# COLMINA provider

## For REST API

Version 1.5.0

# User’s guide

April 21, 2021

Remarks:

・This document uses the machine translation.

# 【 revision history 】

| Version | Date | Content |
|---|---|---|
| 1.0.0 | 2018-4-16 | First edition. |
| | 2018-6-5 | Mount registration (JSON,CSV,TXT,BIN), the latest data reference, and registration data HIT number acquisition command as Variable. |
| | 2018-7-11 | Mount following API command as Execute.<br>Resource control (registration, update, and deletion)<br>Access code control (registration, reference, update, and deletion)<br>Event control (registration, reference, update, and deletion) |
| | 2018-7-20 | Add the response status code at REST. |
| | 2018-7-30 | Add a simple explanation to the outline about API.<br>Add the example to the filter condition.<br>Add the filter condition that can be used when the access code reference and the event code are referred. |
| | 2018-8-2 | Sample program addition |
| | 2018-8-31 | Sample program addition (Variable, general purpose REST, data control, resource control, access code control, and event control) |
| 1.0.1 | 2019-3-7 | Fixed “Introduction” chapter |
| 1.1.0 | 2019-8-29 | Added Extension.<br>Added proxy settings.<br>Delete unnecessary commands and variables. |
| 1.2.0 | 2019-10-8 | Added Insecure options. |
| 1.3.0 | 2019-10-23 | ・ CSV data registration API support<br>・ APIs for registering JSON data<br>・ COLMINA Edges IoT-PF API<br>Support. |
| 1.4.0 | 2020-1-24 | ・ DataLake API(NoSQL)<br>・ DataLake API(RDB)<br>Support. |
| 1.5.0 | 2021-4-21 | Changed to out-of-process. |

## Contents

# 1. Introduction

The COLMINA provider provides calls to various APIs provided by Fujitsu "Monozukuri Digital Place COLMINA".

COLMINA realizes factory facilities, information on people / products, coordination of business systems and know-how related to manufacturing in general, and supply chain cooperation among companies.

By using this provider, it is possible to connect various information on the production / manufacturing site to various services provided by COLMINA.

This document explains the overview of the COLMINA provider and the implemented CAO interface (function specification).

# 2. Outline of provider

## 2.1. Installation

The COLMINA provider module is composed of following EXE. The installation work is unnecessary when installing it with the installer of ORiN2 SDK. Execute it as shown in Table 2-1 when you install it by hand power.

**Table2-1COLMINA provider**

| | |
|---|---|
| File name | CaoProv.FUJITSU.COLMINA.exe |
| ProgID | CaoProv.FUJITSU.COLMINA |
| Registry registration | RegistAsm.bat CaoProv.FUJITSU.COLMINA.exe |
| Blotting out of registry registration | UnregistAsm.bat CaoProv.FUJITSU.COLMINA.exe |

※ There are RegistAsm.bat and UnregistAsm.bat in case of { ORiN2 installation folder } ¥DotNet¥Bat.

## 2.2. Outline

The COLMINA provider provides functions wrapping APIs (generic REST, data control, etc.) for utilizing various services provided by COLMINA.

The following APIs are available:

・CSV Data Registration API

・JSON Data Registration API

・DataLake API（NoSQL）

※"Unstructured data" in the body represents the data lake APIs (NoSQL) data.

・DataLake API（RDB）

※"Structured data" in the body represents data in the Data Lake API (RDB)

・COLMINA Edges IoT-PF API

In case of connecting with COLMINA, the setting items depend on each API you use.

Therefore, for details, refer to COLMINA API reference.

## 2.3. Method property

### 2.3.1. CaoWorkspace::AddController method

Format AddController ( <bstrCtrlName:BSTR>, <bstrProvName:BSTR>, <bstrPcName:BSTR>, <bstrOption:BSTR> )

< bstrCtrlName > : In controller name
< bstrProvName > : In provider name. "CaoProv.FUJITSU.COLMINA fixed value ="
<bstrPcName> : Execution machine name of in provider (unused)
<bstrOption> : "< option 1> and < option 2> in optional character string ="
・Base URL
・API version
・Time-out
・Proxy server address
・Proxy server port number
・Proxy server user name
・Certificate Check Settings

Specify it by switching off the comma district in the form of a set set item = content.
Setting example:
"BaseURL=http://<zone>.fujitsu.com, Timeout=30000,…"

Details of optional character string (bstrOption) are shown as follows.

**Table2-2Optional character string of CaoWorkspace:: AddController method**

| Set item | Set content | Indispensability | Remarks |
|---|---|---|---|
| BaseURL | http://<zone>.fujitsu.com | ○ | Follow the content of the notification after COLMINA is contracted about the value that enters < zone >. |
| APIVersion | <Version> | - | Specify "V1" as of March, 2018. When omitting it, "V1" is set. |
| Timeout | <Timeout> | - | Set the timeout period when REST |

| | | | |
|---|---|---|---|
| | | | is communicated in each millisecond.<br>When omitting it, 30000 is set. |
| ProxyServer | <Proxy server address> | | Proxy server address.<br>If omitted, the system default setting is used.<br>Setting example:<br>aaaa.bbbb.cccc.dddd |
| ProxyPort | <Proxy server port number> | | Proxy server port number.<br>If omitted when [ProxyServer] is set, [80] is used. |
| ProxyUserName | <Proxy server user name> | | Proxy server user name. |
| ProxyPassword | <Proxy server password> | | Proxy server password. |
| Insecure | <True/False> | | Specifies the default setting for server certificate and server integrity checking during secure communication.<br>True : Omit checking.<br>False: Do not skip checking.<br>Defaulted |

### 2.3.2. CaoController::AddExtension method

Format AddExtension ( <bstrExtensionName:BSTR>, <bstrOption:BSTR> )

< bstrExtensionName > : [in] Extension name

<bstrOption> : [in] "< option 1> and < option 2> in optional character string ="

Common

・ APIType

・ API version

CSV Data Registration API

・ Tenant ID

・ User Name

・ Passwords

JSON Data Registration APIs and COLMINA Edges IoT-PF API

・ Access code
・ Port number

DataLake API（NoSQL）

DataLake API（RDB）

・ Tenant ID
・ User ID
・ Password
・ API key

Specify it by switching off the comma district in the form of a set set item = content.
Setting example:
"APIType=<APIType>,APIVersion=v1,..."

**Table2-3 Optional character string of CaoController:: AddExtension method**

**(Common)**

| Set item | Set content | Indispensability | Remarks |
|---|---|---|---|
| APIType | <API type> | ○ | Specify the APIType.<br>The following values are available:<br>0: CSV Data Registration API<br>1: JSON entry APIs<br>2：DataLake API（NoSQL）<br>3：DataLake API（RDB）<br>100: COLMINA Edges IoT-PF API |
| APIVersion | <Version> | - | "v1" is specified as of March 2018.<br>"v1" is set by default. |

**Table2-4 Optional character string of CaoController:: AddExtension method**

**(CSV Data Registration API)**

| Set item | Set content | Indispensability | Remarks |
|---|---|---|---|
| TenantID | <Tenant ID> | ○ | Resource ownership tenant's identifier |

| | | | |
|---|---|---|---|
| | | | Follow the content of the notification after COLMINA is contracted. |
| UserName | <User name> | ○ | The username for basic COLMINA V2 usage. |
| Password | <Password> | ○ | Passwords for basic COLMINA V2 use. |

**Table2-5 Optional character string of CaoController:: AddExtension method**

**(JSON Data Registration API and COLMINA Edges IoT-PF API)**

| Set item | Set content | Indispensability | Remarks |
|---|---|---|---|
| Port | <Port number> | - | Specify the port number.<br>By default,<br>[When APIType=1]<br>31443<br>[When APIType=100]<br>8080<br>Is set. |
| AccessCode | <Access code> | ○ | The access code is a value set by the service portal of COLMINA. |

**Table2-6 Optional character string of CaoController:: AddExtension method**

**（DataLake API（NoSQL） and DataLeke API（RDB））**

| Set item | Set content | Indispensability | Remarks |
|---|---|---|---|
| TenantID | <Tenant> | ○ | Identifier of the resource owning tenant.<br>Follow the notice that appears after you subscribe to COLMINA. |
| UserID | <User ID> | ○ | User ID. |
| Password | <Password> | ○ | Password. |
| APIKey | <API key> | - | API keys issued at the time of the basic COLMINA V2 contract. |

### 2.3.3. CaoExtension::AddVariable method

Add the CaoVariable object to execute a part of the Execute command of CaoExtension with get/put of the CaoVariable object.

Format AddVariable ( <bstrName:BSTR>, [<bstrOption:BSTR>] )

< bstrName > : In variable identifier

The following system variable identifier or user variable identifiers can be specified.

System variable : Specify the following reservation character strings that start by '@'.

[When APIType=0]
@ID
@RegistCSV

[When APIType=1]
@ID
@RegistJSON
@RegistCSV
@RegistTXT
@RegistBIN

[When APIType=2, 3]
@ID
@RegistJSON
@ReferenceLatestData
@RetrieveDataCount

[When APIType=100]
@ID
@RegistJSON
@RegistCSV
@RegistTXT

User variable : Specify an arbitrary character string that doesn't start by '@'. In this case, it is indispensable to specify Type of an optional character string.

<bstrOption> : Specify the specified option of each done Execute command for in by switching off the comma district.

Specify following optional Type when you specify user variables. This

Execute command that corresponds by optional Type is fixed.
When the system variable is specified, the Execute command that corresponds according to the system variable identifier is fixed.

Type : Specify the system variable identifier for the user variable to decide behavior.
[When APIType=0]
@ID
@RegistCSV
[When APIType=1]
@ID
@RegistJSON
@RegistCSV
@RegistTXT
@RegistBIN
[When APIType=2，3]
@ID
@RegistJSON
@ReferenceLatestData
@RetrieveDataCount
[When APIType=100]
@ID
@RegistJSON
@RegistCSV
@RegistTXT
This option is ineffectual for the system variable.
Example)
Type=@RegistJSON

An option necessary in each corresponding Execute command is described to the following clause.

#### 2.3.3.1. @ID

Use "@ID" as the system variable name. You can get and set the ID property of the parent extension by getting and putting.

#### 2.3.3.2. @RegistJSON

[When APIType=1, 2, 3, 100]

Use a system variable identifier or optional Type of user variables "@RegistJSON" specifying it. In doing JSON character string (BSTR) put,"RegistJSON" commandThe JSON data can be registered to the resource in similar.

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-7Optional character string of @RegistJSON**

| Set item | Indispensability | Remarks |
|---|---|---|
| ResourcePath | ○ | Specify the resource passing. |
| Date | - | [When APIType=1, 100]<br>Specify (*1) at the registration date given to the registration data.<br>Adopt the request reception date when you omit it. |
| Retain | - | [When APIType=1]<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified.<br>- Disregard it even if RETAIN is specified when you specify Bulk Insert. |
| BulkInsert | - | [When APIType=1, 2, 3]<br>Specify whether to execute Bulk Insert (Transmit two or more requests to one degree).<br>[When APIType=1]<br>・Do not do none:Bulk Insert.<br>・Single_resource_path: Execute Bulk Insert for a single resource.<br>When omitting it, it is assumed the one that none was specified.<br>[When APIType=2, 3]<br>・true:<br>・false:None |

| | | |
|---|---|---|
| | | If omitted, false is assumed. |

(*1)It follows ISO8601 (The millisecond expression as a basic mark is used)(20141225T103612.001Z etc.). Accuracy is a millisecond (When the millisecond is omitted, it is considered 0 milliseconds). The following "Registration date" are the same all specifications. * When "." and the zone specification of time are omitted by the "±hhmm" form, the delimitation of the second and the millisecond affixes "Z". Use UTC when this service stores it in the response. The following date specification follows this rule.

#### 2.3.3.3. @RegistCSV

[When APIType=0, 1, 100]

Use a system variable identifier or optional Type of user variables "@RegistCSV" specifying it. In doing CSV character string (BSTR) put, The CSV data can be registered to the resource in similar to "RegistCSV" command.

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-8Optional character string of @RegistCSV**

| Set item | Indispensability | Remarks |
|---|---|---|
| TableID | ○ | [When APIType=0]<br>Identifier of the RDB table in which to register the structured data. |
| ResourcePath | ○ | [When APIType=1, 100]<br>Specify the resource passing. |
| Date | - | [When APIType=0]<br>Specify the transmission date and time (* 1) to be added to the transmission data.<br>If omitted, the POST date is used.<br>[When APIType=1, 100]<br>Specify the registration date given to the registration data.<br>Adopt the request reception date when you omit it. |
| FormatCheck | - | [When APIType=0]<br>Specifies whether or not format checking is to be performed.<br>・ True: Enforce<br>・ False: Not enforced<br>By default, true is specified. |
| DataHeader | - | [When APIType=0] |

| | | |
|---|---|---|
| | | Specifies whether a header for the data is present.<br>・ True : Exist<br>・ False : Not present<br>By default, false is specified. |
| Option1 | - | [When APIType=0]<br>Specify Option 1 (Set as required).<br>Nothing is set by default. |
| Option2 | - | [When APIType=0]<br>Specify Option 2 (Set as required).<br>Nothing is set by default. |
| Option3 | - | [When APIType=0]<br>Specify Option 3 (Set as required).<br>Nothing is set by default. |
| Retain | - | [When APIType=1]<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified. |
| Skip | - | [When APIType=1，100]<br>Specify the number of lines deleted from the head of the Body data.<br>Do not delete the line when you omit it. |
| NumConv | - | [When APIType=1，100]<br>Specify whether to convert the numerical value in the Body data into the character string.<br>・True: Convert the numerical value.<br>・False: Do not convert the numerical value.<br>When omitting it, it is assumed the one that false was specified. |

(*1) Follows the format YYYY-MM-DDThh:mm:ssTz.

(for example, 2016-12-25T10:36:12+09:00).The precision is milliseconds (if you omit milliseconds, SAS assumes 0 milliseconds).

#### 2.3.3.4. @RegistTXT

[When APIType=1, 100]

Use a system variable identifier or optional Type of user variables "@RegistTXT" specifying it. In doing character string (BSTR) put, The TXT data can be registered to the resource in similar to "RegistTXT" command.

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-9Optional character string of @RegistTXT**

| Set item | Indispensability | Remarks |
|---|---|---|
| ResourcePath | ○ | Specify the resource passing. |
| Date | - | Specify the registration date given to the registration data.<br>Adopt the request reception date when you omit it. |
| Retain | - | [When APIType=1]<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified. |

#### 2.3.3.5. @RegistBIN

[When APIType=1]

Use a system variable identifier or optional Type when the user variable is specified "@RegistBIN" specifying it. In doing binary (ARRAY|UI1) in put CaoController::Execute("RegistBIN") The binary data can be newly registered to the resource in similar to "RegistBIN" commnad.

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-10Optional character string of @RegistBIN**

| Set item | Indispensability | Remarks |
|---|---|---|
| ResourcePath | ○ | Specify the resource passing. |
| MimeType | ○ | Specify MIME-TYPE specified for Content-Type. |
| Date | - | Specify the registration date given to the registration data.<br>Adopt the request reception date when you omit it. |
| Retain | - | Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified. |
| Compression | - | Specify the compression type when it transmits by compressing the Body data as follows.<br>・gz<br>Consider the Body data to be no compression when you omit it. |

#### 2.3.3.6. @ReferenceLatestData

[When APIType=2, 3]

Use system variable names or user variable Type options with "@ReferenceLatestData" to get unstructured and structured data as a string (BSTR) in the same way as the "ReferenceLatestData" commands.

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-11 Optional character string of @ReferenceLatestData**

| Set item | Indispensability | Remarks |
|---|---|---|
| ResourcePath | ○ | Specify the resource passing. |
| Accept | - | [When APIType=3]<br>Specifies the data format.<br>・application/json：JSON format<br>・text/csv：CSV-format<br>If it is omitted, application/json is assumed. |
| Doublequote | - | [When APIType=3]<br>Specify whether to use double quotes for numeric items.<br>・true：Returns numeric items as strings (with double quotes)<br>・false：Returns numeric items as is (without double quotes)<br>If it is omitted, true is assumed. |

#### 2.3.3.7. @RetrieveDataCount

[When APIType=2, 3]

By specifying "@RetrieveDataCount" as the system variable name or user variable Type option. By getting, you can obtain the number of HIT data (I4) of unstructured and structured data in the same way as the "RetrieveDataCount"

Specify the following options besides optional Type when the user variable is specified to add this variable to CaoExtension.

**Table2-12 Optional character string of @RetrieveDataCount**

| Set item | Indispensability | Remarks |
|---|---|---|
| ResourcePath | ○ | Specify the resource passing. |
| Filter | - | Specify QUERY $filter parameter.<br>Limit the results to return only those that match <search criteria>.<br><Search condition> is an "element operator value" and can be defined more than once in and or. Available operators and elements are described below. See 5.2.1. for details on this option. |

## 2.4. Variable list

The following system variables have been reserved in the COLMINA provider. Moreover, an arbitrary name can be used for user variables.

| Variable identifier | Data type | Explanation | Attribute | |
|---|---|---|---|---|
| | | | get | put |
| @RegistJSON | VT_BSTR | [When APIType=1, 2, 3, 100]<br>Registers (accumulates) JSON character strings in resources _JSON, unstructured data, and structured data. | - | - |
| @RegistCSV | VT_BSTR | [When APIType=0, 1, 100]<br>Register the data of the CSV character string to resource _ JSON (accumulation). | - | - |
| @RegistTXT | VT_BSTR | [When APIType=1, 100]<br>Register the data of the TXT character string to resource _ JSON (accumulation). | - | - |
| @RegistBIN | VT_ARRAY\|<br>VT_UI1 | [When APIType=1]<br>Register the binary data to resource _ JSON (accumulation). | - | - |
| @ReferenceLatestData | VT_BSTR | [When APIType=2, 3]<br>References the most recent unstructured or structured data. | ○ | - |
| @RetrieveDataCount | VT_I4 | [When APIType=2, 3]<br>Retrieve the number of HIT data for unstructured data structured data. | ○ | - |

# 3. Command reference

## 3.1. Extension class

**Table3-1CaoExtension::Execute command list**

| Type | Command | Function | Correspondence variable | Page |
|---|---|---|---|---|
| General purpose REST | REST | [When APIType=1, 100]<br>Give the URL passing and [kueri] for which the user is specified and execute PUT, GET, DELETE, and POST. | - | P22 |
| Data registration/forwarding | RegistJSON | [When APIType=1, 2, 3, 100]<br>Registers (accumulates) JSON character strings in resources _JSON, unstructured data, and structured data. | @RegistJSON | P24 |
| | RegistCSV | [When APIType=0, 1, 100]<br>Register the data of the CSV character string to resource _ JSON (accumulation). | @RegistCSV | P26 |
| | RegistTXT | [When APIType=1, 100]<br>Register the data of the TXT character string to resource _ JSON (accumulation). | @RegistTXT | P29 |
| | RegistBIN | [When APIType=1]<br>Register the binary data to resource _ JSON (accumulation). | @RegistBIN | P30 |
| Referencing unstructured and structured data | ReferenceLatestData | [When APIType=2, 3]<br>References the most recent unstructured or structured data. | - | 31 |
| | ReferencePastData | [When APIType=2, 3]<br>References previous (specified) unstructured or structured data. | - | 33 |
| Retrieve unstructured and structured data | RetrieveData | [When APIType=2, 3]<br>Retrieves data for unstructured and structured | - | 34 |

| | | | | |
|---|---|---|---|---|
| | | data. | | |
| | RetrieveDataCount | [When APIType=2, 3]<br>Retrieve the number of HIT data for unstructured data structured data. | - | 37 |
| Updating unstructured and structured data | UpdateData | [When APIType=2, 3]<br>Updates data in unstructured and structured data. | - | 37 |
| Deleting unstructured data and structured data | DeleteData | [When APIType=2, 3]<br>Deletes unstructured and structured data. | - | 38 |

### 3.1.1. General purpose REST

3.1.1.1. CaoExtension::Execute("REST") command

[When APIType=1, 100]

Execute PUT, GET, DELETE, and POST generally for Fujitsu COLMINA Platform. Content of the response is interpreted as a character string of UTF-8.

Format REST (<Data>)

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < REST method > (BSTR)<br>Requisite element<br>Specify either the following.<br>・PUT<br>・GET<br>・DELETE<br>・POST |
| The second element | = | < passing added to URL that is basic > (BSTR)<br>Requisite element<br>Make URL at the request destination from passing specified by the parameter and this element specified at AddController and AddExtension.<br>Made URL is as follows.<br>< Base URI>/<API version >/< passing added to URL that becomes basic tenant ID>/< > |
| The third element | = | < [kueri] character string added to URL passing > (BSTR)<br>Element that can be omitted (*1)<br>Specify it without putting "?" on the head.<br>Example) and "KeyA=ValueA&KeyB=ValueB" |
| The fourth element | = | <Content-Type>(BSTR)<br>Element that can be omitted (*1)<br>When omitting it, Content-Type is not specified. |
| The fifth element | = | < transmitted Body data > (ARRAY\|UI1)<br>Element that can be omitted (*1)<br>Set Content transmitted by the binary. |

Return : [out] (ARRAY|VARIANT)

value

| | | |
|---|---|---|
| The first element | = | StatusCode(int) |
| The second element | = | Header(BSTR) |
| The third element | = | Body character string of response (BSTR) |

(*1)It is considered that the element was omitted by specifying null or the dead letter character for a value. Moreover, when it omits since a certain element all, the array only of the specified element (Length is an array of three when specifying it from the head only by three elements while there are all of the five elements) can be passed to the argument. Only the element of not the array type but contents can be passed as an argument when becoming an array of one element as a result of omitting the element. When the array is taken in the argument of the Execute command from now on all, this is applied.

### 3.1.2. Resource_JSON, CSV, unstructured, or structured data registrations or transfers

#### 3.1.2.1. CaoExtension::Execute("RegistJSON") command

[When APIType=1, 2, 3, 100]

Registration/transmit the JSON data to the resource newly.

When an illegal argument is specified, E_INVALIDARG is generated.

[When APIType=1, 100]

Format RegistJSON (<Data>)

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing > (BSTR)<br>Requisite element |
| The second element | = | < transmitted JSON character string > (BSTR)<br>Requisite element |
| The third element | = | < registration date given to registration data > (BSTR)<br>Element that can be omitted<br>Adopt the request reception date when you omit it. |
| The fourth element | = | [When APIType=1]<br><RETAIN>(BOOL)<br>Element that can be omitted<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified.<br>- Disregard it even if RETAIN is specified when you specify Bulk Insert. |
| The fifth element | = | [When APIType=1]<br>< Bulk Insert flag > (BSTR)<br>Element that can be omitted<br>Specify whether to execute Bulk Insert (Transmit two or more requests to one degree).<br>・Do not do none:Bulk Insert. |

・Single_resource_path: Execute Bulk Insert for a single resource.
When omitting it, it is assumed the one that none was specified.

[When APIType=2, 3]

<Data> : [in] (ARRAY|VARIANT)

| | |
|---|---|
| The first element | = < resource passing >（BSTR）<br>Requisite element<br>[When APIType=2]<br>{database-name}/{collection-name}<br>[When APIType=3]<br>{database-name}/{schema-name}/{table-ID} |
| The second element | = < transmitted JSON character string >（BSTR）<br>Requisite element |
| The third element | = < Bulk Insert flag >（BOOL）<br>Element that can be omitted<br>Bulk Insert (sending more than one request at a time. ) is executed or not.<br>・ Do not execute false:Bulk Insert<br>・ Run true:Bulk Insert<br>If omitted, false is assumed. |

#### 3.1.2.2. CaoExtension::Execute("RegistCSV") command

[When APIType=0, 1, 100]

Registration/transmit the CSV data to the resource newly.

When an illegal argument is specified, E_INVALIDARG is generated.

Format RegistCSV (<Data>)

[When APIType=0]

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | <Table ID> (BSTR)<br>Requisite element |
| The second element | = | < transmitted CSV character string > (BSTR)<br>Requisite element |
| The third element | = | <Transmission date and time assigned to the registered data> (BSTR)<br>Element that can be omitted<br>The default is the POST date and time. |
| The fourth element | = | <Execute Format Check> (BOOL)<br>Optional element<br>Specifies whether or not format checking is to be performed.<br>・ True: Enforce<br>・ False: Not enforced<br>By default, true is specified. |
| The fifth element | = | <Data Header Existence> (BOOL)<br>Optional element<br>Specifies whether a header for the data is present.<br>・ True : Exist<br>・ False : Not present<br>By default, false is specified. |
| The sixth element | = | <Option 1> (BSTR)<br>Optional element<br>Specify Option 1 (Set as required).<br>Nothing is set by default. |
| The seventh element | = | <Option 2> (BSTR)<br>Optional element |

Specify Option 2 (Set as required).
Nothing is set by default.

The eighth element = <Option 2> (BSTR)
Optional element
Specify Option 3 (Set as required).
Nothing is set by default.

[When APIType=1]

<Data> : [in] (ARRAY|VARIANT)

The first element = < resource passing > (BSTR)
Requisite element

The second element = < transmitted CSV character string > (BSTR)
Requisite element

The third element = < registration date given to registration data > (BSTR)
Element that can be omitted
Adopt the request reception date when you omit it.

The fourth element = <RETAIN>(BOOL)
Element that can be omitted
Specify whether to maintain this registration data on the MQTT broker side.
・True: Maintain it.
・False: Do not maintain it.
When omitting it, it is assumed the one that false was specified.

The fifth element = < Body data deletion specification line > (I4)
Element that can be omitted
Specify the number of lines deleted from the head of the Body data.
Do not delete the line when you omit it.

The sixth element = < numerical transformation > (BOOL)
Element that can be omitted
Specify whether to convert the numerical value in the Body data into the character string.
・True: Convert the numerical value.
・False: Do not convert the numerical value.

When omitting it, it is assumed the one that true was specified.

[When APIType=100]

<Data> : [in] (ARRAY|VARIANT)

The first element = < resource passing > (BSTR)
Requisite element

The second element = < transmitted CSV character string > (BSTR)
Requisite element

The third element = < registration date given to registration data > (BSTR)
Element that can be omitted
Adopt the request reception date when you omit it.

The fourth element = < Body data deletion specification line > (I4)
Element that can be omitted
Specify the number of lines deleted from the head of the Body data.
Do not delete the line when you omit it.

The fifth element = < numerical transformation > (BOOL)
Element that can be omitted
Specify whether to convert the numerical value in the Body data into the character string.
・True: Convert the numerical value.
・False: Do not convert the numerical value.
When omitting it, it is assumed the one that true was specified.

#### 3.1.2.3. CaoExtension::Execute("RegistTXT") command

[When APIType=1, 100]

Registration/transmit the TXT data to the resource newly.

When an illegal argument is specified, E_INVALIDARG is generated.

Format RegistTXT (<Data>)

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing > (BSTR)<br>Requisite element |
| The second element | = | < transmitted TXT character string > (BSTR)<br>Requisite element |
| The third element | = | < registration date given to registration data > (BSTR)<br>Element that can be omitted<br>Adopt the request reception date when you omit it. |
| The fourth element | = | [When APIType=1]<br><RETAIN>(BOOL)<br>Element that can be omitted<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified. |

#### 3.1.2.4. CaoExtension::Execute("RegistBIN") command

[When APIType=1]

Registration/transmit the binary data to the resource newly.

When an illegal argument is specified, E_INVALIDARG is generated.

Format RegistBIN (<Data>)

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing > (BSTR)<br>Requisite element |
| The second element | = | It is specified MIME-TYPE>(BSTR) in < Content-Type.<br>Requisite element |
| The third element | = | < transmitted binary > (ARRAY\|UI1)<br>Requisite element |
| The fourth element | = | < registration date given to registration data > (BSTR)<br>Element that can be omitted<br>Adopt the request reception date when you omit it. |
| The fifth element | = | <RETAIN>(BOOL)<br>Element that can be omitted<br>Specify whether to maintain this registration data on the MQTT broker side.<br>・True: Maintain it.<br>・False: Do not maintain it.<br>When omitting it, it is assumed the one that false was specified. |
| The sixth element | = | < compression type > (BSTR)<br>Element that can be omitted<br>Specify the compression type when it transmits by compressing the Body data as follows.<br>・gz<br>Consider the Body data to be no compression when you omit it. |

### 3.1.3. Referencing unstructured and structured data

#### 3.1.3.1. CaoExtension::Execute("ReferenceLatestData")

[When APIType=2, 3]

References the most recent unstructured or structured data.

When an illegal argument is specified, E_INVALIDARG is generated.

Format ReferenceLatestData (<Data>)

[When APIType=2]

| | | |
|---|---|---|
| <Data> | : | [in] BSTR<br>< resource passing ><br>Requisite element<br>{database-name}/{collection-name} |
| Return | : | [out] (BSTR) |
| Values | | The referenced data. |

[When APIType=3]

| | | |
|---|---|---|
| <Data> | : | [in] (ARRAY\|VARIANT) |
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>{database-name}/{schema-name}/{table-D} |
| The second element | = | < data format >（BSTR）<br>Element that can be omitted<br>・application/json：JSON format<br>・text/csv：CSV-format<br>If it is omitted, application/json is assumed. |
| The third element | = | < Double quote on a numeric item >（BOOL）<br>Element that can be omitted<br>・true: Returns numeric items as strings (with double quotes)<br>・false: Returns numeric items as is (without double quotes)<br>If omitted, true is assumed. |
| Return | : | [out] (BSTR) |

| | |
|---|---|
| Values | The referenced data. |

### 3.1.3.2. CaoExtension::Execute("ReferencePastData")

[When APIType=2, 3]

References data registered in unstructured or structured data whose registration date and time match the specified date and time.

When an illegal argument is specified, E_INVALIDARG is generated.

(*1) If there is more than one <Registration Date>, all data will be returned <Registration Date> (BSTR)

Format ReferencePastData (<Data>)

[When APIType=2]

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>{database-name}/{collection-name} |
| The second element | = | < Registration Date >（BSTR）<br>Requisite element<br>Registration date and time of the referenced data |

Return Values : [out] (BSTR)
The referenced data.

[When APIType=3]

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>{database-name}/{schema-name}/{table-ID} |
| The second element | = | < Registration Date >（BSTR）<br>Requisite element<br>Registration date and time of the referenced data |
| The third element | = | < data format >（BSTR）<br>Element that can be omitted<br>・application/json：JSON format<br>・text/csv：CSV-format<br>If it is omitted, application/json is assumed. |

The fourth element = < Double quote on a numeric item >（BOOL）
Element that can be omitted
・ True: Returns numeric items as strings (with double quotes)
・ False: Returns numeric items as is (without double quotes)
If it is omitted, true is assumed.

Return Values : [out] (BSTR)
The referenced data.

### 3.1.4. Retrieve unstructured and structured data

#### 3.1.4.1. CaoExtension::Execute("RetrieveData")

[When APIType=2, 3]

Retrieves data registered in unstructured or structured data that meets specified criteria.

When an illegal argument is specified, E_INVALIDARG is generated.

(*1) [APIType=2, 3 hours] The order of the data obtained as the search result is sorted by <registered date and time>

Format RetrieveData (<Data>)

[When APIType=2]

<Data> : [in] (ARRAY|VARIANT)

The first element = < resource passing >（BSTR）
Requisite element
{database-name}/{collection-name}

The second element = < search condition > (BSTR)
Element that can be omitted
Limit the results to return only those that match <search criteria>.
Refer to 5.2.1. for details.

The third element = < Acquisition Count >（I4）
Element that can be omitted
Limit the number of data items that can be retrieved to n. The maximum number of records that can be acquired is 20,000.

When omitted, no upper limit is assumed.

The fourth element = < Number of skipped items >（I4）
Element that can be omitted
You can skip n data items obtained as a result of a search. The order of the data obtained as a search result is sorted by <registration date and time>.
If it is omitted, 0 is assumed.

Return Values : [out] (BSTR)
Matching unstructured data.

[When APIType=3]

<Data> : [in] (ARRAY|VARIANT)

The first element = < resource passing >（BSTR）
Requisite element
{database-name}/{schema-name}/{table-ID}

The second element = < data format >（BSTR）
Element that can be omitted
・application/json：JSON format
・text/csv：CSV-format
If it is omitted, application/json is assumed.

The third element = < Double quote on a numeric item >（BOOL）
Element that can be omitted
・ true: Returns numeric items as strings (with double quotes)
・ false: Returns numeric items as is (without double quotes)
If it is omitted, true is assumed.

The fourth element = < search condition >（BSTR）
Element that can be omitted
Limit the results to return only those that match <search criteria>.
Refer to 5.2.1. for details.

The fifth element = < Acquisition Count >（I4）
Element that can be omitted
Limit the number of data items that can be retrieved to n. The maximum number of records that can be

| | | |
|---|---|---|
| | | acquired is 20,000.<br>When omitted, no upper limit is assumed. |
| | The sixth element | = < Number of skipped items >（I4）<br>Element that can be omitted<br>You can skip n data items obtained as a result of a search. The order of the data obtained as a search result is sorted by <registration date and time>.<br>If it is omitted, 0 is assumed. |

Return Values : [out] (BSTR)
Structured data that matched.

#### 3.1.4.2. CaoExtension::Execute("RetrieveDataCount")

[When APIType=2, 3]

Retrieves the number of data entries for unstructured or structured data that match the specified criteria.

When an illegal argument is specified, E_INVALIDARG is generated.

Format RetrieveDataCount (<Data>)

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>[When APIType=2]<br>{database-name}/{collection-name}<br>[When APIType=3]<br>{database-name}/{schema-name}/{table-ID} |
| The second element | = | < search condition >（BSTR）<br>Element that can be omitted<br>Limit the results to return only those that match <search criteria>.<br>Refer to 5.2.1. for details. |

Return Values : [out] (I4)

Number of unstructured and structured data matched.

### 3.1.5. Updating unstructured and structured data

#### 3.1.5.1. CaoExtension::Execute("UpdateData")

[When APIType=2]

Updates the data registered in unstructured data that matches the specified object ID with the specified data.

When an illegal argument is specified, E_INVALIDARG is generated.

[When APIType=3]

Updates the data registered in the structured data that matches the primary key in the specified data with the specified data.

When an illegal argument is specified, E_INVALIDARG is generated.

Format UpdateData (<Data>)

[When APIType=2, 3]

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>[When APIType=2]<br>{database-name}/{collection-name}/{object-ID}<br>[When APIType=3]<br>{database-name}/{schema-name}/{table-D} |
| The second element | = | < Data to be updated >（BSTR）<br>Requisite element |

### 3.1.6. Deleting unstructured data and structured data

#### 3.1.6.1. CaoExtension::Execute("DeleteData")

[When APIType=2, 3]

Deletes data already registered in unstructured or structured data that matches the specified criteria.

When an illegal argument is specified, E_INVALIDARG is generated.

Format DeleteData (<Data>)

[When APIType=2, 3]

<Data> : [in] (ARRAY|VARIANT)

| | | |
|---|---|---|
| The first element | = | < resource passing >（BSTR）<br>Requisite element<br>[When APIType=2]<br>{database-name}/{collection-name}<br>[When APIType=3]<br>{database-name}/{schema-name}/{table-ID} |
| The second element | = | < Search condition >（BSTR）<br>Requisite element<br>Deletes items that match the <search condition>.<br>Refer to 5.2.1. for details. |

# 4. Error code

Fujitsu COLMINA providers define the following specific error codes:

For ORiN2 common error codes, refer to the error code section in the ORiN2 Programming Guide.

**Table4-1 specific error codes**

| Error name | Error No | Description |
|---|---|---|
| RemoteCertificateNotAvailable | 0x80100000 | Returned if the certificate is not available. |
| RemoteCertificateNameMismatch | 0x80100001 | Returned if the certificate names do not match. |
| RemoteCertificateChainErrors | 0x80100002 | Returns if ChainStatus returns a non-empty array. |

# 5. Supplementation

## 5.1. Description method of < resource passing (/$all can be used)>.

- Specify the resource passing in the full path.
  Return the resource data of the specified resource passing.

- Specify on the way of the resource passing, and add "/$all" to the furnace afterwards.
  Return the resource data of the specified resource passing of all the passing subordinates.
  Example)
  Target two resources of "A/B" and "A/B/C" when you specify "A/$all" with three resources of "AX" "A/B" "A/B/C" exist.

## 5.2. About Search Criteria

### 5.2.1. DataLake API(NoSQL・RDB)

#### 5.2.1.1. Search condition operator

The following operators are available for search criteria that can be specified with Filter options:

| Item No | Operator | Description | Example |
|---|---|---|---|
| 1 | eq | Equal sign | Filter=owner eq 'Tom' |
| 2 | ne | Not equal sign | Filter=owner ne null |
| 3 | gt | Greater than | Filter=value gt 100 |
| 4 | ge | Above | Filter=value ge 100 |
| 5 | lt | Less than | Filter=value lt 100 |
| 6 | le | Below | Filter=value le 100 |
| 7 | and | Logical AND | Filter=value ge 100 and owner eq 'Tom' |
| 8 | or | Logical sum | Filter=value ge 100 or owner eq 'Tom' |

Other operators cannot be used.

※ However, "(" and ")" indicating the priority can be used.

#### 5.2.1.2. Elements Available for Search Criteria

The following elements are available for the left side of Filter options comparison expression:

| Item No | Element name | Description | Notes |
|---|---|---|---|
| 1 | _date | Registration date | Registration date and time Follow the registration date and time of the record to be searched and ISO8601 format "YYYYMMDDThhmmss.SSSZ"<br>Not enclosed in quotation marks (') |
| 2 | Any item name | Registration data items | ※If NoSQL only has a hierarchical key structure, specify "." (Period) as a delimiter, such as "Floor.Value". Maximum depth is 15 |
| 3 | _id | Object ID of the document<br>※For NoSQL only | The right-hand side of the comparison expression must be enclosed in quotes (') comparison expression. |
| 4 | _resource_path | Resource path string<br>※For NoSQL only | The right-hand side of the comparison expression must be enclosed in quotes (') comparison expression. |

The following elements are available on the right side of the comparison expression in Filter options:

| Item No | Element name | Description | Notes |
|---|---|---|---|
| 1 | _date | Registration date | The registration date and time of the record to be searched |
| 2 | Any item name | Registration data items | --- |
| 3 | null | NULL values | You cannot use operators other than equals and inequality for NULL value |
| 4 | 'Any value' | String | Enclose in quotation mark "'"<br>When describing the quotation mark itself, set two quotation marks on top of each other. |
| 5 | Any date and time | Datetime literal | Do not enclose in quotation mark "'"<br>For items with time zones, follow ISO8601 basic format "YYYYMMDDThhmmss.SSSZ"<br>For non-timezone formats, follow YYYY-MM-DD hh:mm:ss[.SSS] format. |
| 6 | Any number | Numeric literal | Do not enclose in quotation mark "'" |

#### 5.2.1.3. Fuzzy Search

Using Filter options, you can search by the fuzzy condition of forward match/backward match/partial match. For fuzzy search, specify a wildcard (*) in the Value field of Filter options.

- Available Operators

  Two operators are available: "eq", "ne".

  ✧ You can also search for compound conditions by combining logical expressions of fuzzy search using "eq", "ne" with "and" and "or"

- Available Elements/Values

  You can specify wildcards only if you specify strings (enclosed in single quotes) in the Value fields of Filter options. A wildcard (*) can appear only at the beginning or end of a value field.

  ✧ A leading or trailing "*" is treated as a wildcard, and a trailing "*" is treated as a string. You cannot specify "*" as a character at the beginning or end

If only "*" is specified in the value field, the operation is as follows.

- "*" and "**" : match all data
- "***" : match strings with an asterisk (*)

POINTS OF CAUTION

Among the fields automatically assigned by the system by the Data Lake API (NoSQL), the fuzzy search specifying "_id", "_date" and the element name is not supported.

Fuzzy search execution time of forward match/backward match/partial match is faster than partial match/backward match if the search conditions are the same.

## 5.3. JSON format at REST

This format is made based on following URL API references.

https://iot-docs.jp-east-1.paas.cloud.global.fujitsu.com/ja/manual/v5/apireference.pdf

## 5.4. Response status code at REST

It introduces a part of the status code returned when the command is executed.

| Status-Code | Reason-Phrase | Explanation |
|---|---|---|
| 200 | OK | Success and success in resource data creation |
| 201 | Created | Success in resource, access code, and event making |
| 204 | No Content | Deletion success of resource in either the following when it succeeds deletion, meta data access code event is referred to, and various information doesn't exist (It is likely to be going to change in the future) and the meta data access code event is deleted when no existence of the corresponding resource data and the resource are deleted when it corresponds and the resource data is referred though it exists. |
| 206 | Partial content | Success in partial acquisition |
| 400 | Bad Request | There is an illegal value in the request data. |
| 401 | Unauthorized | There is no right of access to the resource. |
| 403 | Forbidden | There is no right of access. |
| 404 | Not Found | The resource doesn't exist. |
| 405 | Method Not Allowed | The method type of the correspondence has not been permitted. |
| 408 | Request Time-out | It is a request time-out. |
| 409 | Conflict | It is rival with other resources. |
| 411 | Length Required | The server access was refused (There is no Content-Lengh specification). |
| 412 | Precondition Failed | The server access was refused (The request condition is illegal). |
| 413 | Payload Too Large | The server access was refused (The size of the request body transcends the tolerance of the server). |
| 414 | URI Too Long | The server access was refused (URI is long). |
| 415 | Unsupported Media Type | The server access was refused (unsupport Content-Type). |
| 416 | Requested Range Not Satisfiable | The server access was refused (The value of the Range demand is illegal). |
| 421 | Misdirected Request | The response was transmitted to a server not generable. |
| 423 | Locked | The resource is locked. |

| | | |
|---|---|---|
| 429 | Too Many Request | The traffic upper bound in the contract is exceeded. |
| 495 | SSL Certificate Error | An invalid client certificate was received. |
| 496 | SSL Certificate Required | The client certificate was not sent from the client. |
| 497 | HTTP Request Sent toHTTPS Port | The HTTP request was received in the HTTPS request port. |
| 500 | Internal Server Error | It is a failure by the problem on the server side. |
| 501 | Not Implemented | The unsupport request method was transmitted with the server. |
| 502 | Bad Gateway | The gateway server doesn't start. |
| 503 | Service Unavailable | It is not possible to access it temporarily. |
| 504 | Gateway Time-out | The gateway server was not able to return the response in time. |

Refer to following URL for more detailed information.

https://iot-docs.jp-east-1.paas.cloud.global.fujitsu.com/ja/manual/v5/apireference.pdf

# 6. Sample program

The sample ..C as follows.. is shown.

## 6.1. Setting and acquisition of value to Variable

Variable listThe usage example of Variable to which [nite] is introduced is shown.

### 6.1.1. Setting Values

**List 6-1-1**

```
Abbreviation.
using ORiN2.ManagedCAO;

namespace COLMINA_Sample
{
    public class Sample
    {
        private readonly string BASE_URL = @"http://<zone>.fujitsu.com";
        private readonly int API_TYPE = 1;  // JSON Data Registration API
        private readonly string ACCESS_CODE = "AccessCode";
        private readonly string RESOURCE_OPT = "ResourcePath=Test";
        private readonly string FILE_PATH = "jpegFilePath";

        private CCaoEngine m_CaoEngine = null;
        private CCaoWorkspaces m_CaoWorkspaces = null;
        private CCaoWorkspace m_CaoWorkspace = null;
        private CCaoController m_CaoController = null;
        private CCaoExtension m_CaoExtension = null;

        private void executeAllVariable()
        {
            // CAO engine generation
            m_CaoEngine = new CCaoEngine ();
            m_CaoWorkspaces = m_CaoEngine.Workspaces;
            m_CaoWorkspace = m_CaoWorkspaces[0];

            // Controller argument
            var opstionStr = string.Format("BaseURL={0}", BASE_URL);

            // Connect it with the controller.
            m_CaoController = m_CaoWorkspace.AddController("Test",
                "CaoProv.FUJITSU.COLMINA", null, opstionStr);
```

```
// Extension argument
var extOptionStr = string.Format("APIType={0},AccessCode={1}", API_TYPE,
    ACCESS_CODE);

// Connect it with the extension.
m_CaoExtension = m_CaoController.AddExtension("Ext", extOpstionStr);

// Optional character string
var registBinOpt = string.Format("{0}, MimeType=image/jpeg, Retain=true",
    RESOURCE_OPT);

// @RegistJSON
CCaoVariable systemVariable = m_CaoExtension.AddVariable("@RegistJSON",
    RESOURCE_OPT);
CCaoVariable userVariable = m_CaoExtension.AddVariable("RegistJSON",
    string.Format("Type=@RegistJSON,{0}", RESOURCE_OPT));

string jsonStr = "{¥"test¥":1}";
systemVariable.Value = jsonStr;
userVariable.Value = jsonStr;

// @RegistCSV
systemVariable = m_CaoExtension.AddVariable("@RegistCSV", RESOURCE_OPT);
userVariable = m_CaoExtension.AddVariable("RegistCSV",
    string.Format("Type=@RegistCSV,{0}", RESOURCE_OPT));
string csvStr = @"name,age,tel
    Tanaka and 30,012-345-6789
    "of ..Suzuki.. 40,098-765-4321;

systemVariable.Value = csvStr;
userVariable.Value = csvStr;

// @RegistTXT
systemVariable = m_CaoExtension.AddVariable("@RegistTXT", RESOURCE_OPT);
userVariable = m_CaoExtension.AddVariable("RegistTXT",
    string.Format("Type=@RegistTXT,{0}", RESOURCE_OPT));
```

```
                string txtStr = "test";
                systemVariable.Value = txtStr;
                userVariable.Value = csvStr;

                // @RegistBIN
                systemVariable = m_CaoExtension.AddVariable("@RegistBIN", registBinOpt);
                userVariable = m_CaoExtension.AddVariable("RegistBIN",
                    string.Format("Type=@RegistBIN,{0}", registBinOpt));

                if (!string.IsNullOrEmpty(FILE_PATH))
                {
                    byte[] binaryArray = File.ReadAllBytes(FILE_PATH);
                    systemVariable.Value = binaryArray;
                    userVariable.Value = binaryArray;
                }
            }
        }
    }
```

### 6.1.2. Get Values

**List 6-1-2**

```
Abbreviation.
using ORiN2.ManagedCAO;

namespace COLMINA_Sample
{
    public  class Sample
    {
        private readonly string BASE_URL = @"http://<zone>.fujitsu.com";
        private readonly int API_TYPE = 3;  // DataLake API(NoSQL)
        private readonly string TENANT_ID = "TenantID";
        private readonly string USER_ID = "UserID";
        private readonly string PASSWORD = "Password";
        private readonly string API_KEY = "APIKey";
        private readonly string RESOURCE_OPT = "ResourcePath=Test";

        private CCaoEngine m_CaoEngine = null;
        private CCaoWorkspaces m_CaoWorkspaces = null;
        private CCaoWorkspace m_CaoWorkspace = null;
        private CCaoController m_CaoController = null;
        private CCaoExtension m_CaoExtension = null;

        private void executeAllVariable()
        {
            // CAO engine generation
            m_CaoEngine = new CCaoEngine();
            m_CaoWorkspaces = m_CaoEngine.Workspaces;
            m_CaoWorkspace = m_CaoWorkspaces[0];

            // Controller argument
            var opstionStr = string.Format("BaseURL={0}", BASE_URL);

            // Connect it with the controller.
            m_CaoController = m_CaoWorkspace.AddController("Test",
                "CaoProv.FUJITSU.COLMINA", null, opstionStr);

            // Extension argument
            var extOptionStr =
                string.Format("APIType={0},TenantID={1},UserID={2},Password={3},APIKey={
```

```
                4}", API_TYPE, TENANT_ID, USER_ID, PASSWORD, API_KEY);

            // Connect it with the extension.
            m_CaoExtension = m_CaoController.AddExtension("Ext", extOpstionStr);

            // @ReferenceLatestData
            CCaoVariable systemVariable =
                m_CaoExtension.AddVariable("@ReferenceLatestData", RESOURCE_OPT);
            CCaoVariable userVariable = m_CaoExtension.AddVariable("ReferenceLatestData",
                string.Format("Type=@ReferenceLatestData,{0}", RESOURCE_OPT));

            var referenceLatestDataStr = systemVariable.Value.ToString();
            referenceLatestDataStr = userVariable.Value.ToString();
        }
    }
}
```

## 6.2. General purpose REST

General purpose REST[Tsuka] example is shown drinking.

**List 6-2**

```
Abbreviation.
using System.Collections.Generic;
using ORiN2.ManagedCAO;

namespace COLMINA_Sample
{
    public class Sample
    {
        private readonly string BASE_URL = @"http://<zone>.fujitsu.com";
        private readonly int API_TYPE = 1;  // JSON Data Registration API
        private readonly string ACCESS_CODE = "AccessCode";
        private readonly string RESOUCE_PATH = "Test";

        private CCaoEngine m_CaoEngine = null;
        private CCaoWorkspaces m_CaoWorkspaces = null;
        private CCaoWorkspace m_CaoWorkspace = null;
        private CCaoController m_CaoController = null;
        private CCaoExtension m_CaoExtension = null;

        private void executSample()
        {
            // CAO engine generation
            m_CaoEngine = new CCaoEngine();
            m_CaoWorkspaces = m_CaoEngine.Workspaces;
            m_CaoWorkspace = m_CaoWorkspaces[0];

            // Controller argument
            var opstionStr = string.Format("BaseURL={0}", BASE_URL);

            if (m_CaoController == null)
            {
                // Connect it with the controller.
                m_CaoController = m_CaoWorkspace.AddController("Test",
                    "CaoProv.FUJITSU.COLMINA", null, opstionStr);
            }

            // Extension argument
            var extOptionStr = string.Format("APIType={0},AccessCode={1}", API_TYPE,
```

```
                    ACCESS_CODE);

                if (m_CaoExtension == null)
                {
                    // Connect it with the extension.
                    m_CaoExtension = m_CaoController.AddExtension("Ext", extOpstionStr);
                }

                var paramList = new List<object>()

                // General purpose REST
                paramList.Add("PUT");
                paramList.Add(RESOUCE_PATH);
                paramList.Add(string.Empty);
                paramList.Add(string.Empty);
                paramList.Add(System.Text.Encoding.ASCII.GetBytes("{¥"abc¥":¥"ABC¥"}"));
                var restResult = m_CaoExtension.Execute("REST", paramList.ToArray());
            }
        }
    }
```

## 6.3. Data control

### 6.3.1. Data registration/forwarding to resource _ JSON

Data registration/forwarding to resource _ JSON[Tsuka] example is shown drinking.

**List 6-3-1**

```
Abbreviation.
using System.IO;
using System.Collections.Generic;
using ORiN2.ManagedCAO;

namespace COLMINA_Sample
{
    public class Sample
    {
        private readonly string BASE_URL = @"http://<zone>.fujitsu.com";
        private readonly int API_TYPE = 1;  // JSON Data Registration API
        private readonly string ACCESS_CODE = "AccessCode";

        private readonly string RESOURCE_OPT = "ResourcePath=Test";
        private readonly string FILE_PATH = "jpegFilePath";
        private readonly string RESOUCE_PATH = "Test";
        private readonly string REGIST_DATE = "20180831T023219.222Z";

        private CCaoEngine m_CaoEngine = null;
        private CCaoWorkspaces m_CaoWorkspaces = null;
        private CCaoWorkspace m_CaoWorkspace = null;
        private CCaoController m_CaoController = null;
        private CCaoExtension m_CaoExtension = null;

        private void executSample()
        {
            // CAO engine generation
            m_CaoEngine = new CCaoEngine();
            m_CaoWorkspaces = m_CaoEngine.Workspaces;
            m_CaoWorkspace = m_CaoWorkspaces[0];

            // Controller argument
            var opstionStr = string.Format("BaseURL={0}", BASE_URL);

            if (m_CaoController == null)
            {
                // Connect it with the controller.
                m_CaoController = m_CaoWorkspace.AddController("Test",
```

```
            "CaoProv.FUJITSU.COLMINA", null, opstionStr);
}

// Extension argument
var extOptionStr = string.Format("APIType={0},AccessCode={1}", API_TYPE,
    ACCESS_CODE);

if (m_CaoExtension == null)
{
    // Connect it with the extension.
    m_CaoExtension = m_CaoController.AddExtension("Ext", extOpstionStr);
}

// Optional character string
var registBinOpt = string.Format("{0}, MimeType=image/jpeg, Retain=true",
    RESOURCE_OPT);
var paramList = new List<object>();
var paramStrList = new List<string>();

// Data control
// Data registration/forwarding to resource JSON
// RegistJSON
paramList.Clear();
paramList.Add(RESOUCE_PATH);
paramList.Add("{¥"test¥":1}");
m_CaoExtension.Execute("RegistJSON", paramList.ToArray());

// RegistCSV
paramList.Clear();
string csvStr = @"name,age,tel
    Tanaka and 30,012-345-6789
    "of ..Suzuki.. 40,098-765-4321;
paramList.Add(RESOUCE_PATH);
paramList.Add(csvStr);
m_CaoController.Execute("RegistCSV", paramList.ToArray());

// RegistTXT
```

```
                paramList.Clear();
                paramList.Add(RESOUCE_PATH);
                paramList.Add("testTxt");
                m_CaoExtension.Execute("RegistTXT", paramList.ToArray());

                // RegistBIN
                paramList.Clear();
                paramList.Add(RESOUCE_PATH);
                paramList.Add("MimeType=image/jpeg");
                if (!string.IsNullOrEmpty(FILE_PATH))
                {
                    paramList.Add(File.ReadAllBytes(FILE_PATH));
                    m_CaoExtension.Execute("RegistBIN", paramList.ToArray());
                }
            }
        }
    }
```

### 6.3.2. Referencing unstructured data

Here is an example of using unstructured data references:

**List 6-3-2**

```
Abbreviation.
 using System.IO;
 using System.Collections.Generic;
 using ORiN2.ManagedCAO;

 namespace COLMINA_Sample
 {
     public  class Sample
     {

         private readonly string BASE_URL = @"http://<zone>.fujitsu.com";
         private readonly int API_TYPE = 3;  // DataLake API(NoSQL)
         private readonly string TENANT_ID = "TenantID";
         private readonly string USER_ID = "UserID";
         private readonly string PASSWORD = "Password";
         private readonly string API_KEY = "APIKey";
         private readonly string RESOURCE_OPT = "ResourcePath=Test";

         private CCaoEngine m_CaoEngine = null;
         private CCaoWorkspaces m_CaoWorkspaces = null;
         private CCaoWorkspace m_CaoWorkspace = null;
         private CCaoController m_CaoController = null;
         private CCaoExtension m_CaoExtension = null;

         private void executSample()
         {
             // CAO engine generation
             m_CaoEngine = new CCaoEngine();
             m_CaoWorkspaces = m_CaoEngine.Workspaces;
             m_CaoWorkspace = m_CaoWorkspaces[0];

             // Controller argument
             var opstionStr = string.Format("BaseURL={0}", BASE_URL);

             if (m_CaoController == null)
             {
                 // Connect it with the controller.
                 m_CaoController = m_CaoWorkspace.AddController("Test",
                     "CaoProv.FUJITSU.COLMINA", null, opstionStr);
```

```
                }

                // Extension argument
                var extOptionStr = string.Format("APIType={0},AccessCode={1}", API_TYPE,
                    ACCESS_CODE);

                if (m_CaoExtension == null)
                {
                    // Connect it with the extension.
                    m_CaoExtension = m_CaoController.AddController("Ext", extOpstionStr);
                }

                var paramList = new List<object>();

                // ReferenceLatestData
                paramList.Add(RESOUCE_PATH);
                var referenceLatestData = m_CaoExtension.Execute("ReferenceLatestData",
                    paramList.ToArray());
            }
        }
    }
```