Field value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-

Example

Raw log:

```
{"xml_field": "<note><to>B</to><from>A</from><heading>Reminder</heading><body>Do
n't forget me this weekend!</body></note>", "status": "500"}
```

Processing rule:

```
fields_set("json_field", xml_to_json(v("xml_field")))
```

Processing result:


```
{"xml_field":"<note><to>B</to><from>A</from><heading>Reminder</heading><body>Do
n't forget me this weekend!</body></note>","json_field":"{\"to\":\"B\",\"from\":
\"A\",\"heading\":\"Reminder\",\"body\":\"Don't forget me this weekend!\"}","stat
us":"500"}
```


Function json_to_xml

Function definition

This function is used to parse and convert a JSON string value to an XML string.

Syntax description

```
json_to_xml(Field value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-

Example

Raw log:

```
{"json_field":"{\"to\":\"B\",\"from\":\"A\",\"heading\":\"Reminder\",\"body\":\"Don't forget me this weekend!\"}", "status": "200"}
```

Processing rule:

```
fields_set("xml_field", json_to_xml(v("json_field")))
```

Processing result:

```
{"json_field":"{\"to\":\"B\",\"from\":\"A\",\"heading\":\"Reminder\",\"body\":\"Don't forget me this weekend!\"}","xml_field":"<ObjectNode><to>B</to><from>A</from><heading>Reminder</heading><body>Don't forget me this weekend!</body></ObjectNode>","status":"200"}
```

Function if_json

Function definition

This function is used to determine whether a value is a JSON string.

Syntax description

```
if_json(Field value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-

Example

- Example 1

  Raw log:

```
{"condition":"{\"a\":\"b\"}","status":"500"}
```

Processing statement:

```
t_if(if_json(v("condition")), fields_set("new", 1))
```

Processing result:

```
{"new":"1","condition":"{\"a\":\"b\"}","status":"500"}
```

- Example 2

  Raw log:

```
{"condition":"haha","status":"500"}
```

Processing statement:

```
t_if(if_json(v("condition")), fields_set("new", 1))
```

Processing result:

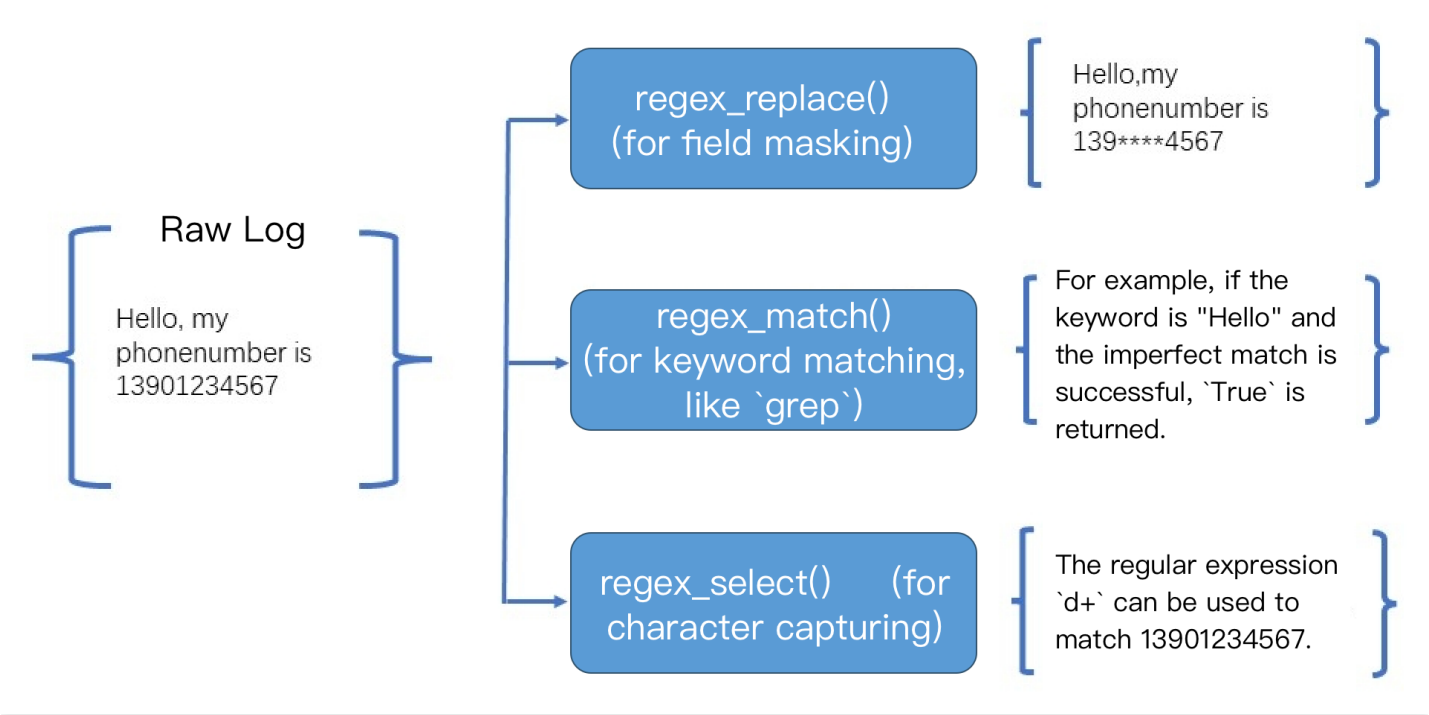
```
{"condition":"haha","status":"500"}
```

Regular Expression Processing Functions

Last updated：2022-04-19 16:22:15

Overview

Logs contain a large volume of text. When processing text, you can use regular expression functions to flexibly extract keywords, mask fields, or determine whether the text contains specified characters. See the figure below.



For examples of regular expressions commonly used in log scenarios, visit Online Test of Regular Expressions.

Purpose	Raw Log	Regular Expression	Extraction Result

Purpose	Raw Log	Regular Expression	Extraction Result
Extract content in braces.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 14], "orderField": "createTime"}}}`	\{[^\}]+\}	{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 10], "orderField": "createTime"}
Extract content in brackets.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 14], "orderField": "createTime"}}}`	\[\S+\]	[328495eb-b562-478f-9d5d-3bf7e] [INFO]
Extract time.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 14], "orderField": "createTime"}}}`	\d{4}-\d{2}-\d{2} \d{2}:\d{2}:\d{2},\d{3}	`2021-11-08 11:11:08,232`

Purpose	Raw Log	Regular Expression	Extraction Result
Extract uppercase characters of a specific length.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 14], "orderField": "createTime"}}}`	[A-Z]{4}	INFO
Extract lowercase characters of a specific length.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 15], "orderField": "createTime"}}}`	[a-z]{6}	versio passwo timest interf create
Extract letters and digits.	`[2021-11-24 11:11:08,232] [328495eb-b562-478f-9d5d-3bf7e] [INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d '{"version": "1.0", "user": "CGW", "password": "123", "timestamp": 1637723468, "interface": {"Name": "ListDetail", "para": {"owner": "1253", "limit": [10, 14], "orderField": "createTime"}}}`	([a-z]{3}):([0-9]{4})	com:8080

Function regex_match

Function definition

This function is used to match data in full or partial match mode based on a regular expression and return whether the match is successful.

Syntax description

```
regex_match(Field value, regex="", full=True)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-
regex	Regular expression	string	Yes	-	-
full	Whether to enable full match. For full match, the entire value must fully match the regular expression. For partial match, only part of the value needs to match the regular expression.	bool	No	True	-

Sample

- Example 1. Check whether the regular expression "192.168.*" fully matches the value `192.168.0.1` of the field `IP` (full=True). The `regex_match` function returns `True` for the case of full match.

  Raw log:

  ```
  {"IP":"192.168.0.1", "status": "500"}
  ```

Processing rule:

```
// Check whether the regular expression "192\.168.*" fully matches the value `19
2.168.0.1` of the field `IP` and save the result to the new field `matched`.
t_if(regex_match(v("IP"), regex="192\.168.*", full=True), fields_set("matched", T
rue))
```

Processing result:

```
{"IP":"192.168.0.1","matched":"TRUE","status":"500"}
```

- Example 2. Check whether the regular expression "192*" partially matches the value `192.168.0.1` of the field `IP` (full=False). The `regex_match` function returns `True` for the case of partial match.

  Raw log:

  ```
  {"IP":"192.168.0.1", "status": "500"}
  ```

Processing rule:

```
t_if(regex_match(v("ip"), regex="192", full=False), fields_set("matched", True))
```

Processing result:

```
{"IP":"192.168.0.1","matched":"TRUE","status":"500"}
```

Function regex_select

Function definition

This function is used to match data based on a regular expression and returns the corresponding partial match result. You can specify the sequence number of the matched expression and the sequence number of the group to return (partial match + sequence number of the specified matched group). If no data is matched, an empty string is returned.

Syntax description

```
regex_select(Field value, regex="", index=1, group=1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-
regex	Regular expression	string	Yes	-	-
index	Sequence number of the matched expression in the match result	number	No	First	-
group	Sequence number of the matched group in the match result	number	No	First	-

Sample

Capture different content from a field value based on a regular expression.

Raw log:

```
{"data":"hello123,world456", "status": "500"}
```

Processing rule:

```
fields_set("match_result", regex_select(v("data"), regex="[a-z]+(\d+)",index=0, group=0))
fields_set("match_result1", regex_select(v("data"), regex="[a-z]+(\d+)", index=1, group=0))
fields_set("match_result2", regex_select(v("data"), regex="([a-z]+)(\d+)",index=0, group=0))
fields_set("match_result3", regex_select(v("data"), regex="([a-z]+)(\d+)",index=0, group=1))
```

Processing result:

```
{"match_result2":"hello123","match_result1":"world456","data":"hello123,world456","match_result3":"hello","match_result":"hello123","status":"500"}
```

Function regex_split

Function definition

This function is used to split a string and return a JSON array of the split strings (partial match).

Syntax description

```
regex_split(Field value, regex=\"\", limit=100)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-
regex	Regular expression	string	Yes	-	-
limit	Maximum array length for splitting. When this length is exceeded, the excessive part will be split, constructed as an element, and added to the array.	number	No	100	-

Sample

Raw log:

```
{"data":"hello123world456", "status": "500"}
```

Processing rule:

```
fields_set("split_result", regex_split(v("data"), regex="\d+"))
```

Processing result:

```
{"data":"hello123world456","split_result":"[\"hello\",\"world\"]","status":"500"}
```

Function regex_replace

Function definition

This function is used to match data based on a regular expression and replace the matched data (partial match).

Syntax description

```
regex_replace(Field value, regex="", replace="", count=0)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-
regex	Regular expression	string	Yes	-	-
replace	Target string, which is used to replace the matched result	string	Yes	-	-
count	Replacement count. The default value is `0`, indicating complete replacement.	number	No	0	-

Sample

- Example 1. Replaces a field value based on a regular expression

  Raw log:

  ```
  {"data":"hello123world456", "status": "500"}
  ```

Processing rule:

```
fields_set("replace_result", regex_replace(v("data"), regex="\d+", replace="", co
unt=0))
```

Processing result:

```
{"replace_result":"helloworld","data":"hello123world456","status":"500"}
```

- Example 2. Mask the user ID, phone number, and IP address

  Raw log:

  ```
  {"Id": "dev@12345","Ip": "11.111.137.225","phonenumber": "13912345678"}
  ```

Processing rule:

```
// Mask the `Id` field. The result is `dev@***45`.
fields_set("Id",regex_replace(v("Id"),regex="\d{3}", replace="***",count=0))
fields_set("Id",regex_replace(v("Id"),regex="\S{2}", replace="**",count=1))
// Mask the `phonenumber` field by replacing the middle 4 digits with ****. The r
esult is `139****5678`.
fields_set("phonenumber",regex_replace(v("phonenumber"),regex="(\d{0,3})\d{4}(\d
{4})", replace="$1****$2"))
// Mask the `Ip` field by replacing the octet with ***. The result is `11.***137.
225`.
fields_set("Ip",regex_replace(v("Ip"),regex="(\d+\.)\d+(\.\d+\.\d+)", replace="$1
***$2",count=0))
```

Processing result:

```
{"Id":"**v@***45","Ip":"11.***.137.225","phonenumber":"139****5678"}
```

Function regex_findall

Function definition

This function is used to match data based on a regular expression and return a JSON array of the matched data (partial match).

Syntax description

```
regex_findall(Field value, regex="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value	string	Yes	-	-
regex	Regular expression	string	Yes	-	-

Sample

Raw log:

```
{"data":"hello123world456", "status": "500"}
```

Processing rule:

```
fields_set("result", regex_findall(v("data"), regex="\d+"))
```

Processing result:

```
{"result":"[\"123\",\"456\"]","data":"hello123world456","status":"500"}
```

Time Value Processing Functions

Last updated：2022-04-19 16:22:15

Overview

CLS's time processing functions include functions for converting date values to string values, converting time field values to UTC time values and vice versa, and getting the current time.

Function dt_str

Function definition

This function is used to convert a time field value (a date string in a specific format or timestamp) to a target date string of a specified time zone and format.

Syntax description

```
dt_str(Value, format="Formatted string", zone="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value. For the parsing formats supported, see dateparser.	string	Yes	-	-
format	Formatted date. For more information, see DateTimeFormatter.	string	No	-	-
zone	Default UTC time, without a specified time zone. For time zone definitions, see ZoneId.	string	No	UTC+00:00	-

Example

Raw log:

```
{"date":"2014-04-26 13:13:44 +09:00"}
```

Processing rule:

```
fields_set("result", dt_str(v("date"), format="yyyy-MM-dd HH:mm:ss", zone="UTC+8"
))
```

Processing result:

```
{"date":"2014-04-26 13:13:44 +09:00","result":"2014-04-26 12:13:44"}
```

Function dt_to_timestamp

Function definition

This function is used to convert a time field value (a date string in a specified format; time zone specified) to a UTC timestamp.

Syntax description

```
dt_to_timestamp(Value, zone="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value. For the parsing formats supported, see dateparser.	string	Yes	-	-
zone	UTC time is used by default, without a time zone specified. If you specify a time zone, make sure that it corresponds to the time field value. Otherwise, a time zone error occurs. For time zone definitions, see ZoneId.	string	No	UTC+00:00	-

Example

Raw log:

```
{"date":"2021-10-26 15:48:15"}
```

Processing rule:

```
fields_set("result", dt_to_timestamp(v("date"), zone="UTC+8"))
```

Processing result:

```
{"date":"2021-10-26 15:48:15","result":"1635234495000"}
```

Function dt_from_timestamp

Function definition

This function is used to convert a timestamp field value to a time string in the specified time zone.

Syntax description

```
dt_from_timestamp(Value, zone="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Field value. For the parsing formats supported, see dateparser.	string	Yes	-	-
zone	Default UTC time, without a specified time zone. For time zone definitions, see ZoneId.	string	No	UTC+00:00	-

Example

Raw log:

```
{"date":"1635234495000"}
```

Processing rule:

```
fields_set("result", dt_from_timestamp(v("date"), zone="UTC+8"))
```

Processing result:

```
{"date":"1635234495000","result":"2021-10-26 15:48:15"}
```

Function dt_now

Function definition

This function is used to obtain the current datetime of the processing calculation.

Syntax description

```
dt_now(format="Formatted string", zone="")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
format	Formatted date. For more information, see DateTimeFormatter.	string	No	-	-
zone	Default UTC time, without a specified time zone. For time zone definitions, see ZoneId.	string	No	UTC+00:00	-

Example

Raw log:

```
{"date":"1635234495000"}
```

Processing rule:

```
fields_set("now", dt_now(format="yyyy-MM-dd HH:mm:ss", zone="UTC+8"))
```

Processing result: (The actual processing result depends on the system time, and the following is for reference only.)

```
{"date":"1635234495000","now":"2021-MM-dd HH:mm:ss"}
```

String Processing Functions

Last updated：2022-04-19 16:22:15

Overview

String functions support string length calculation, case conversion, string concatenation, substring replacement, substring deletion, character locating, prefix/suffix matching, and more.
Note that regular expression functions and string functions are for difference use cases. **Regular expression functions are more suitable for** extracting fields and field values from unstructured log data. For example, to extract `log_time` and `log_level` from logs, a regular expression function is more suitable.

```
{
“Log content”: "2021-12-02 14:33:35.022 [1] INFO org.apache.Load - Response:status: 200, resp msg: OK, resp content: { \"TxnId\": 58322, \"Label\": \"flink_connector_20211202_1de749d8c80015a8\", \"Status\": \"Success\", \"Message\": \"OK\", \"TotalRows\": 1, \"LoadedRows\": 1, \"FilteredRows\": 0, \"CommitAndPublishTimeMs\": 16}"
}
```

String functions are more suitable for processing the value of a specified field in structured log data such as following:

```
"resonsebody": {"method": "GET","user": "Tom"}
```

Function str_count

Function definition

This function is used to search for a substring in a specified range of a value and return the number of occurrences of the substring.

Syntax description

```
str_count(Value, sub="", start=0, end=-1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
sub	Substring whose number of occurrences you want to count	string	Yes	-	-
start	Start position to search	number	No	0	-
end	End position to search	number	No	-1	-

Example

Raw log:

```
{"data": "warn,error,error"}
```

Processing rule:

```
fields_set("result", str_count(v("data"), sub="err"))
```

Processing result:

```
{"result":"2","data":"warn,error,error"}
```

Function str_len

Function definition

This function is used to return the length of a string.

Syntax description

```
str_len(Value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-

Example

Raw log:

```
{"data": "warn,error,error"}
```

Processing rule:

```
fields_set("result", str_len(v("data")))
```

Processing result:

```
{"result":"16","data":"warn,error,error"}
```

Function str_uppercase

Function definition

This function is used to convert a string to uppercase.

Syntax description

```
str_uppercase(Value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-

Example

Raw log:

```
{"data": "warn,error,error"}
```

Processing rule:

```
fields_set("result", str_uppercase(v("data")))
```

Processing result:

```
{"result":"WARN,ERROR,ERROR","data":"warn,error,error"}
```

Function str_lowercase

Function definition

This function is used to convert a string to lowercase.

Syntax description

```
str_lowercase(Value)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-

Example

Raw log:

```
fields_set("result", str_lowercase(v("data")))
```

Processing rule:

```
{"data": "WARN,ERROR,ERROR"}
```

Processing result:

```
{"result":"warn,error,error","data":"WARN,ERROR,ERROR"}
```

Function str_join

Function definition

This function is used to concatenate input values by using a concatenation string.

Syntax description

```
str_join(Concatenation string 1, Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
join	Value of string type	string	Yes	-	-
Value parameter, list of variable parameters	Value of string type	string	Yes	-	-

Example

Raw log:

```
{"data": "WARN,ERROR,ERROR"}
```

Processing rule:

```
fields_set("result", str_join(",", v("data"), "INFO"))
```

Processing result:

```
{"result":"WARN,ERROR,ERROR,INFO","data":"WARN,ERROR,ERROR"}
```

Function str_replace

Function definition

This function is used to replace an old string with a new string.

Syntax description

```
str_replace(Value, old="", new="", count=0)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
old	String to the replaced	string	Yes	-	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
new	Target string after replacement	string	Yes	-	-
count	Maximum replacement count. The default value is `0`, replacing all matched content.	number	No	0	-

Example

Replace "WARN" in the value of the `data` field with "ERROR".

Raw log:

```
{"data": "WARN,ERROR,ERROR"}
```

Processing rule:

```
fields_set("result", str_replace( v("data"), old="WARN", new="ERROR"))
```

Save the replacement result to the new field `result`.

Processing result:

```
{"result":"ERROR,ERROR,ERROR","data":"WARN,ERROR,ERROR"}
```

Function str_format

Function definition

This function is used to format strings.

Syntax description

```
str_format(Formatted string, Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
format	Target format, using "{}" as placeholders, such as "The disk "{1}" contains {0} file(s).". The numbers in "{}" correspond to the sequence numbers of the parameter values, and the numbers start from 0. For usage details, see MessageFormat.format.	string	Yes	-	-
Value parameter, list of variable parameters	Value of string type	string	Yes	-	-

Example

Raw log:

```
{"status": 200, "message":"OK"}
```

Processing rule:

```
fields_set("result", str_format("status:{0}, message:{1}", v("status"), v("messag
e")))
```

Processing result:

```
{"result":"status:200, message:OK","message":"OK","status":"200"}
```

Function str_strip

Function definition

This function is used to delete specified characters from a string concurrently from the start and end of the string and return the remaining part.

Syntax description

```
str_strip(Value, chars="\t\r\n")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
chars	String to delete	string	No	\t\r\n	-

Example

- Example 1

  Raw log:

```
{"data": " abc "}
```

Processing rule:

```
fields_set("result", str_strip(v("data"), chars=" "))
```

Processing result:

```
{"result":"abc","data":" abc "}
```

- Example 2

  Raw log:

```
{"data": " **abc** "}
```

Processing rule:

```
fields_set("result", str_strip(v("data"), chars=" *"))
```

Processing result:

```
{"result":"abc","data":" **abc** "}
```

Function str_lstrip

Function definition

This function is used to delete specified characters from a string from the start of the string and return the remaining part.

Syntax description

```
str_strip(Value, chars="\t\r\n")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
chars	String to delete	string	No	\t\r\n	-

Example

Raw log:

```
{"data": " abc "}
```

Processing rule:

```
fields_set("result", str_lstrip(v("data"), chars=" "))
```

Processing result:

```
{"result":"abc ","data":" abc "}
```

Function str_rstrip

Function definition

This function is used to delete specified characters from a string from the end of the string and return the remaining part.

Syntax description

```
str_strip(Value, chars="\t\r\n")
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
chars	String to delete	string	No	\t\r\n	-

Example

Raw log:

```
{"data": " abc "}
```

Processing rule:

```
fields_set("result", str_rstrip(v("data"), chars=" "))
```

Processing result:

```
{"result":" abc","data":" abc "}
```

Function str_find

Function definition

This function is used to check whether a string contains a specified substring and return the position of the substring in the string.

Syntax description

```
str_find(Value, sub="", start=0, end=-1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
sub	Substring whose number of occurrences you want to count	string	Yes	-	-
start	Start position to search	number	No	0	-

Parameter	Description	Parameter Type	Required	Default Value	Value Range
end	End position to search	number	No	-1	-

Example

Raw log:

```
{"data": "warn,error,error"}
```

Processing rule:

```
fields_set("result", str_find(v("data"), sub="err"))
```

Processing result:

```
{"result":"5","data":"warn,error,error"}
```

Function str_start_with

Function definition

This function is used to check whether a string starts with a specified prefix.

Syntax description

```
str_start_with(Value, sub="", start=0, end=-1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
sub	Prefix string or character	string	Yes	-	-
start	Start position to search	number	No	0	-
end	End position to search	number	No	-1	-

Example

- Example 1

  Raw log:

```
{"data": "something"}
```

Processing rule:

```
fields_set("result", str_start_with(v("data"), sub="some"))
```

Processing result:

```
{"result":"true","data":"something"}
```

- Example 2

  Raw log:

```
{"data": "something"}
```

Processing rule:

```
fields_set("result", str_start_with(v("data"), sub="*"))
```

Processing result:

```
{"result":"false","data":"something"}
```

Function str_end_with

Function definition

This function is used to check whether a string starts with a specified prefix.

Syntax description

```
str_end_with(Value, sub="", start=0, end=-1)
```

Parameter description

Parameter	Description	Parameter Type	Required	Default Value	Value Range

Parameter	Description	Parameter Type	Required	Default Value	Value Range
data	Value of string type	string	Yes	-	-
sub	Prefix string or character	string	Yes	-	-
start	Start position to search	number	No	0	-
end	End position to search	number	No	-1	-

Example

Raw log:

```
{"data": "endwith something"}
```

Processing rule:

```
fields_set("result", str_end_with(v("data"), sub="ing"))
```

Processing result:

```
{"result":"true","data":"endwith something"}
```

Type Conversion Functions

Last updated：2022-04-28 15:06:53

Overview

Type conversion functions provide commonly type conversion features. They can be used to convert field values to the int, float, bool, and Str types.

Function ct_int

Function definition

This function is used to convert a value (whose base can be specified) to a decimal integer.

Syntax description

```
ct_int(Value 1, base=10)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
base	Base	number	No	10	[2-36]

Examples

- Example 1

  Raw log:

  ```
  {"field1": "10"}
  ```

Processing rule:

```
fields_set("result", ct_int(v("field1")))
```

Processing result:

```
{"result":"10","field1":"10"}
```

- Example 2

  Raw log:

  ```
  {"field1": "AB"}
  ```

Processing rule:

```
fields_set("result", ct_int(v("field1"), 16))
```

Processing result:

```
{"result":"171","field1":"AB"}
```

Function ct_float

Function definition

This function is used to convert a value to a floating-point number.

Syntax description

```
ct_float(Value)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "123"}
```

Processing rule:

```
fields_set("result", ct_float(v("field1")))
```

Processing result:

```
{"result":"123.0","field1":"123"}
```

Function ct_str

Function definition

This function is used to convert a value to a string.

Syntax description

```
ct_str(Value)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": 123}
```

Processing rule:

```
fields_set("result", ct_str(v("field1")))
```

Processing result:

```
{"result":"123","field1":"123"}
```

Function ct_bool

Function definition

This function is used to convert a value to a Boolean value.

Syntax description

```
ct_bool(Value)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

- Example 1

  Raw log:

  ```
  {}
  ```

Processing rule:

```
fields_set("result", ct_bool(0))
```

Processing result:

```
{"result":"false"}
```

- Example 2

  Raw log:

  ```
  {}
  ```

Processing rule:

```
fields_set("result", ct_bool(1))
```

Processing result:

```
{"result":"true"}
```

- Example 3

  Raw log:

  ```
  {"field1": 1}
  ```

Processing rule:

```
fields_set("result", ct_bool(v("field1")))
```

Processing result:

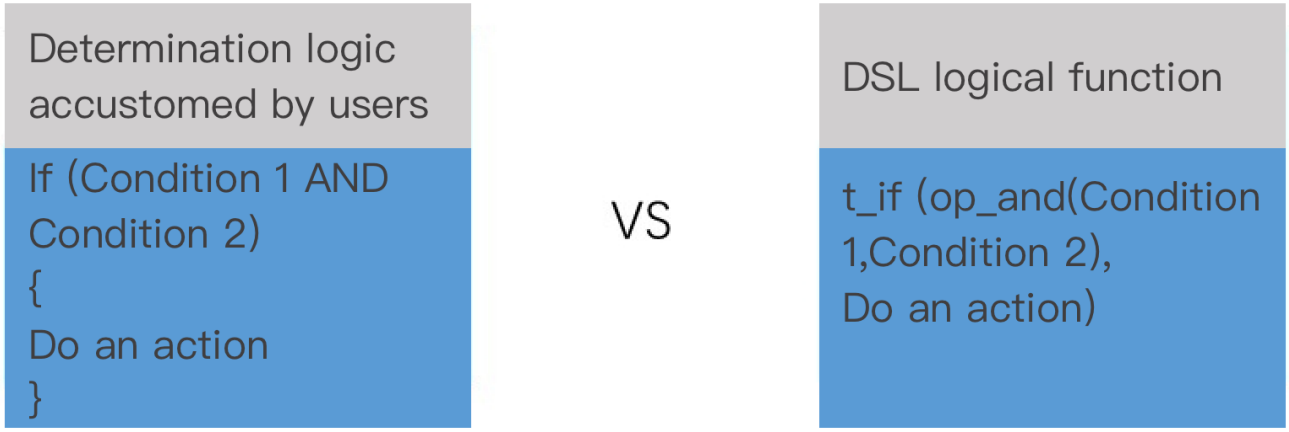
```
{"result":"true","field1":"1"}
```

Logical Expression Functions

Last updated：2022-04-28 15:06:53

Overview

Logic and arithmetic functions include AND, OR, greater than, less than, equal to, addition, subtraction, multiplication, division, and modulus operation functions. Their writing method is slightly different from that of commonly used programming languages, as shown in the figure below.



Function op_if

Function definition

This function is used to return a value based on a specified condition.

Syntax description

```
op_if(Condition 1, Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
condition	Condition expression	bool	Yes	-	-

Parameter	Description	Type	Required	Default Value	Value Range
data1	If the condition is `True`, the value of this parameter is returned.	string	Yes	-	-
data2	If the condition is `False`, the value of this parameter is returned.	string	Yes	-	-

Examples

- Example 1

  Raw log:

```
{"data": "abc"}
```

Processing rule:

```
fields_set("result", op_if(True, v("data"), "false"))
```

Processing result:

```
{"result":"abc","data":"abc"}
```

- Example 2

  Raw log:

```
{"data": "abc"}
```

Processing rule:

```
fields_set("result", op_if(False, v("data"), "123"))
```

Processing result:

```
{"result":"123","data":"abc"}
```

Function op_ifnull

Function definition

This function is used to return the first non-null and non-empty result value.

Syntax description

```
op_ifnull(Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
Variable parameter list	Parameters or expressions that participate in the calculation	string	Yes	-	-

Examples

Raw log:

```
{"data1": null, "data2": "", "data3": "first not null"}
```

Processing rule:

```
fields_set("result", op_ifnull(v("data1"), v("data2"), v("data3")))
```

Processing result:

```
{"result":"first not null","data3":"first not null","data2":"","data1":"null"}
```

Function op_and

Function definition

This function is used to perform the AND operation on values. If all the specified parameter values are evaluated to true, `True` is returned. Otherwise, `False` is returned.

Syntax description

```
op_and(Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
Variable parameter list	Parameters or expressions that participate in the calculation	string	Yes	-	-

Examples

- Example 1

  Raw log:

```
{}
```

Processing rule:

```
fields_set("result", op_and(True, False))
```

Processing result:

```
{"result":"false"}
```

- Example 2

  Raw log:

```
{}
```

Processing rule:

```
fields_set("result", op_and(1, 1))
```

Processing result:

```
{"result":"true"}
```

- Example 3

  Raw log:

```
{"data":"false"}
```

Processing rule:

```
fields_set("result", op_and(1, v("data")))
```

Processing result:

```
{"result":"false","data":"false"}
```

Function op_or

Function definition

This function is used to perform the OR operation on values. If one or more of the specified parameter values are evaluated to false, `False` is returned. Otherwise, `True` is returned.

Syntax description

```
op_or(Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
Variable parameter list	Parameters or expressions that participate in the calculation	string	Yes	-	-

Examples

Raw log:

```
{}
```

Processing rule:

```
fields_set("result", op_or(True, False))
```

Processing result:

```
{"result":"true"}
```

Function op_not

Function definition

This function is used to perform the NOT operation on values.

Syntax description

```
op_not(Value)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data	Value of any type	any	Yes	-	-

Examples

- Example 1

  Raw log:

  ```
  {}
  ```

Processing rule:

```
fields_set("result", op_not(True))
```

Processing result:

```
{"result":"false"}
```

- Example 2

  Raw log:

  ```
  {}
  ```

Processing rule:

```
fields_set("result", op_not("True"))
```

Processing result:

```
{"result":"false"}
```

Function op_eq

Function definition

This function is used to compare two values. If the values are equal, `True` is returned.

Syntax description

```
op_eq(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

- Example 1. Determine whether the values of the `Post` and `Get` fields are equal

  Raw log:

  ```
  {"Post": "10", "Get": "11"}
  ```

Processing rule:

```
fields_set("result", op_eq(v("Post"), v("Get")))
```

Save the result to `result` .

Processing result:

```
{"result":"false","Post":"10","Get":"11"}
```

- Example 2. Determine whether the values of the `field1` and `field2` fields are equal

  Raw log:

```
{"field1": "1", "field2": "1"}
```

Processing rule:

```
fields_set("result", op_eq(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"1","field2":"1"}
```

Function op_ge

Function definition

This function is used to compare two values. If `Value 1` is greater than or equal to `Value 2`, `True` is returned.

Syntax description

```
op_ge(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

- Example 1

  Raw log:

  ```
  {"field1": "20", "field2": "9"}
  ```

Processing rule:

```
fields_set("result", op_ge(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"20","field2":"9"}
```

- Example 2

  Raw log:

  ```
  {"field1": "2", "field2": "2"}
  ```

Processing rule:

```
fields_set("result", op_ge(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"2","field2":"2"}
```

Function op_gt

Function definition

This function is used to compare two values. If `Value 1` is greater than `Value 2`, `True` is returned.

Syntax description

```
op_gt(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "20", "field2": "9"}
```

Processing rule:

```
fields_set("result", op_ge(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"20","field2":"9"}
```

Function op_le

Function definition

This function is used to compare two values. If `Value 1` is less than or equal to `Value 2`, `True` is returned.

Syntax description

```
op_le(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "2", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_le(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"2","field2":"2"}
```

Function op_lt

Function definition

This function is used to compare two values. If `Value 1` is less than `Value 2`, `True` is returned.

Syntax description

```
op_lt(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "2", "field2": "3"}
```

Processing rule:

```
fields_set("result", op_lt(v("field1"), v("field2")))
```

Processing result:

```
{"result":"true","field1":"2","field2":"3"}
```

Function op_add

Function definition

This function is used to return the sum of two specified values.

Syntax description

```
op_add(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "1", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_add(v("field1"), v("field2")))
```

Processing result:

```
{"result":"3","field1":"1","field2":"2"}
```

Function op_sub

Function definition

This function is used to return the difference between two specified values.

Syntax description

op_sub(Value 1, Value 2)

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "1", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_sub(v("field1"), v("field2")))
```

Processing result:

```
{"result":"-1","field1":"1","field2":"2"}
```

Function op_mul

Function definition

This function is used to return the product of two specified values.

Syntax description

```
op_mul(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Parameter	Description	Type	Required	Default Value	Value Range
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

Raw log:

```
{"field1": "1", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_mul(v("field1"), v("field2")))
```

Processing result:

```
{"result":"2","field1":"1","field2":"2"}
```

Function op_div

Function definition

This function is used to return the quotient of two specified values.

Syntax description

```
op_div(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-
data2	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

- Example 1

  Raw log:

```
{"field1": "1", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_div(v("field1"), v("field2")))
```

Processing result:

```
{"result":"0","field1":"1","field2":"2"}
```

- Example 2

  Raw log:

```
{"field1": "1.0", "field2": "2"}
```

Processing rule:

```
fields_set("result", op_div(v("field1"), v("field2")))
```

Processing result:

```
{"result":"0.5","field1":"1.0","field2":"2"}
```

Function op_sum

Function definition

This function is used to return the sum of multiple specified values.

Syntax description

```
op_sum(Value 1, Value 2, ...)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range

Parameter	Description	Type	Required	Default Value	Value Range
Variable parameter list	Numeric value or string that can be converted to a numeric value	string	Yes	-	-

Examples

Raw log:

```
{"field1": "1.0", "field2": "10"}
```

Processing rule:

```
fields_set("result", op_sum(v("field1"), v("field2")))
```

Processing result:

```
{"result":"11.0","field1":"1.0","field2":"10"}
```

Function op_mod

Function definition

This function is used to return the remainder of a specified value divided by the other specified value.

Syntax description

```
op_mod(Value 1, Value 2)
```

Parameter description

Parameter	Description	Type	Required	Default Value	Value Range
data1	Numeric value or string that can be converted to a numeric value	number	Yes	-	-

Examples

- Example 1

  Raw log:

```
{"field1": "1.0", "field2": "0"}
```

Processing rule:

```
fields_set("result", op_mod(v("field1"), v("field2")))
```

Processing result:

```
{"result":"2","field1":"1","field2":"2"}
```

- Example 2

  Raw log:

  ```
  {"field1": "1.0", "field2": "5"}
  ```

Processing rule:

```
fields_set("result", op_mod(v("field1"), v("field2")))
```

Processing result:

```
{"result":"1.0","field1":"1.0","field2":"5"}
```

- Example 3

  Raw log:

  ```
  {"field1": "6", "field2": "4"}
  ```

Processing rule:

```
fields_set("result", op_mod(v("field1"), v("field2")))
```

Processing result:

```
{"result":"2","field1":"6","field2":"4"}
```

Processing Cases
Case Overview

Last updated：2022-05-26 16:48:20

Overview

The cases in this document will help you get a general and perceptual understanding of data processing. You can also copy the functions in these cases for your own data processing.

Limits

- `v` function: **v("Field A")** indicates the value of field A. The parameter is **Field** or **Field value** in some functions. The common error is that: the function parameter is **Field value** but the `v` function is not used to get the field value, which leads to function execution failure.
- If you need to distribute logs to multiple log topics, you need to configure the **target log topic** and its **target name** in advance. The target name is used by the **distribution function**.
- `fields_set` function: the `fields_set` function is used to set field values and store the content processed by data processing function. For example, `fields_set("A+B",op_add(v("Field A"),v("Field B")))` is to add the values of fields A and B, and the `op_add` function needs to leverage the `fields_set` function to complete result writing and storage.

Overview

You can refer to the following cases to complete your data processing:

- Filtering and Distributing Logs
- Structuring Single-Line Text Logs
- Masking Data
- Processing Logs in Nested JSON Format
- Structuring Logs in Multiple Formats
- Using Separators to Extract Specified Content from Logs

Log Filtering and Distribution

Last updated：2022-04-28 15:10:17

Use Case

Tom has collected logs to CLS. The logs contain information such as the log time, log level, log content, task ID, process name, and host IP, and the information is separated by two vertical bars (||). Now Tom wants to structure the log to facilitate subsequent indexing and dashboard display. He also wants to **distribute** the logs to three different target log topics according to three log levels (**ERROR**, **WARNING**, and **INFO**) for subsequent analysis. Tom also wants the logs whose content contains the **team B is working** keywords to be filtered out (discarded)**.

Scenario Analysis

According to Tom's requirements, the processing ideas are as follows:

1. Filter out (discard) logs that contain the **team B is working** keywords and place the discarded logs up front to reduce subsequent computation.
2. Structure logs based on the separator of **two vertical bars** (||).
3. Log distribution: Distribute the logs to three different target log topics according to three log levels (**ERROR**, **WARNING**, and **INFO**).

> Note：
> To distribute logs to multiple target log topics, you need to define the target names of the log topics when creating the data processing task. The target names will be used in the **log_output("Target name")** functions.

Raw Log

```
[
{
"message": "2021-12-09 11:34:28.279||team A is working||INFO||605c643e29e4||BIN--COMPILE||192.168.1.1"
},
{
```

```
"message": "2021-12-09 11:35:28.279||team A is working ||WARNING||615c643e22e4||BIN--Java||192.168.1.1"
},
{
"message": "2021-12-09 11:36:28.279||team A is working ||ERROR||635c643e22e4||BIN--Go||192.168.1.1"
},
{
"message": "2021-12-09 11:37:28.279||team B is working||WARNING||665c643e22e4||BIN--Python||192.168.1.1"
}
]
```

DSL Processing Function

```
log_drop(regex_match(v("message"),regex="team B is working",full=False))
ext_sepstr("message","time,log,loglevel,taskId,ProcessName,ip",sep="\|\|")
fields_drop("message")
t_switch(regex_match(v("loglevel"),regex="INFO",full=True),log_output("info_log")
,regex_match(v("loglevel"),regex="WARNING",full=True),log_output("warning_log"),r
egex_match(v("loglevel"),regex="ERROR",full=True),log_output("error_log"))
```

DSL Processing Function Details

1. Discard logs that contain the **team B is working** keywords. The fourth log contains the **team B is working** keywords and needs to be discarded.

   ```
   log_drop(regex_match(v("message"),regex="team B is working",full=False))
   ```

2. Extract structured data based on the separator of **two vertical bars** (||).

   ```
   ext_sepstr("message","time,log,loglevel,taskId,ProcessName,ip",sep="\|\|")
   ```

3. Discard the **message** field.

   ```
   fields_drop("message")
   ```

4. According to the value of the **loglevel** field, **INFO**, **WARNING**, and **ERROR** logs will be distributed to different target log topics.

```
t_switch(regex_match(v("loglevel"),regex="INFO",full=True),log_output("info_log"),regex_match(v("loglevel"),regex="WARNING",full=True),log_output("warning_log"),regex_match(v("loglevel"),regex="ERROR",full=True),log_output("error_log"))
```

Processing Result

> Note：
> Target log topics and target names must be configured in advance.

The following log is distributed to **info_log** (**Data processing-target 3**). See the mappings between target names and log topics in the figure above.

```
{"ProcessName":"BIN--COMPILE","ip":"192.168.1.1","log":"team A is working","loglevel":"INFO","taskId":"605c643e29e4","time":"2021-12-09 11:34:28.279"}
```

The following log is distributed to **warning_log** (**Data processing-target 2**).

```
{"ProcessName":"BIN--COMPILE","ip":"192.168.1.1","log":"team A is working","loglevel":"INFO","taskId":"605c643e29e4","time":"2021-12-09 11:34:28.279"}
```

The following log is distributed to **error_log** (**Data processing-target 1**).

```
{"ProcessName":"BIN--Go","ip":"192.168.1.1","log":"team A is working ","loglevel":"ERROR","taskId":"635c643e22e4","time":"2021-12-09 11:36:28.279"}
```

Single-Line Text Log Structuration

Last updated：2022-04-28 15:09:17

Use Case

Tom has collected a log to CLS. The log does not use a fixed separator and is in single-line text format. Now Tom wants to structuralize the log and **extract the log time, log level, operation, and URL information** from the text for subsequent search and analysis.

Scenario Analysis

According to Tom's requirements, the processing ideas are as follows:
1.The content in {...} is the detailed information of operations and can be extracted with a regular expression.
2. Use a regular expression to extract the **log time**, **log level**, and **URL**.

Raw Log

```
{
"content": "[2021-11-24 11:11:08,232][328495eb-b562-478f-9d5d-3bf7e][INFO] curl -H 'Host: ' http://abc.com:8080/pc/api -d {\"version\": \"1.0\",\"user\": \"CGW\",\"password\": \"123\",\"interface\": {\"Name\": \"ListDetail\",\"para\": {\"owner\": \"1253\",\"orderField\": \"createTime\"}}}"
}
```

DSL Processing Function

```
fields_set("Action",regex_select(v("content"),regex="\{[^\}]+\}",index=0,group=0))
fields_set("loglevel",regex_select(v("content"),regex="\[[A-Z]{4}\]",index=0,group=0)).
fields_set("logtime",regex_select(v("content"),regex="\d{4}-\d{2}-\d{2} \d{2}:\d{2}:\d{2},\d{3}",index=0,group=0))
fields_set("Url",regex_select(v("content"),regex="([a-z]{3}).([a-z]{3}):([0-9]{4})",index=0,group=0))
fields_drop("content")
```

DSL Processing Function Details

1. Create a field named **Action** and use the regular expression {[^}]+} to match **{...}**.

```
fields_set("Action",regex_select(v("content"),regex="\{[^\}]+\}",index=0,group=0))
```

2. Create a field named **loglevel** and use the regular expression [A-Z]{4} to match **INFO**.

```
fields_set("loglevel",regex_select(v("content"),regex="\[[A-Z]{4}\]",index=0,group=0)).
```

3. Create a field named **logtime** and use the regular expression d{4}-\d{2}-\d{2} \d{2}:\d{2}:\d{2},\d{3} to match **2021-11-24 11:11:08**.

```
fields_set("logtime",regex_select(v("content"),regex="\d{4}-\d{2}-\d{2} \d{2}:\d{2}:\d{2},\d{3}",index=0,group=0))
```

4. Create a field named **Url**, use the regular expression [a-z]{3}.[a-z]{3} to match **abc.com**, and use [0-9]{4} to match **8080**.

```
fields_set("Url",regex_select(v("content"),regex="([a-z]{3}).([a-z]{3}):([0-9]{4})",index=0,group=0))
```

5. Discard the **content** field.

```
fields_drop("content")
```

Processing Result

```
{"Action":"{\"version\": \"1.0\",\"user\": \"CGW\",\"password\": \"123\",\"interface\": {\"Name\": \"ListDetail\",\"para\": {\"owner\": \"1253\",\"orderField\":
```

\"createTime\"}","Url":"abc.com:8080","loglevel":"[INFO]","logtime":"2021-11-24 11:11:08,232"}

Data Masking

Last updated：2022-04-28 15:09:18

Use Case

Tom has collected a log to CLS. The log contains sensitive information such as the user ID (**dev@12345**), login IP (**11.111.137.225**), and mobile number (**13912345678**). Tom wants to mask these sensitive information.

Scenario Analysis

The log itself is a structured log, and therefore its fields can be masked directly.

Raw Log

```
{
"Id": "dev@12345",
"Ip": "11.111.137.225",
"phonenumber": "13912345678"
}
```

DSL Processing Function

```
fields_set("Id",regex_replace(v("Id"),regex="\d{3}", replace="***",count=0))
fields_set("Id",regex_replace(v("Id"),regex="\S{2}", replace="**",count=1))
fields_set("phonenumber",regex_replace(v("phonenumber"),regex="(\d{0,3})\d{4}(\d
{4})", replace="$1****$2"))
fields_set("Ip",regex_replace(v("Ip"),regex="(\d+\.)\d+(\.\d+\.\d+)", replace="$1
***$2",count=0))
```

DSL Processing Function Details

1. Mask the **Id** field. The result is **dev@***45**.

```
fields_set("Id",regex_replace(v("Id"),regex="\d{3}", replace="***",count=0))
```

2. Mask the **Id** field again. The result is ****v@***45**.

```
fields_set("Id",regex_replace(v("Id"),regex="\S{2}", replace="**",count=1))
```

3. Mask the **phonenumber** field by replacing the middle 4 digits with ****. The result is **139****5678**.

```
fields_set("phonenumber",regex_replace(v("phonenumber"),regex="(\d{0,3})\d{4}
(\d{4})", replace="$1****$2"))
```

4. Mask the **IP** field by replacing the octet with ***. The result is **11.***137.225**.

```
fields_set("Ip",regex_replace(v("Ip"),regex="(\d+\.)\d+(\.\d+\.\d+)", replace="
$1***$2",count=0))
```

Processing Result

```
{"Id":"**v@***45","Ip":"11.***.137.225","phonenumber":"139****5678"}
```

Nested JSON Handling

Last updated：2022-04-28 15:09:18

Use Case

Tom has collected logs to in nested JSON format to CLS. Now he wants to extract the **user** (secondary nested field) and **App** fields from the logs.

Raw Log

```
[
{
"content": {
"App": "App-1",
"start_time": "2021-10-14T02:15:08.221",
"resonsebody": {
"method": "GET",
"user": "Tom"
},
"response_code_details": "3000",
"bytes_sent": 69
}
},
{
"content": {
"App": "App-2",
"start_time": "2222-10-14T02:15:08.221",
"resonsebody": {
"method": "POST",
"user": "Jerry"
},
"response_code_details": "2222",
"bytes_sent": 1
}
}
]
```

DSL Processing Function

- Option 1. Use the **JMES** formula to extract fields directly without expanding all key-value pairs

```
ext_json_jmes("content", jmes="resonsebody.user", output="user")
ext_json_jmes("content", jmes="App", output="App")
```

- Option 2. Expand all key-value pairs and discard unwanted fields

```
ext_json("content")
fields_drop("content")
fields_drop("bytes_sent","method","response_code_details","start_time")
```

DSL Processing Function Details

- Option 1:

1. Use the JMES formula **resonsebody.user** to directly specify the secondary nested field **user**.

```
ext_json_jmes("content", jmes="resonsebody.user", output="user")
```

2. Use the JMES formula **App** to directly specify the **App** field.

```
ext_json_jmes("content", jmes="App", output="App")
```

- Option 2:

1. Use the **ext_json** function to extract structured data from the JSON data. All fields are expanded by default.

```
ext_json("content")
```

2. Discard the **content** field.

```
fields_drop("content")
```

3. Discard the unwanted fields **bytes_sent**, **method**, **response_code_details**, and **start_time**.

```
fields_drop("bytes_sent","method","response_code_details","start_time")
```

Processing Result

```
[{"App":"App-1","user":"Tom"},
{"App":"App-2","user":"Jerry"}]
```

Multi-Format Log Structuration

Last updated：2022-04-28 15:09:18

Use Case

Tom has collected **user operation and result** logs to CLS in single-line text format. The formats of contents of the logs **are not identical**. Tom wants to write a set of statements to structure the logs in different formats.
Analysis found that the logs are basically in three formats: the first contains four fields (**uin**, **requestid**, **action**, and **Reqbody**), the second contains three fields (**uin**, **requestid**, and **action**), and the third contains three fields (**requestid**, **action**, and **TaskId**).

Scenario Analysis

According to Tom's requirements, the processing ideas are as follows:

1. Since all three formats of logs contain the **requestid** and **action** fields, use a regular expression to extract these two fields.
2. Perform special processing on the **uin**, **reqbody**, and **TaskId** fields: determine whether the fields exist and then extract them if they exist.

Raw Log

```
[
{
"__CONTENT__": "2021-11-29 15:51:33.201 INFO request 7143a51d-caa4-4a6d-bbf3-771b
4ac9e135 action: Describe uin: 15432829 reqbody {\"Key\": \"config\",\"Values\":
\"appisrunnning\",\"Action\": \"Describe\",\"RequestId\": \"7143a51d-caa4-4a6d-bb
f3-771b4ac9e135\",\"AppId\": 1302953499,\"Uin\": \"100015432829\"}"
},
{
"__CONTENT__": "2021-11-2915: 51: 33.272 ERROR request 2ade9fc4-2db2-49d8-b3e0-a6
ea78ce8d96 has error action DataETL uin 15432829"
},
{
"__CONTENT__": "2021-11-2915: 51: 33.200 INFO request 6059b946-25b3-4164-ae93-917
8c9e73d75 action: UploadData hUWZSs69yGc5HxgQ TaskId 51d-caa-a6d-bf3-7ac9e"
}
]
```

DSL Processing Function

```
fields_set("requestid",regex_select(v("__CONTENT__"),regex="request [A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+",index=0,group=0))
fields_set("action",regex_select(v("__CONTENT__"),regex="action: \S+|action \S+",index=0,group=0))
t_if(regex_match(v("__CONTENT__"),regex="uin", full=False),fields_set("uin",regex_select(v("__CONTENT__"),regex="uin: \d+|uin \d+",index=0,group=0)))
t_if(regex_match(v("__CONTENT__"),regex="TaskId", full=False),fields_set("TaskId",regex_select(v("__CONTENT__"),regex="TaskId [A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+",index=0,group=0)))
t_if(regex_match(v("__CONTENT__"),regex="reqbody", full=False),fields_set("requestbody",regex_select(v("__CONTENT__"),regex="reqbody \{[^\}]+\}")))
t_if(has_field("requestbody"),fields_set("requestbody",str_replace(v("requestbody"),old="reqbody",new="")))
fields_drop("__CONTENT__")
fields_set("requestid",str_replace(v("requestid"),old="request",new=""))
t_if(has_field("action"),fields_set("action",str_replace(v("action"),old="action:|action",new="")))
t_if(has_field("uin"),fields_set("uin",str_replace(v("uin"),old="uin:|uin",new="")))
t_if(has_field("TaskId"),fields_set("TaskId",str_replace(v("TaskId"),old="TaskId",new="")))
```

DSL Processing Function Details

1. Create a field named **requestid** and use a regular expression to match "**request 7143a51d-caa4-4a6d-bbf3-771b4ac9e135**".

   ```
   fields_set("requestid",regex_select(v("__CONTENT__"),regex="request [A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+",index=0,group=0))
   ```

2. Create a field named **action** and use a regular expression to match "**action: UploadData**" and "**action DataETL**" (they exist in two formats of the raw logs).

   ```
   fields_set("action",regex_select(v("__CONTENT__"),regex="action: \S+|action \S+",index=0,group=0))
   ```

- If the **__CONTENT__** field contains the **uin** keyword, create the **uin** field and use the regular expression "**uin: \d+|uin \d+**" to match **uin: 15432829** and **uin 15432829**.

```
t_if(regex_match(v("__CONTENT__"),regex="uin", full=False),fields_set("uin",reg
ex_select(v("__CONTENT__"),regex="uin: \d+|uin \d+",index=0,group=0)))
```

- If the **TaskId** keyword exists, create the **TaskId** field and use a regular expression to match "**TaskId 51d-caa-a6d-bf3-7ac9e**".

```
t_if(regex_match(v("__CONTENT__"),regex="TaskId", full=False),fields_set("TaskI
d",regex_select(v("__CONTENT__"),regex="TaskId [A-Za-z0-9]+-[A-Za-z0-9]+-[A-Za-
z0-9]+-[A-Za-z0-9]+-[A-Za-z0-9]+",index=0,group=0)))
```

- If the **reqbody** keyword exists, create the **requestbody** field and use a regular expression to match "**reqbody{...}**".

```
t_if(regex_match(v("__CONTENT__"),regex="reqbody", full=False),fields_set("requ
estbody",regex_select(v("__CONTENT__"),regex="reqbody \{[^\}]+\}")))
```

3. Discard the **__CONTENT__** field.

```
fields_drop("__CONTENT__")
```

Now we have extracted the fields we need. However, unnecessary characters (**action**, **uin**, **requestbody**, **requestid**, and **TaskId**) are generated during regular expression matching. Therefore, we need to use the **str_replace()** function to remove the unnecessary characters and use the **fields_set()** function to reset field values.

1. If the **requestbody** field exists, remove the unnecessary characters **reqbody** from the field value.

```
t_if(has_field("requestbody"),fields_set("requestbody",str_replace(v("requestbo
dy"),old="reqbody",new="")))
```

2. Remove the unnecessary characters **requestid** from the v("**requestid**") field value. Because every log contains **requestid**, we do not determine whether the field exists.

```
fields_set("requestid",str_replace(v("requestid"),old="request",new=""))
```

3. If the **action** field exists, remove the unnecessary characters **action:** or **action** from the field value.

```
t_if(has_field("action"),fields_set("action",str_replace(v("action"),old="actio
n:|action",new="")))
```

4. If the **uin** field exists, remove the unnecessary characters **uin:** or **uin** from the field value.

```
t_if(has_field("uin"),fields_set("uin",str_replace(v("uin"),old="uin:|uin",new=
"")))
```

5. If the **TaskId** field exists, remove the unnecessary characters **TaskId** from the field value.

```
t_if(has_field("tTaskId"),fields_set("TaskId",str_replace(v("TaskId"),old="Task
Id",new="")))
```

Processing Result


```
[
{"action":" Describe","requestid":" 7143a51d-caa4-4a6d-bbf3-771b4ac9e135","reques
tbody":" {\"Key\": \"config\",\"Values\": \"appisrunnning\",\"Action\": \"Describ
e\",\"RequestId\": \"7143a51d-caa4-4a6d-bbf3-771b4ac9e135\",\"AppId\": 130295349
9,\"Uin\": \"100015432829\"}","uin":" 15432829"},
{"action":" DataETL","requestid":" 2ade9fc4-2db2-49d8-b3e0-a6ea78ce8d96","uin":"
15432829"},
{"action":" UploadData","requestid":" 6059b946-25b3-4164-ae93-9178c9e73d75","Task
Id":" 51d-caa-a6d-bf3-7ac9e"}
]
```

Using Separators to Extract Specified Content from Logs

Last updated：2022-04-28 15:09:18

Use Case

Tom has collected **Flink task running logs** to CLS in single-line text format. The log content is divided into segments with the **comma (,)** and **colon (:)** separators. Among these segments, there is a segment in escaped JSON format containing Flink task execution details. Tom wants to extract the task details and structure them.

Scenario Analysis

According to Tom's requirements, the processing ideas are as follows:

1. Extract the content in escaped JSON format.
2. Extract structured data from the JSON content.

Raw Log

```
{
"regex": "2021-12-02 14:33:35.022 [1] INFO org.apache.Load - Response:status: 200, resp msg: OK, resp content: { \"TxnId\": 58322, \"Label\": \"flink_connector_20211202_1de749d8c80015a8\", \"Status\": \"Success\", \"Message\": \"OK\", \"TotalRows\": 1, \"LoadedRows\": 1, \"FilteredRows\": 0, \"CommitAndPublishTimeMs\": 16}"
}
```

DSL Processing Function

```
ext_sepstr("regex", "f1, f2, f3", sep=",")
fields_drop("regex")
fields_drop("f1")
fields_drop("f2")
ext_sepstr("f3", "f1,resp_content", sep=":")
```

```
fields_drop("f1")
fields_drop("f3")
ext_json("resp_content", prefix="")
fields_drop("resp_content")
```

DSL Processing Function Details

1. Use commas (,) to divide the log into 3 segments, where the third segment **f3** is **resp content:{JSON}**.

```
ext_sepstr("regex", "f1, f2, f3", sep=",")
```

2. Discard unwanted fields.

```
fields_drop("regex")
fields_drop("f1")
fields_drop("f2")
```

3. Use colons (:) to divide the **f3** field into two segments.

```
ext_sepstr("f3", "f1,resp_content", sep=":")
```

4. Discard useless fields.

```
fields_drop("f1")
fields_drop("f3")
```

5. Use the **ext_json** function to extract structured data from the **resp_content** field.

```
ext_json("resp_content", prefix="")
```

6. Discard the **resp_content** field.

```
fields_drop("resp_content")
```

Processing Result


```
{"CommitAndPublishTimeMs":"16","FilteredRows":"0","Label":"flink_connector_20211202_1de749d8c80015a8","LoadedRows":"1","Message":"OK","Status":"Success","TotalRows":"1","TxnId":"58322"}
```

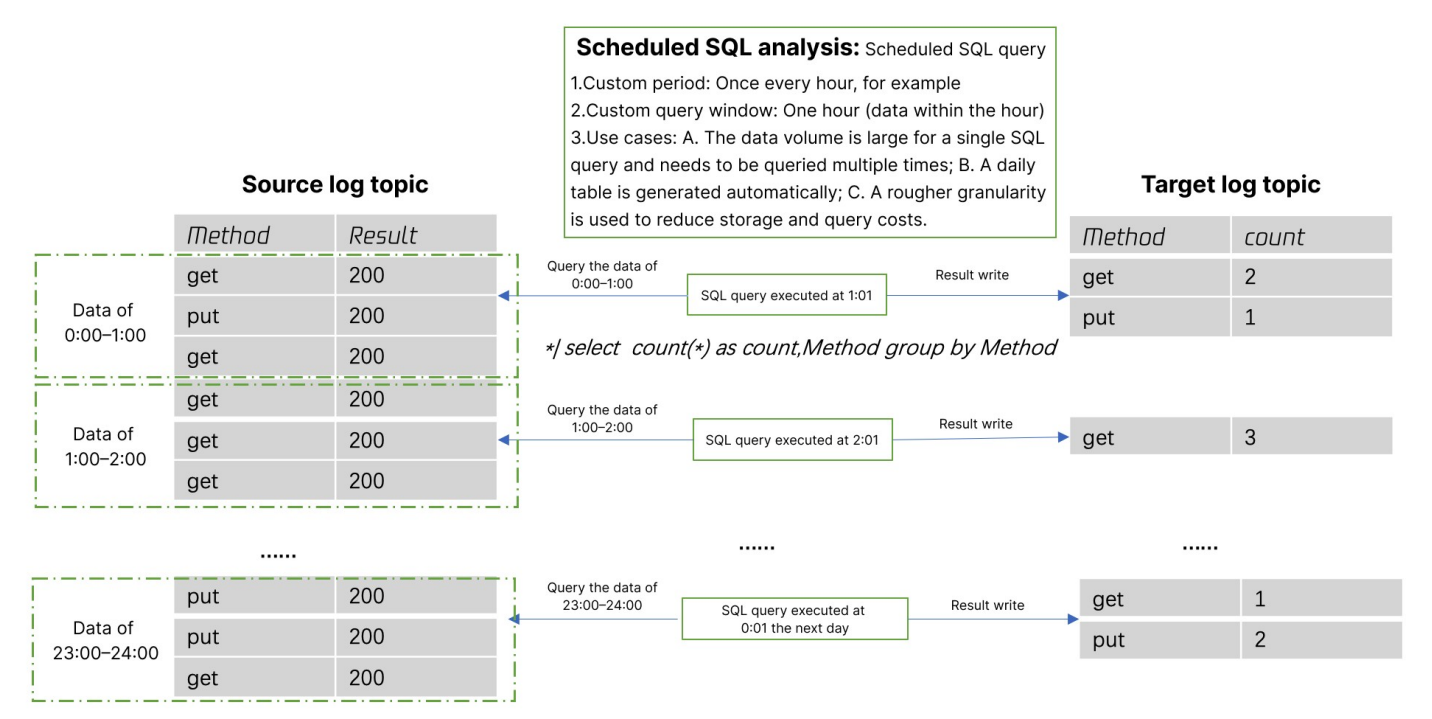
Scheduled SQL Analysis Overview

Last updated：2022-11-01 12:08:24

Note：
This feature has been in beta test in Beijing, Shanghai, and Guangzhou, Nanjing, and Chongqing regions free of charge since August 15, 2022.

Overview

Scheduled SQL analysis can be simply understood as crontab SQL. You can configure a scheduling policy, and the system will execute SQL queries on the source log topic regularly based on the policy and save query results to the specified target log topic.



Prerequisites

- The CLS service has been activated, and key-value index has been enabled.
- Make sure that the current account has the permission to configure scheduled SQL analysis. For more information, see Examples of Custom Access Policies.

Use cases

- For a query with a high data volume, you can use the scheduled SQL analysis feature to break it down into multiple queries with a low data volume each to avoid query failure and timeout.
  For example, if the original SQL query involves data of one day, you can split it into 24 queries for execution once every hour.
- Generate daily and weekly reports.
- Aggregate logs, which can greatly reduce index and log storage fees.
  For example, aggregating 1-minute historical logs into 1-hour logs can effectively save the storage costs.
- Filter and save data to a new log topic. Scheduled SQL analysis can meet the needs in some simple filtering scenarios through WHERE and WHEN statements. However, as a SQL query can only return up to 10,000 results, data integrity cannot be guaranteed, and the query is not conducted by real-time stream computing. Therefore, this feature is only applicable to use cases with a small amount of data that don't require real-time computing. For similar use cases, we recommend you use this feature.

Use limits

- Up to 10,000 results can be returned per query, and the excess will be truncated.

- Cross-region query is not supported. The source and target log topics must be in the same region.

Creating Task

Last updated：2022-10-14 15:27:44

Overview

This document describes how to create a scheduled SQL analysis task.

Prerequisites

- The CLS service has been activated, and key-value index has been enabled.
- Make sure that the current account has the permission to configure scheduled SQL analysis. For more information, see Examples of Custom Access Policies.

Directions

1. Log in to the CLS console.

2. Click **Data Processing** > **Scheduled SQL Analysis** on the left sidebar and click  to create a task.

3. On the basic configuration page, configure the following information and click **Next**:

- Task Name: Enter a custom task name.
- Source Log Topic: Select the log topic where to run the SQL analysis task.
- SQL Statement: Enter the SQL statement in **Query Statement**, and the system will return the preview results (up to 100 items).
- Target Log Topic: Select the target log topic where to save SQL analysis results.

4. On the scheduling configuration page, configure the following information and click **OK**.

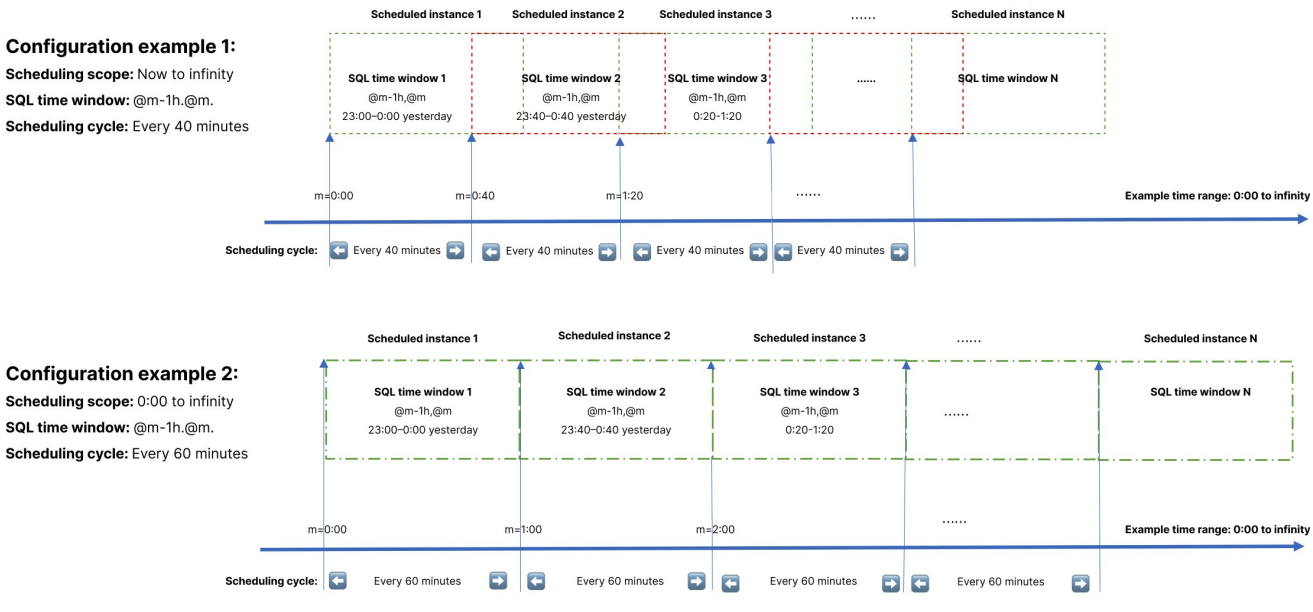
- Scheduling Range: Set the time range for running the scheduled task. The default value is to start at the current time and last forever, i.e., running continuously.
- Scheduling Cycle: Set the cycle of the scheduled task, i.e., execution every X minutes. The maximum value is 1,440.

- SQL Time Window: Set the start and end time of the SQL query log data.

Common SQL Time Window Expression (Suppose It's 12:06 Now)	SQL Time Window	Description
@m-1h, @m	11:06 - 12:06	`@m` and `-1h` indicate to take the value down to the minute and subtract 1 hour, respectively.
@h-1h,@h	11:00 - 12:00	`@h` and `-1h` indicate to take the value down to the hour and subtract 1 hour, respectively.
@m-1h+20m,@h+25m	11:26 - 12:25	`@m`, `-1h`, `+20m`, `@h`, and `+25m` indicate to take the value down to the minute, subtract 1 hour, add 20 minutes, take the value down to the hour, and add 25 minutes, respectively.

Example

The following example illustrates the configurations of the scheduling range, scheduling cycle, and SQL time window:



Viewing Task

Last updated：2022-09-19 14:26:17

Overview

This document describes how to view the information of a scheduled SQL analysis task.

Directions

1. Log in to the CLS console.
2. On the left sidebar, select **Data Processing** > **Scheduled SQL Analysis** to view the following information:

- Basic task information: View the task's name, ID, source log topic, target log topic, creation time, and last modified time.
- Scheduling details: View each SQL query's instance ID, execution time, SQL time window, processed data volume, and scheduling result.
- Preview data: Click **Result Data** to view the result data.

You can also go to the target log topic to view the results of scheduled SQL analysis.

SCF

Last updated：2022-10-17 15:05:01

Overview

You can use SCF to process CLS logs. SCF and CLS are independent of each other and are connected via triggers.

Prerequisites

You have logged in to the CLS console.

Directions

Creating a log topic

Create two log topics as instructed in Managing Log Topic.

> Note：
> As both the source and destination of data ETL are CLS, you need to create at least two topics.

Creating an SCF function

Create a function as instructed in Creating and Testing Function.
The main parameters are as follows:

- **Region**: Select **Beijing** region.
- **Function name**: Enter "CLSdemo".
- **Creation method**: Click **Template** and select the **CLSLogETL** template.

> Note：
> You should select the VPC and subnet of CLS for the created function on the **Function Configuration** page.

Configuring a CLS trigger

1. Log in to the CLS console.

2. On the left sidebar, click **Log Topic** to go to the log topic management page.
3. Find the log topic you just created and click its ID/name to enter the log topic details page.
4. On the log topic details page, select the **Function Processing** tab and click **Create**.
5. In the **Function Processing** pop-up window, add the created function and click **OK**.

The main parameter information is as follows. Use the default values for the remaining configuration items.

- **Namespace**: Select the function namespace.
- **Function Name**: Select the function created in the Creating SCF function step.
- **Alias**: Select a function alias.
- **Maximum waiting time**: Configure the longest waiting time for a single event pull. Default value: 60s.

Testing the function

1. Download the log file in the test sample, extract `demo-scf1.txt` , and import it to the source CLS service.

2. Switch to the SCF console to view the execution result.
   On the function details page, select the **Log Query** tab to view the printed log information.

3. Switch to the target CLS service to view the data processing result.

> Note：
> You can write specific data processing methods as needed.

Shipping and Consumption
CLS Service Role Authorization

Last updated：2022-10-13 15:15:54

Overview

When creating shipping to COS/CKafka tasks, you need to grant the CLS service role the permissions to access COS/CKafka. If you perform operations in the console, the system will guide you through the authorization process. If you directly call APIs, manual authorization will be required. Before manual authorization, check whether the CLS service role has been authorized in the following steps.

Checking CLS Authorization

1. Log in to the CAM console, and select **Role** on the left sidebar.
2. On the **Role** page, check whether you have the `CLS_QcsRole` role. You can use the search box in the top-right corner of the role list to search for the role.
3. Click the role name to go to the role details page.

- Select the **Permission** tab to see if the role has the `QcloudCOSAccessForCLSRole` and `QcloudCKAFKAAccessForCLSRole` permissions.
- Select the **Role Entity** tab to see whether the role entity is `cls.cloud.tencent.com`.
  If there is no such role or permission, create one as instructed below.

Directions

Granting CLS access permissions

You can use either of the following methods to grant CLS the permissions to ship logs to COS/CKafka:

- Automatic Creation via CLS Console
- Manual Creation via CAM Console

If this is the first time you create a task to ship logs to COS/CKafka in the CLS console, follow the instructions in the console to create the required role and policies:

1. In the pop-up window that reads **This feature requires creating a service role**, click **Go to Cloud Access Management**.
2. On the **Role Management** page, click **Grant**.

At this point, you have authorized the CLS service role to access COS/CKafka. If you are using a root account, you can directly ship logs. If you are using a sub-account or collaborator account, you need to be authorized by the root account. For more information on granting permissions, see CAM Access Management. For more information on copying authorization policies, see Examples of Custom Access Policies.

Shipping to COS
Shipping Overview

Last updated：2022-10-14 15:51:35

Shipping to COS

CLS can ship data in a log topic to COS to meet the needs in the following scenarios:

- Logs are shipped to and stored in COS in STANDARD storage class. If you need other storage classes, perform relevant operations in COS. For more information, see Overview.
- Log data is processed through offline computing or other computing programs. Such data is shipped to COS first and then loaded by Data Lake Compute (data lake) or EMR (big data platform) for further analysis. For more information, see Using Data Lake Compute (Hive) to Analyze CLS Log. We recommend you choose CSV or Parquet as the shipping format.

Billing Description

Log shipping generates private network read traffic fees (cross-region shipping is not supported for now), and CLS will charge fees based on the compression format (Snappy/GZIP/lzop). If your raw log is 100 GB and you choose Snappy for compression, around 50 GB will be billable. As the read traffic price is 0.032 USD/GB, the fees will be 50 GB * 0.032 USD/GB = 1.6 USD.

Feature Limits

- Historical data cannot be shipped.
- Cross-region shipping is not supported. The log topic and COS bucket must be in the same region.
- Cross-account shipping is not supported.

Shipping Format

Data Shipping Format	Description	Recommended Scenario

Data Shipping Format	Description	Recommended Scenario
CSV shipping	Log data is shipped to COS based on the specified separator, such as space, tab, comma, semicolon, and vertical bar.	• It can be used for computing in Data Lake Compute. • It can be used to ship raw logs (logs collected in a single line, in multiple lines, and with separators).
JSON shipping	Log data is shipped to COS in JSON format.	It is a common data format and can be selected as needed.
Parquet shipping	Log data is shipped to COS in Parquet format.	Log data needs to be structured data. The data type can be converted (data not collected in a single line or multiple lines). This format is mainly used for Hive batch processing.

Note：

- After log data is shipped to COS, COS storage fees will be incurred. For billing details, see Billing Overview.
- To cleanse the log data before shipping to COS, see Log Filtering and Distribution.

CSV Shipping

Last updated：2022-10-13 15:12:38

Overview

You can log in to the CLS console and ship data in CSV format to COS. This document describes how to create a CSV shipping task.

Prerequisite

1. You have activated CLS, created a logset and a log topic, and successfully collected the log data.
2. You have activated COS and created a bucket in the target region for log topic shipping. For more information, see Creating Bucket.
3. Sub-accounts and collaborators need to be authorized by the root account. For more information on granting permissions, see CAM Access Management. For more information on copying authorization policies, see Examples of Custom Access Policies.
4. You have authorized the CLS service role to access COS. If you perform operations in the console, the system will guide you through the authorization process. If you directly call APIs, manual authorization will be required. For more information, see Viewing and Configuring Shipping Permissions.

Directions

1. Log in to the CLS console.
2. Click **Log Topic** on the left sidebar.
3. Click the desired log topic ID/name to go to the log topic management page.
4. Select the **Ship to COS** tab and click **Add Shipping Configuration**.
5. Set the following configuration items.

The configuration items are as described below:

Configuration Item	Description	Limit
Shipping Task Name	Configures the name of a shipping task	The name can contain letters, numbers, underso
COS Bucket	Target bucket for shipping. The	A value selected from the drop-down list

	target bucket must be in the same region as the current log topic.	
COS Path	COS bucket path, which is in the format of `/year/month/day/hour/` by default, such as `/2022/7/31/14/`. This format is used in COS for storing shipped log files. Here, the strftime syntax is supported. For example, if a log was shipped at 14:00 on July 31, 2022, the generated `/%Y/%m/%d/` path is `/2022/7/31/`, and the `/%Y%M%d/%H/` path is `/2022/07/31/14/`.	Cannot start with `/`
Filename	Option 1 (recommended): Use the shipping time as the name. For example, `202208251645_000_132612782.gz` indicates the shipping time_log topic partition_offset. This type of files can be loaded in Hive. Option 2: Use a random number as the name. This is the legacy practice of naming files and cannot be recognized by Hive as it cannot recognize filenames starting with "_". You can add a custom prefix to the COS path, such as `/%Y%M%d/%H/Yourname`.	/
Compression Format	To reduce read traffic fees, log files are compressed before being shipped to COS. Snappy, lzop, and GZIP are supported.	GZIP, Snappy, and lzop
File Size	It indicates the size of the raw log file to be shipped and is used together with the shipping interval parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches 256 MB within five minutes,	The value must be a number ranging from 5 to 2

	the size condition will be met first to trigger shipping.	
Shipping Interval	It indicates the interval for shipping and is used together with the file size parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches only 200 MB in 15 minutes, the shipping interval condition will be met first to trigger shipping.	Value range: 300-900s

6. Click **Next** to enter the **Advanced Configuration** page. Set **Shipping Format** to **CSV** and set the configuration items.

The configuration items are as described below:

Configuration Item	Description	Limit	Re
Key	Specifies the key name of the written CSV file. The value must be the key name or reserved parameter after logs are structured. Otherwise, the value is invalid.	The name can contain letters, numbers, underscores (_), and hyphens (-)	Ye
Separator	Separators between the fields in the CSV file	A value selected from the drop-down list	Ye
Escape Character	If the normal fields	A value selected from the drop-down list	Ye

	contain the selected separator characters, the separators will be enclosed by escape characters to prevent incorrect identification during data reading.		
Invalid Field Filling	If the configured key field does not exist, an invalid field is filled in.	A value selected from the drop-down list	Ye
Key in First Line	Adds field name description to the first line of the CSV file. That is, the key value is written into the first line of the CSV file. This is disabled by default.	Enabled/Disabled	Ye

JSON Shipping

Last updated：2022-10-13 15:12:38

Overview

You can log in to the CLS console and ship data in JSON format to COS. This document describes how to create a JSON shipping task.

Prerequisite

1. You have activated CLS, created a logset and a log topic, and successfully collected the log data.
2. You have activated COS and created a bucket in the target region for log topic shipping. For more information, see Creating Bucket.
3. Sub-accounts and collaborators need to be authorized by the root account. For more information on granting permissions, see CAM Access Management. For more information on copying authorization policies, see Examples of Custom Access Policies.
4. You have authorized the CLS service role to access COS. If you perform operations in the console, the system will guide you through the authorization process. If you directly call APIs, manual authorization will be required. For more information, see Viewing and Configuring Shipping Permissions.

Directions

1. Log in to the CLS console.
2. Click **Log Topic** on the left sidebar.
3. Click the desired log topic ID/name to go to the log topic management page.
4. Select the **Ship to COS** tab, click **Add Shipping Configuration**, and finish the configuration as detailed below.

The parameters are described as follows:

Configuration Item	Description	Limit
Shipping Task Name	Configures the name of a shipping task	The name can contain letters, numbers, unders
COS Bucket	Target bucket for shipping. The target bucket must be in the same	A value selected from the drop-down list

	region as the current log topic.	
COS Path	COS bucket path, which is in the format of `/year/month/day/hour/` by default, such as `/2022/7/31/14/`. This format is used in COS for storing shipped log files. Here, the strftime syntax is supported. For example, if a log was shipped at 14:00 on July 31, 2022, the generated `/%Y/%m/%d/` path is `/2022/7/31/`, and the `/%Y%M%d/%H/` path is `/2022/07/31/14/`.	Cannot start with `/`
Filename	Option 1 (recommended): Use the shipping time as the name. For example, `202208251645_000_132612782.gz` indicates the shipping time_log topic partition_offset. This type of files can be loaded in Hive. Option 2: Use a random number as the name. This is the legacy practice of naming files and cannot be recognized by Hive as it cannot recognize filenames starting with "_". You can add a custom prefix to the COS path, such as `/%Y%M%d/%H/Yourname`.	/
Compression Format	To reduce read traffic fees, log files are compressed before being shipped to COS. Snappy, lzop, and GZIP are supported.	GZIP, Snappy, and lzop
File Size	It indicates the size of the raw log file to be shipped and is used together with the shipping interval parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches 256 MB within five minutes, the size condition will be met first to trigger shipping.	The value must be a number ranging from 5 to 2

Shipping Interval	It indicates the interval for shipping and is used together with the file size parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches only 200 MB in 15 minutes, the shipping interval condition will be met first to trigger shipping.	Value range: 300-900s

5. Click**Next** to enter the **Advanced Configuration** page. Set **Shipping Format** to **JSON** and select the field to be shipped. Here, `_CONTENT_` is the user log data, and `_SOURCE_`, `_FILENAME_`, `_HOSTNAME_`, `_TIMESTAMP_`, and `_TAG_` are CLS metadata fields that can be selected as needed.

Raw Log Shipping

Last updated：2022-10-13 15:12:38

Overview

This document describes how to ship the collected raw log to COS. Currently, only logs collected in a single line, in multiple lines, or with certain separators are supported in this scenario.

Notes

You can configure CSV shipping to COS to ship certain raw logs. The following table describes the options of **CSV** shipping to COS but doesn't apply to JSON or Parquet shipping.

Log Collection Format	Support for Raw Log Shipping	User Raw Log	CLS Storage Format	Format for Shipping to COS
Full text in a single line	Yes. For more information, see Logs collected in a single line.	yourlog	__CONTENT__:yourlog	yourlog
Full text in multiple lines	Yes. For more information, see Logs collected in multiple lines.	yourlog	__CONTENT__:yourlog	yourlog
Separator (CSV) format	It depends. For more information, see CSV format. Only space, tab, comma, semicolon, and vertical bar are supported as raw log separators.	V1 separator V2 separator V3 separator...Vn For example, V1,V2,V3...Vn	K1:V1 K2:V2 K3:V3...Kn:Vn	V1 separator V2 separator V3 separator...Vn For example, V1,V2,V3...Vn
JSON format	No	K1:V1 K2:V2 K3:V3...Kn:Vn	K1:V1 K2:V2 K3:V3...Kn:Vn	V1,V2,V3...Vn differs from the original JSON.
Full regex	No	V11V22V33...Vnn	K1:V1 K2:V2 K3:V3...Kn:Vn	V1,V2,V3...Vn differs from the raw log.

Directions

Log collected in a single line or multiple lines

For logs collected in a single line or multiple lines, you can configure parameters based on CSV shipping to implement raw log shipping.

1. Complete the first step of **Basic Configuration** as instructed in CSV Shipping.
2. Set **Shipping Format** to **CSV**, retain the `__CONTENT__` field, delete other fields, set **Separator** to **Space**, set **Escape Character** to **Space**, set **Invalid Field Filling** to **None**, and disable **Key in First Line**.
   The parameters are described as follows:

Configuration Item	Description	Remarks
Key	`__CONTENT__`	For full text in a single line or multiple lines, `__CONTENT__` is used as the default key, and the raw log is used as the value. When the raw log is shipped, only the `__CONTENT__` field is retained.
Separator	Space	Set **Separator** to **Space** for the full text in a single line or multiple lines.
Escape Character	None	To prevent the raw log from being modified due to escape characters, set **Escape Character** to **None**.
Invalid Field Filling	None	Set **Invalid Field Filling** to **None**.
Key in First Line	Disabled	You don't need to add a description of the field name in the first line of the CSV file for raw log shipping.

3. Click **OK** to enable shipping.

Logs collected in CSV format

> Note：
> CSV shipping supports limited types of separators, including space, tab, comma, semicolon, and vertical bar. Therefore, you can ship log data in the raw format only when the separator in the raw log content is supported by CSV shipping.

1. Complete the first step of **Basic Configuration** as instructed in CSV Shipping.
2. Set **Shipping Format** to **CSV**. During field configuration, you need to delete CLS metadata fields.

The parameters are described as follows:

Configuration Item	Value	Description
Key	Keys	Only the user field is retained.
Separator	A value selected from the drop-down list	Select the separator of the raw log content. If separators are different, raw log shipping is not supported. Currently, only space, tab, comma, semicolon, and vertical bar are supported.
Escape Character	None	To prevent the raw log from being modified due to escape characters, set **Escape Character** to **None**.
Invalid Field Filling	None	Set **Invalid Field Filling** to **None**.
Key in First Line	Disabled	You don't need to add a description of the field name in the first line of the CSV file for raw log shipping.

3. Click **OK** to enable shipping.

Parquet Shipping

Last updated：2022-10-13 15:12:38

Overview

You can log in to the CLS console and ship data in Parquet format to COS. Parquet files can be loaded in Hive mainly for big data computing and analysis. This document describes how to create a Parquet shipping task.

> Note：
> Parquet files are mainly used for big data platforms. As Parquet comes with compression and Snappy/lzop/GZIP can be used for further compression, the file to be shipped needs to be large in size. We recommend you configure a value of greater than 200 MB (which becomes around 50 MB when shipped to COS).

Prerequisite

1. You have activated CLS, created a logset and a log topic, and successfully collected the log data.
2. You have activated COS and created a bucket in the target region for log topic shipping. For more information, see Creating Bucket.
3. Sub-accounts and collaborators need to be authorized by the root account. For more information on granting permissions, see CAM Access Management. For more information on copying authorization policies, see Examples of Custom Access Policies.
4. You have authorized the CLS service role to access COS. If you perform operations in the console, the system will guide you through the authorization process. If you directly call APIs, manual authorization will be required. For more information, see Viewing and Configuring Shipping Permissions.

Directions

1. Log in to the CLS console.
2. Click **Log Topic** on the left sidebar.
3. Click the desired log topic ID/name to go to the log topic management page.
4. Select the **Ship to COS** tab, click **Add Shipping Configuration**, and finish the configuration.

The parameters are described as follows:

Configuration Item	Description	Limit
Shipping Task Name	Configures the name of a shipping task	The name can contain letters, numbers, underso
COS Bucket	Target bucket for shipping. The target bucket must be in the same region as the current log topic.	A value selected from the drop-down list
COS Path	COS bucket path, which is in the format of `/year/month/day/hour/` by default, such as `/2022/7/31/14/`. This format is used in COS for storing shipped log files. Here, the strftime syntax is supported. For example, if a log was shipped at 14:00 on July 31, 2022, the generated `/%Y/%m/%d/` path is `/2022/7/31/`, and the `/%Y%M%d/%H/` path is `/2022/07/31/14/`.	Cannot start with `/`
Filename	Option 1 (recommended): Use the shipping time as the name. For example, `202208251645_000_132612782.gz` indicates the shipping time_log topic partition_offset. This type of files can be loaded in Hive. Option 2: Use a random number as the name. This is the legacy practice of naming files and cannot be recognized by Hive as it cannot recognize filenames starting with "_". You can add a custom prefix to the COS path, such as `/%Y%M%d/%H/Yourname`.	/
Compression Format	To reduce read traffic fees, log files are compressed before being shipped to COS. Snappy, lzop, and GZIP are supported.	GZIP, Snappy, and lzop
File Size	It indicates the size of the raw log file to be shipped and is used together	The value must be a number ranging from 5 to 2

	with the shipping interval parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches 256 MB within five minutes, the size condition will be met first to trigger shipping.	
Shipping Interval	It indicates the interval for shipping and is used together with the file size parameter. When either condition is met, compression will be performed accordingly. For example, if the size is set to 256 MB and the interval is set to 15 minutes, when the file reaches only 200 MB in 15 minutes, the shipping interval condition will be met first to trigger shipping.	Value range: 300-900s

5. Click **Next** to enter the **Advanced Configuration** page. Set **Shipping Format** to **Parquet**. `__SOURCE__`, `__FILENAME__`, and `__HOSTNAME__` are CLS metadata fields and can be deleted if you don't need them. The configuration items are as described below.

The parameters are described as follows:

Configuration Item	Description	Limit	Required
Key	The key field to write into the Parquet file. The system will automatically pull keys from the log for your choice. To add other fields to the log, click **Add**. Note that new keys cannot have the same name as existing keys. The field name can contain letters, digits, underscores, and hyphens.	A value selected from the drop-down list	Yes
Data Type	This field indicates the data type in the Parquet file, such as string, boolean, int32, int64, float, and double.	A value selected from the drop-down list	Yes
Assigned	You can assign a custom value	A value selected from the drop-down list	Yes

Value for Parsing Failure	when the data type parsing (conversion) fails. For the string type, an empty string indicates "", and `NULL` indicates unknown. You can also assign a custom value for the boolean, integer, or float type.		

Shipping Task Management

Last updated：2022-10-13 15:12:38

Overview

This document describes how to manage shipping tasks, including viewing task details as well as modifying and deleting tasks.

Directions

Viewing shipping task details

1. Log in to the CLS console.
2. Select **Shipping Task Management** on the left sidebar.
3. On the **Shipping Task Management** page, select the region, logset, and log topic to view the list of shipping to COS tasks.
4. Click a task name to view its details and monitoring information.

- Shipping Traffic: The traffic generated by successful shipping to COS. When the configured file size or shipping interval is reached to trigger shipping, there will be an actual value for this parameter. At other times, the value will be 0.
- Shipped Line Count: The number of data lines successfully shipped to COS. When the configured file size or shipping interval is reached to trigger shipping, there will be an actual value for this parameter. At other times, the value will be 0.
- Shipping Latency: The time after log data arrives at CLS and before it is processed in a shipping task. It is normal if this value is within 60 seconds. This metric is mainly used to monitor whether data heaps up and logs are shipped to COS timely.
- Shipping Task Status:
  - `1` indicates a success.
  - `10001` indicates that the COS bucket doesn't exist. You should check the validity of the bucket.
  - `10002` indicates that you have no permission to access the COS bucket. You should make sure that you have the permission.
  - `10003` indicates an internal error. You should try again. If the problem persists, submit a ticket.

Modifying a task

1. Log in to the CLS console.

2. Select **Shipping Task Management** on the left sidebar.
3. On the **Shipping Task Management** page, select the region, logset, log topic, and name of the target shipping task, and click **Modify Configuration** on the right.

Deleting a task

1. Log in to the CLS console.

2. Select **Shipping Task Management** on the left sidebar.

3. On the **Shipping Task Management** page, select the region, logset, log topic, and name of the target shipping task, and click **Delete** on the right.

4. In the pop-up window, click **Delete**.

Shipping to CKafka
Creating Shipping Task

Last updated：2022-10-28 15:09:09

Overview

You can ship log topic data to CKafka for real-time stream computing and storage. If you haven't purchased a CKafka instance, you can consider using the Consumption over Kafka feature of CLS.

Prerequisites

- You have activated the CKafka service.
- Make sure that the current account has the permission to enable shipping to CKafka. If your account is a sub-account, it needs to be authorized by the root account first. For more information, see Examples of Custom Access Policies.

Billing Description

Log shipping incurs private network read traffic fees (cross-region shipping is not supported for now), which CLS charges based on the size after Snappy or lz4 compression. If your raw log is 100 GB and you choose Snappy for compression, around 50 GB will be billable. As the read traffic price is 0.032 USD/GB, the fees will be 50 GB * 0.032 USD/GB = 1.6 USD.

Directions

1. Create a CKafka instance in the same region as the log topic. For more information, see Creating Instance.
2. Configure the following parameters to create a topic in the same region as the log topic. For more information, see Creating Topic.

- **Preset ACL Policy**: Disable this option.
- **Show advanced configuration**:
  - **CleanUp.policy**: Select **delete**; otherwise, shipping will fail.

- **max.message.bytes**: Set this value to 8 MB or above. Otherwise, when the size of a single message in CLS exceeds the specified limit, the message cannot be written to the CKafka topic, and shipping will fail.

3. Go to the CLS console and enter the shipping task management page or log topic management page as needed.

- On the left sidebar, click **Shipping Task Management** and select a region, logset, and log topic.
- On the left sidebar, click **Log Topic** and select a log topic to be shipped to CKafka to enter the log topic management page.

4. Click the **Ship to CKafka** tab to enter the configuration page.

5. Click *Edit on the right to enable shipping to CKafka. Then, select the target CKafka instance and topic as well as the log field to be shipped.

6. Click **OK** to start shipping to CKafka. If the task status is **Enabled**, the feature is enabled successfully.

> Note：
> To cleanse the log data before shipping to CKafka, see Log Filtering and Distribution.

FAQs

What should I do if the log data cannot be shipped to CKafka?

If ACL authentication is enabled in CKafka, the log data cannot be shipped. In this case, you need to disable the ACL of the topic.

What should I do if the system prompts that I have no permissions to read/write the CKafka topic?

If you directly use an API to ship data to CKafka, you may not have the read/write permissions of the CKafka topic. If you ship data in the console, the system will guide you through the authorization process, but if you directly call an API for shipping, you need to authorize manually. For more information, see CLS Service Role Authorization.

Shipping to ES
Dumping to ES Through SCF

Last updated：2022-03-03 13:57:13

Overview

This document describes how to use SCF to dump CLS logs to ES. CLS is mainly used for log collection, and SCF mainly provides node computing capabilities for data processing. For the data processing flowchart, please see Function Processing Overview.

Directions

Creating an SCF function

1. Log in to the SCF console and select **Function Service** on the left sidebar.

2. At the top of the **Function Service** page, select the **Beijing** region and click **Create** to go to the function creating page and configure the following parameters:
   - **Function name**: enter **CLSdemo**.
   - **Runtime environment**: select **Python 2.7**.
   - **Creation Method**: select **Function Template**.
   - **Fuzzy search**: enter **CLSToElasticsearch** and search.

3. Click **Learn More** in the template to view relevant information in the **Template Details** pop-up window, which can be downloaded.

4. After configuring the basic information, click **Next** to go to the function configuration page.

5. Keep the default configuration and click **Complete** to complete the function creation.

> Note：
> You should select the same VPC and subnet of CLS for the created function on the **Function Configuration** page as shown below:

Configuring CLS triggers

1. Log in to the CLS console and click **Logset** on the left sidebar.
2. Locate the existing logset you want, and click **View** under **Operation** on the right to go to the logset details page.
3. On the log topic details page, select **Function Processing** and click **Create**. Add the created function in the **Function Processing** pop-up window. See the figure below:

The main parameter information is as follows. Use the default values for the remaining configuration items.

- **Namespace**: select the function namespace.
- **Function Name**: select the function created in the Creating SCF function step.
- **Alias**: select a function alias.
- **Maximum waiting time**: configure the longest waiting time for a single event pull. Default value: 60s.

Testing the function

1. Download the log file in the test sample, extract `demo-scf1.txt` , and import it to the source CLS service.

2. Switch to the SCF console to view the execution result.
   Select the **Log Query** tab on the function details page to view the printed log information.

3. Log in to the ES console to view the data dumping and processing result.

> Note：
> You can write specific data processing methods as needed.

Consumption over Kafka

Last updated：2022-10-14 15:23:45

Overview

You can consume a log topic as a Kafka topic over the Kafka protocol. In practice, collected log data can be consumed through the Kafka Consumer or Kafka connectors provided by open-source communities, such as flink-connector-kafka and Kafka-connector-jdbc, to downstream big data components or data warehouses, including Spark, HDFS, Hive, Flink, and Tencent Cloud products like Oceanus and EMR.

This document provides demos for how to consume log topics with Flink and Flume.

Prerequisite

- You have activated CLS, created a logset and a log topic, and collected log data.
- Make sure that the current account has the permission to enable **Consumption over Kafka**. For more information, see Examples of Custom Access Policies.

Use Limits

- Supported Kafka protocol versions: 1.1.1 and earlier.
- Supported compression modes: Snappy and LZ4.
- User authentication mode: SASL_PLAINTEXT.
- You can consume only current but not historical data.
- Data in topics are retained for two hours.

Configuration Methods

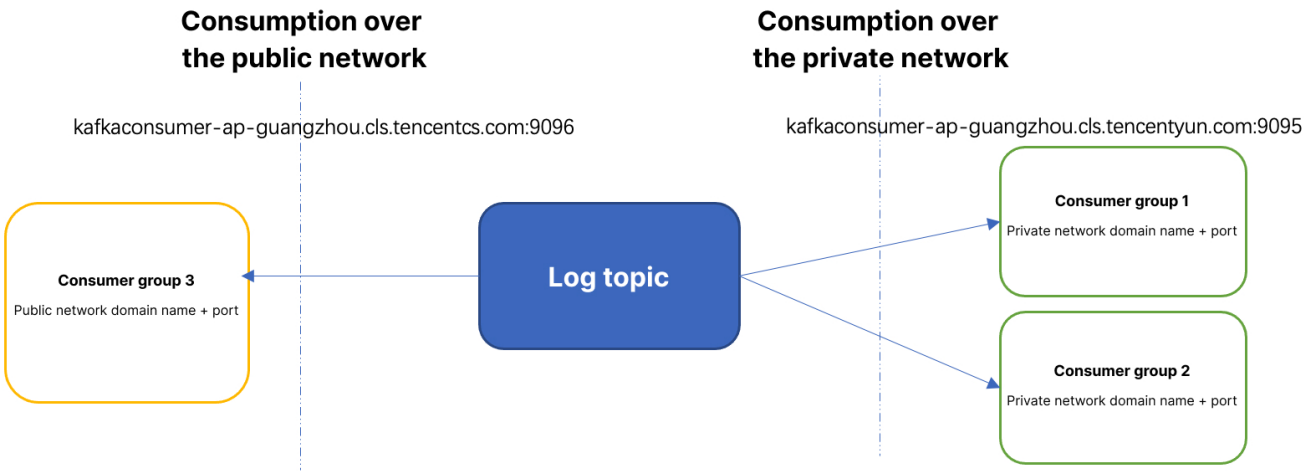
To consume logs via Kafka, you need to configure the following parameters:

Parameter	Description
User authentication mode	Currently, only SASL_PLAINTEXT is supported.

Parameter	Description
hosts	Configure it as `${region}-producer.cls.tencentyun.com:9095`. For more information, see Available Regions.
topic	Configure it as `${out-TopicID}`, i.e., `out-log topic ID`, such as `out-76c63473-c496-466b-XXXX-XXXXXXXXXXX`.
username	Configure it as `${logsetID}`, i.e., logset ID, such as `0f8e4b82-8adb-47b1-XXXX-XXXXXXXXXXX`. You can copy the logset ID in the log topic list.
password	Configure it as `${SecretId}#${SecretKey}`, such as `XXXXXXXXXXXXXX#YYYYYYYY`. Log in to the CAM console and select **Access Key** on the left sidebar to get the key information. You can use either the API key or project key (recommended).

Consumption over private or public network

- **Consumption over the private network**: A private network domain name is used to consume logs, and the traffic price is 0.032 USD/GB. If your raw log is 100 GB and you choose Snappy for compression, around 50 GB will be billable, and the private network read traffic fees will be 50 GB * 0.032 USD/GB = 1.6 USD. In general, you can consume logs over the private network if your consumer and log topic are in the same VPC or region.
- **Consumption over the public network**: A public network domain name is used to consume logs, and the traffic price is 0.141 USD/GB. If your raw log is 100 GB and you choose Snappy for compression, around 50 GB will be billable, and the public network read traffic fees will be 50 GB * 0.141 USD/GB = 7.05 USD. In general, you need to consume logs over the public network if your consumer and log topic are in different VPCs or regions.



Directions

1. Log in to the CLS console and select **Log Topic** on the left sidebar.
2. On the **Log Topic** page, click the target **Log Topic ID/Name** to enter the log topic management page.
3. On the log topic management page, click the **Consumption over Kafka** tab.
4. Click **Edit** on the right, set **Current Status** to **Enable**, and click **OK**.
5. The console displays the topic and host+port information, which can be copied for constructing the consumer SDK.

SDK for Python

```
import uuid
from kafka import KafkaConsumer,TopicPartition,OffsetAndMetadata
consumer = KafkaConsumer(
# Consumption topic in the format of `out+log topic ID`, such as `out-633a268c-XX
XX-4a4c-XXXX-7a9a1a7baXXXX`.
'${out-TopicID} ',
group_id = uuid.uuid4().hex,
auto_offset_reset='earliest',
# Service address + port (9096 for the public network and 9095 for the private ne
twork). In this example, consumption is performed over the private network. Enter
this field accordingly.
bootstrap_servers = ['${region}-producer.cls.tencentyun.com:9095'],
security_protocol = "SASL_PLAINTEXT",
```

```
sasl_mechanism = 'PLAIN',
# The username is the logset ID, such as `ca5cXXXXdd2e-4ac0af12-92d4b677d2c6`.
sasl_plain_username = "${logsetID}",
# The password is a string of your `SecretId#SecretKey`, such as `AKIDWrwkHYYHjvq
hz1mHVS8YhXXXX#XXXXuXtymIXT0Lac`. Note that `#` is required.
sasl_plain_password = "${SecretId}#${SecretKey}",
api_version = (1,1,1)
)
print('begin')
for message in consumer:
print('begins')
print ("Topic:[%s] Partition:[%d] Offset:[%d] Value:[%s]" % (message.topic, messa
ge.partition, message.offset, message.value))
print('end')
```

Consumption of CLS Log by Oceanus

Create a job in the Oceanus console.

```
CREATE TABLE `nginx_source`
( # Fields in the log
`@metadata` STRING,
`@timestamp` TIMESTAMP,
`agent` STRING,
`ecs` STRING,
`host` STRING,
`input` STRING,
`log` STRING,
`message` STRING,
`partition_id` BIGINT METADATA FROM 'partition' VIRTUAL, -- Kafka partition
`ts` TIMESTAMP(3) METADATA FROM 'timestamp'
) WITH (
'connector' = 'kafka',
# Consumption topic in the format of `out+log topic ID`, such as `out-633a268c-XX
XX-4a4c-XXXX-7a9a1a7baXXXX`.
'topic' = '${out-TopicID}',
# Service address + port (9096 for the public network and 9095 for the private ne
twork). In this example, consumption is performed over the private network. Enter
this field accordingly.
'properties.bootstrap.servers' = '${region}-producer.cls.tencentyun.com:9095',
'properties.group.id' = 'YourConsumerGroup',
'scan.startup.mode' = 'earliest-offset',
'format' = 'json',
'json.fail-on-missing-field' = 'false',
```

```
'json.ignore-parse-errors' = 'true' ,
# The username is the logset ID, such as `ca5cXXXXdd2e-4ac0af12-92d4b677d2c6`.
# The password is a string of your `SecretId#SecretKey`, such as `AKIDWrwkHYYHjvq
hz1mHVS8YhXXXX#XXXXuXtymIXT0Lac`. Note that `#` is required.
'properties.sasl.jaas.config' = 'org.apache.kafka.common.security.plain.PlainLogi
nModule required username="${logsetID}" password="${SecretId}#${SecretKey}";',
'properties.security.protocol' = 'SASL_PLAINTEXT',
'properties.sasl.mechanism' = 'PLAIN'
);
```

Consumption of CLS Log by Flink

Enabling log consumption over Kafka

Enable log consumption over Kafka and get the consumer service domain name and topic as instructed in Directions.

Confirming flink-connector-kafka dependency

After confirming that `flink-connector-kafka` exists in `flink lib`, directly register a Kafka table in `sql`. The dependency is as follows:

```
<dependency>
<groupId>org.apache.flink</groupId>
<artifactId>flink-connector-kafka</artifactId>
<version>1.14.4</version>
</dependency>
```

Registering Flink table

```
CREATE TABLE `nginx_source`
(
# Fields in the log
`@metadata` STRING,
`@timestamp` TIMESTAMP,
`agent` STRING,
`ecs` STRING,
`host` STRING,
`input` STRING,
`log` STRING,
`message` STRING,
# Kafka partition
`partition_id` BIGINT METADATA FROM 'partition' VIRTUAL,
`ts` TIMESTAMP(3) METADATA FROM 'timestamp'
```

```
) WITH (
'connector' = 'kafka',
# Consumption topic in the format of `out+log topic ID`, such as `out-633a268c-XX
XX-4a4c-XXXX-7a9a1a7baXXXX`.
'topic' = '${out-TopicID}',
# Service address + port (9096 for the public network and 9095 for the private ne
twork). In this example, consumption is performed over the private network. Enter
this field accordingly.
'properties.bootstrap.servers' = '${region}-producer.cls.tencentyun.com:9095',
'properties.group.id' = 'YourConsumerGroup',
'scan.startup.mode' = 'earliest-offset',
'format' = 'json',
'json.fail-on-missing-field' = 'false',
'json.ignore-parse-errors' = 'true' ,
# The username is the logset ID, such as `ca5cXXXXdd2e-4ac0af12-92d4b677d2c6`.
# The password is a string of your `SecretId#SecretKey`, such as `AKIDWrwkHYYHjvq
hz1mHVS8YhXXXX#XXXXuXtymIXT0Lac`. Note that `#` is required.
'properties.sasl.jaas.config' = 'org.apache.kafka.common.security.plain.PlainLogi
nModule required username="${logsetID}" password="${SecretId}#${SecretKey}";',
'properties.security.protocol' = 'SASL_PLAINTEXT',
'properties.sasl.mechanism' = 'PLAIN'
);
```

Querying

After successful execution, you can use the statement for query.

```
select count(*) , host from nginx_source group by host;
```

Consumption of CLS Log by Flume

If you need to have log data consumed by a self-built HDFS or Kafka cluster, you can use the Flume component for forwarding as instructed below.

Enabling log consumption over Kafka

Enable log consumption over Kafka and get the consumer service domain name and topic as instructed in Directions.

Flume configuration

```
a1.sources = source_kafka
a1.sinks = sink_local
a1.channels = channel1
```

```
# Configure the source
a1.sources.source_kafka.type = org.apache.flume.source.kafka.KafkaSource
a1.sources.source_kafka.batchSize = 10
a1.sources.source_kafka.batchDurationMillis = 200000
# Service address + port (9096 for the public network and 9095 for the private ne
twork). In this example, consumption is performed over the private network. Enter
this field accordingly.
a1.sources.source_kafka.kafka.bootstrap.servers = ${region}-producer.cls.tencenty
un.com:9095
# Consumption topic in the format of `out+log topic ID`, such as `out-633a268c-XX
XX-4a4c-XXXX-7a9a1a7baXXXX`.
a1.sources.source_kafka.kafka.topics = ${out-TopicID}
a1.sources.source_kafka.kafka.consumer.group.id = YourConsumerGroup
a1.sources.source_kafka.kafka.consumer.auto.offset.reset = earliest
a1.sources.source_kafka.kafka.consumer.security.protocol = SASL_PLAINTEXT
a1.sources.source_kafka.kafka.consumer.sasl.mechanism = PLAIN
# The username is the logset ID, such as `ca5cXXXXdd2e-4ac0af12-92d4b677d2c6`.
# The password is a string of your `SecretId#SecretKey`, such as `AKIDWrwkHYYHjvq
hz1mHVS8YhXXXX#XXXXuXtymIXT0Lac`. Note that `#` is required.
a1.sources.source_kafka.kafka.consumer.sasl.jaas.config = org.apache.kafka.common
.security.plain.PlainLoginModule required username="${logsetID}"
password="${SecretId}#${SecretKey}";

// Configure the sink
a1.sinks.sink_local.type = logger
a1.channels.channel1.type = memory
a1.channels.channel1.capacity = 1000
a1.channels.channel1.transactionCapacity = 100
// Bind the source and sink to the channel
a1.sources.source_kafka.channels = channel1
a1.sinks.sink_local.channel = channel1
```

Monitoring Alarm
Monitoring Alarm Overview

Last updated：2022-05-07 11:47:58

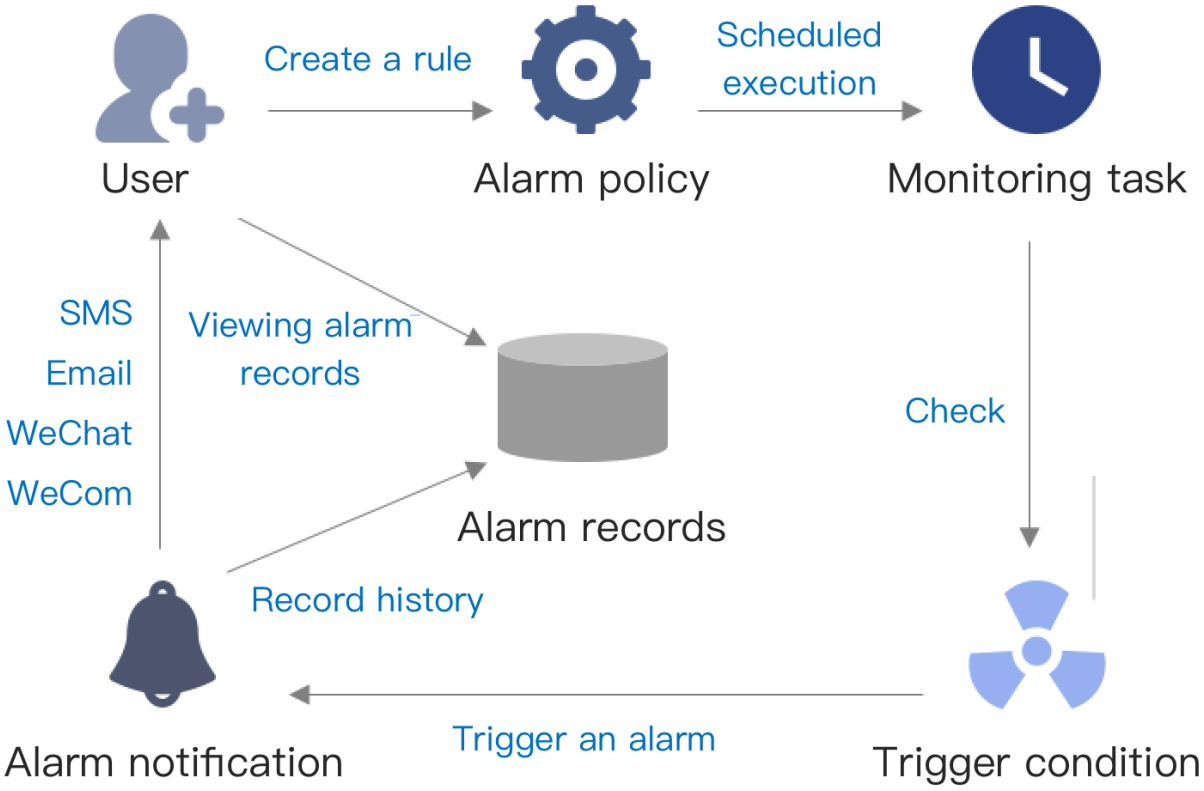
Overview

CLS supports setting alarm policies for one or more log topics. An alarm policy periodically performs monitoring tasks and sends alarm notifications when the query and analysis results meet the trigger condition, so that you can find exceptions in time.

Relevant concepts

Name	Description
Alarm policy	It is the management unit for monitoring alarms. An alarm policy contains various information such as monitoring object, monitoring period, trigger condition, alarm frequency, and notification template.
Monitoring object	A log topic can be used as the monitoring object, a query or analysis statement can be executed on the log topic, and then the query or analysis result can be checked.
Trigger condition	The query and analysis result is checked, and if the trigger condition expression is true, an alarm will be triggered.
Monitoring period	It is the policy execution period. A fixed period (such as every 5 minutes) and a fixed time (such as 12:00 every day) are supported.
Alarm frequency	It is the alarm frequency after the trigger condition is met, which helps avoid frequent alarm notifications.
Notification group	Supported notification channels include SMS, WeChat, phone calls, email, and webhook.

Flowchart



Managing Alarm Policies
Configuring Alarm Policy

Last updated：2022-10-17 14:47:44

Overview

This document describes how to configure an alarm policy based on logs so that alarms can be sent when certain conditions are met, such as when there are too many error logs or the API response time is too long.

Prerequisites

- You have uploaded the log to a log topic and configured the index.
- The log topic is not in STANDARD_IA storage, which doesn't support alarm policy configuration.
- You have logged in to the CLS console and entered the Alarm Policy page.

Directions

On the **Alarm Policy** page, click **Create** and configure the following items.

Configuring the monitoring object and monitoring task

- **Monitoring Object**: Select the target log topic.
- **Monitoring Task**
- **Query Statement**: It is used for log topics and needs to contain the analysis statement (i.e., SQL statement as described in Overview and Syntax Rules).
  - Example 1: To count logs with errors, use `status:error | select count(*) as ErrCount`.
  - Example 2: To calculate the average response time of the domain name "domain:aaa.com", enter `domain:"aaa.com" | select avg(request_time) as Latency`.
- **Query Time Range**: It indicates the time range of data for query by the query statement, which can be up to the last 24 hours.
- **Trigger Condition**: An alarm is triggered when the trigger condition is met. In the condition expression, `$N.keyname` is used to reference the query statement result. Here, `$N` indicates the Nth query statement in the current alarm policy, and `keyname` indicates the corresponding field name. For more information on the expression syntax, see Trigger Condition Expression.

- Example 1: To trigger an alarm when the number of logs with errors exceeds 10, enter `$1.ErrCount > 10`. Here, `$1` indicates the first query statement, and `ErrCount` indicates the `ErrCount` field in the result.
- Example 2: To trigger an alarm when the domain name "domain:aaa.com" takes more than 5 seconds on average to respond, enter `$2.Latency > 5`. Here, `$2` indicates the first query statement, and `Latency` indicates the `Latency` field in the result.

- **Trigger by Group**: It specifies whether the trigger condition expression should trigger alarms by group. When it is enabled, if multiple results of the query statement meet the trigger condition, the results will be grouped based on the group field, and an alarm will be triggered for each group.
  For example, if the query statement 2 is `* | select avg(request_time) as Latency,domain group by domain order by Latency desc limit 5`, and multiple results are returned:

Latency	Domain
12.56	aaa.com
9.45	bbb.com
7.23	ccc.com
5.21	ddd.com
4.78	eee.com

  If the trigger condition is `$2.Latency > 5`, then it is met by four results.
  - If triggering by group is not enabled, only one alarm will be triggered when the trigger condition is met by one of the above execution results.
  - If it is enabled and the results are grouped by the `domain` field, four alarms will be triggered separately for the above execution results.

Note：

- When triggering by group is enabled, the trigger condition may be met by multiple results, and a large number of alarms will be triggered, leading to an alarm storm. Therefore, configure the group field and trigger condition appropriately.
- When specifying the group field, you can divide execution results into up to 1,000 groups. No alarms will be triggered for excessive groups.

- **Execution Cycle**: It indicates the execution frequency of the monitoring task, which can be configured in the following two ways:

Cycle Configuration Method	Description	Example
Fixed frequency	Monitoring tasks are performed at fixed intervals Interval: 1–1,440 minutes. Granularity: Minute	Monitoring tasks are performed once every 5 minutes
Fixed time	Monitoring tasks are performed once at fixed points in time Time point range: 00:00–23:59. Granularity: Minute	Monitoring tasks are performed once at 02:00 every day

Configuring multi-dimensional analysis

When an alarm is triggered, raw logs can be further analyzed through multi-dimensional analysis, and the analysis result can be added to the alarm notification to facilitate root cause discovery. The multi-dimensional analysis doesn't affect the alarm trigger condition.

Multi-dimensional Analysis Type	Description
Related raw logs	Get the raw logs that meet the search condition of the query statement. The log field, quantity, and display form can be configured. For example, when an alarm is triggered by too many error logs, you can view the detailed logs in the alarm.
Top 5 field values by occurrence and their percentages	For all the logs within the time range when the alarm is triggered, group them based on the specified field and get the top 5 field values and their percentages. For example, when an alarm is triggered by too many error logs, you can get the top 5 URLs and top 5 response status codes.
Custom search and analysis	Execute the custom search and analysis statement for all the logs within the time range when the alarm is triggered. Example 1: `*

Note：
The "related raw logs" and "top 5 field values by occurrence and their percentages" options support the automatic association with the search condition of the specified query statement (excluding the analysis statement, i.e., SQL filter condition), so as to indicate to perform multi-dimensional analysis on raw logs that meet what conditions.

Configuring an alarm notification

- **Alarm Frequency**:
- Duration: A notification will be sent only after the trigger condition is met constantly a certain number of times (which can be 1–10 and is 1 by default).
- Interval: No notifications will be sent within the specified interval after the last notification. For example, the **an alarm will be triggered every 15 minutes** option indicates that only one alarm will be sent within 15 minutes.
- **Notification Group**:
  The notification channels and objects can be set by associating a notification channel group. Notifications can be sent by SMS, email, phone call, WeChat, WeCom, and custom callback API (webhook). For more information, see Managing Notification Group.
- **Notification Content**:
  By adding preset variables to the notification content, you can add specified information to the alarm notification. For more information on variables, see Notification Content Variable.
- **Custom Webhook Configuration**:
  If the selected notification group contains a custom webhook, the custom webhook input box will be displayed. You can customize the request header and request body there, which will be used by CLS to call the specified API when an alarm is triggered. In the request header and body, you can use notification content variables to send relevant data to the specified API.

Best Practices

Counting Logs by Time Range

Trigger Condition Expression

Last updated：2022-07-12 16:43:07

A trigger condition expression is used to determine whether to trigger an alarm. The query analysis result of the monitoring object is input as a variable for the trigger expression. If the expression is true, an alarm will be triggered.

Syntax Description

Operator	Description	Example
$N.keyname	Imports the query analysis result. `N` is the monitoring object number, `keyname` is the field name in the **query analysis result** (which must start with a letter and can contain letters, digits, and underscores. We recommend you use the AS syntax to set an alias for the result.)	$1.ErrCount
+	Addition operator	$1.ErrCount+$1.FatCount>10
-	Subtraction operator	$1.Count-$1.InfoCount>100
*	Multiplication operator	$1.RequestMilSec*1000>10
/	Division operator	$1.RequestSec/1000>0.01
%	Modulo operator	$1.keyA%10==0
==	Comparison operator: equal to	$1.ErrCount==100 $1.level=="Error"
>	Comparison operator: greater than	$1.ErrCount>100
<	Comparison operator: less than	$1.pv<100
>=	Comparison operator: greater than or equal to	$1.ErrCount>=100
<=	Comparison operator: less than or equal to	$1.pv<=100
!=	Comparison operator: not equal to	$1.level!="Info"
()	Parentheses for controlling the operation priority	($1.a+$1.b)/$1.c>100
&&	Logical operator: AND	$1.ErrCount>100 && $1.level=="Error"

Operator	Description	Example
||	Logical operator: OR	$1.ErrCount>100 || $1.level=="Error"

- An alarm will be triggered only if the expression is true. For example, if the calculation result of `$1.a+$1.b` is 100, no alarms will be triggered; if the result is greater than or equal to 100, an alarm will be triggered.
- `keyname` in `$N.keyname` is the field name of the query analysis result. It must start with a letter and can contain letters, digits, and underscores, such as `level:error | select count(*) AS errCount`. `errCount` can be directly used as `keyname` in the trigger condition expression. If the field name contains special symbols, you need to enclose the imported variable with `[]`, such as `[$1.count(*)]`. **We recommend you use an AS analysis statement to set an alias for the result field name.**
- Up to three monitoring objects can be set in an alarm policy. Each one is identified by a number starting from 1. For example, `$1.key1` imports the `key1` field name in the query whose number is `1`, and `$2.key2` imports the `key2` field name in the query whose number is `2`.
- If multiple values are returned in the query analysis result, the expression will be calculated according to the values for up to 1,000 times or until the calculation result is `true`. For example, if the expression is `$1.a+$2.b>100`, analysis 1 returns m results, and analysis 2 returns n results, then the expression will be calculated for m * n times, and calculation will stop when `$1.a+$2.b>100` is `true` or after 1,000 times of calculation.

Alarm Notification Variable

Last updated：2022-10-17 14:46:59

When setting the **notification content** and **custom webhook configuration** in an **alarm policy**, you can use alarm notification variables to customize the notification content and include a clearer cause description.

Getting Started

When configuring an alarm policy, enter the following configuration information for the notification content:

```
Detailed log:
{{.QueryLog[0][0]}}
```

When the alarm notification is received, the notification content will be automatically replaced with the following value, indicating the last detailed log when the alarm is triggered:

```
Detailed log:
{"content":{"body_bytes_sent":"33352","http_referer":"-","http_user_agent":"Mozil
la/5.0 (Windows NT 6.2; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/30.
0.1599.17 Safari/537.36","remote_addr":"201.80.83.199","remote_user":"-","request
_method":"GET","request_uri":"/content/themes/test-com/images/header_about.jpg",
"status":"404","time_local":"01/Nov/2018:01:16:31"},"fileName":"/root/testLog/ngi
nx.log","pkg_id":"285A243662909DE3-70A","source":"172.17.0.2","time":165383115000
8,"topicId":"a54de372-ffe0-49ae-a12e-c340bb2b03f2"}
```

Notification Variables

Variable	Description	Sample Variable Value	Remarks
{{.UIN}}	Account ID	100007xxx827	-
{{.Nickname}}	Account nickname	xx company	-
{{.Region}}	Region	Guangzhou	-
{{.Alarm}}	Alarm policy name	Too many NGINX error logs	-

Variable	Description	Sample Variable Value	Remarks
{{.AlarmID}}	Alarm policy ID	notice-3abd7ad6-15b7-4168-xxxx-52e5b961a561	-
{{.ExecuteQuery}}	Query statement	["status:>=400 | select count(*) as errorLogCount","status:>=400 | select count(*) as errorLogCount,request_uri group by request_uri order by count(*) desc"]	It is an array. `{{.ExecuteQuer` indicates the detailed the first query statem `{{.ExecuteQuer` the second, and so o
{{.Condition}}	Trigger condition	$1.errorLogCount > 1	-
{{.HappenThreshold}}	Number of times the trigger condition needs to be constantly met before an alarm is triggered	1	-
{{.AlertThreshold}}	Alarm interval	15	Unit: Minute
{{.Topic}}	Log topic name	nginxLog	-
{{.TopicId}}	Log topic ID	a54de372-ffe0-49ae-xxxx-c340bb2b03f2	-
{{.StartTime}}	Time when the alarm is triggered for the first time	2022-05-28 18:56:37	Time zone: Asia/Sha
{{.StartTimeUnix}}	Timestamp when the alarm is triggered for the first time	1653735397099	UNIX timestamp in milliseconds

Variable	Description	Sample Variable Value	Remarks
{{.NotifyTime}}	Time of this alarm notification	2022-05-28 19:41:37	Time zone: Asia/Sha
{{.NotifyTimeUnix}}	Timestamp of this alarm notification	1653738097099	UNIX timestamp in milliseconds
{{.NotifyType}}	Alarm notification type	1	Valid values: `1` (alar (resolved)
{{.ConsecutiveAlertNums}}	Number of consecutive alarms	2	-
{{.Duration}}	Alarm duration	0	Unit: Minute
{{.TriggerParams}}	Alarm trigger parameter	$1.errorLogCount=5;	-
{{.ConditionGroup}}	Group information when the alarm is triggered	{"$1.AppName":"userManageService"}	This is valid only whe triggering by group is in the alarm policy.
{{.DetailUrl}}	URL of the alarm details page	https://alarm.cls.tencentcs.com/MDv2xxJh	No login is required.
{{.QueryUrl}}	URL of the search and analysis statement in the first query statement	https://alarm.cls.tencentcs.com/T0pkxxMA	-

Variable	Description	Sample Variable Value	Remarks
{{.Message}}	Notification content	-	It indicates the **noti content** entered in t policy.
{{.QueryResult}}	Execution result of the query statement	For more information, see the {{.QueryResult}} remarks.	-
{{.QueryLog}}	Detailed log matching the search condition of the query statement	For more information, see the {{.QueryLog}} remarks.	-
{{.AnalysisResult}}	Multi-dimensional analysis result	For more information, see the {{.AnalysisResult}} remarks.	-

Below are relevant descriptions:

Show All

{{.QueryResult}}

展开&收起

- **Description**: Execution result of the query statement
- **Remarks**: It is an array. `{{.QueryResult[0]}}` indicates the execution result of the first query statement, `{{.QueryResult[1]}}` the second, and so on.
- **Sample variable value**:

  If there are two query statements in the alarm policy:

```
The first query statement: status:>=400 | select count(*) as errorLogCount
The second query statement: status:>=400 | select count(*) as errorLogCount,req
uest_uri group by request_uri order by count(*) desc
```

  Then the variable values are:

```
[
[{
```

```
"errorLogCount": 7
}],
[{
"errorLogCount": 3,
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 3,
"request_uri": "/feed"
}, {
"errorLogCount": 1,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}]
]
```


{{.QueryLog}}

展开&收起

- **Description**: Detailed log matching the search condition of the query statement (excluding SQL filter condition)
- **Remarks**: It is an array. `{{.QueryLog[0]}}` indicates the detailed log of the first query statement, `{{.QueryLog[1]}}` the second, and so on. Up to last ten detailed logs can be contained in each query statement.
- **Sample variable value**:


```
[
[{
"content": {
"__TAG__": {
"pod": "nginxPod",
"cluster": "testCluster"
},
"body_bytes_sent": "32847",
"http_referer": "-",
"http_user_agent": "Opera/9.80 (Windows NT 6.1; U; en-US) Presto/2.7.62 Versio
n/11.01",
"remote_addr": "105.86.148.186",
"remote_user": "-",
"request_method": "GET",
"request_uri": "/apple-touch-icon-144x144.png",
"status": "404",
"time_local": "01/Nov/2018:00:55:14"
},
"fileName": "/root/testLog/nginx.log",
"pkg_id": "285A243662909DE3-5CD",
"source": "172.17.0.2",
"time": 1653739000013,
```

```
"topicId": "a54de372-ffe0-49ae-a12e-c340bb2b03f2"
}, {
"content": {
"__TAG__": {
"pod": "nginxPod",
"cluster": "testCluster"
},
"body_bytes_sent": "33496",
"http_referer": "-",
"http_user_agent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_3) AppleWebKit/
537.36 (KHTML, like Gecko) Chrome/27.0.1453.93 Safari/537.36",
"remote_addr": "222.18.168.242",
"remote_user": "-",
"request_method": "GET",
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
,
"status": "404",
"time_local": "01/Nov/2018:00:54:37"
},
"fileName": "/root/testLog/nginx.log",
"pkg_id": "285A243662909DE3-5C8",
"source": "172.17.0.2",
"time": 1653738975008,
"topicId": "a54de372-ffe0-49ae-a12e-c340bb2b03f2"
}]
]
```


{{.AnalysisResult}}

展开&收起

- **Description**: Multi-dimensional analysis result
- **Remarks**: It is an object. The level-1 object corresponds to each multi-dimensional analysis result, with the `key` being the multi-dimensional analysis name and the `value` being the multi-dimensional analysis result.
- **Sample variable value**:

  If there are three multi-dimensional analysis operations in the alarm policy:

```
Name: Top URL
Type: Top 5 field values by occurrence and their percentages
Field: request_uri
Name: Error log URL distribution
Type: Custom search and analysis
Analysis statement: status:>=400 | select count(*) as errorLogCount,request_uri
group by request_uri order by count(*) desc
Name: Detailed error log
```

```
Type: Custom search and analysis
Analysis statement: status:>=400
```

Then the variable values are:


```
{
"Top URL": [{
"count": 77,
"ratio": 0.45294117647058824,
"value": "/"
}, {
"count": 20,
"ratio": 0.11764705882352941,
"value": "/favicon.ico"
}, {
"count": 7,
"ratio": 0.041176470588235294,
"value": "/blog/feed"
}, {
"count": 5,
"ratio": 0.029411764705882353,
"value": "/test-tile-service"
}, {
"count": 3,
"ratio": 0.01764705882352941,
"value": "/android-chrome-192x192.png"
}],
"Detailed error log": [{
"content": {
"__TAG__": {
"pod": "nginxPod",
"cluster": "testCluster"
},
"body_bytes_sent": "32847",
"http_referer": "-",
"http_user_agent": "Opera/9.80 (Windows NT 6.1; U; en-US) Presto/2.7.62 Versio
n/11.01",
"remote_addr": "105.86.148.186",
"remote_user": "-",
"request_method": "GET",
"request_uri": "/apple-touch-icon-144x144.png",
"status": "404",
"time_local": "01/Nov/2018:00:55:14"
},
"fileName": "/root/testLog/nginx.log",
"pkg_id": "285A243662909DE3-5CD",
```

```
"source": "172.17.0.2",
"time": 1653739000013,
"topicId": "a54de372-ffe0-49ae-a12e-c340bb2b03f2"
}, {
"content": {
"__TAG__": {
"pod": "nginxPod",
"cluster": "testCluster"
},
"body_bytes_sent": "33496",
"http_referer": "-",
"http_user_agent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_3) AppleWebKit/
537.36 (KHTML, like Gecko) Chrome/27.0.1453.93 Safari/537.36",
"remote_addr": "222.18.168.242",
"remote_user": "-",
"request_method": "GET",
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
,
"status": "404",
"time_local": "01/Nov/2018:00:54:37"
},
"fileName": "/root/testLog/nginx.log",
"pkg_id": "285A243662909DE3-5C8",
"source": "172.17.0.2",
"time": 1653738975008,
"topicId": "a54de372-ffe0-49ae-a12e-c340bb2b03f2"
}],
"Error log URL distribution": [{
"errorLogCount": 3,
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 3,
"request_uri": "/feed"
}, {
"errorLogCount": 1,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}]
}
```


Variable Syntax

The variable syntax is similar to Go template syntax. It extracts and formats alarm notification variables so that they can be displayed more clearly in the alarm notification content. All variables and their syntaxes are within `{{ }}`, and text outside `{{ }}` won't be processed.

Variable extraction

Syntax format:

```
{{.variable[x]}} or {{index .variable x}}
{{.variable.childNodeName}} or {{index .variable "childNodeName"}}
```

Syntax description:

- When the variable is an array, `{{.variable[x]}}` (equivalent to `{{index .variable x}}`) is used to extract array elements by subscript. Here, `x` is an integer greater than or equal to 0.
- When the variable is an object, `{{.variable.childNodeKey}}` (equivalent to `{{index .variable "childNodeName"}}`) is used to extract sub-object values (`value`) by sub-object name (`key`).

> Note：
> When a sub-object name contains spaces, use syntax in the format of `{{index .variable "childNodeName"}}`, such as `{{index .AnalysisResult "Top URL"}}`.

Sample:

The `{{.QueryResult}}` variable values are:

```
[
[{
"errorLogCount": 7 // Extract the value
}],
[{
"errorLogCount": 3,
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 3,
"request_uri": "/feed"
}, {
"errorLogCount": 1,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}]
]
```

Get the `errorLogCount` value of the first array through the following expression:

```
{{.QueryResult[0][0].errorLogCount}}
```

Returned result:

```
7
```

Loop and traversal

Syntax format:

```
{{range .variable}}
Custom content{{.childNode1}}custom content{{.childNode2}}...
{{end}}
```

Or

```
{{range $key,$value := .variable}}
Custom content{{$key}}custom content{{$value}}...
{{end}}
```

Syntax description:

When the variable is an array or an object that contains multiple sub-objects, you can use this syntax to display each element/object in the specified format.

Sample:

The `{{.QueryResult}}` variable values are:

```
[
[{
"errorLogCount": 7
}],
[{
"errorLogCount": 3,
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 3,
"request_uri": "/feed"
}, {
"errorLogCount": 1,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}]
]
```

Display the `errorLogCount` value of each `request_uri` in the second array through the following expression:

```
{{range .QueryResult[1]}}
* {{.request_uri}} error log quantity: {{.errorLogCount}}
{{end}}
```

Returned result:

```
* /apple-touch-icon-144x144.png error log quantity: 3
* /feed error log quantity: 3
* /opt/node_apps/test-v5/app/themes/basic/public/static/404.html error log quanti
ty: 1
```

Condition judgment

Syntax format:

```
{{if boolen}}
xxx
{{end}}
```

Or

```
{{if boolen}}
xxx
{{else}}
xxx
{{end}}
```

Syntax description:

Execute the expressions based on the condition judgment result, where AND, OR, and NOT can be used for logical operations and values can be compared.

```
eq arg1 arg2: When arg1 == arg2, the value is `true`.
ne arg1 arg2: When arg1 != arg2, the value is `true`.
lt arg1 arg2: When arg1 < arg2, the value is `true`.
le arg1 arg2: When arg1 <= arg2, the value is `true`.
```

```
gt arg1 arg2: When arg1 > arg2, the value is `true`.
ge arg1 arg2: When arg1 >= arg2, the value is `true`.
```

Sample:

The `{{.QueryResult}}` variable values are:

```
[
[{
"errorLogCount": 7
}],
[{
"errorLogCount": 3,
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 3,
"request_uri": "/feed"
}, {
"errorLogCount": 1,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}]
]
```

Display the `request_uri` that is ≥ 2 and ≤ 100 and its `errorLogCount` value in the second array through the following expression:

```
{{range .QueryResult[1]}}
{{if and (ge .errorLogCount 2) (le .errorLogCount 100)}}
* {{.request_uri}} error log quantity: {{.errorLogCount}}
{{end}}
{{end}}
```

Returned result:

```
* /apple-touch-icon-144x144.png error log quantity: 3

* /feed error log quantity: 3
```

Blank area removal

Syntax format:

```
{{- xxx}} or {{xxx -}}
```

Syntax description:

When the variable syntax is executed, its spaces, indents, line breaks, and other blank areas will be retained. For example, many blank lines are contained in the returned result of the samples for loop and traversal as well as condition judgment, adversely affecting the display effect. You can add `-` at the beginning or end in `{{ }}` to remove blank areas.

Sample:

Change the expression in the condition judgment sample to:

```
{{- range .QueryResult[1]}}
{{- if and (ge .errorLogCount 2) (le .errorLogCount 100)}}
* {{.request_uri}} error log quantity: {{.errorLogCount}}
{{- end}}
{{- end}}
```

Returned result:

```
* /apple-touch-icon-144x144.png error log quantity: 3
* /feed error log quantity: 3
```

Variable Function

Special symbol escaping

Syntax format:

```
{{escape .variable}}
```

Syntax description:

Many alarm variables contain special symbols. If these variables are directly concatenated into JSON strings for custom webhooks, the JSON format may be incorrect, leading to callback failures. In this case, you can escape the original variables before they are concatenated.

Sample:

The `{{.ExecuteQuery[0]}}` variable value is `status:>=400 | select count(*) as "error log quantity"` .

If escaping is not used, the request content in the custom webhook configuration will be:

```
{
"Query":"{{.ExecuteQuery[0]}}"
}
```

The returned result will be as follows, which is not a valid JSON string:

```
{
"Query":"status:>=400 | select count(*) as "error log quantity""
}
```

In this case, you can use escaping to change the request content in the custom webhook configuration to:

```
{
"Query":"{{escape .ExecuteQuery[0]}}"
}
```

The returned result will be as follows, which is in line with the JSON syntax:

```
{
"Query":"status:>=400 | select count(*) as \"error log quantity\""
}
```

String extraction

Extraction by length

Syntax format:

```
{{substr .variable start}} or {{substr .variable start length}}
```

Syntax description:

Extract a string based on the specified start point and length (optional).

Sample:

The `{{.QueryLog[0][0].fileName}}` variable value is:

```
/root/testLog/nginx.log
```

Get a string starting from the sixth character and containing seven characters through the following expression:

```
{{substr .QueryLog[0][0].fileName 6 7 }}
```

Returned result:

```
testLog
```

Extraction based on the start and end characters

Syntax format:

```
{{extract .variable "startstring" ["endstring"]}}
```

Syntax description:

Extract a string based on the specified start and end characters (optional).

Sample:

The `{{.QueryLog[0][0].fileName}}` variable value is:

```
/root/testLog/nginx.log
```

Get a string between `/root/` and `/nginx` through the following expression:

```
{{extract .QueryLog[0][0].fileName "/root/" "/nginx"}}
```

Returned result:

```
testLog
```

Specified string check

Syntax format:

```
{{containstr .variable "searchstring"}}
```

Syntax description:

Check whether the specified string is included in the variable value. The check result can be used in the condition judgment syntax.

Sample:

The `{{.QueryLog[0][0].fileName}}` variable value is:

```
/root/testLog/nginx.log
```

Get a string between `/root/` and `/nginx` through the following expression:

```
{{if containstr .QueryLog[0][0].fileName "test"}}
Test log
{{else}}
Non-test log
{{end}}
```

Returned result:

```
Test log
```

UNIX timestamp conversion

Syntax format:

```
{{fromUnixTime .variable}} or {{fromUnixTime .variable "timezone"}}
```

Syntax description:

It is used to convert UNIX timestamps (in milliseconds or seconds) into readable dates and times. Here, the time zone is optional and is Asia/Shanghai by default.

Sample:

The `{{.QueryLog[0][0].time}}` variable value is:

```
1653893435008
```

Get the dates and times in different time zones through the following expressions:

```
{{fromUnixTime .QueryLog[0][0].time}}
{{fromUnixTime .QueryLog[0][0].time "Asia/Shanghai"}}
```

```
{{fromUnixTime .QueryLog[0][0].time "Asia/Tokyo"}}
```

Returned result:

```
2022-05-30 14:50:35.008 +0800 CST
2022-05-30 14:50:35.008 +0800 CST
2022-05-30 15:50:35.008 +0900 JST
```

Use Cases

Case 1: Displaying the last detailed log in the alarm notification

Scenario:

The last detailed log that meets the search condition of the query statement is added to the alarm notification in the format of `key:value`. There is a key in each row, and CLS preset fields and metadata fields are not included.

Notification content configuration:

```
{{range $key,$value := .QueryLog[0][0].content}}
{{if not (containstr $key "__TAG__")}}
{{- $key}}:{{$value}}
{{- end}}
{{- end}}
```

Here, `.QueryLog[0][0]` indicates the last detailed log that meets the search condition of the first query statement in the alarm policy. Its value is:

```
{
"content": {
"__TAG__": {
"a": "b12fgfe",
"c": "fgerhcdhgj"
},
"body_bytes_sent": "33704",
"http_referer": "-",
"http_user_agent": "Mozilla/5.0 (Windows NT 5.1) AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/35.0.3319.102 Safari/537.36",
"remote_addr": "247.0.249.191",
"remote_user": "-",
"request_method": "GET",
"request_uri": "/products/hadoop)",
```

```
"status": "404",
"time_local": "01/Nov/2018:07:54:08"
},
"fileName": "/root/testLog/nginx.log",
"pkg_id": "285A243662909DE3-210B",
"source": "172.17.0.2",
"time": 1653908859008,
"topicId": "a54de372-ffe0-49ae-a12e-c340bb2b03f2"
}
```

Alarm notification content:

```
remote_addr:247.0.249.191
time_local:01/Nov/2018:07:54:08
http_user_agent:Mozilla/5.0 (Windows NT 5.1) AppleWebKit/537.36 (KHTML, like Geck
o) Chrome/35.0.3319.102 Safari/537.36
remote_user:-
http_referer:-
body_bytes_sent:33704
request_method:GET
request_uri:/products/hadoop)
status:404
```

Case 2: Displaying the execution result of the query statement in the alarm notification

Scenario:

What meets the trigger condition in the execution result of the query statement is added to the alarm notification and displayed in a list.

The query statement of the alarm policy is `status:>=400 | select count(*) as errorLogCount,request_uri group by request_uri order by count(*) desc`.

The trigger condition is `$1.errorLogCount > 10`.

Notification content configuration:

```
{{range .QueryResult[0]}}
{{- if gt .errorLogCount 10}}
{{.request_uri}} error log quantity: {{.errorLogCount}}
{{- end}}
{{- end}}
```

Here, `.QueryResult[0]` indicates the execution result of the first query statement in the alarm policy. Its value is:

```
[{
"errorLogCount": 161,
```

```
"request_uri": "/apple-touch-icon-144x144.png"
}, {
"errorLogCount": 86,
"request_uri": "/opt/node_apps/test-v5/app/themes/basic/public/static/404.html"
}, {
"errorLogCount": 33,
"request_uri": "/feed"
}, {
"errorLogCount": 26,
"request_uri": "/wp-login.php"
}, {
"errorLogCount": 10,
"request_uri": "/safari-pinned-tab.svg"
}, {
"errorLogCount": 7,
"request_uri": "/mstile-144x144.png"
}, {
"errorLogCount": 4,
"request_uri": "/atom.xml"
}, {
"errorLogCount": 3,
"request_uri": "/content/plugins/prettify-gc-syntax-highlighter/launch.js?ver=3.
5.2?ver=3.5.2"
}]
```


Alarm notification content:

```
/apple-touch-icon-144x144.png error log quantity: 161
/opt/node_apps/elastic-v5/app/themes/basic/public/static/404.html error log quant
ity: 86
/feed error log quantity: 33
/wp-login.php error log quantity: 26
```

Case 3: Using DingTalk/Lark to receive alarm notifications and adding common basic information to the alarm notification

Scenario:

Alarm notifications are sent to DingTalk/Lark groups through custom webhooks, containing common basic information just like SMS and email alarms.

Notification content configuration:

```
{{- if eq .NotifyType 1 -}}
Alarm policy: {{.Alarm}}
Log topic: {{.Topic}}
Trigger condition: {{.Condition}}
```

```
Current data: {{.TriggerParams}}
Duration: {{.Duration}} minutes
Multidimensional analysis:
{{- range $key,$value := .AnalysisResult}}
{{$key}}
{{$value}}
{{- end}}
Detailed report: {{.DetailUrl}}
Query log: {{.QueryUrl}}
{{- end}}
{{- if eq .NotifyType 2 -}}
Alarm policy: {{.Alarm}}
Log topic: {{.Topic}}
Trigger condition: {{.Condition}}
Resolution time: {{.NotifyTime}}, for {{.Duration}} minutes
{{- end}}
```

Custom webhook configuration:

Request headers:

```
Content-Type: application/json
```

Lark request content:

```
{
"msg_type": "post",
"content": {
"post": {
"zh_cn": {
"title": "{{if eq .NotifyType 1}}[Alarm] CLS triggered an alarm {{else}} under th
e account {{escape .UIN}}({{escape .User}}) [Alarm cleared] The following CLS ala
rm under the account {{escape .UIN}}({{escape .User}}) has been resolved{{end}}",
"content": [
[{
"tag": "text",
"text": "{{substr (escape .Message) 0 10000}}"
}],
[{
"tag": "at",
"user_id": "all"
}]
]
}
}
```

```
}
}
```

DingTalk request content:

```
{
"msgtype": "text",
"text": {
"content": "{{if eq .NotifyType 1}}[Alarm] CLS triggered an alarm {{else}} under
the account {{escape .UIN}}({{escape .User}}) [Alarm cleared] The following CLS a
larm under the account {{escape .UIN}}({{escape .User}}) has been resolved{{end}}
\n{{substr (escape .Message) 0 10000}}"
},
"at": {
"atMobiles": [
""
],
"atUserIds": [
""
],
"isAtAll": true
}
}
```

Note：

In the DingTalk/Lark request content, `{{substr (escape .Message) 0 10000}}` indicates that the notification can contain up to 10,000 characters, and excessive characters will be truncated. Avoid exceeding the length limit of DingTalk/Lark APIs; otherwise, notification sending may fail.

Channels to Receive Alarm Notifications

Email

Last updated：2022-05-18 15:18:57

Overview

This document describes how to receive alarm notifications via email.

Directions

Verifying email address

1. Log in to the CAM console.
2. Click **User** > **User List** on the left sidebar to enter the user list page.
3. Find the user for whom to configure the email notification channel and click the username to enter the user details page.
4. In the **Contact Email** column, click  .
5. In the pop-up window, enter the target email address and click **Confirm**.
6. In the **Email** column, click **Send Verification Link**.
7. Check the inbox and click **Confirm to Receive** in the "Tencent Cloud Email Receipt Verification" message.

Selecting email alarm channel

1. Log in to the CLS console.
2. On the left sidebar, click **Monitoring Alarm** > **Alarm Policy** to enter the alarm policy list page.
3. Find the policy for which to enable notification receipt and click the policy name to enter the policy editing page.
4. Select the recipient group and click **Edit**.

5. In the pop-up window, select **Email** and click **OK**.

Custom Callback APIs

Last updated：2021-10-27 16:03:05

Overview

This document describes how to receive alarm notifications via custom callback APIs (webhooks).

Use Limits

Each custom callback API can send no more than 20 messages per minute. If many alarm policies are configured, we recommend that you create multiple custom callback APIs and associate them with different alarm policies. Otherwise, multiple alarm policies may trigger alarms simultaneously, and you may fail to receive some alarm notifications as a result.

> Note：
> After you create a custom callback API and set the callback address, CLS automatically sends requests to the custom callback API based on the configuration.

Directions

Generating custom callback links for target services

Generate custom callback links (webhooks) for custom services requiring callbacks (such as DingTalk and Slack) to receive alarm notifications.

Configuring custom API callbacks (custom webhooks)

On the **Notification Channel** page in the CLS console, enter the custom callback link address, and set the custom request content as required. For more information on the configuration, please see Adding Notification Channel Groups.

After custom API callbacks are configured, when alarm policies are triggered, CLS will call the custom APIs according to the configured request formats.

Managing Notification Group

Last updated：2022-05-18 14:36:38

Overview

This document describes how to manage notification groups.

Directions

Adding notification group

1. Log in to the CLS console.
2. On the left sidebar, select **Monitoring and Alarms** > **Notification Group** to enter the notification group management page.
3. Click **Create** and set the following parameters as required on the notification group creation page:

- Basic Info
  - Name: Custom notification group name.
  - Notification Type:
    - Triggered: When the monitoring result meets the alarm trigger expression, an alarm triggered notification will be sent.
    - Resolved: When the trigger condition is met in the previous monitoring period but not met in the current period and the alarm triggered notification has been sent, an alarm resolved notification will be sent.
- Method: Configure user notification and enter the receipt information.
  - Type: Select a type as needed.
  - Recipient: Specified users or user groups (a user group contains multiple users).
  - Notification Period: Define the time period for receiving alarms.
  - Notify By: Email, SMS, or phone.
  - Webhook URL: Configure the API callback and enter the callback address.

> Note：
> Up to ten custom webhooks can be configured for API callback.

```
- Webhook - Custom
```

Enter a custom webhook address to further process and forward alarm notifications received. You can customize the request content. CLS alarm-related information can be referenced by variables, and when the alarm callback is triggered, it will be replaced with the corresponding content in the current alarm policy. For more information, see Custom Callback APIs.

Copying notification group

1. Log in to the CLS console.
2. On the left sidebar, select **Monitoring and Alarms** > **Notification Group** to enter the notification group management page.
3. Select the notification group to copy and click **Copy**.

Modifying notification group

1. Log in to the CLS console.
2. On the left sidebar, select **Monitoring and Alarms** > **Notification Group** to enter the notification group management page.
3. Select the notification group to modify and click **Edit**.

Deleting notification group

1. Log in to the CLS console.
2. On the left sidebar, select **Monitoring and Alarms** > **Notification Group** to enter the notification group management page.
3. Select the notification group to delete and click **Delete**.

Viewing Alarm Records

Last updated：2022-05-07 11:50:31

This document shows how to view alarm records in the CLS console.

Directions

1. Log in to the CLS console.
2. On the left sidebar, click **Monitoring Alarm** > **Alarm Records** to enter the alarm records page.

Notes

CLS allows you to view the alarm records in the last 30 days.

Alarm statistics

Alarm Statistics displays important information on alarms in the current region, such as alarm policy statistics and monitoring task execution. The metrics are as detailed below:

Metric	Description
Total Alarm Policy Executions	Number of alarm policies executed over the statistical time range
Alarm Policy Executions	Number of times the query and analysis statement in the alarm policy is executed over the statistical time range
Failed Alarm Policy Executions	Number of alarm policy execution failures over the statistical time range. Execution failures include AlarmConfigNotFound, QuerySyntaxError, QueryError, QueryResultParseError, ConditionSyntaxError, ConditionEvaluateError, and ConditionValueTypeError. For more information, please see Execution Result Status Codes
Times of Trigger Conditions Met	Number of times the query and analysis statement in the alarm policy is executed successfully and the result returned meets the trigger condition over the statistical time range

Metric	Description
Notifications Triggered by the Alarm Policy	Number of times notifications are triggered by the execution of the alarm policy over the statistical time range
Top 10 Alarm Policies by Number of Notifications	Top 10 alarm policies in terms of the number of times notifications are triggered over the statistical time range

Historical records

Once an alarm policy takes effect, it will periodically perform monitoring tasks, and the details of executions of each monitoring task will be recorded in **Historical Records**, including the result of each execution. By viewing the records of alarm policy execution, you can easily trace back historical alarming tasks.

> Note：
> CLS allows you to view the records in the last 30 days.

Policy execution results are described as follows.

Execution Result	Description
AlarmConfigNotFound	The alarm policy configuration is missing. Please check whether the alarm policy and monitoring object have been configured correctly.
QuerySyntaxError	The analysis statement of the monitoring object has a syntax error. Please check whether the statement is correct. For more information on the syntax, please see Overview.
QueryError	The analysis statement is not executed properly. Please check the analysis statement and the index configuration of the log topic.
QueryResultParseError	Failed to parse the analysis result format.
ConditionSyntaxError	The trigger condition expression has a syntax error. Please check the syntax format of the expression.

Execution Result	Description
ConditionEvaluateError	An error occurred while computing the trigger condition. Please check whether the imported variable exists in the analysis result
ConditionValueTypeError	The evaluation result of the trigger condition is not a Boolean value. Please check whether the trigger condition expression is correct.
EvalTimesLimited	The trigger condition hasn't been met even after it has been computed more than 1,000 times.
QueryResultUnmatch	The analysis result for the current monitoring period doesn't meet the alarm trigger condition.
UnreachedThreshold	The alarm trigger condition is met, but the alarm convergence threshold has not been reached, so no alarm notification is sent. • HappenThreshold Unreached: the period convergence condition is not met; for example, an alarm is triggered only if the trigger condition is met in 5 consecutive monitoring periods. • AlertThreshold Unreached: the alarm interval condition is not met; for example, an alarm will be triggered once every 15 minutes.
TemplateUnmatched	The alarm configuration information doesn't match the notification template. Specific causes include: • TypeUnmatched: the alarm notification type (alarm triggered or alarm cleared) doesn't match the notification template, so no alarm notification is sent. • TimeUnmatched: the alarm notification time period doesn't match the notification template, so no alarm notification is sent. • SendFail: the notification failed to be sent.
Matched	The alarm condition is met, and the alarm notification is sent successfully.

Policy alarm states are described as follows.

Alarm State	Description
Uncleared	The system continuously meets the trigger condition and triggers an alarm.
Cleared	The current monitoring period does not meet the trigger condition.
Invalid	The alarm policy is deleted or modified.

Historical Documentation
Operation guide of earlier LogListener versions

Last updated：2020-06-30 15:49:53

This document provides an operation guide for LogListener 2.2.4 and earlier. We recommend that you update to the latest version as this document may no longer be maintained. For information on how to install the latest version, see the LogListener Installation Guide.

Starting LogListener

Go to the installation directory `loglistener` and start LogListener by running the following script:

```
cd loglistener/tools; ./start.sh
```

Stopping LogListener

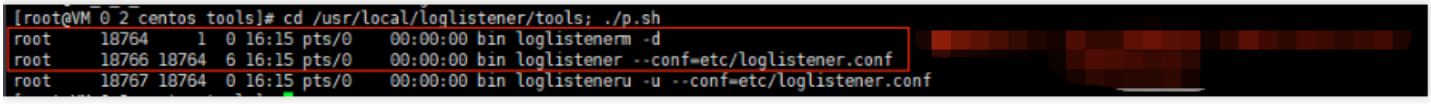
Go to the installation directory `loglistener` and stop LogListener by running the following script:

```
cd loglistener/tools; ./stop.sh
```

Checking LogListener process status

Go to the installation directory `loglistener` and check the status of the LogListener processes by running the following command:

```
cd loglistener/tools; ./p.sh
```



Normally, there are three processes:

```
bin/loglistenerm -d #Daemon process
bin/loglistener --conf=etc/loglistener.conf #Main process
bin/loglisteneru -u --conf=etc/loglistener.conf #Update process
```

Uninstalling LogListener

Go to the installation directory `loglistener` and uninstall LogListener by running the following command:

```
cd loglistener/tools; ./uninstall.sh
```

Checking LogListener heartbeat and configuration

Go to the installation directory `loglistener` and check the heartbeat and configuration of LogListener by running the following command:

```
cd loglistener/tools; ./check.sh
```

Troubleshooting earlier LogListener versions

Last updated：2020-04-13 16:44:54

This document provides troubleshooting information for LogListener 2.2.4 and earlier. For information on troubleshooting the latest version, see Server Group Exceptions.

Error Description

An exception occurred with log collection, and the associated server group is found to be exceptional.

Possible Causes

The heartbeat between the server group and the CLS system is interrupted, resulting in failure to collect and report logs. Possible causes for the server group exception include:

1. The IP address is incorrect.
2. The network is disconnected.
3. LogListener process failure.
4. LogListener is configured incorrectly.

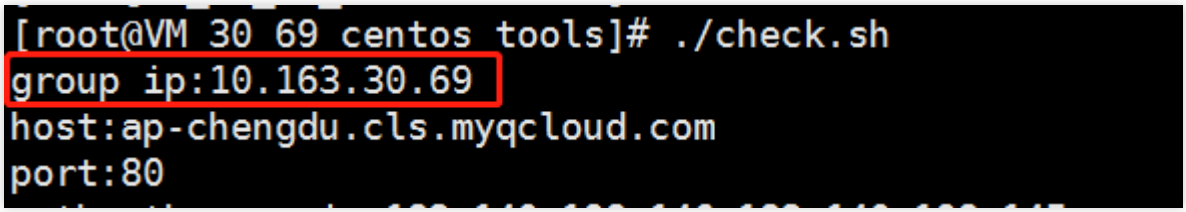
Solution

Troubleshoot problems according to the above causes.

Directions

1. Check whether the IP address added to the server group is correct.
    i. Check the IP address obtained by LogListener by running the following command:

```
cd loglistener/tools && ./check.sh
```



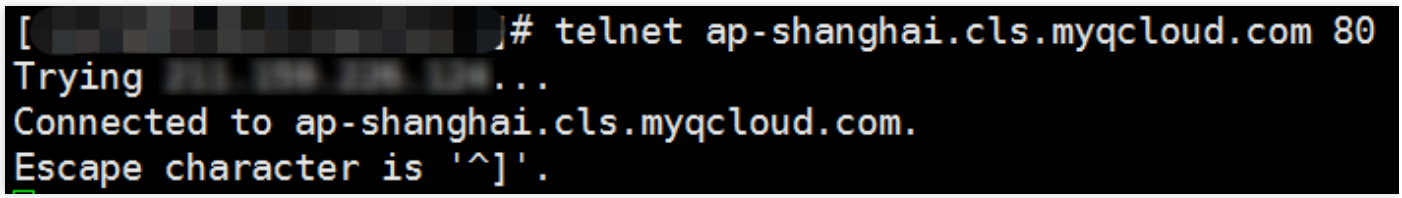
ii. Log in to the Cloud Log Service Console, and click **Server Group** in the leftside bar. On the Server Group Management page, check the IP address of the server group. The IP address must be the same as that for collection.

2. Check whether the network is connected by running the following command:

```
telnet <region>.cls.myqcloud.com 80
```

`<region>` is the abbreviation for the region where CLS resides. For more information on regions, see Available Regions.

The following code appears upon normal network connection. Otherwise, connection fails. Check the network and ensure normal connection.



3. Check whether LogListener processes are running normally. Go to the installation directory and run the following command:

```
cd loglistener/tools && ./p.sh
```

Normally, there are three processes:

```
bin/loglistenerm -d #Daemon process
bin/loglistener --conf=etc/loglistener.conf #Main process
bin/loglisteneru -u --conf=etc/loglistener.conf #Update process
```

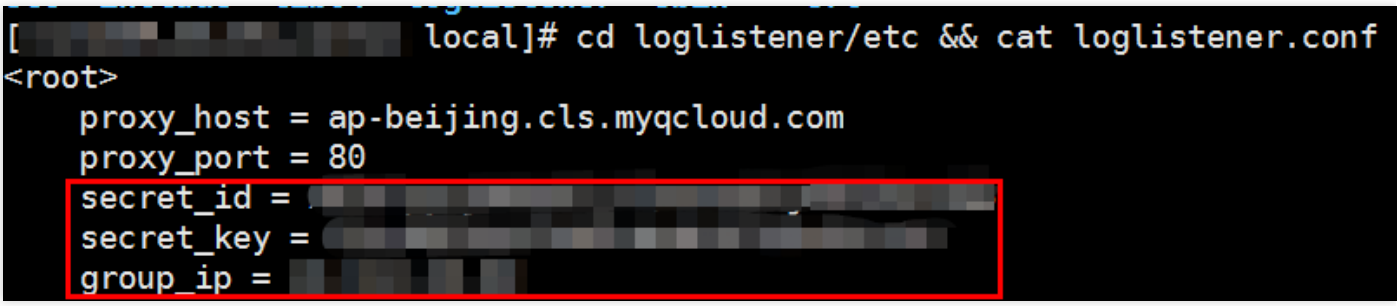
If any process fails, restart it. Go to the installation directory and run the following command:

```
cd loglistener/tools && ./start.sh
```

4. Check whether the key and IP address are correctly configured in LogListener. Go to the installation directory to check the configuration information by running the following command:

   ```
   cd loglistener/etc && cat loglistener.conf
   ```

   See the following figure:



   - The key is the API key for the Tencent Cloud account or the collaborator. Project keys are not supported.
   - group_ip in the configuration file must be consistent with the IP address entered in the server group on the console. Since LogListener obtains the server IP address automatically, check the consistency regularly when the server is bound to multiple ENIs.

Legacy CLS Search Syntax

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CLS provides a variety of search features. You can search for logs in real time by search syntax and rules, and get results within seconds. CLS gives you insights into your business operations.

Starting Search

Log search is an important CLS feature. You can define the search criteria for billions of log data and obtain results within seconds. Specific steps are as follows:

1. Log in to the CLS Console.
2. Click **Log Search** in the left sidebar to enter the **Search Analysis** page.
3. Select the time range, logset, and log topic.
4. Enter the keyword, and click **Search Analysis** to obtain the query result.

Search Syntax

The following query statements are supported:

Syntax	Semantics
key:value	The "key-value" search format. You need to enable the key-value index. The `value` supports fuzzy search by `?` or `*`
A and B	The "AND" logic that returns the intersection of A and B. If several keywords are separated by spaces, the "AND" logic is used by default
A or B	The "OR" logic that returns the union of A or B
not B	The "NOT" logic that returns the results excluding B
A not B	The "MINUS" logic that returns the results including A but excluding B, i.e., `A - B`
'a'	The character `a` will be considered as a regular character and will not be processed as a syntax keyword
"A"	All characters in `A` will be considered as regular characters and will not be processed as syntax keywords
\	Escape character. An escaped character represents the literal meaning of the character,

	such as `\"` for quotation mark or `\:` for colon
*	Fuzzy query of keywords that can match zero, single, or multiple random characters. But the search cannot start with `*`. For example, enter `abc*` to search for all logs beginning with `abc`
?	Fuzzy query of keywords that can match a single character at a specific position. For example, enter `ab?c` to search for logs that begin with `ab`, end with `c`, and contain only one character between `ab` and `c`
>	"GREATER THAN" logic, which is used for numeric fields
>=	"GREATER THAN OR EQUAL TO" logic, which is used for numeric fields
<	"LESS THAN" logic, which is used for numeric fields
<=	"LESS THAN OR EQUAL TO" logic, which is used for numeric fields
=	"EQUAL TO" logic, which can be used for numeric or text fields (Fuzzy search is not supported. If you need fuzzy search, please see the key-value search `key:value`)
`__SOURCE__`	The operator that specifies the IP address of a source whose logs you want to query, and wildcard is supported, such as `__SOURCE__:127.0.0.*`
`__FILENAME__`	The operator that specifies the file path from which you want to query logs, and wildcard is supported, such as `__FILENAME__:/var/log/access.*`

⚠ Note：

- Before using the range search, set the numeric fields to a double or long type; otherwise, you may have unexpected results.
- If **b** is text, the difference between `a=b` and `a:b` lies in that **a** equals **b** in the former, while **a** contains **b** in the latter (the search is processed based on the segment logic and fuzzy search is supported).

Search Rules

Time range, logset, and log topic are required for log search. The default time range is the current day, while the logset and log topic are at your discretion. You can search for all logs without entering anything in the search box.

Full-text search

Log data of log topics with full-text index enabled is split into segments by delimiter, so you can execute keyword query based on the segments.

For example, enter `error` in the search box to search for log data containing the keyword `error`.

Key-value search

Log data of the log topics with key-value index enabled is managed based on the specified key-value pairs. You can search for the log by specifying a key field.

For example, enter `status:error` in the search box to search for log data whose `status` field is `error`.

Fuzzy keyword search

CLS supports fuzzy search by special keywords as shown below:

Metacharacter	Description
*	Fuzzy query of keywords that can match zero, single, or multiple random characters. For example, enter `abc*` to search for all logs beginning with `abc`
?	Fuzzy query of keywords that can match a single character at a specific position. For example, enter `ab?c` to search for logs that begin with `ab`, end with `c`, and contain only one character between `ab` and `c`

Notes

1. Before performing a log search, make sure the log topic has index enabled. Otherwise, no valid logs will be found.
2. Before performing a key-value search, make sure the index field for searching is successfully configured in the index configuration of the log topic.
3. The results are displayed in reverse order by default.