

Other

Universal Controller 7.9.x

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1 Overview

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Other Resources

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2 Variables

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3 Functions

[Functions](#)

4 Other Overview

Universal Controller resources are records that both define your Universal Automation Center system and that you set up to help facilitate operations:

Credentials	Allow the Controller to log in to remote machines and execute jobs.
Email Templates	Allow you to construct information that can be copied to create Email tasks .
Scripts	Allow you to execute scripts stored in the Controller database.
Variables and Functions	Allow you to embed values into free-text fields of tasks and workflows.
Virtual Resources	Allow you to create throttling schemes for tasks.

5 Credentials

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5.1 Overview

Credentials are the user ID and password under which an [Agent](#) runs [tasks](#) on the machine where the Agent resides.

By default, an Agent will run tasks under the same Credentials used to install the Agent. However, via the Controller user interface, you also can define Credentials and assign them to any task or Agent.

When prompted for Credentials, the Agent looks in the following locations, in this order, for a user ID and password:

1. If the task specifies Credentials, the Agent uses those Credentials.
2. If the task does not specify Credentials, the Agent uses the Credentials specified in its Agent Details record.
3. If the Agent Details does not specify Credentials, the Agent uses the Credentials used to install the Agent.

5.2 Types of Credentials

There are five types of Credentials:

Standard	Runtime user name and runtime password of a user.
Resolvable	Runtime user name and runtime password of a user that you can embed into a task or script without exposing the password in clear text.
Web Service	Runtime user name and runtime password of a user running a Web Service task.
Email	Runtime user name and runtime password of a user connecting to an incoming mail server (IMAP).
SAP	Runtime user name and runtime password of a user connecting to an SAP server.

Note

Unless Credentials must be [embedded](#), we recommend defining Standard Credentials. If required, you can always [convert](#) a Standard Credential to a Resolvable Credential at a future time.

5.3 Converting Credential Types

You can convert a Credential from any [type](#) to any type.

To convert a Credential type from Standard to Resolvable, Web Service, or Email, the [Resolvable Credentials Permitted](#), [Web Service Credentials Permitted](#), or [Email Credentials Permitted](#) Universal Controller system property, respectively, must be set to true.

To convert a Credential, either:

- Click the **Convert...** button in the [Credential Details](#).
- Select **Convert...** in the Credentials Details [action menu](#).
- Select **Convert...** for a specific Credential in the Credentials List [action menu](#).

When you convert a Credential, you must provide a new password. The Controller will not convert an encrypted password of one Credential type to an encrypted password of a different Credential type.

Note

Converting a Credential type does not create a new version of the Credential. Also, you cannot [restore](#) a Credential to an older version if the Credential type of the current version is not the same Credential type as the older version.

5.4 Credentials Compatibility

As of Universal Controller 6.4.x, the Credential Runtime Passwords, along with the [LDAP Settings Bind Password](#), [Email Connection Passwords](#), [Promotion Target Passwords](#), and [Promotion Schedule Promotion Passwords](#), now are encrypted using AES with 128-bit keys.

Additionally, Standard and Resolvable Credentials are encrypted using separate keys; therefore, an encrypted password for a Standard Credential cannot be decrypted by the Resolvable Credential framework.

Under the following circumstances, conversion from the old encryption to the new encryption will be automatic. Furthermore, all pre-6.4.x credentials will be recognized as Standard credentials.

- Apply maintenance to a pre-6.4.x release of Universal Controller to increase it to a 7.9.x release.
- Perform a bulk import or list import from a pre-6.4.x release of Universal Controller to a 7.9.x release.
- Promote from a pre-6.4.x release of Universal Controller to a 7.9.x release.

Under the following circumstance, conversion from the new encryption to the old encryption will be automatic.

- Promote from a 7.9.x release of Universal Controller to a compatible pre-6.4.x release. However, any attempt to promote a Resolvable Credential from a 7.9.x release of Universal Controller to a compatible pre-6.4.x release will fail.

Pre-6.4.0.0 releases cannot decrypt anything encrypted by a 7.9.x release, with the exception of promotion (noted above), which is fully backwards compatible.

Please note the following backwards compatibility constraints with respect to [List Import](#), [Bulk Import](#), and the [Universal Controller Start-up Properties \(opswise.properties\)](#).

- Any attempt to List Import or Bulk Import XML (containing a password encrypted by a 7.9.x release) into a pre-6.4.0.0 release will result in an encrypted value that cannot be decrypted by the pre-6.4.0.0 release.
- Any encrypted passwords within the Universal Controller Start-up Properties will be re-encrypted using the new algorithm when the 7.9.x Controller initializes at start-up. Once converted, that Universal Controller Start-up Properties will no longer be compatible with a pre-6.4.0.0 release.

5.5 Resolvable Credentials

Resolvable Credentials are meant to be used with [scripts](#) and commands specified in [tasks](#), and resolved when the script or command is executed. They provide the script or command with access to Credentials (user name and password) without having to hard-code the Credentials in the script, command, or parameters itself.

In order to enable the use of Resolvable Credentials, the [Resolvable Credentials Permitted](#) Universal Controller system property must be set to true (default is false).

If the [Resolvable Credentials Permitted](#) property is set to false, the following restrictions on Resolvable Credentials apply:

- You cannot create a Resolvable Credential.
- You cannot convert a Standard Credential to a Resolvable Credential.
- Any attempt to launch a task with an embedded Resolvable Credential will result in a Start Failure status.

5.5.1 Using Resolvable Credentials in a Script

To use Resolvable Credentials with a script, embed the Resolvable Credentials in any of the following:

- [Content](#) of a Script specified in the Script field in a [Linux/Unix](#) or [Windows](#) task.
- [Content](#) of a Data Script.
- [Universal Template](#) Script (Script, Linux/Unix Script, or Windows Script field).
- [Content](#) of a Script specified in the Payload Script field in a [Web Service](#) task.

5.5.2 Using Resolvable Credentials in a Task

To use Resolvable Credentials with a task, embed the Resolvable Credentials in any of the following:

Task	Fields
Linux/Unix	<ul style="list-style-type: none"> • Command • Parameters • Environment Variables
Universal Task	<ul style="list-style-type: none"> • Text • Array • Script Content • Environment Variables
Windows	<ul style="list-style-type: none"> • Command • Parameters • Environment Variables
Web Service	<ul style="list-style-type: none"> • URL Query Parameter Values (Not Name) • Form Data Values (Not Name) • Form Payload • HTTP Headers Values (Not Name)

5.6 Embedding Resolvable Credentials

Five Controller [Credentials Functions](#) are available for embedding Resolvable Credentials:

Name	Description	Syntax
Return Key Location of a Credential	Used for embedding the Key Location in a script.	<code>\$_credentialKeyLoc('<credential_name>')</code>
Return Passphrase of a Credential	Used for embedding the Passphrase in a script.	<code>\$_credentialPassphrase('<credential_name>')</code>
Return Token of a Credential	Used for embedding the Token in a script.	<code>\$_credentialToken('<credential_name>')</code>
Return User Name of a Credential	Used for embedding the Runtime User in a script.	<code>\$_credentialUser('<credential_name>')</code>
Return User Password of a Credential	Used for embedding the Runtime Password in a script.	<code>\$_credentialPwd('<credential_name>')</code>

Variables are supported for these Functions.

For example:

- `$_credentialKeyLoc('${my_credential}')`
- `$_credentialPassphrase('${my_credential}')`
- `$_credentialToken('${my_credential}')`
- `$_credentialUser('${my_credential}')`
- `$_credentialPwd('${my_credential}')`

In the resolved script, these Functions are resolved to (for example):

- `$(ops_unv_cred_key_loc_08236da16c3944899aae5a874da077bb)`
- `$(ops_unv_cred_passphrase_08236da16c3944899aae5a874da077bb)`
- `$(ops_unv_cred_token_08236da16c3944899aae5a874da077bb)`

- `$(ops_unv_cred_user_08236da16c3944899aae5a874da077bb)`
- `$(ops_unv_cred_pwd_08236da16c3944899aae5a874da077bb)`

Additionally, for a [Universal Template](#), you can create a [Field](#) of Type = Credential, which lets you select or create Resolvable Credentials. The Controller will create a variable for the Resolvable Credential Field, which you can embed in the Universal Template script using the Credentials Functions. This also lets you change Credentials when you run a [Universal Task](#) based on the Universal Template.

Note

When you embed Resolvable Credentials in a script, the password is exposed in the temporary script on the Agent while the task instance is running.

Resolvable Credentials embedded in a command or parameters field of a Linux/Unix or Windows task are not exposed on the Agent system.

By default, occurrences of Resolvable Credential passwords are scrubbed from the output, reducing (but not eliminating) the risk of passwords echoed directly to the task instance output, which can be retrieved and viewed within the Universal Controller. Please note, however, you still could echo the password to a file on the Agent server.

Note

By default, occurrences of Resolvable Credential passwords and passphrases are scrubbed from [Web Service task](#) output, reducing (but not eliminating) the risk of passwords and passphrases return to the task instance output or output metadata, which can be retrieved and viewed within Universal Controller. Please note, however, you still could use the functions against some API that stores the password and passphrase somewhere that you have access to.

5.6.1 Restrictions on Embedding Resolvable Credentials

If an embedded Credential is not a Resolvable Credential, the task instance will transition into the Start Failure status with one of the following status descriptions:

- Execution with credentials "credential-name", contained within the Universal Template Script, prohibited due to credential type constraint; only Resolvable credential type permitted.
- Execution with credentials "credential-name", contained within the command field or parameters field prohibited due to credential type constraint; only Resolvable credential type permitted.
- Execution with credentials "credential-name", contained within the script "script-name", prohibited due to credential type constraint; only Resolvable credential type permitted.
- For Web Service tasks:
Execution with credentials "credential-name", contained within the "<URL Query

Parameter/Form Data/Payload/Payload Script/HTTP Headers>" field, prohibited due to credential type constraint; only Resolvable credential type permitted.

If the [Execution User](#) for a task instance does not have [Execute permission](#) for an embedded Resolvable Credential, the task instance will transition to the Start Failure status with one of the following status descriptions:

- Execution with credentials "credential-name", contained within the Universal Template Script, prohibited due to security constraints.
- Execution with credentials "credential-name", contained within the command field or parameters field, prohibited due to security constraints.
- Execution with credentials "credential-name", contained within the script "script-name", prohibited due to security constraints.
- Execution with credentials "credential-name", contained within a script, prohibited due to security constraints.
- For Web Service tasks:
Execution with credentials "credential-name", contained within the "<URL Query Parameter/Form Data/Payload/Payload Script/HTTP Headers>" field, prohibited due to security constraints.

If the [Resolvable Credentials Permitted](#) Universal Controller system property is set to false, any task instance with an embedded Resolvable Credential will result in a Start Failure status with the following status description:

- Execution with resolvable credentials not permitted; Universal Controller property "Resolvable Credentials Permitted" is not enabled.
- For Web Service tasks:
 - Execution with resolvable credentials not permitted; Universal Controller property "Web Service Task Resolvable Credentials Functions Permitted" is not enabled
 - Execution with resolvable credentials not permitted; Universal Controller property "Resolvable Credentials Permitted" and "Web Service Task Resolvable Credentials Functions Permitted" are not enabled

If an embedded Resolvable Credential cannot be decrypted, the task instance will transition into the Start Failure status with the following status description:

- Unable to decrypt password for "credential-name" credentials.

5.7 Other Credentials

You can embed source and destination Credentials in a UDM script using [File Transfer Task Instance built-in variables](#).

For [File Transfer tasks](#), the Agent may need additional credentials for logging on to the FTP server.

5.8 Defining a Credential

- Step 1** From the [Automation Center](#) navigation pane, select **Other > Credentials**. The Credentials list displays a list of all currently defined Credentials. Below the list, Credential Details for a new Credential displays.

The screenshot shows the 'Credentials' page in the Universal Controller. On the left, there is a table listing existing credentials:

Name	Runtime User	Type	Description
Opwise - Anonymous	anonymous	Standard	
Opwise - Db Credentials	root	Standard	
Opwise - FTP	opwise	Standard	

On the right, the 'Credential Details' form is displayed. The form includes the following fields:

- Name ***: A text input field.
- Description**: A text input field.
- Member of Business Services**: A dropdown menu.
- Type**: A dropdown menu with 'Standard' selected.
- Provider**: A dropdown menu with 'Universal Controller' selected.
- Runtime User ***: A text input field.
- Runtime Password**: A text input field.
- Key Location (SFTP only)**: A text input field.
- Passphrase (SFTP only)**: A text input field.

- Step 2** Enter/select Details for a new Credential, using the [field descriptions](#) below as a guide. As a best practice, use an alias in the **Name** field, as you may have several identical user names for different systems all having different passwords.
- Required fields display an asterisk (*) after the field name.
 - Default values for fields, if available, display automatically.
- To display more of the Details fields on the screen, you can either:
- Use the scroll bar.
 - Temporarily [hide the list](#) above the Details.
 - Click the **New** button above the list to display a pop-up version of the Details.

- Step 3** Click a **Save** button. The Credential is added to the database, and all buttons and tabs in the Credential Details are enabled.

Note

To [open](#) an existing record on the list, either:

- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the **New** button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.
- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

5.8.1 Credential Details

The following Credential Details is for an existing credential. See the [field descriptions](#), below, for a description of all fields that display in the Credential Details.

The screenshot shows a web interface for editing a credential. At the top, there are two tabs: 'Credential' and 'Versions'. Below the tabs is a 'Details' section with the following fields:

- Name ***: A text input field.
- Description**: A larger text input field.
- Member of Business Services**: A dropdown menu.
- Type**: A dropdown menu with 'Standard' selected.
- Provider**: A dropdown menu with 'Universal Controller' selected.
- Runtime User ***: A text input field.
- Runtime Password**: A text input field.
- Key Location (SFTP only)**: A text input field.
- Passphrase (SFTP only)**: A text input field.

For information on how to access additional details - such as [Metadata](#) and complete [database Details](#) - for Credentials (or any type of record), see [Records](#).

5.8.2 Credential Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in the Credential Details.

Field Name	Description
Details	This section contains detailed information about the credential.
Name	Name for this credential. Maximum length is 100 characters.
Version	System-supplied; version number of the current record, which is incremented by Universal Controller every time a user updates a record. Click on the Versions tab to view previous versions. For details, see Record Versioning .
Description	Description of this record. Maximum length is 255 characters.

<p>Member of Business Services</p>	<p>User-defined; Allows you to select one or more Business Services that this record belongs to. (You also can Check All or Uncheck All Business Services for this record.)</p> <p>You can select up to 62 Business Services for any record type, and enter a maximum of 2048 characters for each Business Service.</p> <p>If the Business Service Visibility Restricted Universal Controller system property is set to true, depending on your assigned (or inherited) Permissions or Roles, Business Services available for selection may be restricted.</p>
<p>Type</p>	<p>Type of Credential.</p> <p>Options:</p> <ul style="list-style-type: none"> • Standard (default) • Resolvable • Web Service • Email • SAP <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>Only Resolvable Credentials can be embedded in a Universal Template script.</p> </div>
<p>Provider</p>	<p>Specifies Provider.</p> <p>Options:</p> <ul style="list-style-type: none"> • Universal Controller • AWS Secrets Manager • Azure Key Vault • CyberArk Credential Provider • CyberArk Central Credential Provider • HashiCorp Vault <p>Default is Universal Controller.</p>
<p>Provider Parameters</p>	<p>When switching the Provider option, the default Provider Parameters for each provider will be populated.</p> <p>When switching to the Universal Controller provider, the Provider Parameters will not be displayed.</p>

<p>Runtime User</p>	<p>Runtime user ID, including an LDAP- or AD-formatted user ID, under which the job will be run. Maximum length is 100 characters. If the user does not have a login shell, add a - character in front of the ID. The Controller will provide a shell for that user and strip the - character from the username.</p> <p>When specifying a Windows account, be aware that the user must have the following privileges based upon the Universal Agent's configuration for the UAG logon option:</p> <ul style="list-style-type: none"> • logon = Interactive (default) <ul style="list-style-type: none"> • Not be in "Deny log on locally." • Be a member of "Allow log on locally." • logon = Batch <ul style="list-style-type: none"> • Not be in "Deny log on as a batch job" • Be a member of "Allow log on as a batch job" <p>When specifying a local Windows account that may be used by an Agent running inside a Windows domain environment, be sure to use "." as a placeholder for the domain name (for example, ".\<localuser>").</p> <p>This qualifies the account name and ensures that Windows will authenticate it against the local – and not the active directory – account database. If the "." placeholder is missing, the account may be interpreted as a domain account in a domain environment, and a task using that credential may fail.</p> <p>If none of your Agents execute on a Windows domain member or domain controller, the placeholder is optional.</p> <p>If a domain account must be used, you may specify the account name using the user principal name (UPN) format (that is, "<domainuser>@<domainname>") or the down-level logon name format (that is, "<domainname>\<domainuser>").</p>
<p>Runtime Password</p>	<p>Runtime user's password. Maximum length is 512 characters.</p>
<p>Key Location (SFTP only)</p>	<p>Location of the Runtime User's SSH private key in OpenSSH format; also applicable for SFTP key location. Maximum length is 255 characters.</p>
<p>Passphrase (SFTP only)</p>	<p>Passphrase for the Runtime User's SSH private key file; also applicable for SFTP keys. Maximum length is 512 characters.</p>
<p>Token</p>	<p>If Type = Resolvable; Token for the Runtime User that can be used with the <code>\$_credentialToken(credential_name)</code> function. Maximum length is 8000 characters.</p>
<p>Metadata</p>	<p>This section contains Metadata information about this record.</p>
<p>UUID</p>	<p>Universally Unique Identifier of this record.</p>
<p>Updated By</p>	<p>Name of the user that last updated this record.</p>
<p>Updated</p>	<p>Date and time that this record was last updated.</p>
<p>Created By</p>	<p>Name of the user that created this record.</p>
<p>Created</p>	<p>Date and time that this record was created.</p>
<p>Buttons</p>	<p>This section identifies the buttons displayed above and below the Credential Details that let you perform various actions.</p>
<p>Save</p>	<p>Saves a new Credential record in the Controller database.</p>

Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
Test Provider	For providers other than Universal Controller. Test Provider button will be available for validating the configured Provider Parameters.
Convert...	Allows you to convert the current Credential Type to a new type and define a new password for the Credential (see Converting Credential Types).
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this credential.
Tabs	This section identifies the tabs across the top of the Credential Details that provide access to additional information about the credential.
Versions	Stores copies of all previous versions of the current record. See Record Versioning .

5.8.3 Provider Parameters

When switching the **Provider** option, the default **Provider Parameters** for each provider will be populated.

When switching to the Universal Controller provider, the **Provider Parameters** will not be displayed.

If a provider parameter is sensitive, value input will be masked in the client, and encrypted in the database. When viewing existing credentials, sensitive provider parameter values are never sent to the client.

5.8.3.1 AWS Secrets Manager

Provider Parameter	Required	Description
ACCESS_KEY_ID	true	The AWS access key, used to identify the user interacting with AWS.
SECRET_ACCESS_KEY	true	The AWS secret access key, used to authenticate the user interacting with AWS.
REGION	true	The region name (e.g., us-east-1).
SECRET_ID	true	The ARN or name of the secret to retrieve.
SECRET_PASSWORD_KEY	false	If this secret was created by using the console, then Secrets Manager stores the information as a JSON structure of key/value pairs. Specifies the key for the password in the JSON structure. <ul style="list-style-type: none"> If left unspecified, the password will evaluate to the entire secret value.
SECRET_PASSPHRASE_KEY	false	Specifies the key for the passphrase in the JSON structure. <ul style="list-style-type: none"> If left unspecified, the passphrase will be undefined.
SECRET_TOKEN_KEY	false	Specifies the key for the token in the JSON structure. <ul style="list-style-type: none"> If left unspecified, the token will be undefined.

Provider Parameter	Required	Description
CACHE_TTL	false	The TTL (Time To Live), in seconds, for the cached secret before a new request to the provider is made. (default 3600 seconds / 1 hour)

5.8.3.2 Azure Key Vault

Provider Parameter	Required	Description
KEY_VAULT_NAME	true	The name of the Key Vault used to build the vault URL to send HTTP requests to. <ul style="list-style-type: none"> <a href="https://<your-key-vault-name>.vault.azure.net">https://<your-key-vault-name>.vault.azure.net
SECRET_NAME	true	The name of the secret.
CLIENT_ID	true	The client (application) ID.
TENANT_ID	true	The Azure Active Directory tenant (directory) Id.
CLIENT_SECRET		The client secret used to authenticate. <ul style="list-style-type: none"> Only one of CLIENT_SECRET, CLIENT_ASSERTION, PEM_CERTIFICATE, or PFX_CERTIFICATE can be specified.
CLIENT_ASSERTION		The client assertion used to authenticate. <ul style="list-style-type: none"> Only one of CLIENT_SECRET, CLIENT_ASSERTION, PEM_CERTIFICATE, or PFX_CERTIFICATE can be specified.
PEM_CERTIFICATE		The path of the PEM certificate used for authenticating. <ul style="list-style-type: none"> Only one of CLIENT_SECRET, CLIENT_ASSERTION, PEM_CERTIFICATE, or PFX_CERTIFICATE can be specified.
PFX_CERTIFICATE		The path of the PFX certificate used for authenticating. <ul style="list-style-type: none"> Only one of CLIENT_SECRET, CLIENT_ASSERTION, PEM_CERTIFICATE, or PFX_CERTIFICATE can be specified.
PFX_CERTIFICATE_PASSWORD		The password for the PFX certificate. <ul style="list-style-type: none"> Required if the PFX_CERTIFICATE is specified.
CACHE_TTL	false	The TTL (Time To Live), in seconds, for the cached secret before a new request to the provider is made. (default 28800 seconds / 8 hours)

5.8.3.3 CyberArk Credential Provider

Provider Parameter	Required	Description
APPLICATION_ID	true	The unique ID of the application issuing the password request.
SAFE	true	The name of the Safe where the password is stored.
FOLDER	true	The name of the folder where the password is stored.
OBJECT	true	The name of the password object to retrieve.

Provider Parameter	Required	Description
REASON	false	The reason for retrieving the password.
CACHE_TTL	false	The TTL (Time To Live), in seconds, for the cached secret before a new request to the provider is made. (default 5 seconds)

5.8.3.4 CyberArk Central Credential Provider

Provider Parameter	Required	Description
HOST	true	The hostname of the Central Credential Provider.
PORT	true	The port of the Central Credential Provider.
APPLICATION_ID	true	The unique ID of the application issuing the password request.
SAFE	true	The name of the Safe where the password is stored.
FOLDER	true	The name of the folder where the password is stored.
OBJECT	true	The name of the password object to retrieve.
KEYSTORE	true	The path of the keystore containing the client certificate used for authenticating.
KEYSTORE_PASSWORD	false	The password used to unlock the keystore.
KEYSTORE_TYPE	false	The type of keystore. (default PKCS12) <ul style="list-style-type: none"> • JKS <ul style="list-style-type: none"> • The proprietary keystore implementation provided by the SUN provider. • PKCS12 <ul style="list-style-type: none"> • The transfer syntax for personal identity information as defined in PKCS #12.
KEYSTORE_ALIAS	false	The name of a specific entry in the keystore to use.
CACHE_TTL	false	The TTL (Time To Live), in seconds, for the cached secret before a new request to the provider is made. (default 5 seconds)

5.8.3.5 HashiCorp Vault

P r o v i d e r P a r a m e t e r	R e q u i r e d	Description
ADD RES S	true	The address of the Vault server (e.g. http://127.0.0.1:8200).
TOK EN		The Vault token for use with Vault's token auth method.
ROL E_ID		The Role ID of the AppRole for use with Vault's AppRole auth method.
SEC RET _ID		The Secret ID belonging to the AppRole for use with Vault's AppRole auth method. <ul style="list-style-type: none"> Required if the ROLE_ID is specified.
JWT		The signed JSON Web Token (JWT) for use with Vault's JWT auth method.
ROL E		The Role name for use with Vault's JWT auth method. <ul style="list-style-type: none"> Required, but not enforced, if the JWT auth method backend does not have a default role.
KEY STO RE		The path to the keystore containing the client certificate and private key for use with Vault's TLS Certificates auth method.
KEY STO RE_ PAS SWO RD		The password used to unlock the keystore.
KEY STO RE_ TYP E		The type of keystore. Default is PKCS12. <ul style="list-style-type: none"> JKS <ul style="list-style-type: none"> The proprietary keystore implementation provided by the SUN provider. PKCS12 <ul style="list-style-type: none"> The transfer syntax for personal identity information as defined in PKCS #12.
CLIE NT_ CER TIFI CAT E		The path to the X.509 certificate, in PEM format, for use with Vault's TLS certificates auth method.
CLIE NT_ KEY		The path to the unencrypted RSA private key, in PEM format, for use with Vault's TLS certificates auth method. <ul style="list-style-type: none"> Required if the CLIENT_CERTIFICATE is specified.

P r o v i d e r P a r a m e t e r	R e q u i r e d	Description
NAMESPACE	false	The namespace for Vault server instance. The namespace will be used for both auth and read calls. If the NAMESPACE is specified, then the X-Vault-Namespace header will be set for all requests. Final paths for all requests will be relative to the header value.
AUTH_MOUNT_PATH	false	Specifies the path where the auth method backend is mounted.
MOUNT_PATH	false	Specifies the path where the KV backend is mounted. <ul style="list-style-type: none"> If not specified, the SECRET_PATH parameter will be interpreted as the combined mount path and secret path, with /data/ automatically inserted for KV Version 2 secrets.
SECRET_PATH	true	The path to the KV secret.
DATA_PASSWORD_KEY	false	Specifies the key for the password in the secret data.
DATA_PASSPHRASE_KEY	false	Specifies the key for the passphrase in the secret data.
DATA_TOKEN_KEY	false	Specifies the key for the token in the secret data.
CACHE_TTL	false	The TTL (Time To Live), in seconds, for the cached secret before a new request to the provider is made. (default 300 seconds / 5 minutes) If the secret has a TTL, then it will be used to set the expiration time (KV Version 1 only).

5.9 Deleting a Credential

You cannot delete a Credential if any references exist for the Credential.

References will be checked according to the Credential type, as shown in the following table:

Credential Type	Record Type
Resolvable	<ul style="list-style-type: none"> • Universal Task (Credentials Fields 1-4) • Universal Template Field (Default Value)
Email	<ul style="list-style-type: none"> • Email Monitor (Credentials)
Web Service	<ul style="list-style-type: none"> • Web Service Task (Credentials)
SAP	<ul style="list-style-type: none"> • SAP Task (SAP Credentials, SAP User Credentials)
Standard	<ul style="list-style-type: none"> • Windows Agent (Credentials) • Linux/Unix Agent (Credentials) • Application (Credentials) • Database Connection (Credentials) • PeopleSoft Connection (Credentials) • Windows Task (Credentials) • Linux/Unix Task (Credentials) • z/OS Task (Credentials) • Universal Command Task (Utility Credentials, UCMD Credentials) • SAP Task (SAP Credentials, SAP User Credentials) • PeopleSoft Task (Utility Credentials, PeopleSoft Credentials) • File Transfer Task (Credentials, FTP Credentials, Source Credentials, Destination Credentials) • SQL Task (Credentials) • Stored Procedure Task (Credentials) • File Monitor Task (Credentials) • FTP File Monitor Task (Credentials, FTP Credentials) • System Monitor (Credentials) • Universal Task (Credentials) • Universal Template (Credentials)

Note

Resolvable, Email, Web Service, and SAP Credentials can be used anywhere that a Standard Credential can be specified.

6 Email Templates

- [Overview](#)
- [Creating an Email Template](#)
 - [Email Template Details](#)
 - [Email Template Details Field Descriptions](#)

6.1 Overview

Email templates allow you to construct commonly-used information that can be copied to create [Email tasks](#).

If an Email task specifies a template, Universal Controller uses the information in the template to construct and execute the Email task. Any information specified in the task overrides what is specified in the template.

6.2 Creating an Email Template

Step 1

From the [Agents & Connections](#) navigation pane, select **Other> Email Templates**. The Email Templates list displays.



To the right of the list, Email Template Details for a new Email Template displays.

The screenshot shows the Universal Controller interface. On the left, a table lists five email templates. On the right, the 'Email Template Details' form is displayed, showing fields for Name, Description, Member of Business Services, Email Connection, Reply-To, To, Cc, Bcc, Subject, and Body.

Name	Description	To	Cc	Sk
stonebranch-emailtemplate-01		stonebranch@stonebranch.com		
stonebranch-emailtemplate-02		stonebranch@stonebranch.com		
stonebranch-emailtemplate-03		stonebranch@stonebranch.com		
stonebranch-emailtemplate-04		stonebranch@stonebranch.com		
stonebranch-emailtemplate-05		stonebranch@stonebranch.com		

The 'Email Template Details' form includes the following fields:

- Name *
- Description
- Member of Business Services
- Email Connection *
- Reply-To
- To
- Cc
- Bcc
- Subject
- Body

Step 2	<p>Enter / select Details for a new Email Template, using the field descriptions below as a guide.</p> <ul style="list-style-type: none"> • Required fields display an asterisk (*) after the field name. • Default values for fields, if available, display automatically. <p>To display more of the Details fields on the screen, you can either:</p> <ul style="list-style-type: none"> • Use the scroll bar. • Temporarily hide the list above the Details. • Click the  button above the list to display a pop-up version of the Details.
Step 3	<p>Click a  button. The Email Template is added to the database, and all buttons and tabs in the Email Template Details are enabled.</p>

Note

To [open](#) an existing record on the list, either:

- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the **New** button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.
- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

6.2.1 Email Template Details

The following Email Template Details is for an existing Email Template. See the [field descriptions](#), below, for a description of all fields that display in the Email Template Details.

For information on how to access additional details - such as [Metadata](#) and complete [database Details](#) - for Email Templates (or any type of record), see [Records](#).

6.2.2 Email Template Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in the Email Template Details.

Field Name	Description
Details	This section contains detailed information about the Email Template.
Name	Name used within the Controller to identify this resource. Up to 40 alphanumeric. It is the responsibility of the user to develop a workable naming scheme for resources.

Version	System-supplied; version number of the current record, which is incremented by the Controller every time a user updates a record. Click the Versions tab to view previous versions. For details, see Record Versioning .
Description	Description of this record. Maximum length is 255 characters.
Member of Business Services	User-defined; Allows you to select one or more Business Services that this record belongs to. (You also can Check All or Uncheck All Business Services for this record.) You can select up to 62 Business Services for any record type, and enter a maximum of 2048 characters for each Business Service. If the Business Service Visibility Restricted Universal Controller system property is set to true, depending on your assigned (or inherited) Permissions or Roles , Business Services available for selection may be restricted.
Email Connection	Connection used for the Email Template. Select an Email Connection from the drop-down list, or click the Details icon to create a new Email Connection or view the Details of a selected Email Connection.
Reply-To	Email address of the sender. Use commas to separate multiple recipients. Variables and functions supported.
To	Required unless CC or BCC is specified; Email address of the recipient. Use commas to separate multiple recipients. Variables and functions supported.
CC	Required unless To or BCC is specified; Email address of the party being sent a copy of the email, if any. Use commas to separate multiple recipients. Variables and functions supported.
BCC	Required unless To or CC is specified; Email address of the party being sent a blind (hidden) copy of the email, if any. Use commas to separate multiple recipients. Variables and functions supported.
Subject	Subject line of the email. Variables and functions supported.
Body	Text of the email message. Variables and functions supported. <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>If both the Email Template and the Email Task (or Email Notification) contain text in the Body, the text in the Email Template is appended to the text in the Email Task (or Email Notification).</p> </div>
Metadata	This section contains Metadata information about this record.
UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Created	Date and time that this record was created.
Buttons	This section identifies the buttons displayed above and below the Email Template Details that let you perform various actions.
Save	Saves a new Email Template record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.

Update	Saves updates to the record.
Copy	Creates a copy of this Email Template, which you are prompted to rename.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this Email Template.
Tabs	This section identifies the tabs across the top of the Email Template Details that provide access to additional information about the Email Template.
Email Tasks	Displays a list of Email Tasks that specify this Email Template, and lets you create a new Email Task with its Email Template field pre-populated with this Email Template.
Versions tab	Stores copies of all previous versions of the current record. See Record Versioning .

6.3 Copying Email Templates

- [Overview](#)
- [Copying One or More Email Templates from an Email Templates List](#)
- [Copying an Email Template from the Email Template Details](#)
- [Copy Permissions](#)

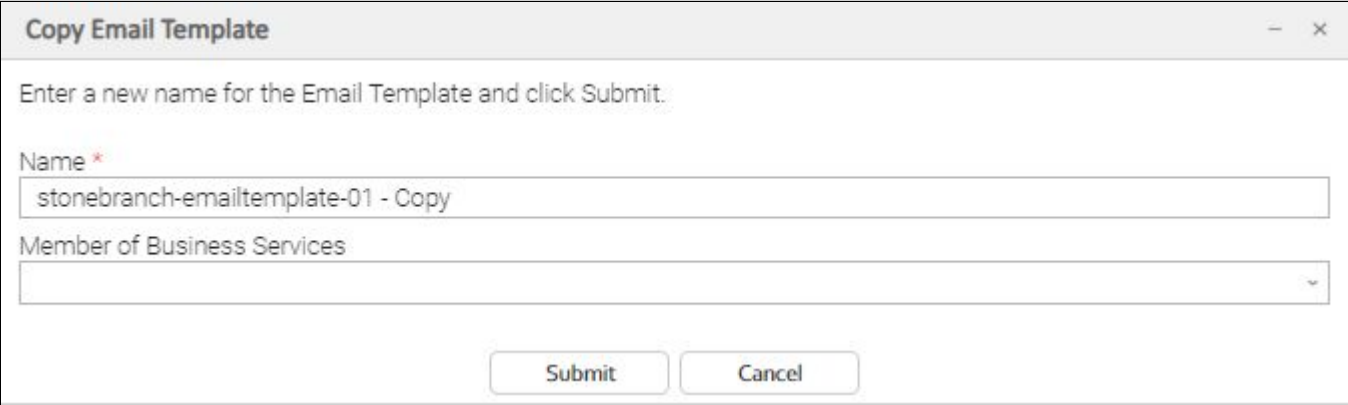
6.3.1 Overview

You can make copies of all Universal Controller records, including Email Templates, using the standard method for [Copying a Record](#): selecting **Insert** on the [Action menu](#).

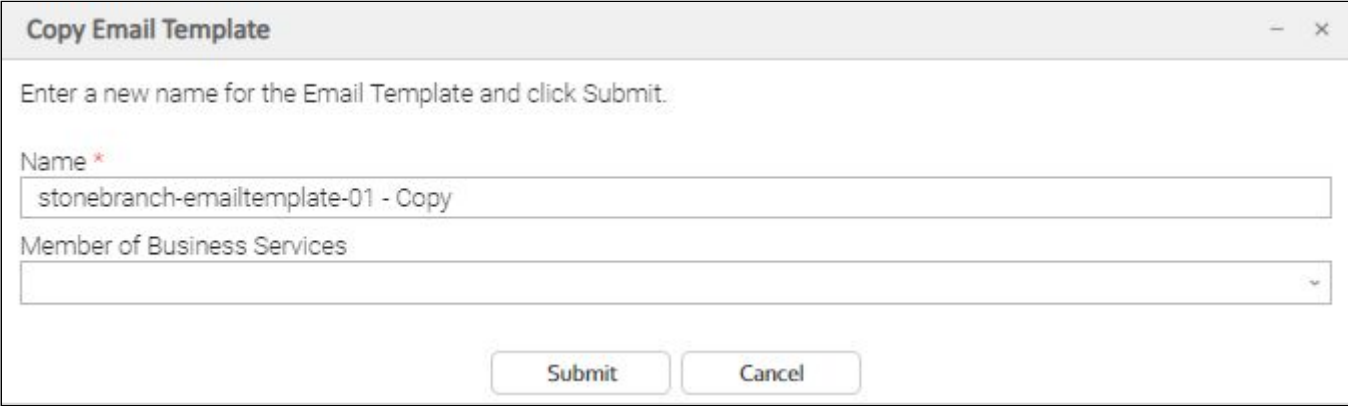
However, you also can use the Copy action on the Email Templates [Action menu](#) or the Copy button in the Email Templates Details.

6.3.2 Copying One or More Email Templates from an Email Templates List

Step 1	From the Agents & Connections navigation pane, select System > Email Templates to display the Email Templates list.
Step 2	Locate the Email Template(s) you want to copy (see Filtering).

Step 3	<p>Copy the Email Template(s):</p> <p>Copy One Email Template</p> <ol style="list-style-type: none"> 1. Right-click the Email Template Name. 2. On the Action menu, select Copy. A Copy Email Template pop-up dialog displays.  <ol style="list-style-type: none"> 3. Enter a new name for the Email Template and, optionally, select any Business Services that you want the Email Template assigned to. 4. Click Submit to create a copy of the Email Template. <p>Copy Multiple Email Templates</p> <ol style="list-style-type: none"> 1. Ctrl-Click the Email Templates you want to copy. 2. Right-click any of the selected Email Templates. 3. On the Action menu, select Copy. 4. On the Confirmation pop-up that displays, click OK. The copied Email Templates are added to the list, with - Copy added as a suffix to the Email Template Name for each Email Template. If an Email Template with that - Copy name already exists, another copy is not created.
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6.3.3 Copying an Email Template from the Email Template Details

Step 1	Select an Email Template from the Email Template list. The Email Template Details for that Email Template displays.
Step 2	<p>Either:</p> <ul style="list-style-type: none"> • Click the Copy button. • Right-click the Details to display the Action menu, and then click Copy. <p>A Copy Email Template pop-up dialog displays.</p> 
Step 3	Enter a new name for the Email Template and, optionally, select any Business Services that you want the Email Template assigned to.

Step 4	Click Submit to create a copy of the Email Template.
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6.3.4 Copy Permissions

To copy an Email Template, you must have both Read [permission](#) and Copy command permission for the Email Template you are copying, in addition to having Create permission for the copied Email Template.

7 Scripts

- [Overview](#)
- [Types of Scripts](#)
- [Data Scripts](#)
 - [Using Data Scripts in a Script](#)
 - [Using Data Scripts in a Task](#)
- [Embedding a Data Script](#)
 - [Restrictions on Embedding Data Scripts](#)
- [Creating a Script](#)
 - [Script Details](#)
 - [Script Details Field Descriptions](#)
- [Uploading a Script](#)

7.1 Overview

Scripts allows you to store scripts in the Universal Controller database.

When a task that specifies a stored script is executed, the script is transmitted to the remote machine for execution.

Note

There is a 1MB limit on the content size of scripts, whether the content is defined in the Script Details or a uploaded from a local file system (see [Uploading a Script](#), below).

You can use scripts with the following task types: Windows, Linux/Unix, SAP, and File Transfer (UDM scripts for UDM File Transfer tasks).

You cannot import compiled executables into Scripts. The content of scripts must be text that can be processed by some shell, script host, or command interpreter.

You can embed Universal Controller [variables](#) in the script content. Embedded variables are resolved at trigger/run time before the script is sent to an Agent.

Controller variables can be passed as parameters, but the script still has to be written to parse the variables. However, you cannot pass variables as parameters that contain data longer than the parameter field (for example, SQL results).

For example, the following script shows how a Controller variable could be used.

```
#!/bin/bash
echo Task Name: ${ops_task_name}
echo Task Instance: ${ops_task_id}
```

Note

You also can enter a script directly into a [Universal Template](#), but you cannot select a stored script.

7.2 Types of Scripts

There are five types of scripts:

Script	For use in Windows or Linux/Unix tasks.
SAP Definition	For use in SAP tasks.
UDM Script	For use in UDM File Transfer tasks.
Web Service Payload	For use in Web Service tasks.
Data	For use in a script or task (see Data Scripts , below).

7.3 Data Scripts

Data Scripts (Script Type = Data) are meant to be used with [scripts](#) and commands specified in [tasks](#), and resolved when the script or command is executed. Data Scripts provide the script or command with access to a path on the UAG file system where the temporary Data Script content resides.

Note

Deleting a Data script is prohibited if it is referenced by one or more Universal Tasks or Universal Template Fields (Default Value).

Changing the type for a Data script is prohibited if it is referenced by one or more Universal Tasks or Universal Template Fields (Default Value).

The Tasks tab on the Script Details is enabled for Data scripts and lists Universal Tasks that reference the script via a mapped Script field.

7.3.1 Using Data Scripts in a Script

To use a Data Script with a script, embed the Data Script in any of the following:

- [Content](#) of a Script specified in the Script field in a [Linux/Unix](#) or [Windows](#) task.
- [Content](#) of a Data Script.
- [Universal Template](#) Script (Script, Linux/Unix Script, or Windows Script field).

7.3.2 Using Data Scripts in a Task

To use a Data Script with a task, embed the Data Script in any of the following:

- Command field in a [Linux/Unix](#) or [Windows](#) task
- Parameters field in a [Linux/Unix](#) or [Windows](#) task

Note

Although you can embed a Data Script in the Command field or Parameters field of a Linux/Unix or Windows task, only scripts with [Script Type](#) = Script can be referenced in a Linux/Unix or Windows task; that is, it is the only type of script that is available for selection in the Linux/Unix or Windows task Script field.

7.4 Embedding a Data Script

To embed a Data Script, use the following [Script Function](#):

Name	Description	Syntax
Return Path to Data Script	Used for embedding the path to a Data Script.	<code>\${_scriptPath('<script_name>')}</code>

Note

`_scriptPath` requires Agent 6.4.0.0 or later.

Upon task instance execution, the Controller will resolve `${_scriptPath('<script_name>')}` and replace it with a token representing the path to the embedded Data Script in the following format: `$(ops_unv_script_path_<script-sys_id>)`.

For every Data Script embedded in a Data Script, the Controller will resolve `${_scriptPath('script_name')}` (if [Resolve UAC Variables](#) is enabled for the Data Script), and look for additional Data Script references (and [Resolvable Credentials](#) references). This process will continue until no additional Data Script references are found.

For each Data Script reference, the Controller will send UAG the Data Script Content, file extension, and the corresponding token - `$(ops_unv_script_path_<script-sys_id>)` - that would represent a reference to that Content, which would ultimately be temporarily written to the UAG file system.

UAG will replace any tokens within the Script Content, Universal Template Script, Command, or Parameters with the appropriate file path associated with the Data Script Content. UAG also will replace any tokens within each Data Script Content.

Additionally, for a [Universal Template](#), you can create a [Field](#) of Type = Script, which lets you select or create Data Scripts. The Controller will create a variable for the Data Script Field, which you can embed in the Universal Template script using the Script Functions. This also lets you change Scripts when you run a [Universal Task](#) based on the Universal Template.

7.4.1 Restrictions on Embedding Data Scripts

For every embedded Script, the Script Type must be Data; otherwise, the task will transition to the Start Failure status with one of the following status descriptions:

Execution for script "script-name", contained within the Universal Template Script, prohibited due to script type constraint; only Data script type permitted.

Execution for script "script-name", contained within the command field or parameters field prohibited due to script type constraint; only Data script type permitted.

Execution for script "script-name", contained within the script "script-name", prohibited due to script type constraint; only Data script type permitted.

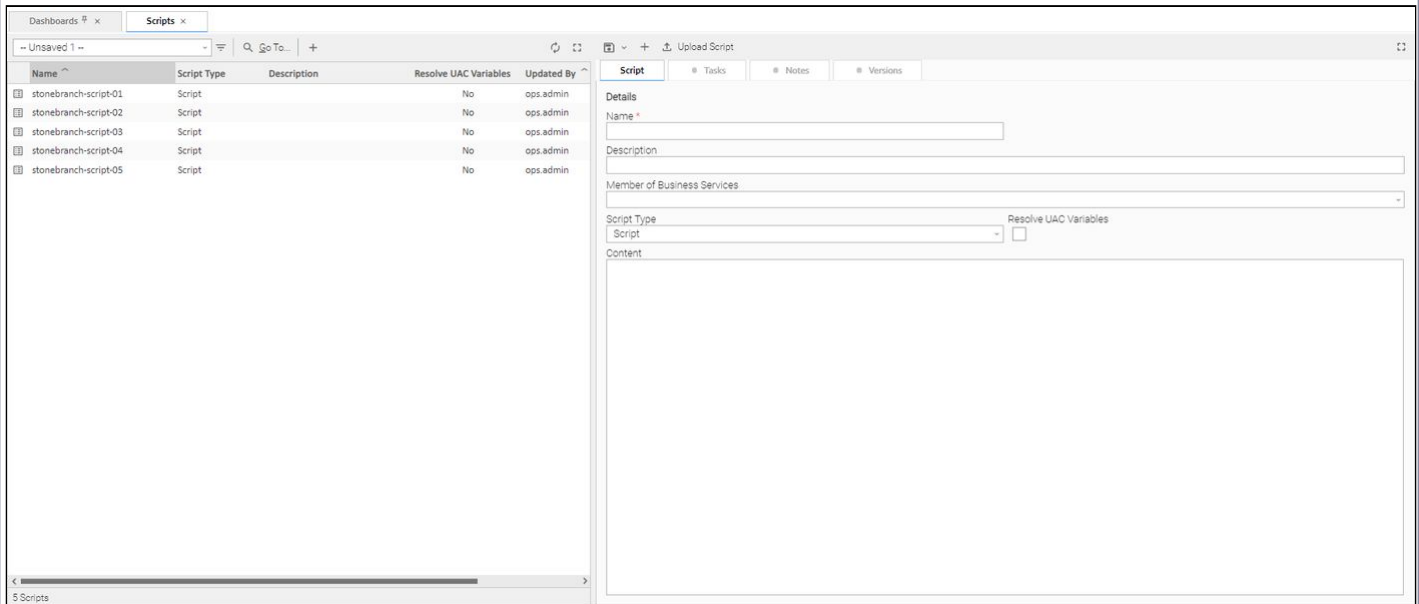
For every embedded Data Script, the [Execution User](#) must have [Execute permission](#) for the Data Script; otherwise, the task instance will transition to the Start Failure status with one of the following status descriptions:

Execution for script "script-name", contained within a Universal Template Script or script, prohibited due to security constraints.

Execution for script "script-name", contained within a script, command field, or parameters field, prohibited due to security constraints.


7.5 Creating a Script


- Step 1** From the [Automation Center](#) navigation pane, select **Other > Scripts**. The Scripts list displays a list of all existing scripts. To the right of the list, Script Details for a new script displays.



- Step 2** Enter / select Details for a new script, using the [field descriptions](#) below as a guide.
- Required fields display an asterisk (*) after the field name.
 - Default values for fields, if available, display automatically.

To display more of the Details fields on the screen, you can either:

- Use the scroll bar.
- Temporarily [hide the list](#) above the Details.
- Click the  button above the list to display a pop-up version of the Details.

- Step 3** Click a  button. The script is added to the Controller database, and all buttons and tabs in the Script Details are enabled.

Note

To [open](#) an existing record on the list, either:

- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the **New** button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.
- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

7.5.1 Script Details

The following Script Details is for an existing script. See the [field descriptions](#), below, for a description of all fields that display in the Script Details.

For information on how to access additional details - such as [Metadata](#) and complete [database Details](#) - for Scripts (or any type of record), see [Records](#).

7.5.2 Script Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in the Script Details.

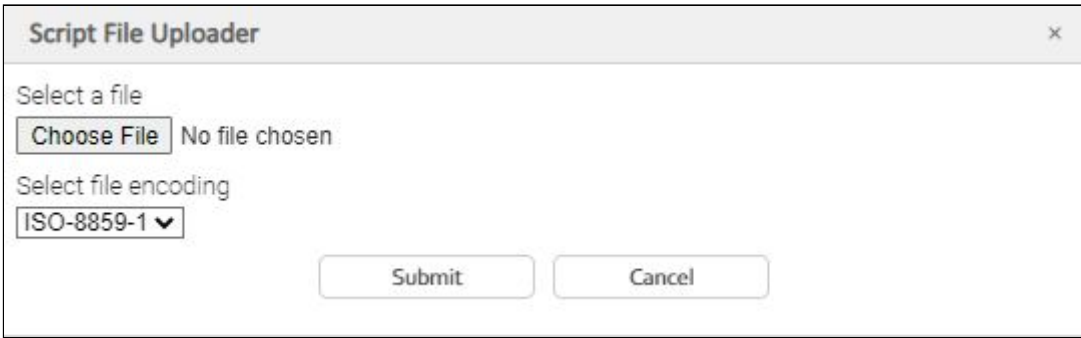
Field Name	Description
Details	This section contains detailed information about the Script.
Name	Name of the script. This name can be the same as the name of the script file. You also can specify a file extension; the default file extension for Windows is <code>.bat</code> . If the name has the extension <code>.ps1</code> , Windows will run the script as a powershell script. You may have to create the appropriate file association and security for this to work.
Version	System-supplied; version number of the current record, which is incremented by the Controller every time a user updates a record. Click the Versions tab to view previous versions. For details, see Record Versioning .

Description	Description of this record. Maximum length is 255 characters.
Member of Business Services	<p>User-defined; Allows you to select one or more Business Services that this record belongs to. (You also can Check All or Uncheck All Business Services for this record.)</p> <p>You can select up to 62 Business Services for any record type, and enter a maximum of 2048 characters for each Business Service.</p> <p>If the Business Service Visibility Restricted Universal Controller system property is set to true, depending on your assigned (or inherited) Permissions or Roles, Business Services available for selection may be restricted.</p>
Script Type	<p>Type of script:</p> <p>Options:</p> <ul style="list-style-type: none"> • Script • SAP Definition • UDM Script • Web Service Payload • Data
Resolve UAC Variables	<p>Controls whether or not the Script will be parsed in pursuit of Universal Controller variables. It allows the Controller to avoid the overhead of parsing a Script that does not contain variables.</p> <div style="border: 1px solid yellow; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>Variables <i>could</i> be embedded with this field disabled; likewise, you could have a Script with no variables but have this field enabled. However, enabling this field for a Script that does not contain Controller variables will impose an unnecessary burden (however small) on the Controller.</p> </div>
Content	<p>Content of the script or SAP definition file.</p> <p>You can enter content manually or upload content from the local file system by using the Upload Script button.</p> <p>For UDM Scripts, Primary and Secondary credentials are available for use. The credentials can be coded into the UDM script using the following File Transfer variables:</p> <ul style="list-style-type: none"> • ops_primary_cred_user • ops_primary_cred_pwd • ops_secondary_cred_user • ops_secondary_cred_pwd <p>The variables will be resolved by UDM internally. The following example illustrates the correct way to code them:</p> <div style="border: 1px solid gray; height: 30px; margin-top: 10px;"></div> <p>The values for these variables are sent to UDM via stdin. This provides a secure channel where the credentials never show up in the script or on the command line.</p>
Metadata	This section contains Metadata information about this record.
UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Created	Date and time that this record was created.
Buttons	This section identifies the buttons displayed above and below the Script Details that let you perform various actions.

Save	Saves a new script record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
Upload Script	Allows you to upload a script from the local file system and place it in the Content field (see Uploading a Script , below).
Copy	Creates a copy of this script, which you are prompted to rename.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this task.
Tabs	This section identifies the tabs across the top of the Script Details that provide access to additional information about the script.
Tasks	Lists of all tasks using this script.
Notes	Lists all notes associated with this record.
Versions	Stores copies of all previous versions of the current record. See Record Versioning .

7.6 Uploading a Script

To upload a script into the [Content](#) field in the Script Details:

Step 1	Click the Upload Script button. The Script File Uploader pop-up displays. 
Step 2	Click the Choose File button and select a script from the local file system.

Step 3	<p>From the Select file encoding drop-down list, select the character set of the script:</p> <ul style="list-style-type: none"> • CESU-8 • IBM00858 • IBM437 • IBM775 • IBM850 • IBM852 • IBM855 • IBM857 • IBM862 • IBM866 • ISO-8859-1 • ISO-8859-2 • ISO-8859-4 • ISO-8859-5 • ISO-8859-7 • ISO-8859-9 • ISO-8859-13 • ISO-8859-15 • KOI8-R • KOI8-U • US-ASCII • UTF-8 • UTF-16 • UTF-16BE • UTF-16LE • UTF-32 • UTF-32BE • UTF-32LE • x-UTF-32BE-BOM • x-UTF-32LE-BOM • windows-1250 • windows-1251 • windows-1252 • windows-1253 • windows-1254 • windows-1257 • x-IBM737 • x-IBM875 • x-UTF-16LE-BOM
Step 4	<p>Click the Submit button to add the script to the Content field.</p>

7.7 Copying Scripts

- [Overview](#)
- [Copying One or More Scripts from a Scripts List](#)
- [Copying a Script from the Script Details](#)
- [Copy Permissions](#)

7.7.1 Overview

You can make copies of all Universal Controller records, including scripts, using the standard method for [Copying a Record](#): selecting **Insert** on the [Action menu](#).

However, this method does not make copies of any records that are associated with the copied record. For scripts, **Insert** does not make copies of any [Notes](#) that are associated with the script.

The Copy option allows you to make a complete copy of a script, including all of its Notes.

7.7.2 Copying One or More Scripts from a Scripts List

Step 1	From the Automation Center navigation pane, select Other > Scripts to display the Scripts list.
Step 2	Locate the script(s) you want to copy (see Filtering).
Step 3	<p>Copy the script(s):</p> <p>Copy One Script</p> <ol style="list-style-type: none"> 1. Right-click the Script Name. 2. On the Action menu, select Copy. A Copy Script pop-up dialog displays. <div data-bbox="153 712 1513 1115" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Copy Script — ×</p> <p>Enter a new name for the Script and click Submit.</p> <p>Name *</p> <input type="text" value="stonebranch-script-01 - Copy"/> <p>Member of Business Services</p> <input type="text"/> <p style="text-align: center;"> <input type="button" value="Submit"/> <input type="button" value="Cancel"/> </p> </div> <ol style="list-style-type: none"> 1. Enter a new name for the script and, optionally, select any Business Services that you want the script assigned to. 2. Click Submit to create a copy of the script. <p>Copy Multiple Scripts</p> <ol style="list-style-type: none"> 1. Ctrl-Click the scripts you want to copy. 2. Right-click any of the selected scripts. 3. On the Action menu, select Copy. 4. On the Confirmation pop-up that displays, click OK. The copied scripts are added to the list, with - Copy added as a suffix to the Script Name for each script. If a script with that - Copy name already exists, another copy is not created.

7.7.3 Copying a Script from the Script Details

Step 1	Select a script from the Script list. The Script Details for that script displays.
---------------	--

Step 2	<p>Either:</p> <ul style="list-style-type: none"> • Click the Copy button. • Right-click the Details to display the Action menu, and then click Copy. <p>A Copy Script pop-up dialog displays.</p> <div data-bbox="156 383 1517 786" style="border: 1px solid black; padding: 10px;"> <p>Copy Script — ×</p> <p>Enter a new name for the Script and click Submit.</p> <p>Name *</p> <input type="text" value="stonebranch-script-01 - Copy"/> <p>Member of Business Services</p> <input type="text"/> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Submit"/> <input type="button" value="Cancel"/> </div> </div>
Step 3	<p>Enter a new name for the script and, optionally, select any Business Services that you want the script assigned to.</p>
Step 4	<p>Click Submit to create a copy of the script.</p>

7.7.4 Copy Permissions

To copy a Script, you must have both Read [permission](#) and Copy command permission for the Script you are copying, in addition to having Create permission for the copied Script.

8 Simulation

- [Overview](#)
- [Using Simulation Mode](#)
- [Customizing Simulation Behavior](#)
 - [Simulation Details](#)
 - [Simulation Details Field Descriptions](#)
- [Task Type Specific Simulation Mode Behavior](#)

8.1 Overview

Simulation allows you to validate the execution of a workflow, a specific set of tasks within a workflow, or a standalone task in the Universal Controller without actually having to execute the underlying operation of each task instance.

8.2 Using Simulation Mode

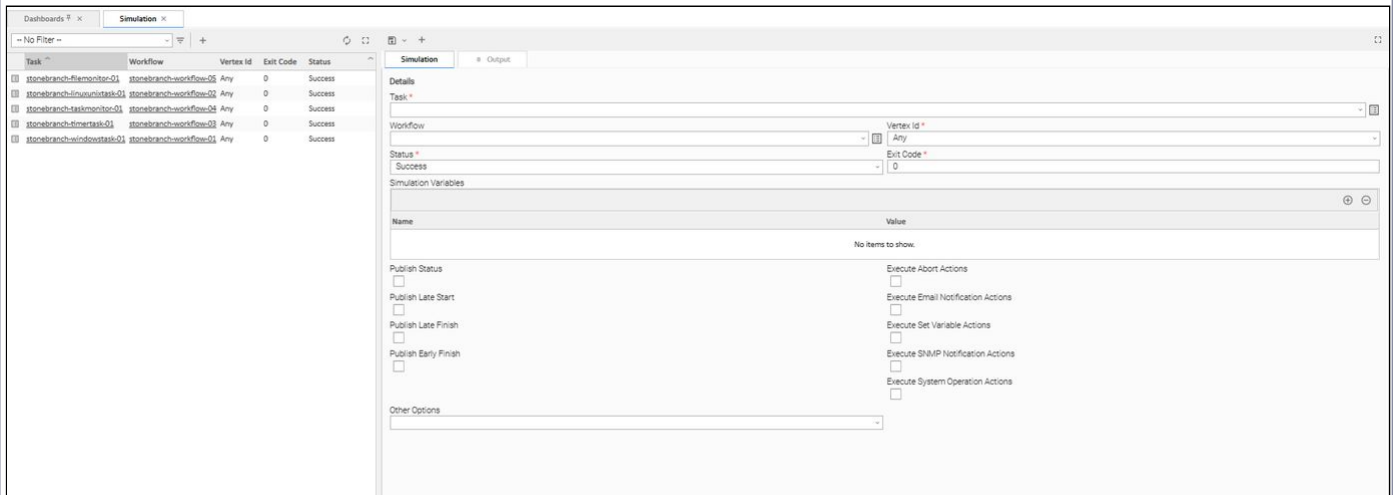
Outlined below is the basic procedure and processing flow for using Simulation Mode:

Step 1	<p>Designate a task for Simulation Mode by enabling the Simulate option on any Task Form.</p> <p>If enabled at the workflow-level, all tasks within the workflow will inherit the option and run in simulation mode.</p> <p>To customize simulation behavior of a task running in a specific workflow, you must select both the task and the specific workflow.</p> <p>If you only specify the task, the custom simulation behavior applies only to the task running standalone.</p> <p>By default, when an instance is running in simulate mode:</p> <ul style="list-style-type: none"> • The instance will complete with a status of Success. • The instance will complete with an exit code of 0 (or 200 for the Web Service task). • The instances Status, Late Start, Late Finish, and Early Finish events are not published to running task monitor instances. • The instances Actions are not executed. <p>A simulated instance will transition through the same Status changes as a non-simulated instance, and honor virtual resource limits, mutually exclusive constraints, execution limits, etc.</p> <p>Authorization constraints, such as permission to execute on a particular agent, or execute using particular credentials, are also validated in simulation mode.</p>
Step 2	To simulate a Task Instance without the Default Simulation Mode Behavior, see Customizing Simulation Behavior .
Step 3	<p>Launch the Task.</p> <div style="border: 2px solid orange; padding: 10px; margin-top: 10px;"> <p>In the Activity or Task Instance List, you can add the Simulate field to determine if an instance is running under simulation mode.</p> </div>

8.3 Customizing Simulation Behavior

Step 1 From the [Services](#) navigation pane, select **Other > Simulation**. The Simulation list displays:


To the right of the list, Simulation Details for a new Simulation record displays.




Step 2 Enter / select Details for a new Simulation, using the field descriptions below as a guide.

- Required fields display an asterisk (*) after the field name.
- Default values for fields, if available, display automatically.


To display more of the Details fields on the screen, you can either:

- Use the scroll bar.
- Temporarily hide the [list](#) above the Details.
- Click the  button above the list to display a pop-up version of the Details.

Step 3 Click a  button. The Simulation record is added to the database, and all buttons and tabs in the Simulation Details are enabled.

Note

To [open](#) an existing record on the list, either:

- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the  button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.
- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

8.3.1 Simulation Details

The following Simulation Details is for an existing Simulation. See the field descriptions, below, for a description of all fields that display in the Simulation Details.

8.3.2 Simulation Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in the Simulation Details.

Field Name	Description
Details	This section contains detailed information about the Simulation.
Task	Specifies the task you are configuring simulation options for. The simulation configuration only applies when the task is launched with the Simulate option enabled. When specified without a workflow, the simulation configuration only applies to the task when running outside of a workflow. When specified with a workflow, the simulation configuration only applies to the task when running within the specified workflow.
Workflow	Specifies that the simulation configuration only applies to the task when running within the specified workflow.
Vertex ID	Specifies if the simulation configuration applies to a specific vertex of the specified task within the specified workflow or any vertex of the specified task within the specified workflow. Only applicable when a workflow is specified.
Status	Status for the Simulated Instance once completed.
Exit Code	Specifies the Exit Code that the simulated task instance should complete with. By default, an instance will complete with an Exit Code of 0 (or 200 for the Web Service task).
Simulation Variables	Specifies variables that should be added for simulation purposes, including any built-in monitor variables starting with "ops_trigger_". The Simulation Variables are for adding variables that the simulated instance would have normally produced, therefore, are only available after the instance is already Queued or Running.
Publish Status	Specifies if Status events should be published to task monitor instances and subscriptions for the UAC - Task Status Changed (uac_task_status_changed) Universal Event.

Field Name	Description
Publish Late Start	Specifies if Late Start events should be published to task monitor instances and subscriptions for the UAC - Task SLA (uac_task_sla) Universal Event.
Publish Late Finish	Specifies if Late Finish events should be published to task monitor instances and subscriptions for the UAC - Task SLA (uac_task_sla) Universal Event.
Publish Early Finish	Specifies if Early Finish events should be published to task monitor instances and subscriptions for the UAC - Task SLA (uac_task_sla) Universal Event.
Execute Abort Actions	Specifies if Abort Actions should be executed for the simulated instance.
Execute Email Notification Actions	Specifies if Email Notification Actions should be executed for the simulated instance.
Execute Set Variable Actions	Specifies if Set Variable Actions should be executed for the simulated instance.
Execute SNMP Notification Actions	Specifies if SNMP Notification Actions should be executed for the simulated instance.
Execute System Operations Actions	Specifies if System Operation Actions should be executed for the simulated instance.
Other Options	Specify Other Options for the Simulation record. <ul style="list-style-type: none"> z/OS JCL Resolution
Metadata	This section contains Metadata information about this record.
UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Buttons	This section identifies the buttons displayed above and below the Simulation Details that let you perform various actions.
Save	Saves a new Simulation record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this task.
Tabs	This section identifies the tabs across the top of the Script Details that provide access to additional information about the script.

Field Name	Description
Output	If you need to simulate that an instance produces output, you can specify one or more Output records on the Simulation record from the Output tab. When running an instance in simulation mode, output specified on the Simulation record will be generated for the instance at completion time, specifically, when the simulated instances transitions to Success or Failed status.

8.4 Task Type Specific Simulation Mode Behavior

Workflow

- You can only specify a [Status](#) of Success and [Exit Code](#) of 0.
 - Regardless, the Status transitions for a workflow depend solely on the outcome of the instances within the workflow.
- Specifying the simulate option on a workflow indicates all tasks within the workflow run in simulation mode.
- The [Calculate Critical Path](#) option on the workflow will be ignored when the [Simulate](#) option is on.
- If the [Simulate](#) option on the workflow is off, but on for one or more tasks within the workflow, the [Calculate Critical Path](#) option will be honored.

Timer

- You can only specify a [Status](#) of Success and [Exit Code](#) of 0.
- In simulation mode, the instance still sleeps for the specified time.

Manual

- You can only specify a [Status](#) of Success and [Exit Code](#) of 0.
- In simulation mode, the instance transitions as if both **Set Started** and **Set Completed commands** were executed, that is, it will transition through [Action Required](#), [Started](#), and [Success](#).

Approval

- You can only specify a [Status](#) of Approved or Rejected and [Exit Code](#) of 0.

Recurring

- You can only specify a [Status](#) of Success and [Exit Code](#) of 0.
 - Regardless, the Status transitions for a recurring task instance depend solely on the outcome of executing the recurrences.
- In simulation mode, Recurring instances still process recurrences, however, any created/launched target task instances will run in simulation mode.
- If you use a [Target Task Monitor Condition](#), you must create a Simulation record and enable Status Publish for the Recurring task.

[Monitors](#) (Task Monitors, Agent File Monitors, Remote File Monitors, System Monitors, Variable Monitors, Email Monitors, Universal Monitors, and z/OS Monitors)

- The simulate option has no impact on (continuous) monitors associated with an enabled monitor trigger.
- The simulate option is applied to (non-continuous) monitors running standalone or within a workflow.
- Use the Simulation Variables to populate the ops_trigger_* [variables](#), if necessary.

Universal Monitors

- In simulation mode, the Universal Task Publisher instance is not created/launched.

Launch Task / Trigger Now [System Operations](#)

- In simulation mode, assuming you have enabled [Execute System Operation Actions](#) for the instance being simulated, any task instance created/launched by either the **Launch Task** [System Operation](#) or the **Trigger Now** [System Operation](#) , will run in simulation mode.

9 Variables and Functions

9.1 Variables

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9.4 Built-In Variables

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[SQL Task Instance Variables](#)

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[Task Instance Variables \(all task types\)](#)

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[Trigger Variables \(all trigger types\)](#)

[Variable Monitor Task Instance/Trigger Variables](#)

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[z/OS Task Instance Variables](#)

9.5 Variables and Functions Overview

- [Variables and Functions](#)
- [Types of Variables](#)
- [Setting Variables under Special Circumstances](#)

9.5.1 Variables and Functions

Variables and functions can be used in free-text fields within tasks and workflows. When a variable or function is specified in a free-text field, the Controller inserts its value into the field when the task or workflow is run.

Triggers can pass variables and functions into the tasks and workflows that they launch.

Additionally, email notifications for Controller resources (agents, OMS servers, and cluster nodes) can use [Built-In Variables](#) that are specific to that type of resource.

9.5.2 Types of Variables

Universal Controller supports the following types of variables, all of which can be used in free text fields within tasks:

User-Defined Variables	<p>These variables are created by the user for use within:</p> <ul style="list-style-type: none"> • A single trigger, task, or workflow (that is a trigger-, task-, or workflow-specific variable). • All trigger, tasks, and workflows (that is, a Global variable).
Built-In Variables	<p>These variables, maintained by the Controller, allow you to access information about task instances and other related data, such as task name, task status, and trigger name.</p>
Functions	<p>These variables calculate some value, such as current date and time, or perform some function, such as _replaceAll.</p>

9.5.3 Setting Variables under Special Circumstances

The Controller also supports several features that allow you to set variables under special circumstances:

- [Manually launch tasks and temporarily set user-defined variables.](#)
- Manually launch all of the tasks associated with a trigger while supplying variable values used by the task(s) (see [Triggering with Variables](#)).
- Use the Set Variable action to [set variables within a task or workflow](#).
- Use the [ops-variable-set](#) CLI function to set variables.

9.6 User-Defined Variables

- [Overview](#)
- [Variable Naming Conventions](#)
- [Resolving User-Defined Variables](#)

- [For Tasks Launched by a Trigger](#)
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- [For Tasks Launched Manually](#)
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- [Creating a Global Variable](#)
 - [Global Variable Details](#)
 - [Global Variable Details Field Descriptions](#)
- [Creating a Variable Specific to a Trigger, Task, or Workflow](#)
- [Automatically Incrementing a Variable](#)

9.6.1 Overview

User-defined Universal Controller variables are available for use in triggers, tasks, and Workflows.

You can define variables to be either:

- Available to a [single trigger, task, or workflow](#); that is, **Local**.
- Available to all triggers, tasks, and workflows; that is, **Global**.

You define **Local** variables (variables specific to a single trigger, task, or workflow) on the **Variables** tab in the Details of that [trigger](#), [task](#), or [workflow](#). These variables are stored in the **ops_local_variable** table.

You define **Global** variables either by:

- Selecting **Other > Variables** from the [Automation Center](#) navigation pane.
- Using the [Set Variable action](#) for a task or workflow.

Global variables are stored in the **ops_variable** table.

9.6.2 Variable Naming Conventions

- Variable names must begin with a letter.
- Allowable characters are alphanumeric (upper or lower case), and underscore (_).
- White spaces are not permitted
- Variable names are not case-sensitive.

Warning

Do not define Controller variables with the prefix **ops_**. That prefix is reserved for built-in variables.

9.6.3 Resolving User-Defined Variables

When the Controller creates a task instance from a task, it also resolves all variables specified in its free text fields. Because you can define variables at four different levels (trigger, task, workflow, and global), the Controller follows a prescribed formula to determine which variable takes precedence if duplicate variables have been defined. The general order of precedence, each of which may or may not exist in any given situation, is as follows:

1. Task trigger (highest precedence)
2. Task
3. Workflow trigger
4. Workflow
5. Global (lowest precedence)

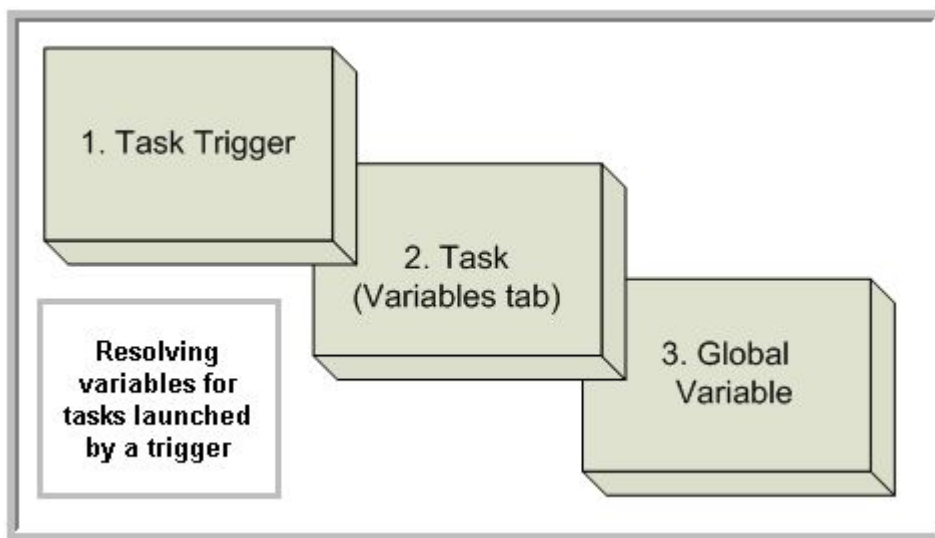
Note

You also can use the [Set Variable Action](#) of any task or workflow to define a variable. The Set Variable action explicitly states what [scope](#) you are setting the variable at, and under what circumstances.

The following scenarios provide more detailed information about how Controller variables are resolved.

9.6.3.1 For Tasks Launched by a Trigger

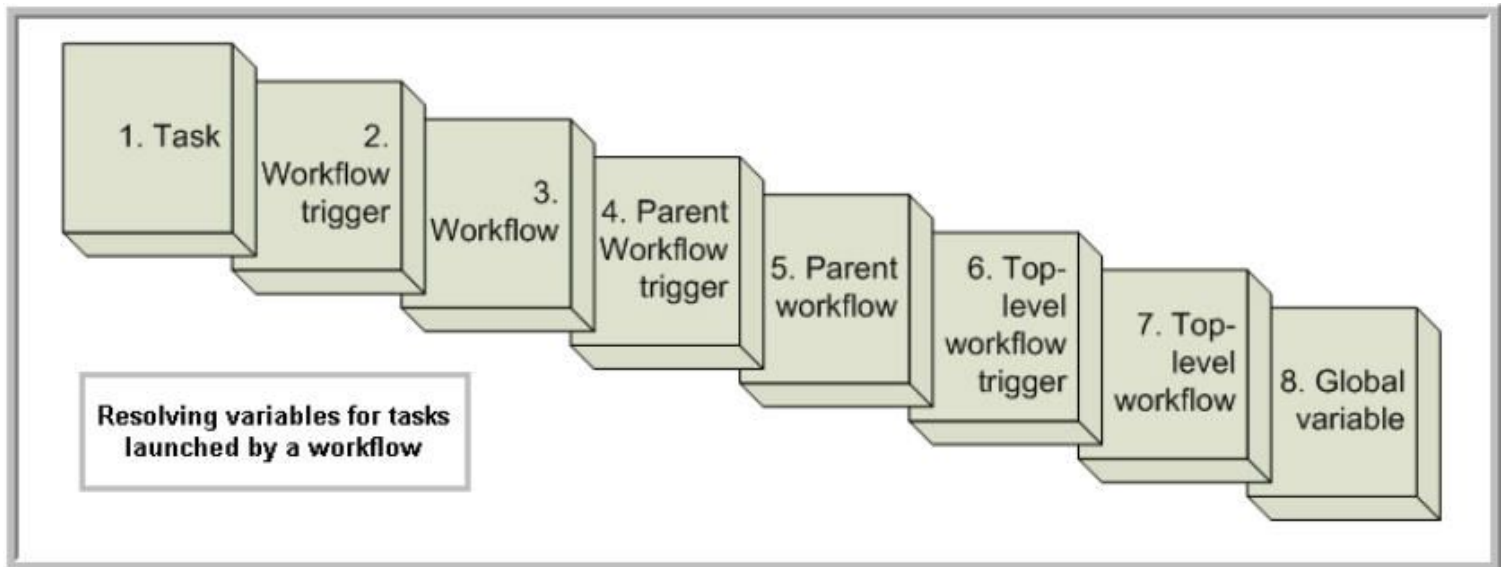
1. If the trigger defines the variable in the variables tab, that value is used to resolve the variable.
2. If the trigger does not define the variable, the value from the variable tab in the task Details is used.
3. If neither the trigger nor the task define the variable, the variable definition in the global variables table is used.
4. If the global variables table does not define the variable, the variable remains unresolved.



9.6.3.2 For Tasks Launched by a Workflow

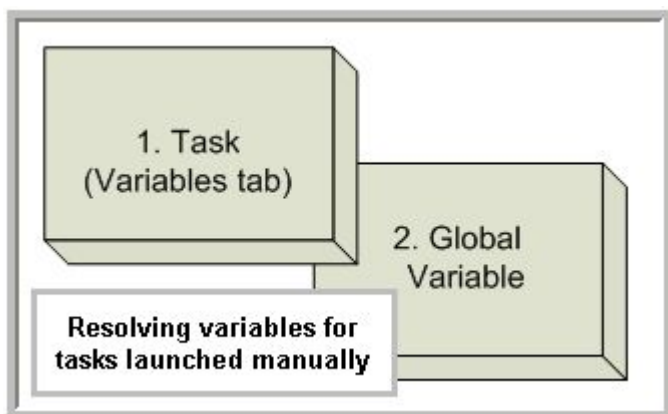
1. If the task defines the variable in the variables tab, that value is used to resolve the variable.
2. If the task does not define the variable, and the workflow was launched by a trigger, the value defined in the trigger is used.
3. If the workflow's trigger does not define the variable or the workflow was not launched by a trigger, the value defined in the workflow is used.

4. If the workflow does not define the variable, and there is a parent workflow, the value defined in the parent workflow's trigger is used.
5. If the parent workflow's trigger does not define the variable or if there is no trigger, the value defined in the parent workflow is used.
6. If the parent workflow does not define the variable, the Controller checks up a level for the trigger on the next parent workflow.
7. If that trigger does not define the variable, it checks for variables associated with the workflow. (This continues until the top level workflow is reached.)
8. If the top-level workflow does not define the variable, the variable definition in the global variables table is used.
9. If the global variables table does not define the variable, the variable remains unresolved.



9.6.3.3 For Tasks Launched Manually

1. If the task defines the variable in the variables tab, that value is used to resolve the variable.
2. If the task does not define the variable, the variable definition in the global variables table is used.
3. If the global variables table does not define the variable, the variable remains unresolved.



9.6.4 Format for Using Variables

When you enter a variable into a text field, precede the variable with the dollar sign (\$) and enclose the variable in curly braces ({ }). You can enter a series of variables or nested variables.

Examples:

```

${variable_name}
${v1}${v2}
${${inner_variable}}

```

9.6.5 Creating a Variable

You can create variables that are:

1. Available on a [Global](#) level; that is, available for all triggers, tasks, and Workflows.
2. Available only for a [specific trigger, task, or Workflow](#).

9.6.6 Creating a Global Variable

To create a Global variable that is available for all triggers, tasks, and Workflows:



Step 1 From the [Automation Center](#) navigation pane, select **Other > Variables**. The Variables list displays a list of all Global variables. (You also can define a Global variable by using the [Set Variable action](#) for a task or workflow.)

To the right of the list, Variable Details for a new Global variable displays.

Name	Value	Description	Updated By	Updated
stonebranch_variable_01	1		ops.admin	2016-02-04 16:41:31 -0500
stonebranch_variable_02	1		ops.admin	2014-06-13 14:52:47 -0400
stonebranch_variable_03	1		ops.admin	2014-06-13 14:52:50 -0400
stonebranch_variable_04	1		ops.admin	2014-06-13 14:52:53 -0400
stonebranch_variable_05	1		ops.admin	2014-06-13 14:52:57 -0400

The Variable Details panel on the right includes the following fields:

- Name**: A text input field.
- Description**: A text area.
- Member of Business Services**: A dropdown menu.
- Value**: A text area.

Step 2	<p>Enter / select Details for a new Variable, using the field descriptions below as a guide.</p> <ul style="list-style-type: none"> Required fields display an asterisk (*) after the field name. Default values for fields, if available, display automatically. <p>To display more of the Details fields on the screen, you can either:</p> <ul style="list-style-type: none"> Use the scroll bar. Temporarily hide the list above the Details. Click the  button above the list to display a pop-up version of the Details.
Step 3	<p>Click a  button to save the record in the Controller database.</p>

Note

To [open](#) an existing record on the list, either:




- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the **New** button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.
- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

9.6.6.1 Global Variable Details

The following Variable Details is for an existing Global Variable.

See the [field descriptions](#) below for a description of all fields that display in the Global Variable Details.

Variable Details: stonebranch_variable_01
- [] x

Variable
Versions

Details

Name * Version

3

Description

Member of Business Services

Value

1

For information on how to access additional details - such as [Metadata](#) and complete [database Details](#) - for Variables (or any type of record), see [Records](#).

9.6.6.2 Global Variable Details Field Descriptions

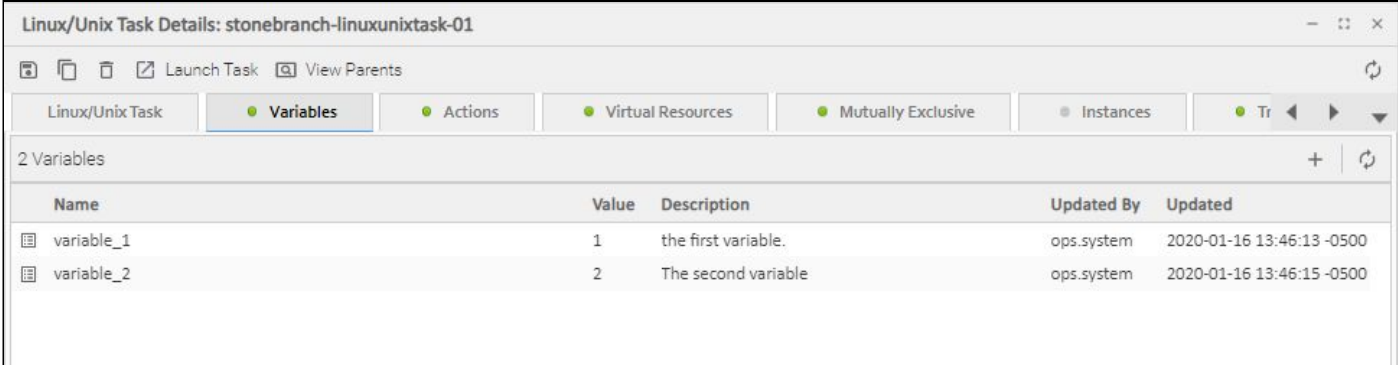
The following table describes the fields and buttons in the Variables Details.




Field Name	Description
Details	This section contains assorted detailed information about the variable.
Name	<p>Name of the variable. Up to 128 alphanumeric characters. The name must begin with an alphabetic character and can consist of: alphas (a-z, A-Z), numerics 0-9, _ (underscore). White spaces are not permitted; names are not case-sensitive.</p> <div style="border: 1px solid red; padding: 10px; margin-top: 10px;"> <p>Important</p> <p>Do not define variables with the prefix ops_. The ops_ prefix is reserved for built-in variables.</p> </div>
Version	System-supplied. The version number of the current record, which is incremented by the Controller every time a user updates a record. Click the Versions tab to view previous versions. For details, see Record Versioning .
Description	Optional. Description of this variable.
Member of Business Services	<p>User-defined; Allows you to select one or more Business Services that this record belongs to. (You also can Check All or Uncheck All Business Services for this record.)</p> <p>You can select up to 62 Business Services for any record type, and enter a maximum of 2048 characters for each Business Service.</p> <p>If the Business Service Visibility Restricted Universal Controller system property is set to true, depending on your assigned (or inherited) Permissions or Roles, Business Services available for selection may be restricted.</p>
Value	Value of the variable up to a maximum of 25000 characters.
Self-Service Options	This section contains assorted information about the variable for tasks, workflows, and triggers only - not for Global Variables .
Required	<p>Specifies that the Trigger Now... and Launch With Variables... command dialogs require the user to specify a non-blank value for the variable.</p> <p>If true, the variable cannot be removed in the Launch with Variables... or Trigger Now... command dialogs, and the variable name will be read-only.</p> <p>Required cannot be enabled if Allow Empty Option is enabled.</p>
Value Options	<p>Specifies value options that will be presented when editing variables from the Trigger Now... and Launch With Variables... command dialogs.</p> <p>Only non-empty values are allowed; duplicate values are not allowed. (Maximum = 25000 characters.)</p>
Allow Empty Option	<p>Specifies if an empty option should be added to the drop-down when editing values from the Trigger Now... and Launch With Variables... command dialogs.</p> <p>Allow Empty Option cannot be enabled if Required is enabled.</p>
Allow Unlisted Option	Specifies if the drop-down input box should allow users to enter a value that is not present in the set of value options when editing values from the Trigger Now... and Launch With Variables... command dialogs.
Metadata	This section contains Metadata information about this record.

UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Created	Date and time that this record was created.
Buttons	This section identifies the buttons displayed above and below the Global Variable Details that let you perform various actions.
Save	Saves a new variable record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.
Update button	Saves updates to the record.
Delete button	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this task.

9.6.7 Creating a Variable Specific to a Trigger, Task, or Workflow

To create a variable that is specific to a single trigger, task, or Workflow:

Step 1	From the Automation Center navigation pane, select Trigger > <trigger type> or Tasks > <task type> . The records list for that trigger or task type displays.															
Step 2	<p>Open a task on the list and click the Variables tab to display a list of any currently defined variables specific to that record.</p>  <p>The screenshot shows the 'Linux/Unix Task Details' page for 'stonebranch-linuxunixtask-01'. The 'Variables' tab is active, displaying a table with the following data:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Description</th> <th>Updated By</th> <th>Updated</th> </tr> </thead> <tbody> <tr> <td>variable_1</td> <td>1</td> <td>the first variable.</td> <td>ops.system</td> <td>2020-01-16 13:46:13 -0500</td> </tr> <tr> <td>variable_2</td> <td>2</td> <td>The second variable</td> <td>ops.system</td> <td>2020-01-16 13:46:15 -0500</td> </tr> </tbody> </table>	Name	Value	Description	Updated By	Updated	variable_1	1	the first variable.	ops.system	2020-01-16 13:46:13 -0500	variable_2	2	The second variable	ops.system	2020-01-16 13:46:15 -0500
Name	Value	Description	Updated By	Updated												
variable_1	1	the first variable.	ops.system	2020-01-16 13:46:13 -0500												
variable_2	2	The second variable	ops.system	2020-01-16 13:46:15 -0500												

Step 3	<p>Click the  button to display Variables Details for a new variable.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Variable Details - □ ×</p> <p> ▾</p> <p>Variable</p> <p>Details</p> <p>Name * <input type="text"/></p> <p>Value <input type="text"/></p> <p>Description <input type="text"/></p> <p>Self-Service Options</p> <p>Required <input type="checkbox"/></p> <p>Value Options</p> <div style="border: 1px solid gray; padding: 2px;"> <p style="text-align: right;">+ -</p> <p>Option</p> <p style="text-align: center;">No items to show.</p> </div> <p>Allow Empty Option <input type="checkbox"/> Allow Unlisted Option <input type="checkbox"/></p> </div>
Step 4	Using the field descriptions provided for Global Variable Details as a guide, complete the fields as needed.
Step 5	Click the  button, or right-click in the Details and click Save , to save the record.
Step 6	If appropriate, repeat these steps for any additional variables you want to add.

9.6.8 Automatically Incrementing a Variable

For example: To increment `${counter}`, use a [Set Variable action](#) to set `${counter}` with a value of `${_trim($_add("${counter}", "1"))}`.

9.7 Built-In Variables

- [Overview](#)
- [Built-In Variable Categories](#)
- [Agent Variables](#)

- Agent Hostname
- Agent IP Address
- Agent IP Address
- Agent Mode
- Agent Name
- Agent Queue Name
- Agent-Based Task Instance Variables
 - Agent Hostname
 - Agent IP Address
 - Agent IP Address
 - Agent Name
 - Agent sys_id
 - Credential ID
 - Credential Name
 - Agent Queue Name
- Agent Cluster Variables
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 - Agent Cluster Task Execution Limit
 - Agent Cluster Suspended
 - Agent Cluster Task Execution Limit Amount
 - Agent Cluster Task Execution Current Limit
 - Agent Cluster Network Alias
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- Agent File Monitor Task Instance / Trigger Variables
 - Base File Name
 - File Directory
 - File Directory {with Final Directory Separator}
 - File Directory {without Final Directory Separator}
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 - Separator
 - Trigger File Date
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 - Trigger File Owner
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 - Trigger Application Name

- Trigger Application Status
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- Cluster Node Variables
 - Cluster Node Hostname
 - Cluster Node ID
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 - Cluster Node Mode
 - Cluster Node Name
 - Cluster Node Running Time
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- Common Variables
 - System Identifier
- Composite Trigger Variables
 - Trigger Component Event Time
- Email Monitor Task Instance/Trigger Variables
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 - Credential Name
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 - Cc Field
 - From Field
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 - Received Date Field
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 - Primary Password
 - Primary User ID
 - Secondary Password
 - Secondary User ID
 - Utility User ID
 - Utility Password
 - Utility Hostname
- For Transfer Protocol = UDM
 - Primary File Name

- Secondary File Name
- Primary Agent Hostname
- Secondary Agent Hostname
- Primary Agent TLS SNI Host Name
- Primary Agent TLS SNI Host Port
- Secondary Agent TLS SNI Host Name
- Secondary Agent TLS SNI Host Port
- For Transfer Protocol = FTP/SFTP/FTPS
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 - Remote File Name
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 - Last OMS Server Connected
 - Last OMS Server Connected Time
 - OMS Server IP Address
 - OMS Server Status
 - OMS Server sys_id
 - OMS Server Messaging Sessions Status
- PeopleSoft Task and Task Instance Variables
 - Distribution Status
 - Main Job Name
 - Main Schedule Name
 - Process Instance
 - Process Name
 - Process Type
 - Run Status
- Recurring Task Instance Variables
 - Next Recurrence Time
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 - Source Instance ID
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- Remote File Monitor Task Instance Variables
 - Base Trigger File Name
 - Files Matching Wildcard
 - Remote Trigger File Name
 - Remote Trigger File Name {No Path}
 - Trigger File Directory
 - Trigger File Directory {with Final Directory Separator}
 - Trigger File Directory {without Final Directory Separator}

- Trigger File Extension
- Trigger Wildcard
- Trigger Wildcard Path Only
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- SAP Task Instance Variables
 - SAP Credential ID
 - SAP Credential Name
 - SAP InfoPackage Request ID
 - SAP Job ID
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 - SAP Process Chain ID
 - SAP Process Chain Log ID
- SQL and Stored Procedure Task Instance Variables
 - Credential ID
 - Credential Name
 - Error Message
 - Processed Rows
 - Return Code for SQL Statement Outcome
- SQL Task Instance Variables
 - SQL Command Field
- Stored Procedure Task Instance Variables
 - Stored Procedure Name
- System Monitor Task Instance Variables
 - Actual Size
 - Actual Size {Rounded}
 - Actual Size {Scale}
 - Scale
 - Size
 - Size {Rounded}
- Task Instance Variables
 - Cluster Node Hostname
 - Cluster Node ID
 - Cluster Node IP Address
 - Cluster Node Mode
 - Cluster Node Name
 - Cluster Node Running Time
 - Cluster Node Start Time
 - Command
 - Command Parameters
 - Custom Field 1
 - Custom Field 2

- Description
- Duration
- Duration In Seconds
- Duration: Average
- Duration In Seconds: Average
- End Time
- End Time: Average Estimated
- End Time: Highest Estimated
- End Time: Lowest Estimated
- End Time: User Estimated
- Execution User ID
- Instance Number
- Launch Time
- Maximum Retry Count
- Parent Workflow Instance sys_id
- Parent Workflow Name
- Projected End Time of Workflow
- Queued Time
- Reference Id
- Retry Count
- Retry Interval
- Script ID
- Script Name
- Script Parameters
- Starting Time
- Task Instance Attempts
- Task Instance Definition ID
- Task Instance Exit Code
- Task Instance Name
- Task Instance Status
- Task Instance Status Description
- Task Instance sys_id
- Task Name at Instance Creation Time
- Task Type
- Task Vertex ID
- Time Zone {Task time zone}
- Time Zone {Trigger time zone}
- Top-Level Workflow Name
- Top-Level Workflow Task Instance ID
- Virtual Resource Priority

- Task Monitor Task Instance/Trigger Variables
 - Trigger Task Name
 - Trigger Task Status
 - Trigger Task sys_id
 - Trigger Task Type
 - Trigger Workflow Id
 - Trigger Workflow Name
- Trigger Variables
 - Custom Field 1
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 - Trigger Name
 - Trigger Time
 - Trigger Time {Trigger time zone}
- Universal Monitor Task Instance/Trigger and Universal Event Variables
 - Universal Event Attributes
 - Universal Event Business Services
 - Universal Event Name
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 - URL Host
 - URL Port
 - URL Path
 - Unencoded URL Path
 - URL Query
 - Unencoded URL Query
- Webhook Variables
 - Universal Event Payload
 - Webhook Name
- z/OS Task Instance Variables
 - JCL Location

- Job Number
- Override JCL Location
- Submitted JCL Location
- z/OS Monitor Task Instance/Trigger Variables
 - Trigger z/OS Job Event
 - Trigger z/OS Job Event Value
 - Trigger z/OS Job Id
 - Trigger z/OS Job Name
 - Trigger z/OS Step Name
 - Trigger z/OS User Id
 - Trigger z/OS Condition Code

9.7.1 Overview

Built-in variables are maintained by Universal Controller and provide information about task instances, agents, Universal Message Service {OMS}, and cluster nodes. They can be used in free text fields in triggers, tasks, task actions, and email notifications for agents, OMS servers, and cluster nodes.

Supported built-in variables and their descriptions are provided below. All built-in variables are prefixed with `ops_`.

9.7.2 Built-In Variable Categories

Built-in variables are listed alphabetically within the following categories on this page:

- Agent Variables
- Agent-Based Task Instance Variables
- Agent Cluster Variables
- Agent File Monitor Task Instance/Trigger Variables
- Application Monitor Trigger Variables
- Cluster Node Variables
- Common Variables
- Composite Trigger Variables
- Email Monitor Task Instance/Trigger Variables
- File Transfer Task Instance Variables
- OMS Server Variables
- PeopleSoft Task Instance Variables
- Recurring Task Instance Variables
- Remote File Monitor Task Instance Variables
- SAP Task Instance Variables
- SQL and Stored Procedure Task Instance Variables
- SQL Task Instance Variables
- Stored Procedure Task Instance Variables
- System Monitor Task Instance Variables
- Task Instance Variables
- Task Monitor Task Instance/Trigger Variables
- Trigger Variables
- Universal Monitor Task Instance/Trigger and Universal Event Variables

- Variable Monitor Task Instance/Trigger Variables
- Web Service Task Instance Variables
- Webhook Variables
- z/OS Task Instance Variables
- z/OS Monitor Task Instance/Trigger Variables

9.7.3 Agent Variables

The following agent variables can be used to pass information into an [Agent notification](#).

9.7.3.1 Agent Hostname

Description	Resolves to the agent hostname.
Syntax	<code>\${ops_agent_hostname}</code>

9.7.3.2 Agent IP Address

Description	Resolves to the agent IP address (see <code>\${ops_agent_ip}</code> , below).
Syntax	<code>\${ops_agent_ipaddr}</code>

9.7.3.3 Agent IP Address

Description	Resolves to the agent IP address.
Syntax	<code>\${ops_agent_ip}</code>

9.7.3.4 Agent Mode

Description	Resolves to the agent operational mode {Active, Offline}.
Syntax	<code>\${ops_agent_mode}</code>

9.7.3.5 Agent Name

Description	Resolves to the agent name.
Syntax	<code>\${ops_agent_name}</code>

9.7.3.6 Agent Queue Name

Description	Resolves to the agent queue name. <div style="border: 1px solid orange; padding: 5px;">Note In the user interface, the queue name is labelled Agent Id.</div>
Syntax	\${ops_agent_id}

Note

Although they have the same syntax, `${ops_agent_id}`, this [Agent Queue Name](#) Agent variable resolves to a different value than the [Agent sys_id](#) Agent-based task instance variable.

9.7.4 Agent-Based Task Instance Variables

The following variables can be used to pass agent information into agent-based task notifications; see [Creating Email Notifications](#) and [Creating SNMP Notifications](#).

Agent-based task types:

- Linux/Unix
- Windows
- z/OS
- Universal Command
- SAP
- PeopleSoft
- File Transfer
- Agent File Monitor
- Remote File Monitor
- System Monitor
- Universal

9.7.4.1 Agent Hostname

Description	Resolves to the agent hostname.
Syntax	\${ops_agent_hostname}

9.7.4.2 Agent IP Address

Description	Resolves to the agent IP address (see <code>\${ops_agent_ip}</code> , below).
Syntax	<code>\${ops_agent_ipaddr}</code>

9.7.4.3 Agent IP Address

Description	Resolves to the agent IP address.
Syntax	<code>\${ops_agent_ip}</code>

9.7.4.4 Agent Name

Description	Resolves to the agent name.
Syntax	<code>\${ops_agent_name}</code>

9.7.4.5 Agent sys_id

Description	Resolves to the sys_id of the agent.
Syntax	<code>\${ops_agent_id}</code>

Note

Although they have the same syntax, `${ops_agent_id}`, this [Agent sys_id](#) Agent-based task instance variable resolves to a different value than the [Agent Queue Name](#) Agent variable.

9.7.4.6 Credential ID

Description	Resolves to the sys_id of the credential defined in the Agent Details section of the task definition (Utility Credential or Credential). If a credential is defined on the agent and not in the Agent Details section of the task definition, it will be the agent's Credential ID.
Syntax	<code>\${ops_credential_id}</code>

9.7.4.7 Credential Name

Description	Resolves to the Name of the credential defined in the Agent Details section of the task definition (Utility Credential or Credential). If a credential is defined on the agent and not in the Agent Details section of the task definition, it will be the agent's credential Name.
Syntax	<code>\${ops_credential_name}</code>

9.7.4.8 Agent Queue Name

Description	Resolves to the agent queue name. <div style="border: 1px solid orange; padding: 5px; margin: 10px 0;"> <p>Note In the user interface, the queue name is labelled Agent Id.</p> </div>
Syntax	<code>\${ops_agent_queue_name}</code>

9.7.5 Agent Cluster Variables

The following agent cluster variables can be used to pass information into an [Agent Cluster notification](#).

9.7.5.1 Agent Cluster Name

Description	Resolves to the agent cluster name.
Syntax	<code>\${ops_agent_cluster_name}</code>

9.7.5.2 Agent Cluster Distribution

Description	Resolves to the Distribution type for the agent cluster.
Syntax	<code>\${ops_agent_cluster_distribution}</code>
Example	<code>\${ops_agent_cluster_distribution} → Any</code>

9.7.5.3 Agent Cluster Task Execution Limit

Description	Resolves to the type of Task Execution Limit for the agent cluster.
Syntax	<code>\${ops_agent_cluster_limit_type}</code>
Example	<code>\${ops_agent_cluster_limit_type}</code> → Unlimited

9.7.5.4 Agent Cluster Suspended

Description	Resolves to the current suspension status of the agent cluster.
Syntax	<code>\${ops_agent_cluster_suspended}</code>
Example	<code>\${ops_agent_cluster_suspended}</code> → true

9.7.5.5 Agent Cluster Task Execution Limit Amount

Description	Resolves to the maximum number of tasks that can be running at the same time by Agents in this agent cluster.
Syntax	<code>\${ops_agent_cluster_limit_max}</code>
Example	<code>\${ops_agent_cluster_limit_max}</code> → 5

9.7.5.6 Agent Cluster Task Execution Current Limit

Description	Resolves to the current number of tasks currently being run by the Agents in this agent cluster.
Syntax	<code>\${ops_agent_cluster_limit_current}</code>
Example	<code>\${ops_agent_cluster_limit_current}</code> → 3

9.7.5.7 Agent Cluster Network Alias

Description	Resolves to the Network Alias of this agent cluster.
Syntax	<code>\${ops_agent_cluster_network_alias}</code>

9.7.5.8 Agent Cluster Network Alias Port

Description	Resolves to the Agent Port of this agent cluster.
Syntax	<code>\${ops_agent_cluster_network_alias_port}</code>

9.7.5.9 Agent Cluster Notification State

Description	Resolves to the Notification State for which the notification matched.
Syntax	<code>\${ops_agent_cluster_notification_state}</code>
Example	<code>\${ops_agent_cluster_notification_state}</code> → Suspended

9.7.6 Agent File Monitor Task Instance / Trigger Variables

When one or more tasks are launched by a [Agent File Monitor trigger](#) after the conditions in its associated Agent File Monitor task are met, the built-in variables described below are passed into the tasks being launched by the trigger.

For example, the Agent File Monitor trigger may specify the launch of a Windows task each time the associated Agent File Monitor task detects the creation of a specific file. The Windows task might use one of these built-in variables as a command argument. Or, if the Agent File Monitor task is not associated with a trigger but is running within a workflow, on completion you can propagate one or more of these built-in variable values to the parent workflow level using the [Set Variable](#) action. This allows you to pass information from the Agent File Monitor task to a successor task within the same workflow hierarchy.

9.7.6.1 Base File Name

Description	Resolves to the base file name.
Syntax	<code>\${ops_trigger_file_name_simple}</code>
Example	<code>\${ops_trigger_file_name_simple}</code> → file

9.7.6.2 File Directory

Description	Resolves to the directory where the new file was created, but not the file itself. If the existence or non-existence of the final directory separator is a requirement, we recommend the use of <code>\${ops_trigger_file_fullpath}</code> and <code>\${ops_trigger_file_fullpath_no_separator}</code> , respectively.
Syntax	<code>\${ops_trigger_file_path}</code>

Example	<code>\${ops_trigger_file_path} → C:\stonebranch</code>
----------------	---

9.7.6.3 File Directory {with Final Directory Separator}

Description	Resolves to the directory where the new file was created, but not the file itself; includes the final directory separator.
Syntax	<code>\${ops_trigger_file_fullpath}</code>
Example	<code>\${ops_trigger_file_fullpath} → C:\stonebranch\</code>

9.7.6.4 File Directory {without Final Directory Separator}

Description	Resolves to the directory where the new file was created, but not the file itself; does not include the final directory separator.
Syntax	<code>\${ops_trigger_file_fullpath_no_separator}</code>
Example	<code>\${ops_trigger_file_fullpath_no_separator} → C:\stonebranch</code>

9.7.6.5 File Extension

Description	Resolves to the file extension of a file.
Syntax	<code>\${ops_trigger_file_name_extension}</code>
Example	<code>\${ops_trigger_file_name_extension} → dat</code>

9.7.6.6 Separator

Description	Resolves to the separator appropriate to the platform where the agent is running. For Windows, resolves to a backslash (<code>\</code>); for Linux/Unix, resolves to forward slash (<code>/</code>). This variable may be useful if you want to piece together a pathname using a combination of text and variables.
Syntax	<code>\${ops_trigger_file_separator}</code>
Example	<code>\${ops_trigger_file_separator} → \</code>

9.7.6.7 Trigger File Date

Description	Resolves to the file date of the file that fired the trigger.
Syntax	<code>\${ops_trigger_file_date}</code>
Example	<code>\${ops_trigger_file_date}</code> → 20241018104639

9.7.6.8 Trigger File Group

Description	Resolves to the file group of the file that fired the trigger.
Syntax	<code>\${ops_trigger_file_group}</code>

9.7.6.9 Trigger File Name

Description	Resolves to the name of the file that fired the trigger.
Syntax	<code>\${ops_trigger_file_name}</code>
Example	<code>\${ops_trigger_file_name}</code> → C:\stonebranch\file.dat

9.7.6.10 Trigger File Name {No Path}

Description	Resolves to the name of the file that fired the trigger, but without any path information.
Syntax	<code>\${ops_trigger_file_name_nopath}</code>
Example	<code>\${ops_trigger_file_name_nopath}</code> → file.dat

9.7.6.11 Trigger File Owner

Description	Resolves to the file owner of the file that fired the trigger.
Syntax	<code>\${ops_trigger_file_owner}</code>
Example	<code>\${ops_trigger_file_owner}</code> → Administrator

9.7.6.12 Trigger File Scan Result

Description	Resolves to the result of the file scan : FOUND or NOT_FOUND.
Syntax	<code>\${ops_trigger_file_scan}</code>

9.7.6.13 Trigger File Size

Description	Resolves to the file size of the file that fired the trigger.
Syntax	<code>\${ops_trigger_file_size}</code>
Example	<code>\${ops_trigger_file_size}</code> → 141085

9.7.7 Application Monitor Trigger Variables

When a task is launched by an [Application Monitor trigger](#), the following built-in variables are passed into the task being launched by the trigger:

9.7.7.1 Trigger Application Name

Description	Resolves to the name of the Application being monitored by the trigger.
Syntax	<code>\${ops_trigger_appl_name}</code>

9.7.7.2 Trigger Application Status

Description	Resolves to the status of the Application being monitored by the trigger.
Syntax	<code>\${ops_trigger_appl_status}</code>
Example	<code>\${ops_trigger_appl_status}</code> → Starting

9.7.7.3 Trigger Application sys_id

Description	Resolves to the sys_id of the application.
Syntax	<code>\${ops_trigger_appl_id}</code>

9.7.7.4 Trigger Application Type

Description	Resolves to the type of Application being monitored by the trigger, as defined by the Application Type field.
Syntax	<code>\${ops_trigger_appl_type}</code>
Example	<code>\${ops_trigger_appl_type}</code> → Windows Service

9.7.8 Cluster Node Variables

The following cluster node variables allow you to pass information into a [cluster node {Controller server} notification](#):

9.7.8.1 Cluster Node Hostname

Description	Resolves to the hostname of this cluster node.
Syntax	<code>\${ops_cluster_hostname}</code>
Example	<code>\${ops_cluster_hostname}</code> → MACHINEC19A

9.7.8.2 Cluster Node ID

Description	Resolves to the cluster node's internally-generated build ID.
Syntax	<code>\${ops_cluster_id}</code>
Example	<code>\${ops_cluster_id}</code> → MACHINEC19A:8080-uc

9.7.8.3 Cluster Node IP Address

Description	Resolves to the IP address of this cluster node.
Syntax	<code>\${ops_cluster_ipaddr}</code>
Example	<code>\${ops_cluster_ipaddr}</code> → 10.N.N.NN

9.7.8.4 Cluster Node Mode

Description	Resolves to the current mode of this cluster node: Offline, Active, Passive. For more information, see Viewing Node Status .
Syntax	<code>\${ops_cluster_mode}</code>
Example	<code>\${ops_cluster_mode}</code> → Active

9.7.8.5 Cluster Node Name

Description	<code>\${ops_cluster_name}</code> is an alias for the <code>\${ops_cluster_id}</code> variable.
Syntax	<code>\${ops_cluster_name}</code>
Example	<code>\${ops_cluster_name}</code> → MACHINEC19A:8080-uc

9.7.8.6 Cluster Node Running Time

Description	Resolves to the numbers of days, hours, and minutes that this cluster node has been running since it was last started.
Syntax	<code>\${ops_cluster_uptime}</code>
Example	<code>\${ops_cluster_uptime}</code> → 1 Hour 10 Minutes 57 Seconds

9.7.8.7 Cluster Node Start Time

Description	Resolves to the date and time the cluster node {server} was started.
Syntax	<code>\${ops_cluster_start_time}</code>
Example	<code>\${ops_cluster_start_time}</code> → 2024-10-14 08:54:09 -0400

9.7.9 Common Variables

The following variable is available for Task Instances, Agents, OMS Servers, and Cluster Nodes.

9.7.9.1 System Identifier

Description	Resolves to the value of the System Identifier Universal Controller system property.
Syntax	<code>\${ops_system_identifier}</code>
Example	<code>\${ops_system_identifier}</code> → QA UC6

9.7.10 Composite Trigger Variables

The following built-in variable is associated with the [Composite Trigger](#) type. This variable is only available for Composite Trigger components that have a Built-in Variable Prefix specified.

9.7.10.1 Trigger Component Event Time

Description	Resolves to the time when a Composite Trigger component fired.
Syntax	<code>\${<prefix>_trigger_component_event_time}</code>
Examples	<code>\${filetrigger_component_event_time}</code> → 2024-10-21 14:38:29 -0400 <code>\${timetrigger_component_event_time}</code> → 2024-10-21 14:38:29 -0400

9.7.11 Email Monitor Task Instance/Trigger Variables

When one or more tasks are launched by an [Email Monitor trigger](#) after the conditions in its associated Email Monitor task are met, the built-in variables described below are passed into the tasks being launched by the trigger.

For example, the Email Monitor trigger may specify the launch of an Email task each time the associated Email Monitor task detects the status in a Mailbox folder. The Windows task might use one of these built-in variables as a command argument. Or, if the Agent File Monitor task is not associated with a trigger but is running within a workflow, on completion you can propagate one or more of these built-in variable values to the parent workflow level using the [Set Variable](#) action. This allows you to pass information from the Email Monitor task to a successor task within the same workflow hierarchy.

9.7.11.1 Credential ID

Description	Resolves to the <code>sys_id</code> of the Task's credential.
Syntax	<code>\${ops_credential_id}</code>

9.7.11.2 Credential Name

Description	Resolves to the Name of the Task's credential.
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Syntax	<code>\${ops_credential_name}</code>
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9.7.11.3 Body Field

Description	Resolves to the Body field of the Email.
Syntax	<code>\${ops_trigger_email_body}</code>

9.7.11.4 Cc Field

Description	Resolves to the Cc field of the Email.
Syntax	<code>\${ops_trigger_email_cc}</code>

9.7.11.5 From Field

Description	Resolves to the From field of the Email.
Syntax	<code>\${ops_trigger_email_from}</code>

9.7.11.6 HTML Body Field

Description	Resolves to the HTML Body field of the Email.
Syntax	<code>\${ops_trigger_email_body_html}</code>

9.7.11.7 Received Date Field

Description	Resolves to the Received Date field of the Email.
Syntax	<code>\${ops_trigger_email_received_date}</code>
Example	<code>\${ops_trigger_email_received_date}</code> → 2024-10-16 13:01:33 -0700

9.7.11.8 Reply To Field

Description	Resolves to the Reply-To field of the Email.
Syntax	<code>\${ops_trigger_email_reply_to}</code>

9.7.11.9 Sent Date Field

Description	Resolves to the Sent Date field of the Email.
Syntax	<code>\${ops_trigger_email_sent_date}</code>
Example	<code>\${ops_trigger_email_sent_date}</code> → 2024-10-16 13:01:27 -0700

9.7.11.10 Subject Field

Description	Resolves to the Subject field of the Email.
Syntax	<code>\${ops_trigger_email_subject}</code>

9.7.11.11 To Field

Description	Resolves to the To field of the Email.
Syntax	<code>\${ops_trigger_email_to}</code>

9.7.12 File Transfer Task Instance Variables

9.7.13 For UDM Scripts

These File Transfer variables are available for use in [UDM scripts](#).

The Source and Destination variables are the legacy variables. The Primary and Secondary variables are new for Universal Controller 7.0.0.0.

A UDM Script using the legacy variables will continue to work, but they are deprecated, and the new naming should be used.

Note

These variables differ from all other built-in variables in that they are resolved by Universal Data Mover {UDM} on a UDM agent, not by the Universal Controller. File Transfer variables are sent to an agent unresolved and UDM performs all resolution for them. The resolved value is never available to the Controller.

Unlike the syntax of built-in variables resolved by Universal Controller - `}${<variable-name>}` - the syntax of File Transfer variables is the same as all [UDM variables](#) - `$(<variable-name>)` .

The following example illustrates the correct way to code them:

Source and Destination Variables

Primary and Secondary Variables

9.7.13.1 Source Password

Description	Resolves to the source password.
Syntax	<code>\$(ops_src_cred_pwd)</code>

9.7.13.2 Source User ID

Description	Resolves to the source user ID.
Syntax	<code>\$(ops_src_cred_user)</code>

9.7.13.3 Destination Password

Description	Resolves to the destination password.
Syntax	<code>\$(ops_dst_cred_pwd)</code>

9.7.13.4 Destination User ID

Description	Resolves to the destination user ID.
Syntax	<code>\$(ops_dst_cred_user)</code>

9.7.13.5 Primary Password

Description	Resolves to the Primary password.
Syntax	<code>\$(ops_primary_cred_pwd)</code>

9.7.13.6 Primary User ID

Description	Resolves to the Primary user ID.
Syntax	<code>\$(ops_primary_cred_user)</code>

9.7.13.7 Secondary Password

Description	Resolves to the Secondary password.
Syntax	<code>\$(ops_secondary_cred_pwd)</code>

9.7.13.8 Secondary User ID

Description	Resolves to the Secondary user ID.
Syntax	<code>\$(ops_secondary_cred_user)</code>

9.7.13.9 Utility User ID

Description	Resolves to the Utility user ID.
Syntax	<code>\$(ops_utility_cred_user)</code>

9.7.13.10 Utility Password

Description	Resolves to the Utility password.
Syntax	<code>\$(ops_utility_cred_pwd)</code>

9.7.13.11 Utility Hostname

Description	Resolves to the Utility hostname.
Syntax	<code>\${ops_utility_agent_hostname}</code>

9.7.14 For Transfer Protocol = UDM

9.7.14.1 Primary File Name

Description	Resolves to the Primary File(s) field values. If the Primary File(s) field is empty, it resolves to empty string/blank.
Syntax	<code>\${ops_primary_filename}</code> <code>\${ops_primary_filename}</code> is an alias for <code>\${ops_local_filename}</code> .
Example	<code>\${ops_primary_filename}</code> → file.dat

9.7.14.2 Secondary File Name

Description	Resolves to the Secondary File(s) field values. If the Secondary File(s) field is empty, it resolves to empty string/blank.
Syntax	<code>\${ops_secondary_filename}</code> <code>\${ops_secondary_filename}</code> is an alias for <code>\${ops_remote_filename}</code> .
Example	<code>\${ops_secondary_filename}</code> → file.dat

9.7.14.3 Primary Agent Hostname

Description	If UDM Agent Option = UDM Agent Hostname; Resolves to the specified hostname. If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the IP address of the referenced Agent definition. If UDM Agent Option = --None--; Resolves to empty string/blank. If UDM Agent Option = Utility Agent; Resolves to *.
Syntax	<code>\${ops_primary_agent_hostname}</code>

9.7.14.4 Secondary Agent Hostname

Description	If UDM Agent Option = UDM Agent Hostname; Resolves to the specified hostname. If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the IP address of the referenced Agent definition. If UDM Agent Option = --None--; Resolves to empty string/blank.
Syntax	<code>#{ops_secondary_agent_hostname}</code>

9.7.14.5 Primary Agent TLS SNI Host Name

Description	If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the UDM Agent TLS SNI Host Name. If UDM Agent Option = UDM Agent Hostname or Utility Agent; Resolves to empty string/blank.
Syntax	<code>#{ops_primary_agent_sni_name}</code>

9.7.14.6 Primary Agent TLS SNI Host Port

Description	If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the UDM Agent TLS SNI Host Port. If UDM Agent Option = UDM Agent Hostname or Utility Agent; Resolves to empty string/blank.
Syntax	<code>#{ops_primary_agent_port}</code>

9.7.14.7 Secondary Agent TLS SNI Host Name

Description	If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the UDM Agent TLS SNI Host Name. If UDM Agent Option = UDM Agent Hostname or Utility Agent; Resolves to empty string/blank.
Syntax	<code>#{ops_secondary_agent_sni_name}</code>

9.7.14.8 Secondary Agent TLS SNI Host Port

Description	If UDM Agent Option = UDM Agent or UDM Agent Cluster; Resolves to the UDM Agent TLS SNI Host Port. If UDM Agent Option = UDM Agent Hostname or Utility Agent; Resolves to empty string/blank.
Syntax	<code>#{ops_secondary_agent_port}</code>

9.7.15 For Transfer Protocol = FTP/SFTP/FTPS

9.7.15.1 Local File Name

Description	Resolves to the Local Filename field values. If the Local Filename field is empty, it resolves to empty string/blank.
Syntax	<code>\${ops_local_filename}</code> <code>\${ops_local_filename}</code> is an alias for <code>\${ops_primary_filename}</code> .
Example	<code>\${ops_local_filename}</code> → file.dat

9.7.15.2 Remote File Name

Description	Resolves to the Remote Filename field values. If the Remote Filename field is empty, it resolves to empty string/blank.
Syntax	<code>\${ops_remote_filename}</code> <code>\${ops_remote_filename}</code> is an alias for <code>\${ops_secondary_filename}</code> .
Example	<code>\${ops_remote_filename}</code> → file.dat

9.7.16 OMS Server Variables

The following OMS Server variables allow you to pass information into an [OMS Server notification](#).

9.7.16.1 Last OMS Server Connected

Description	Resolves to the last OMS Server connected to the Controller in an OMS HA cluster.
Syntax	<code>\${ops_oms_last_connected}</code>

9.7.16.2 Last OMS Server Connected Time

Description	Resolves to the last time that the OMS Server connected to the Controller in an OMS HA cluster.
Syntax	<code>\${ops_oms_last_connected_time}</code>
Example	<code>\${ops_oms_last_connected_time}</code> → 2024-10-17 10:18:06 -0400

9.7.16.3 OMS Server IP Address

Description	Resolves to the OMS Server IP address.
Syntax	<code>\${ops_oms_server_address}</code>

9.7.16.4 OMS Server Status

Description	Resolves to the current status of the OMS Server.
Syntax	<code>\${ops_oms_status}</code>
Example	<code>\${ops_oms_status}</code> → Connected

9.7.16.5 OMS Server sys_id

Description	Resolves to the sys_id of the OMS server.
Syntax	<code>\${ops_oms_id}</code>

9.7.16.6 OMS Server Messaging Sessions Status

Description	Resolves to the current status of the OMS Server messaging sessions {heartbeat, input, output}: Operational, Impaired, None.
Syntax	<code>\${ops_oms_session_status}</code>

9.7.17 PeopleSoft Task and Task Instance Variables

The following built-in variables are available for PeopleSoft tasks and task instances:

9.7.17.1 Distribution Status

{For task instances only.}

Description	Resolves to the PeopleSoft task instance Distribution Status .
Syntax	<code>\${ops_distribution_status}</code>

9.7.17.2 Main Job Name

Description	Resolves to the PeopleSoft Main Job Name .
Syntax	<code>\${ops_main_job_name}</code>

9.7.17.3 Main Schedule Name

Description	Resolves to the PeopleSoft task/task instance Main Schedule Name .
Syntax	<code>\${ops_main_schedule_name}</code>

9.7.17.4 Process Instance

{For task instances only.}

Description	Resolves to the PeopleSoft task instance Process Instance .
Syntax	<code>\${ops_process_instance}</code>

9.7.17.5 Process Name

Description	Resolves to the PeopleSoft task/task instance Process/Job Name .
Syntax	<code>\${ops_process_name}</code>

9.7.17.6 Process Type

Description	Resolves to the PeopleSoft task/task instance Process Type .
Syntax	<code>\${ops_process_type}</code>

9.7.17.7 Run Status

{For task instances only.}

Description	Resolves to the PeopleSoft task instance Run Status .
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Syntax	<code>#{ops_run_status}</code>
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9.7.18 Recurring Task Instance Variables

The following built-in variables are available for Recurrent tasks and task instances:

9.7.18.1 Next Recurrence Time

Description	Resolves to the time when the Recurrence task next runs.
Syntax	<code>#{ops_next_recurrence_time}</code>
Example	<code>#{ops_next_recurrence_time}</code> → 2024-10-18 11:46:28 -0400

9.7.18.2 Recurrence Count

Description	Resolves to the current count of task recurrences.
Syntax	<code>#{ops_recurrence_count}</code>
Example	<code>#{ops_recurrence_count}</code> → 3

9.7.18.3 Recurrence Count Minus One

Description	Resolves to the current count of task recurrences minus one.
Syntax	<code>#{ops_recurrence_count_minus_1}</code>
Example	<code>#{ops_recurrence_count_minus_1}</code> → 2

9.7.18.4 Source Instance ID

Description	Resolves to the ID of the Recurrence task instance.
Syntax	<code>#{ops_source_instance_id}</code>

9.7.18.5 Source Instance Name

Description	Resolves to the name of the Recurrence task instance.
Syntax	<code>\${ops_source_instance_name}</code>

9.7.18.6 Target Task ID

Description	Resolves to the ID of the target task.
Syntax	<code>\${ops_target_task_id}</code>

9.7.18.7 Target Task Name

Description	Resolves to the name of the target task.
Syntax	<code>\${ops_target_task_name}</code>

9.7.19 Remote File Monitor Task Instance Variables

The following built-in variables are available for Remote File Monitor task instances and provide information about the file or file(s) that matched the monitor's criteria.

You can use these variables in a Remote File Monitor action or in a successor task instance by propagating one or more of these built-in variable values to a parent workflow using the [Set Variable](#) action.

9.7.19.1 Base Trigger File Name

Description	Resolves to the base file name.
Syntax	<code>\${ops_trigger_file_name_simple}</code>
Example	<code>\${ops_trigger_file_name_simple}</code> → file

9.7.19.2 Files Matching Wildcard

Description	Resolves to a comma-separated list of files that matched the wildcard, if one was specified in the Remote Filename field in the Remote File Monitor task.
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Syntax	<code>\${ops_trigger_files}</code>
Example	<code>\${ops_trigger_files}</code> → COMPANY-2011-11-22.xls, COMPANY-2011-11-23.xls, COMPANY-2011-11-24.xls

9.7.19.3 Remote Trigger File Name

Description	Resolves to the remote file name.
Syntax	<code>\${ops_trigger_file_name}</code>
Example	<code>\${ops_trigger_file_name}</code> → file.dat

9.7.19.4 Remote Trigger File Name {No Path}

Description	Resolves to the remote file name without any path information.
Syntax	<code>\${ops_trigger_file_name_nopath}</code>
Example	<code>\${ops_trigger_file_name_nopath}</code> → file.dat

9.7.19.5 Trigger File Directory

Description	Resolves to the directory where the remote file is located, but not the file itself. <code>\${ops_trigger_file_path}</code> is an alias for <code>\${ops_trigger_file_fullpath_no_separator}</code> .
Syntax	<code>\${ops_trigger_file_path}</code>

9.7.19.6 Trigger File Directory {with Final Directory Separator}

Description	Resolves to the directory where the remote file is located, but not the file itself; includes the final directory separator.
Syntax	<code>\${ops_trigger_file_fullpath}</code>

9.7.19.7 Trigger File Directory {without Final Directory Separator}

Description	Resolves to the directory where the remote file is located, but not the file itself; does not include the final directory separator.
Syntax	<code>\${ops_trigger_file_fullpath_no_separator}</code>

9.7.19.8 Trigger File Extension

Description	Resolves to the file extension of the file.
Syntax	<code>\${ops_trigger_file_name_extension}</code>
Example	<code>\${ops_trigger_file_name_extension} → dat</code>

9.7.19.9 Trigger Wildcard

Description	Resolves to the contents of the Remote Filename field in the Remote File Monitor task.
Syntax	<code>\${ops_trigger_wildcard}</code>
Example	<code>\${ops_trigger_wildcard} → /home/prod/stonebranch/COMPANY*.xls</code>

9.7.19.10 Trigger Wildcard Path Only

Description	Resolves to the path only, with the final slash but without the file name, from the Remote Filename field in the Remote File Monitor task.
Syntax	<code>\${ops_trigger_wildcard_path}</code>
Example	<code>\${ops_trigger_wildcard_path} → /home/prod/stonebranch/</code>

9.7.19.11 Trigger Wildcard Path Only {without Final Slash}

Description	Resolves to the path only, without the final slash and without the file name, from the Remote Filename field in the Remote File Monitor task.
Syntax	<code>\${ops_trigger_wildcard_path_no_separator}</code>
Example	<code>\${ops_trigger_wildcard_path_no_separator} → /home/prod/stonebranch</code>

9.7.20 SAP Task Instance Variables

For an SAP task instance, where applicable, the following built-in variables resolve to the SAP jobname and SAP jobid of the job running in the SAP system. If you need to use the SAP jobname and/or the SAP jobid from one SAP task instance in a successor SAP task instance, you can use the [Set Variable](#) action to propagate these built-in variable values to the parent workflow.

9.7.20.1 SAP Credential ID

Description	Resolves to the sys_id of the SAP credential.
Syntax	<code>\${ops_sap_credential_id}</code>

9.7.20.2 SAP Credential Name

Description	Resolves to the Name of the SAP credential.
Syntax	<code>\${ops_sap_credential_name}</code>

9.7.20.3 SAP InfoPackage Request ID

Description	Resolves to the SAP InfoPackage Request ID.
Syntax	<code>\${ops_sap_requestid}</code>

9.7.20.4 SAP Job ID

Description	Resolves to the SAP job ID.
Syntax	<code>\${ops_sap_jobid}</code>

9.7.20.5 SAP Job Name

Description	Resolves to the SAP job name.
Syntax	<code>\${ops_sap_jobname}</code>

9.7.20.6 SAP Process Chain ID

Description	Resolves to the SAP Process Chain ID.
Syntax	<code>\${ops_sap_chainid}</code>

9.7.20.7 SAP Process Chain Log ID

Description	Resolves to the SAP Process Chain Log ID.
Syntax	\${ops_sap_logid}

9.7.21 SQL and Stored Procedure Task Instance Variables

The following built-in variables are used in [SQL](#) tasks and [Stored Procedure](#) tasks to collect SQLException data, if any:

9.7.21.1 Credential ID

Description	Resolves to the sys_id of either the Task's credential or the Database Connection's credential. Task credential is higher precedence.
Syntax	\${ops_credential_id}

9.7.21.2 Credential Name

Description	Resolves to the Name of either the Task's credential or the Database Connection's credential. Task credential is higher precedence.
Syntax	\${ops_credential_name}

9.7.21.3 Error Message

Description	Resolves to any error message generated by the database.
Syntax	\${ops_sql_error_msg}

9.7.21.4 Processed Rows

Description	Resolves to the number of rows processed.
Syntax	\${ops_sql_rows}

9.7.21.5 Return Code for SQL Statement Outcome

Description	Resolves to a return code that indicates the outcome of the most recently executed SQL statement.
Syntax	<code>\${ops_sql_state}</code>

9.7.22 SQL Task Instance Variables

The following built-in variable is available for SQL task instances.

9.7.22.1 SQL Command Field

Description	Resolves to the value of the SQL Command field.
Syntax	<code>\${ops_sql_command}</code>

9.7.23 Stored Procedure Task Instance Variables

The following built-in variable is available for Stored Procedure task instances and provides information about the stored procedure itself.

9.7.23.1 Stored Procedure Name

Description	Resolves to the value from the Stored Procedure Name field.
Syntax	<code>\${ops_stored_proc_name}</code>

9.7.24 System Monitor Task Instance Variables

The following System Monitor variables show the results for **Resource Available** and **Actual Available** that can be utilized in [System Monitor](#) tasks.

9.7.24.1 Actual Size

Description	Actual size determined by the agent.
Syntax	<code>\${ops_sm_actual_size}</code>
Example	<code>\${ops_sm_actual_size}</code> → 36.11

9.7.24.2 Actual Size {Rounded}

Description	Same as ops_sm_actual_size, except rounded to the nearest integer.
Syntax	\${ops_sm_actual_int_size}
Example	\${ops_sm_actual_int_size} → 36

9.7.24.3 Actual Size {Scale}

Description	Scale of the actual size determined by the agent.
Syntax	\${ops_sm_actual_scale}
Example	\${ops_sm_actual_scale} → GB

9.7.24.4 Scale

Description	Scale specified in the By Scale field for Resource Available of the System Monitor task definition.
Syntax	\${ops_sm_scale}
Example	\${ops_sm_scale} → MB

9.7.24.5 Size

Description	Size specified in the Resource Available field of the System Monitor task definition.
Syntax	\${ops_sm_size}
Example	\${ops_sm_size} → 5.0

9.7.24.6 Size {Rounded}

Description	Same as ops_sm_size, except that ops_sm_int_size is rounded to the nearest integer.
Syntax	\${ops_sm_int_size}
Example	\${ops_sm_int_size} → 5

9.7.25 Task Instance Variables

The following built-in variables are associated with task instances for [all task types](#).

9.7.25.1 Cluster Node Hostname

Description	Resolves to the hostname of the Active cluster node.
Syntax	<code>\${ops_cluster_hostname}</code>

9.7.25.2 Cluster Node ID

Description	Resolves to the Active cluster node's internally-generated build ID.
Syntax	<code>\${ops_cluster_id}</code>

9.7.25.3 Cluster Node IP Address

Description	Resolves to the IP address of the Active cluster node.
Syntax	<code>\${ops_cluster_ipaddr}</code>

9.7.25.4 Cluster Node Mode

Description	Resolves to the current mode of the cluster node: Offline, Active, Passive. For more information, see Viewing Node Status .
Syntax	<code>\${ops_cluster_mode}</code>

9.7.25.5 Cluster Node Name

Description	<code>\${ops_cluster_name}</code> is an alias for the <code>\${ops_cluster_id}</code> variable.
Syntax	<code>\${ops_cluster_name}</code>

9.7.25.6 Cluster Node Running Time

Description	Resolves to the numbers of days, hours, and minutes that the Active cluster node has been running since it was last started.
Syntax	<code>\${ops_cluster_uptime}</code>
Example	<code>\${ops_cluster_uptime}</code> → 1 Hour 10 Minutes 57 Seconds

9.7.25.7 Cluster Node Start Time

Description	Resolves to the date and time the Active cluster node {server} was started.
Syntax	<code>\${ops_cluster_start_time}</code>
Example	<code>\${ops_cluster_start_time}</code> → 2024-10-14 08:54:09 -0400

9.7.25.8 Command

Description	For tasks that launch a command on a Windows or Linux/Unix machine; resolves to the task command.
Syntax	<code>\${ops_cmd}</code>

9.7.25.9 Command Parameters

Description	For tasks that launch a command on a Windows or Linux/Unix machine; resolves to the task command parameters.
Syntax	<code>\${ops_cmd_parms}</code>

9.7.25.10 Custom Field 1

Description	Resolves to the value of user-defined field #1 .
Syntax	<code>\${ops_custom_field1}</code>

9.7.25.11 Custom Field 2

Description	Resolves to the value of user-defined field #2 .
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Syntax	<code>\${ops_custom_field2}</code>
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9.7.25.12 Description

Description	Resolves to the value of the Task Description field.
Syntax	<code>\${ops_description}</code>

9.7.25.13 Duration

Description	Resolves to the task instance Duration.
Syntax	<code>\${ops_duration_text}</code>
Example	<code>\${ops_duration_text}</code> → 2 Minutes 10 Seconds

9.7.25.14 Duration In Seconds

Description	Resolves to the task instance Duration In Seconds.
Syntax	<code>\${ops_duration}</code>
Example	<code>\${ops_duration}</code> → 130

9.7.25.15 Duration: Average

Description	Resolves to the task instance Average Duration.
Syntax	<code>\${ops_avg_duration_text}</code>
Example	<code>\${ops_avg_duration_text}</code> → 2 Minutes 10 Seconds

9.7.25.16 Duration In Seconds: Average

Description	Resolves to the task instance Average Duration In Seconds.
Syntax	<code>\${ops_avg_duration}</code>
Example	<code>\${ops_avg_duration}</code> → 130

9.7.25.17 End Time

Description	Resolves to the task ending time.
Syntax	<code>\${ops_end_time}</code>
Example	<code>\${ops_end_time}</code> → 2024-10-14 10:05:48 -0400

9.7.25.18 End Time: Average Estimated

Description	Resolves to the Average Estimated End Time in the server's time zone.
Syntax	<code>\${ops_avg_estimated_end_time}</code>
Example	<code>\${ops_avg_estimated_end_time}</code> → 2018-10-16 15:01:45 -0400

9.7.25.19 End Time: Highest Estimated

Description	Resolves to the Highest Estimated End Time in the server's time zone.
Syntax	<code>\${ops_highest_estimated_end_time}</code>
Example	<code>\${ops_highest_estimated_end_time}</code> → 2018-10-16 15:01:45 -0400

9.7.25.20 End Time: Lowest Estimated

Description	Resolves to the Lowest Estimated End Time in the server's time zone.
Syntax	<code>\${ops_lowest_estimated_end_time}</code>
Example	<code>\${ops_lowest_estimated_end_time}</code> → 2018-10-16 15:01:44 -0400

9.7.25.21 End Time: User Estimated

Description	Resolves to the User Estimated End Time in the server's time zone.
Syntax	<code>\${ops_user_estimated_end_time}</code>
Example	<code>\${ops_user_estimated_end_time}</code> → 2018-10-16 15:01:54 -0400

9.7.25.22 Execution User ID

Description	Resolves to the ID of the user who launched the task or to the ID of the user who enabled the trigger that launched the task.
Syntax	<code>\${ops_execution_user}</code>

9.7.25.23 Instance Number

Description	Resolves to the sequentially assigned number, maintained per task, representing the creation order of the instance. For example, if you launch a task twice, the first task instance will have instance number 1, and the second task instance will have instance number 2.
Syntax	<code>\${ops_instance_number}</code>

9.7.25.24 Launch Time

Description	Resolves to the task launch time. For workflows, all descendants will have the same launch time as the top-level workflow.
Syntax	<code>\${ops_launch_time}</code>
Example	<code>\${ops_launch_time}</code> → 2024-10-14 10:05:33 -0400

9.7.25.25 Maximum Retry Count

Description	Resolves to the maximum retry count.
Syntax	<code>\${ops_retry_maximum}</code>

9.7.25.26 Parent Workflow Instance sys_id

Description	Resolves to the sys_id of the parent workflow task instance.
Syntax	<code>\${ops_workflow_id}</code>

9.7.25.27 Parent Workflow Name

Description	Resolves to the name of the parent workflow.
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Syntax	<code>\${ops_workflow_name}</code>
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9.7.25.28 Projected End Time of Workflow

Description	Resolves to the projected end time of workflow, based on its critical path calculations .
Syntax	<code>\${ops_projected_end_time}</code>
Example	<code>\${ops_projected_end_time}</code> → 2024-10-21 11:18:13 -0400

9.7.25.29 Queued Time

Description	Resolves to the date and time that the task was queued for processing.
Syntax	<code>\${ops_queued_time}</code>
Example	<code>\${ops_queued_time}</code> → 2024-10-15 08:25:12 -0700

9.7.25.30 Reference Id

Description	Resolves to the sequentially assigned number, maintained per task, representing the creation order of the instance. For example, if you launch a task twice, the first task instance will have instance number 1, and the second task instance will have instance number 2.
	<div style="border: 2px solid orange; padding: 10px;"> <p>Note</p> <p>Although it still is supported, the Reference Id built-in variable has been superseded by the Instance Number built-in variable.</p> </div>
Syntax	<code>\${ops_task_ref_count}</code>

9.7.25.31 Retry Count

Description	Resolves to the current retry count.
Syntax	<code>\${ops_retry_count}</code>

9.7.25.32 Retry Interval

Description	Resolves to the retry interval {seconds}.
Syntax	<code>\${ops_retry_interval}</code>
Example	<code>\${ops_retry_interval} → 60</code>

9.7.25.33 Script ID

Description	For Windows, Linux/Unix, and SAP tasks where a Script or SAP Definition from Scripts is specified; resolves to the Controller system ID of the script.
Syntax	<code>\${ops_script_id}</code>

9.7.25.34 Script Name

Description	For Windows, Linux/Unix, and SAP tasks where a Script or SAP Definition from Scripts is specified; resolves to the Controller name of the script.
Syntax	<code>\${ops_script_name}</code>

9.7.25.35 Script Parameters

Description	For tasks that run a script on a Windows or Linux/Unix machine; resolves to the task script parameters.
Syntax	<code>\${ops_script_parms}</code>

9.7.25.36 Starting Time

Description	Resolves to the task starting time.
Syntax	<code>\${ops_start_time}</code>
Example	<code>\${ops_start_time} → 2024-10-14 10:05:33 -0400</code>

9.7.25.37 Task Instance Attempts

Description	Resolves to the current task instance attempt count. Each Re-run operation increments the attempt. Initial attempt is 1.
Syntax	<code>\${ops_attempt}</code>

9.7.25.38 Task Instance Definition ID

Description	Resolves to the task instance definition ID.
Syntax	<code>\${ops_task_definition_id}</code>

9.7.25.39 Task Instance Exit Code

Description	Resolves to the task instance exit code, if any.
Syntax	<code>\${ops_exit_code}</code>
Example	<code>\${ops_exit_code} → 0</code>

9.7.25.40 Task Instance Name

Description	Resolves to the task instance name.
Syntax	<code>\${ops_task_name}</code>

9.7.25.41 Task Instance Status

Description	Resolves to the current task instance status.
Syntax	<code>\${ops_status}</code>
Example	<code>\${ops_status} → SUCCESS</code>

9.7.25.42 Task Instance Status Description

Description	Resolves to the task instance status description.
--------------------	---

Syntax	<code>\${ops_status_description}</code>
Example	<code>\${ops_status_description}</code> → State was cancelled from RUNNING to CANCELLED

9.7.25.43 Task Instance `sys_id`

Description	Resolves to the sys_id of the task instance.
Syntax	<code>\${ops_task_id}</code>

9.7.25.44 Task Name at Instance Creation Time

Description	Resolves to the name of the task at the time the task instance was created. <div style="border: 1px solid orange; padding: 5px;"> <p>Note</p> <p>If the name of the task contains variables, those variables contained in the task will be fully resolved when using this built-in variable, <code>\${ops_task_security_name}</code>.</p> </div>
Syntax	<code>\${ops_task_security_name}</code>

9.7.25.45 Task Type

Description	Resolves to the task type.
Syntax	<code>\${ops_task_type}</code>
Example	<code>\${ops_task_type}</code> → Windows

9.7.25.46 Task Vertex ID

Description	Resolves to the value of the task's vertex id in a workflow.
Syntax	<code>\${ops_vertex_id}</code>
Example	<code>\${ops_vertex_id}</code> → 5

9.7.25.47 Time Zone {Task time zone}

Description	Resolves to the time zone of the task instance, as specified by the Time Zone Preference field.
Syntax	<code>\${ops_task_time_zone}</code>
Example	<code>\${ops_task_time_zone}</code> → America/New_York

9.7.25.48 Time Zone {Trigger time zone}

Description	Resolves to the time zone of the trigger that launched the task. If the task was launched by the Trigger Now/Launch Task command, the built-in variable will resolve to the command's time zone option, or if no time zone option was specified, the server time zone.
Syntax	<code>\${ops_time_zone}</code>
Example	<code>\${ops_time_zone}</code> → America/New_York

9.7.25.49 Top-Level Workflow Name

Description	Resolves to the name of the top-level workflow task instance.
Syntax	<code>\${ops_top_level_workflow_name}</code>

9.7.25.50 Top-Level Workflow Task Instance ID

Description	Resolves to the sys_id of the top-level workflow task instance.
Syntax	<code>\${ops_top_level_workflow_id}</code>

9.7.25.51 Virtual Resource Priority

Description	Resolves to the value of the task instance field Virtual Resource Priority.
Syntax	<code>\${ops_resource_priority}</code>
Example	<code>\${ops_resource_priority}</code> → 10

9.7.26 Task Monitor Task Instance/Trigger Variables

When the conditions of a Task Monitor task are met and its associated [Task Monitor trigger](#) launches one or more tasks, the following built-in variables are passed into the task instances being launched by the trigger.

For example, the Task Monitor trigger may specify an Email task that will launch each time the conditions in the associated Task Monitor task are met. You might want to specify one or more of these variables in the body of the email.

If the Task Monitor task is not associated with a trigger but is running within a workflow, on completion you can propagate one or more of these built-in variable values to the parent workflow level by using the [Set Variable](#) action. This allows you to pass information from the Task Monitor task to a successor task within the same workflow hierarchy.

9.7.26.1 Trigger Task Name

Description	Resolves to the name of the task instance that matched the Task Monitor conditions and fired the trigger.
Syntax	<code>\${ops_trigger_task_name}</code>

9.7.26.2 Trigger Task Status

Description	Resolves to the status of the task instance that matched the Task Monitor conditions and fired the trigger.
Syntax	<code>\${ops_trigger_task_status}</code>
Example	<code>\${ops_trigger_task_status} → SUCCESS</code>

9.7.26.3 Trigger Task sys_id

Description	Resolves to the sys_id of the task instance that matched the Task Monitor conditions and fired the trigger.
Syntax	<code>\${ops_trigger_task_id}</code>

9.7.26.4 Trigger Task Type

Description	Resolves to the type of the task instance that matched the Task Monitor conditions and fired the trigger.
Syntax	<code>\${ops_trigger_task_type}</code>
Example	<code>\${ops_trigger_task_type} → Windows</code>

9.7.26.5 Trigger Workflow Id

Description	Resolves to the uuid of the workflow instance containing the task instance that matched the Task Monitor conditions and fired the trigger. This variable is available only if the task instance that matched the Task Monitor conditions and fired the trigger is invoked by a workflow.
Syntax	<code>\${ops_trigger_workflow_id}</code>

9.7.26.6 Trigger Workflow Name

Description	Resolves to the name of the workflow instance containing the task instance that matched the Task Monitor conditions and fired the trigger. This variable is available only for a Task Monitor task that has a Workflow Condition specified. If a workflow condition is specified, <code>\${ops_trigger_workflow_name}</code> will resolve to the name of the workflow instance that the workflow condition matched.
Syntax	<code>\${ops_trigger_workflow_name}</code>

9.7.27 Trigger Variables

The following built-in variables are associated with [all trigger types](#).

When a task is launched by a trigger, the values of the following built-in variables, if they are specified in the task, are passed into the task instance.

9.7.27.1 Custom Field 1

Description	Resolves to the value of user-defined field #1 .
Syntax	<code>\${ops_trigger_custom_field1}</code>

9.7.27.2 Custom Field 2

Description	Resolves to the value of user-defined field #2 .
Syntax	<code>\${ops_trigger_custom_field2}</code>

9.7.27.3 Trigger Name

Description	Resolves to the name of the trigger that launched the task instance.
Syntax	<code>\${ops_trigger_name}</code>

9.7.27.4 Trigger Time

Description	Resolves to the scheduled time of the trigger or, if the trigger is not scheduled, the actual trigger time. If the task is triggered by date/time, it resolves to that specified date/time.
Syntax	<code>\${ops_trigger_time}</code>
Example	<code>\${ops_trigger_time}</code> → 2024-10-14 10:34:38 -0400

9.7.27.5 Trigger Time {Trigger time zone}

Description	Resolves to the trigger time in the time zone of the trigger.
Syntax	<code>\${ops_trigger_time_tz}</code>
Example	<code>\${ops_trigger_time_tz}</code> → 2024-10-14 10:34:38 -0400

9.7.28 Universal Monitor Task Instance/Trigger and Universal Event Variables

9.7.28.1 Universal Event Attributes

Description	Value of a Universal Event Attribute. Facilitates the passing of matched Universal Event attributes to downstream instances within a workflow or to instances launched by a Universal Monitor Trigger.
Syntax	<code>\${ops_trigger_eventName_attributeName}</code> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Note Replace eventName and attributeName with the name of the desired Universal Event Template and Attribute (see example below)</p> </div>
Example	<code>\${ops_trigger_uac_task_status_changed_launch_source}</code> → Trigger Monitor

9.7.28.2 Universal Event Business Services

Description	Business Services of the Universal Event. If the Universal Event is published from a universal task instance, the Universal Event inherits the business services from the task instance. If the Universal Event is a system-published event, it inherits the business services of the object the event is being published for. If the Universal Event is published via our publish web service API, the business services are specified as part of the request body. If the Universal Event is published via our push web service API, the business services are specified as part of the request query parameters.
Syntax	<code>\${ops_trigger_universal_event_business_services}</code>

9.7.28.3 Universal Event Name

Description	Name of the Universal Event.
Syntax	<code>\${ops_trigger_universal_event_name}</code>

9.7.28.4 Universal Event Publisher ID

Description	UUID of the Universal Task Instance that published the Universal Event, if applicable.
Syntax	<code>\${ops_trigger_universal_event_publisher_id}</code>

9.7.28.5 Universal Event Time To Live

Description	Time To Live {in minutes} for the Universal Event.
Syntax	<code>\${ops_trigger_universal_event_ttl}</code>
Example	<code>\${ops_trigger_universal_event_ttl} → 15</code>

9.7.28.6 Universal Template ID

Description	UUID of the Universal Template, if applicable.
Syntax	<code>\${ops_trigger_universal_template_id}</code>

9.7.28.7 Universal Template Event Template ID

Description	UUID of the Universal Template Event Template, if applicable.
Syntax	<code>\${ops_trigger_universal_template_event_template_id}</code>

9.7.28.8 Universal Event Template ID

Description	UUID of the Universal Event Template, if applicable.
Syntax	<code>\${ops_trigger_universal_event_template_id}</code>

9.7.29 Variable Monitor Task Instance/Trigger Variables

When the conditions of a Variable Monitor task are met and its associated [Variable Monitor trigger](#) launches one or more tasks, the following built-in variables are passed into the task instances being launched by the trigger.

For example, the Variable Monitor trigger may specify an Email task that will launch each time the conditions in the associated Variable Monitor task are met. You might want to specify one or more of these variables in the body of the email.

If the Variable Monitor task is not associated with a trigger but is running within a workflow, on completion you can propagate one or more of these built-in variable values to the parent workflow level by using the [Set Variable](#) action. This allows you to pass information from the Variable Monitor task to a successor task within the same workflow hierarchy.

9.7.29.1 Trigger Variable Name

Description	Resolves to the name of the variable being monitored.
Syntax	<code>\${ops_trigger_variable_name}</code>

9.7.29.2 Trigger Variable Value

Description	Resolves to the current value of the variable being monitored.
Syntax	<code>\${ops_trigger_variable_value}</code>

9.7.29.3 Trigger Variable Previous Value

Description	Resolves to previous value of the variable being monitored.
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Syntax	<code>\${ops_trigger_variable_prev_value}</code>
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9.7.30 Web Service Task Instance Variables

The following built-in variables are available for Web Service task instances:

9.7.30.1 Credential ID

Description	Resolves to the sys_id of the Task's credential.
Syntax	<code>\${ops_credential_id}</code>

9.7.30.2 Credential Name

Description	Resolves to the Name of the Task's credential.
Syntax	<code>\${ops_credential_name}</code>

9.7.30.3 URL

Description	Resolves to the entire encoded URL containing the host, port, path and query.
Syntax	<code>\${ops_url}</code>
Example	<code>\${ops_url}</code> → http://localhost:8080/uc/resources/task?taskname=web-service-test

9.7.30.4 Raw Value of URL

Description	Resolves to the raw value of the URL field.
Syntax	<code>\${ops_url_raw}</code>
Example	<code>\${ops_url_raw}</code> → http://localhost:8080/uc/resources/task

9.7.30.5 URL Host

Description	Resolves to the URL host.
--------------------	---------------------------

Syntax	<code>\${ops_url_host}</code>
Example	<code>\${ops_url_host} → localhost</code>

9.7.30.6 URL Port

Description	Resolves to the URL port.
Syntax	<code>\${ops_url_port}</code>
Example	<code>\${ops_url_port} → 8080</code>

9.7.30.7 URL Path

Description	Resolves to the encoded URL path.
Syntax	<code>\${ops_url_path}</code>
Example	<code>\${ops_url_path} → /uc/resources/task</code>

9.7.30.8 Unencoded URL Path

Description	Resolves to the unencoded URL path.
Syntax	<code>\${ops_url_path_unencoded}</code>
Example	<code>\${ops_url_path_unencoded} → /uc/resources/task</code>

9.7.30.9 URL Query

Description	Resolves to the URL query.
Syntax	<code>\${ops_url_query}</code>
Example	<code>\${ops_url_query} → taskname=web-service-test</code>

9.7.30.10 Unencoded URL Query

Description	Resolves to the unencoded URL query.
--------------------	--------------------------------------

Syntax	<code>\${ops_url_query_unencoded}</code>
Example	<code>\${ops_url_query_unencoded} → taskname=web-service-test</code>

9.7.31 Webhook Variables

The following built-in variables are available for Webhooks:

9.7.31.1 Universal Event Payload

Description	Resolves to same JSON payload for the matched Universal Event that would be used for a URL action.
Syntax	<code>\${ops_webhook_eventName_payload}</code> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Note Replace eventName with the name of the desired Universal Event Template (see example below)</p> </div>

Example	<pre> \${ops_webhook_uac_task_status_changed_payload} → { "attributes" : { "attempt" : 1, "calendar_id" : "77171434c0a801c9016d5b2b5d17ddee", "created" : "2024-10-21 12:17:16 -0400", "critical" : false, "current_retry_count" : 0, "early_finished" : false, "execution_user" : "ops.admin", "exit_code" : "0", "halt" : false, "instance_id" : "1729522829077855314PTRR635YO2WOS", "instance_name" : "sample", "instance_number" : 48, "invoked_by" : "Webhook: webhook-test", "late_finished" : false, "late_started" : false, "launch_source" : "Webhook", "launch_time" : "2024-10-21 12:17:16 -0400", "maximum_retries" : 0, "retry_indefinitely" : false, "security_name" : "sample", "simulate" : false, "source_version" : 4, "state_changed_time" : "2024-10-21 12:17:16 -0400", "status" : "Defined", "status_value" : 0, "task_id" : "65c18b06e420403191c9cf9c5da5b428", "type" : "Windows", "type_value" : 3, "updated" : "2024-10-21 12:17:16 -0400" }, "businessServices" : [], "name" : "uac_task_status_changed", "templateId" : "7fda9c3f452e4fe78a4f9dc3afad8353", "webhookName" : "webhook-test" } </pre>
----------------	--

9.7.31.2 Webhook Name

Description	Resolves to the name of the Webhook that launched the Task Instance.
Syntax	<code>\${ops_webhook_name}</code>
Example	<code>\${ops_webhook_name} → webhook-test</code>

9.7.32 z/OS Task Instance Variables

The following built-in variables are available for z/OS task instances:

9.7.32.1 JCL Location

Description	Resolves to the file and member name containing the JCL script.
Syntax	<code>\${ops_jcl_location}</code>

9.7.32.2 Job Number

Description	Resolves to the job number assigned to the job by JES.
Syntax	<code>\${ops_job_id}</code>

9.7.32.3 Override JCL Location

Description	Resolves to the file and member name of the JCL location containing a potential override JCL script.
Syntax	<code>\${ops_override_jcl_location}</code>

9.7.32.4 Submitted JCL Location

Description	Resolves to the file and member name of the JCL location that was actually used for job submission.
Syntax	<code>\${ops_submitted_jcl_location}</code>

9.7.33 z/OS Monitor Task Instance/Trigger Variables

When the conditions of a z/OS Monitor task are met and its associated [z/OS Monitor trigger](#) launches one or more tasks, the following built-in variables are passed into the task instances being launched by the trigger.

For example, the z/OS Monitor trigger may specify an Email task that will launch each time the conditions in the associated z/OS Monitor task are met. You might want to specify one or more of these variables in the body of the email.

If the z/OS Monitor task is not associated with a trigger but is running within a workflow, on completion you can propagate one or more of these built-in variable values to the parent workflow level by using the [Set Variable](#) action. This allows you to pass information from the z/OS Monitor task to a successor task within the same workflow hierarchy.

9.7.33.1 Trigger z/OS Job Event

Description	Resolves to the name of the Job Event being monitored.
Syntax	<code>\${ops_trigger_job_event}</code>
Example	<code>\${ops_trigger_job_event}</code> → Step End

9.7.33.2 Trigger z/OS Job Event Value

Description	Resolves to the value of the Job Event being monitored.
Syntax	<code>\${ops_trigger_job_event_value}</code>
Example	<code>\${ops_trigger_job_event_value}</code> → 4

9.7.33.3 Trigger z/OS Job Id

Description	Resolves to Job Id of the Job that was matched by the monitor.
Syntax	<code>\${ops_trigger_job_id}</code>

9.7.33.4 Trigger z/OS Job Name

Description	Resolves to Job Name of the Job that was matched by the monitor.
Syntax	<code>\${ops_trigger_job_name}</code>

9.7.33.5 Trigger z/OS Step Name

Description	Resolves to Step Name of the Job that was matched by the monitor.
Syntax	<code>\${ops_trigger_step_name}</code>
	<code>\${ops_trigger_step_name}</code> → STEP0202

9.7.33.6 Trigger z/OS User Id

Description	Resolves to User Id of the Job that was matched by the monitor.
Syntax	\${Resolves to Step Name that was matched by the monitor.}

9.7.33.7 Trigger z/OS Condition Code

Description	Resolves to Condition Code of the Job that was matched by the monitor.
Syntax	\${ops_trigger_condition_code}
Example	\${ops_trigger_condition_code} → 0001

9.8 Launching With Variables

For information on how to launch a task with variables, see [Launch a Task Manually with Temporary Variable Values](#) on the [Manually Running and Controlling Tasks](#) page.

9.9 Trigger With Variables

For information on how to use variables when manually launching tasks associated with a trigger, see [Triggering with Variables](#) (in the [Triggers](#) section of this documentation).

9.10 Creating a Set Variable Action within a Task or Workflow

- [Overview](#)
- [Variables and Variable Scope](#)
- [Creating a Set Variable Action](#)
- [Set Variable Details Field Descriptions](#)

9.10.1 Overview

The Set Variable action allows you to set a variable to a specific value for a task or workflow, and to select a scope (level of usage) for that variable (see [Variables and Variable Scope](#), below). Unless you set the [scope of the variable](#) to **GLOBAL**, which specifies that the variable can be accessed at any time by any task, workflow, or trigger, the value exists in memory only for the time that the task or workflow is running, or until another Set Variable action sets the variable to another value.

Note

Variables with a Variable Scope set to **GLOBAL** are added to the list of global variables on the [Variables list \(Automation Center > Other > Variables\)](#) after the task or workflow is run.

You can use the Set Variable action to create a new variable or modify an existing variable.

When creating a Set Variable action, you can trigger the Set Variable action based on one or more of the following:

- Status
- Exit codes
- Late start
- Late or early finish

9.10.2 Variables and Variable Scope

A variable defined for a task under the **Variables** tab for that task is used only by that task.

A variable defined for a workflow under the **Variables** tab for that workflow is available for any task in that workflow; a task will use the variable value defined for the workflow unless the variable is defined for that task.

A variable defined for a task or workflow in the Set Variable Action Details lets you specify, in the [Variable Scope](#) field, the scope of that variable. You can specify that a variable be available for:

- Only the task where it is set.
- All tasks within the task's parent (immediate) workflow.
- All tasks within the task's top-level parent workflow.
- All tasks and workflow instances.

For example, if you set a variable for a task to be available within the scope of its parent workflow, the value of that variable is propagated up to the parent workflow level. As each task in the workflow is run, that value is available for that task.

9.10.3 Creating a Set Variable Action

Step 1	Display the Task Details of the task for which you are creating the Set Variable action.
---------------	--

Step 2 Click the **Actions** tab. A list of any defined Actions for that task displays.

Linux/Unix Task Details: stonebranch-linuxunixtask-01

Launch Task View Parents


Linux/Unix Task Variables Actions Virtual Resources Mutually Exclusive Instances Tr

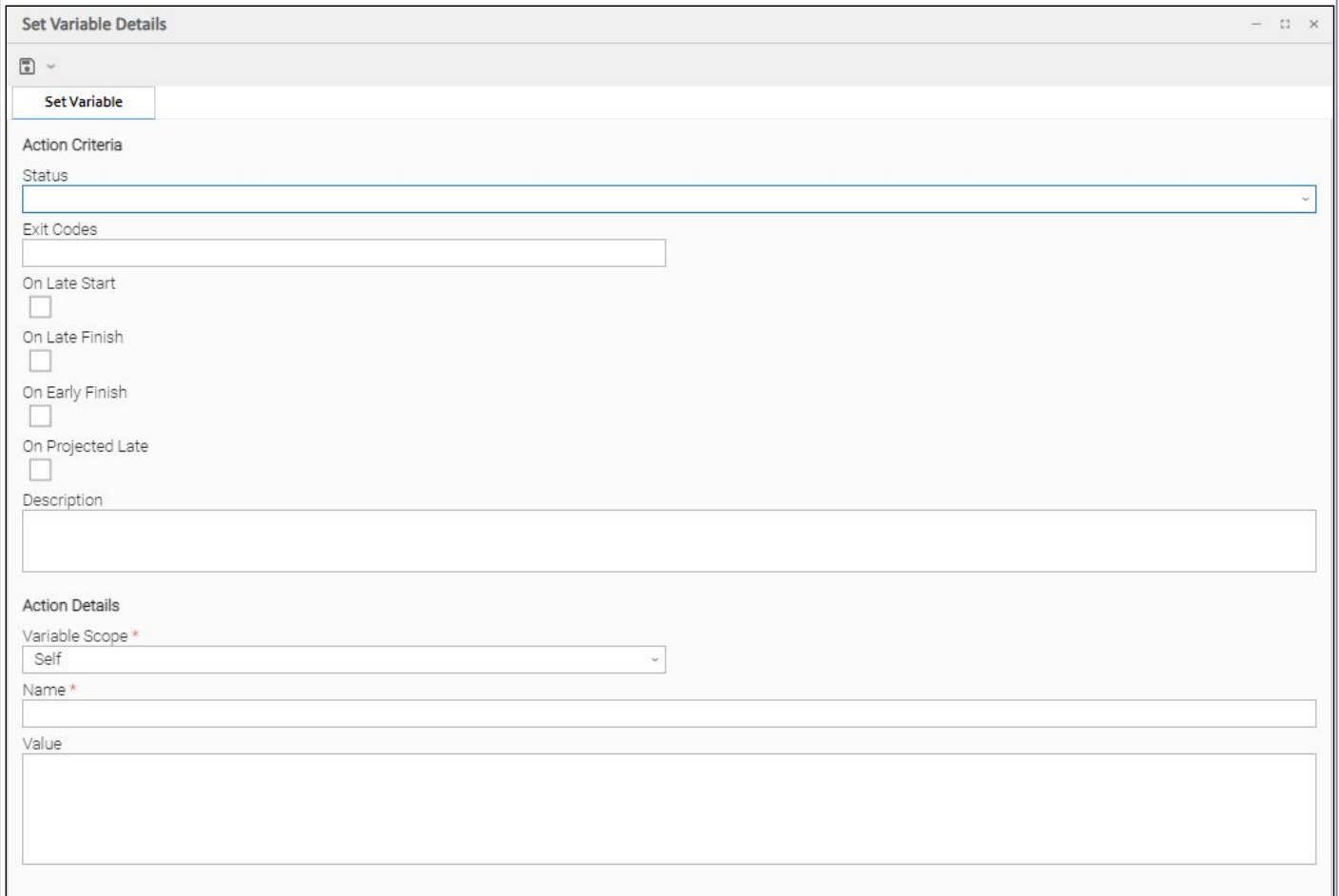
^ 2 Abort Actions + ↻

Status	Description	Type Details	Exit Codes	On Late Start	On Late Finish	On Early Finish	On Projected Late	Cancel Process If Active	Override Exit Cc
Failed			20	No	No	No	No	No	
Cancelled			12	No	No	No	No	No	


< >

- 0 Email Notifications + ↻
- 0 Set Variables + ↻
- 0 SNMP Notifications + ↻
- 0 System Operations + ↻

Step 3 Click the  button that displays on the Set Variables row. The Set Variable Details pop-up displays.



Step 4 Using the [field descriptions](#) below as a guide, complete the fields as needed.

Step 5 Click a  button to save the record in the Controller database.

Step 6 If appropriate, repeat these steps for any additional Set Variable actions you want to create.

9.10.4 Set Variable Details Field Descriptions

The table below describes the fields and buttons in the Set Variable Details.

Field Name	Description
Action Criteria	This section contains criteria for performing the action.
Type Details	Displays - on the Set Variables actions list - the Variable Scope , Name , and Value for this action.

Action Inheritance	For Workflow tasks only; the records that this action applies to. Options: <ul style="list-style-type: none"> • Self The action applies only to the workflow; it is not inherited by its children tasks. For example, if the action is defined for the Defined status, when the workflow where the action is specified transitions into the Defined status, the action will run for the workflow. When children tasks within this workflow transition into the Defined status, the action will not run. • Self/Children The action applies to the workflow and any children under the workflow (it is as if each child under the workflow had the action specified on itself). For example, if the workflow or any of its children transition into the Defined status, the action will run. • Children This action applies only to the children under the workflow and not the workflow itself. For example, if any child of this workflow transitions into the Defined status, the action will run. However, when the workflow where this action is specified transitions into the Defined status, this action will not run.
Status	The status of the task, by itself or together with an exit code, that will trigger this Set Variable action. You can specify as many statuses as needed.
Exit Codes	Specifies one or more exit codes that will trigger the event. If you specify an exit code, you must also specify at least one status. Use commas to separate multiple exit codes; use a hyphen to specify a range. Example: 1, 5, 22-30.
On Late Start	Generates the action or notification if the task started late, based on the Late Start Time specified in the task.
On Late Finish	Generates the action or notification if the task finishes late, based on the Late Finish time specified in the task.
On Early Finish	Generates the action or notification if the task finishes early, based on the Early Finish Time specified in the task.
On Projected Late	Execute the Action when the task instance is projected to be late based on critical path projected end times. Only applicable when a Late Start Time, Late Start Duration, or Late Finish Time is specified for the task instance. <div style="border: 1px solid orange; padding: 10px;"> <p>Note</p> <p>This field displays in the Details only if the Controller is configured for critical path calculations with an enabled Critical Path Calculations Permitted Universal Controller system property.</p> </div>
Description	Description of this action.
Action Details	This section contains additional details about the action.

<p>Variable Scope</p>	<p>Applies to variables associated with a task in a workflow.</p> <p>Options:</p> <table border="1" data-bbox="159 331 1541 786"> <thead> <tr> <th>Scope</th> <th>Scope Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Self</td> <td>1</td> <td>The variable is updated or created in the scope of the task instance running the action. If the task instance is a workflow, then any child of that workflow will be able to read that variable.</td> </tr> <tr> <td>Parent</td> <td>2</td> <td>The variable is updated or created in the immediate parent workflow scope, allowing a child within a workflow to make a variable available to any other child in the same workflow (at the same level).</td> </tr> <tr> <td>Top Level Parent</td> <td>3</td> <td>The variable is updated or created at the top-level workflow variable scope, allowing a child anywhere in the workflow hierarchy to make a variable available to any other child in the workflow hierarchy, regardless of which level in the workflow the task instances are running.</td> </tr> <tr> <td>Global</td> <td>4</td> <td>A global variable will be updated and or created. Allows for variables to be shared across independent workflows.</td> </tr> </tbody> </table>	Scope	Scope Value	Description	Self	1	The variable is updated or created in the scope of the task instance running the action. If the task instance is a workflow, then any child of that workflow will be able to read that variable.	Parent	2	The variable is updated or created in the immediate parent workflow scope, allowing a child within a workflow to make a variable available to any other child in the same workflow (at the same level).	Top Level Parent	3	The variable is updated or created at the top-level workflow variable scope, allowing a child anywhere in the workflow hierarchy to make a variable available to any other child in the workflow hierarchy, regardless of which level in the workflow the task instances are running.	Global	4	A global variable will be updated and or created. Allows for variables to be shared across independent workflows.
Scope	Scope Value	Description														
Self	1	The variable is updated or created in the scope of the task instance running the action. If the task instance is a workflow, then any child of that workflow will be able to read that variable.														
Parent	2	The variable is updated or created in the immediate parent workflow scope, allowing a child within a workflow to make a variable available to any other child in the same workflow (at the same level).														
Top Level Parent	3	The variable is updated or created at the top-level workflow variable scope, allowing a child anywhere in the workflow hierarchy to make a variable available to any other child in the workflow hierarchy, regardless of which level in the workflow the task instances are running.														
Global	4	A global variable will be updated and or created. Allows for variables to be shared across independent workflows.														
<p>System Notification</p>	<p>If Variable Scope = Global; Status of the Set Variable action that will trigger a system notification.</p> <p>Options:</p> <ul style="list-style-type: none"> • None • Operation Failure (default) • Operation Success/Failure • Operation Success <div data-bbox="159 1059 1541 1218" style="border: 1px solid orange; padding: 5px;"> <p>Note</p> <p>The Controller must be configured for system notifications in order for system notifications to be triggered.</p> </div>															
<p>Name</p>	<p>Name of the variable. Up to 128 alphanumeric. The name must begin with an alphabetic character and can consist of: alphas (a-z, A-Z), numerics 0-9, _ (underscore). White spaces are not permitted; names are not case-sensitive. Do not define variables with the prefix ops_. The ops_ prefix is reserved for built-in variables.</p> <div data-bbox="159 1373 1541 1503" style="border: 1px solid orange; padding: 5px;"> <p>If the specified variable name contains an embedded variable or function, the above restrictions will not be validated until runtime.</p> </div>															
<p>Value</p>	<p>Value of the variable.</p> <div data-bbox="159 1641 1541 1872" style="border: 1px solid orange; padding: 5px;"> <p>Note</p> <p>While a global variable value can never exceed 4000 characters, a task instance variable value assigned dynamically at run time (for example, using a function to assign a variable value to Self, Parent, or Top Level Parent, using the Set Variable Action, can exceed the 4000 character limit. Keep in mind, however, that the Maximum Nested Variable Expansion Universal Controller system property prevents unlimited variable value expansion.</p> </div>															
<p>Metadata</p>	<p>This section contains Metadata information about this record.</p>															

UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Created	Date and time that this record was created.
Buttons	This section identifies the buttons displayed above and below the Action Details that let you perform various actions.
Save	Saves a new Action record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	Closes the Details pop-up of this action.

9.11 Listing and Setting Variables from the Command Line

To list and set variables from the command line, use the [List Variables](#) (ops-variable-list) and [Set Variables](#) (ops-variable-set) commands of the Universal Controller [Command Line Interface \(CLI\)](#).

9.12 Functions

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9.12.1 Overview

Variables and functions can be used in free-text fields within tasks and workflows. When a variable or function is specified in a free-text field, the Controller inserts its value into the field when the task or workflow is run.

Also, triggers can pass variables and functions into the tasks and workflows they launch.

Universal Controller supports a number of functions that can be specified in free-text fields. They are resolved when a task instance runs or when a [Set Variable](#) action containing a function is executed.

Functions are entered using the following formats:

```

${_function}
${_function(arg1, ..., argN)}

```

9.12.2 Formatting Rules

- Functions *must* be written either:

- In all lower-case characters.
- Exactly as shown in the tables on this page.
- Functions have zero, one, or multiple parameters.
- Each function parameter is one of three specific types:
 - String
 - Integer
 - Boolean
- String parameters *must* be enclosed in **single or double** quotation marks.
- Integer and Boolean parameters *can* be enclosed in **single or double** quotation marks.
- Optional parameters are identified on this page by being enclosed in [square brackets]. When copying a function from the documentation, be sure to remove the square brackets; otherwise, the function will not resolve.
- If a function has more than one optional parameter, any optional parameters preceding a specified optional parameter must be included in the function's parameter list. For example:
 - For function `$_responseJsonPath`

```
$_responseJsonPath('pathExpression'[, 'defaultValue', 'delimiter', prettyPrint])
```

usage `$_responseJsonPath('.outputData', '', '', true)` would be valid, whereas `$_responseJsonPath('.outputData', ,, true)` would not be valid.
 - For function `$_formatDate`

```
$_formatDate(['date_time', 'format', day_offset, use_business_days, hour_offset, minute_offset, timezone])
```

usage `$_formatDate('2018-09-01', '', 0, true)` would be valid, whereas `$_formatDate('2018-09-01', '', , true)` would not be valid.
- All functions allow nesting to two levels. That is, a function can be an argument to another function, which itself can be an argument to another function.
 - You must use a double underscore preceding the name of a first-level nested function.
 - You must use a triple underscore preceding the name of a second-level nested function.

For example, for 2nd day of next month less one Business Day:

```
$_formatDate('$_dayOfMonth(2, $_dateadv('yyyy-MM-dd', 0, 1))', '', -1, true)
```

9.12.3 Function Categories

Functions are listed alphabetically within the following categories on this page:

- [Conditional Functions](#)
- [Credential Functions](#)
- [Database Connection Functions](#)
- [Date Functions](#)
- [Mathematical Functions](#)
- [Output Functions](#)
- [Other Task Functions](#)
- [SAP Connection Function](#)
- [Script Functions](#)
- [SQL/Stored Procedure Functions](#)

- [String Functions](#)
- [System Functions](#)
- [Universal Task Functions](#)
- [Web Service Functions](#)

9.12.4 Conditional Functions

9.12.4.1 Return Conditional Value Depending on Equality of String Parameters

Description	Returns a conditional value depending on the equality of two string parameters. (Returns <code>if_value</code> if string <code>value1</code> is equal to string <code>value2</code> ; otherwise, <code>else_value</code> is returned.)
Syntax	<code>\$_ifEqual('value1', 'value2', 'if_value', 'else_value'[, ignore_case])</code>
Parameters	<ul style="list-style-type: none"> • <code>value1</code> Required; First string. • <code>value2</code> Required; Second string. • <code>if_value</code> Required; Return value if <code>value1</code> equals <code>value2</code>. • <code>else_value</code> Required; Return value if <code>value1</code> does not equal <code>value2</code>. • <code>ignore_case</code> Optional; Specification (true or false) whether or not to ignore case when comparing <code>value1</code> and <code>value2</code>. Default is false.
Examples	<pre> \$_ifEqual('abc','def','YES','NO')} → NO \$_ifEqual('abc','ABC','YES','NO',true)} → YES \$_ifEqual('2015-08-15','\${_date('yyyy-MM-dd')}','17:00','18:00')} → 18:00 </pre>

9.12.4.2 Return Conditional Value Depending on Value of Boolean Parameter

Description	Returns a conditional value depending on the value of a boolean parameter. Returns <code>if_value</code> if <code>value</code> is true ; otherwise, <code>else_value</code> is returned.
Syntax	<code>\$_ifTrue(value, 'if_value', 'else_value')</code>
Parameters	<ul style="list-style-type: none"> • <code>value</code> Required; Boolean value (true or false). • <code>if_value</code> Required; Return value if <code>value</code> is true. • <code>else_value</code> Required; Return value if <code>value</code> is false.

Example	<pre>\$_ifTrue(\$_isToday('Mon', 'E'),'20:00','22:00')} → 22:00</pre>
----------------	---

9.12.5 Credential Functions

9.12.5.1 Return Key Location of a Credential

Description	Returns a token representing the Resolvable Credentials Key Location that you want to embed.
Syntax	<code>\$_credentialKeyLoc('<credential_name>')</code>
Parameters	<ul style="list-style-type: none"> <code>credential_name</code> Required; Name of the Credential.
Example	<pre>\$_credentialKeyLoc('RCredentialXYZ')} → \$ (ops_unv_cred_key_loc_c89e7b2caf4247909bc46041df8a2643)</pre>

9.12.5.2 Return Passphrase of a Credential

Description	Returns a token representing the Resolvable Credentials Passphrase that you want to embed.
Syntax	<code>\$_credentialPassphrase('<credential_name>')</code>
Parameters	<ul style="list-style-type: none"> <code>credential_name</code> Required; Name of the Credential.
Example	<pre>\$_credentialPassphrase('RCredentialXYZ')} → \$ (ops_unv_cred_passphrase_c89e7b2caf4247909bc46041df8a2643)</pre>

9.12.5.3 Return Token of a Credential

Description	Returns a token representing the Resolvable Credentials Token that you want to embed.
Syntax	<code>\$_credentialToken('<credential_name>')</code>

Parameters	<ul style="list-style-type: none"> <code>credential_name</code> Required; Name of the Credential.
Example	<pre>\$_credentialToken('RCredentialXYZ') → \$ (ops_unv_cred_token_c89e7b2caf4247909bc46041df8a264)</pre>

9.12.5.4 Return User Name of a Credential

Description	Returns a token representing the Resolvable Credentials Runtime User that you want to embed.
Syntax	<code>\$_credentialUser('<credential_name>')</code>
Parameters	<ul style="list-style-type: none"> <code>credential_name</code> Required; Name of the Credential.
Example	<pre>\$_credentialUser('RCredentialXYZ') → \$(ops_unv_cred_user_c89e7b2caf4247909bc46041df8a2643)</pre>

9.12.5.5 Return User Password of a Credential

Description	Returns a token representing the Resolvable Credentials Runtime Password that you want to embed.
Syntax	<code>\$_credentialPwd('<credential_name>')</code>
Parameters	<ul style="list-style-type: none"> <code>credential_name</code> Required; Name of the Credential.
Example	<pre>\$_credentialPwd('RCredentialXYZ') → \$(ops_unv_cred_pwd_c89e7b2caf4247909bc46041df8a2643)</pre>

9.12.6 Database Connection Functions

9.12.6.1 Returns Property of a Database Connection

Description	Returns a token representing the property associated with a Database connection.
--------------------	--

Syntax	<code>\$_databaseConnection('<database_connection_name>', '<property_name>')</code>
Parameters	<ul style="list-style-type: none"> • <code>database_connection_name</code> Required; Name of the Database Connection. • <code>property_name</code> Required; Name of the Database Connection property. <ul style="list-style-type: none"> • <code>description</code> • <code>name</code> • <code>url</code> • <code>driver</code> • <code>max_rows</code> • <code>type</code> • <code>cred_user</code> • <code>cred_pwd</code> • <code>cred_passphrase</code> • <code>cred_key_lock</code> • <code>cred_token</code>
Example	<pre>\$_databaseConnection('db1', 'type') → \$ (op_s_unv_db_connection_type_3ac17d7f3ecb4df0b81aec9c7a24a38c)</pre>

9.12.7 Date Functions

Note

Date Functions can use the **Task Time Zone Preference** property to calculate the date, rather than the default (server) time zone, when being resolved for a Task Instance. You can enable this behavior with the [Use Task Time Zone Preference For Date Functions](#) system property.

9.12.7.1 Checks if Date Argument Equals Today's Date

Description	<p>Checks if a date argument is equal to today's date in the specified format.</p> <p>Returns true if <code>date</code> is equal to today's date in the specified format; otherwise, false is returned.</p>
Syntax	<code>\$_isToday('date'[, 'format', is_relative])</code>

Parameters	<ul style="list-style-type: none"> <code>date</code> Required; Date to compare to today's date. <code>format</code> Optional; Format of today's date. Default is yyyy-MM-dd. <code>is_relative</code> Optional; Specification (true or false) for whether today's date is relative to the trigger/launch time of the task instance. Default is false.
Examples	<pre> \${_isToday('Wed', 'E')} → true \${_isToday('\${_dayOfMonth(1,"",true)}')} → false </pre>

9.12.7.2 Resolve to Current Date and Time

Description	Resolves to the current date and time.
Syntax	<code>\${_date(['format', day_offset, hour_offset, minute_offset])}</code>
Parameters	<ul style="list-style-type: none"> <code>format</code> Optional; Date format. Default format is yyyy-MM-dd HH:mm:ss Z. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html <code>day_offset</code> Optional; +/- number of days to offset. <code>hour_offset</code> Optional; +/- number of hours to offset. <code>minute_offset</code> Optional; +/- number of minutes to offset.
Examples	<pre> \${_date} → 2024-10-16 07:26:34 -0700 \${_date()} → 2024-10-16 07:27:21 -0700 \${_date('yyyy-MM-dd', 5)} → 2024-10-21 \${_date('yyyy-MM-dd HH:mm:ss', -2, -1)} → 2024-10-14 06:30:04 \${_date("", 0, 0, 10)} → 2024-10-16 07:40:28 -0700 </pre>

9.12.7.3 Resolve to Current Date and Time (Advanced)

Description	Resolves to the current date and time.
Syntax	<code>\${_dateadv(['format', year_offset, month_offset, day_offset, hour_offset, minute_offset])}</code>

Parameters	<ul style="list-style-type: none"> <code>format</code> Date format. Default format is yyyy-MM-dd HH:mm:ss Z. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html <code>year_offset</code> Optional; +/- number of years to offset. <code>month_offset</code> Optional; +/- number of months to offset. <code>day_offset</code> Optional; +/- number of days to offset. <code>hour_offset</code> Optional; +/- number of hours to offset. <code>minute_offset</code> Optional; +/- number of minutes to offset.
Examples	<pre> \${_dateadv} → 2024-10-16 07:31:58 -0700 \${_dateadv('yyyy-MMM', -1)} → 2023-Oct \${_dateadv('yyyy-MMM', 0, -1)} → 2024-Sep </pre>

9.12.7.4 Resolve to Current Unix Epoch Time

Description	Resolves to the current time in milliseconds since Wed Dec 31 1969 19:00:00 GMT-0500 (EST) – the start of Unix epoch time .
Syntax	<code>\${_currentTimeMillis}</code>
Parameters	n/a
Example	<pre> \${_currentTimeMillis} → 1729089236350 </pre>

9.12.7.5 Return Date with Offsets

Description	<p>Returns the date after applying offsets. Optionally, can specify the output format.</p> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Whether a holiday is treated as a business day or a non-business day is specified by the Exclude Holidays for Business Days Universal Controller system property.</p> </div>
Syntax	<code>\${_formatDate(['date_time', 'format', day_offset, use_business_days, hour_offset, minute_offset, timezone])}</code>

<p>Parameters</p>	<ul style="list-style-type: none"> <code>date_time</code> Date and time in any of the following formats: <ul style="list-style-type: none"> <code>yyyy-MM-dd</code> <code>yyyy-MM-dd HH:mm</code> <code>yyyy-MM-dd HH:mm:ss</code> <code>yyyy-MM-dd HH:mm Z</code> <code>yyyy-MM-dd HH:mm:ss Z.</code> <code>yyyy-MM-dd HH:mm:ss.SSS</code> <code>yyyy-MM-dd HH:mm:ss.SSS Z.</code> Default is the current date and time. <code>format</code> Format of returned date. If <code>date_time</code> specifies a time, the default format is <code>yyyy-MM-dd HH:mm</code>; otherwise, the default format is <code>yyyy-MM-dd</code>. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html <code>day_offset</code> +/- number of days to offset. <code>use_business_days</code> Specification (<code>true</code> or <code>false</code>) for whether <code>day_offset</code> is for business days. Default is <code>false</code>. <code>hour_offset</code> +/- number of hours to offset. <code>minute_offset</code> +/- number of minutes to offset. <code>timezone</code> Time Zone that the date is formatted in.
<p>Example</p>	<pre> \${_formatDate} → 2018-08-24 15:37 \${_formatDate()} → 2018-08-24 15:37 \${_formatDate("MMddyyyy",5)} → 08292018 \${_formatDate("2018-09-01",5)} → 2018-09-06 \${_formatDate("2018-09-01",-5)} → 2018-08-27 \${_formatDate("2018-10-13 12:13:14 -0400",5,true,0,0,'Australia/Sydney')} → 2018-10-14 03:13:14 +1100 </pre>

9.12.7.6 Return Date with Offsets (Advanced)

<p>Description</p>	<p>Returns the date after applying offsets. Optionally, can specify the output format.</p> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Whether a holiday is treated as a business day or a non-business day is specified by the Exclude Holidays for Business Days Universal Controller system property.</p> </div>
<p>Syntax</p>	<pre> \${_formatDateAdv(['date_time', 'format', year_offset, month_offset, day_offset, use_business_days, hour_offset, minute_offset, timezone])} </pre>

Parameters	<ul style="list-style-type: none"> • <code>date_time</code> Date and time in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z.</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z.</code> • <code>format</code> Default is the current date and time. Format of returned date. If <code>date_time</code> specifies a time, the default format is <code>yyyy-MM-dd HH:mm</code>; otherwise, the default format is <code>yyyy-MM-dd</code>. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html • <code>year_offset</code> Optional; +/- number of years to offset. • <code>month_offset</code> Optional; +/- number of months to offset. • <code>day_offset</code> Optional; +/- number of days to offset. • <code>use_business_days</code> Optional; Specification (true or false) for whether <code>day_offset</code> is for business days. Default is false. • <code>hour_offset</code> +/- number of hours to offset. • <code>minute_offset</code> +/- number of minutes to offset. • <code>timezone</code> Time Zone that the date is formatted in.
Examples	<pre> \${_formatDateAdv} → 2012-08-24 15:55 \${_formatDateAdv()} → 2012-08-24 15:55 \${_formatDateAdv('','MMddyyyy',1)} → 08242013 \${_formatDateAdv('2012-09-01','',0,1)} → 2012-10-01 \${_formatDateAdv('2012-09-01','',0,-1)} → 2012-08-01 \${_formatDateAdv('2012-09-01','',0,0,5,false)} → 2012-09-06 </pre>

9.12.7.7 Return Date with Time Zone

Description	Returns the Date and Time in another time zone.
Syntax	<code>\${_formatDateTz('date_time', 'target_time_zone'[, 'output_format'])}</code>

Parameters	<ul style="list-style-type: none"> <code>date_time</code> Date and time in any of the following formats: <ul style="list-style-type: none"> yyyy-MM-dd HH:mm yyyy-MM-dd HH:mm:ss yyyy-MM-dd HH:mm Z yyyy-MM-dd HH:mm:ss Z. yyyy-MM-dd HH:mm:ss.SSS yyyy-MM-dd HH:mm:ss.SSS Z. <code>target_time_zone</code> Time zone in which to format the date and time. <code>output_format</code> Optional; Format of the date and time in the other time zone.
Examples	<pre> \${_formatDateTz('2018-10-13 01:02:03 -0400', 'Australia/Sydney')} → 2018-10-13 16:02:03 +1100 \${_formatDateTz('2018-10-13 01:02:03 -0400', 'Australia/Sydney','yyyy-MM-dd HH:mm Z')} → 2018-10-13 16:02 +1100 \${_formatDateTz('\${ops_launch_time}', '\${ops_time_zone}')} = \${_formatDateTz('2018-06-13 15:35:00 -0400', 'Europe/Berlin')} → 2018-06-13 21:35:00 +0200 </pre>

9.12.7.8 Return Day of Week

Description	Returns the day of week for the specified date as a number.
Syntax	<code>\$_dayOfWeek(['date', 'first_dow', first_dow_value])</code>
Parameters	<ul style="list-style-type: none"> <code>date</code> Date in any of the following formats: <ul style="list-style-type: none"> yyyy-MM-dd yyyy-MM-dd HH:mm yyyy-MM-dd HH:mm:ss yyyy-MM-dd HH:mm Z yyyy-MM-dd HH:mm:ss Z. yyyy-MM-dd HH:mm:ss.SSS yyyy-MM-dd HH:mm:ss.SSS Z. Default is the current date. <code>first_dow</code> Optional; Specification for whether the week starts on Sunday or Monday. Values are sun and mon (not case-sensitive). Default is sun. <code>first_dow_value</code> Optional; Starting value for the first day of week. Value must be a non-negative number. Default is 1.
Example	<pre> \${_dayOfWeek} → 6 \${_dayOfWeek()} → 6 \${_dayOfWeek('2012-07-04')} → 4 \${_dayOfWeek('2012-07-04', 'mon')} → 3 </pre>

9.12.7.9 Return Days between Dates

Description	<p>Returns the number of days between date1 and date2.</p> <ul style="list-style-type: none"> • If return value is > 0, date2 is after date1. • If return value is < 0, date2 is before date1. • If return value is 0, date1 is equal to date2. <p>The start date is inclusive, but the end date is not.</p>
Syntax	<code>\$_daysBetween('date1', 'date2')</code>
Parameters	<ul style="list-style-type: none"> • <code>date1</code> Required. • <code>date2</code> Required. <p>date1 and date2 are specified in any of the following formats:</p> <ul style="list-style-type: none"> • yyyy-MM-dd • yyyy-MM-dd HH:mm • yyyy-MM-dd HH:mm:ss • yyyy-MM-dd HH:mm Z • yyyy-MM-dd HH:mm:ss Z. • yyyy-MM-dd HH:mm:ss.SSS • yyyy-MM-dd HH:mm:ss.SSS Z.
Example	<pre>\$_daysBetween('2012-08-01','2012-09-01')} → 31</pre>

9.12.7.10 Return Non-Business Day of Month

Description	<p>Returns the Nth non-business day of month for the month of the date specified. Optionally, can start from the end of the month.</p> <p>Whether a holiday is treated as a business day or a non-business day is specified by the Exclude Holidays for Business Days Universal Controller system property.</p>
Syntax	<code>\$_nonBusinessDayOfMonth(index, ['date', 'format', reverse])</code>

Parameters	<ul style="list-style-type: none"> • <code>index</code> Required; Nth non-business day of month. • <code>date</code> Date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z</code> <p>Default is the current date.</p> <ul style="list-style-type: none"> • <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html • <code>reverse</code> Optional; Specification (true or false) for starting from the end of the month. Default is <code>false</code>.
Examples	<pre> \${_nonBusinessDayOfMonth(1)} → 2012-08-04 \${_nonBusinessDayOfMonth(1,'2012-09-01')} → 2012-09-01 \${_nonBusinessDayOfMonth(1,'2012-09-01','true')} → 2012-09-30 </pre>

9.12.7.11 Return Nth Business Day of Month

Description	<p>Returns the Nth business day of month for the month of the date specified. Optionally, can start from the end of the month.</p> <div style="border: 1px solid yellow; padding: 10px; margin-top: 10px;"> <p>Whether a holiday is treated as a business day or a non-business day is specified by the Exclude Holidays for Business Days Universal Controller system property.</p> </div>
Syntax	<pre> \${_businessDayOfMonth(index, ['date', 'format', reverse])} </pre>

Parameters	<ul style="list-style-type: none"> • <code>index</code> Required; Nth business day of month. • <code>date</code> Date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z</code> <p>Default is the current date.</p> <ul style="list-style-type: none"> • <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. For details on the <code>format</code> parameter, see https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html • <code>reverse</code> Optional; Specification (<code>true</code> or <code>false</code>) for starting from the end of the month. Default is <code>false</code>.
Examples	<pre> \${_businessDayOfMonth(1)} → 2012-08-01 \${_businessDayOfMonth(1,'2012-09-01')} → 2012-09-04 \${_businessDayOfMonth(1,'2012-09-01',",true")} → 2012-09-28 </pre>

9.12.7.12 Return Nth Day of Month

Description	Returns the Nth day of month for the month of the date specified. Optionally, can start from the end of the month.
Syntax	<code>\${_dayOfMonth(index, ['date', 'format', reverse])}</code>
Parameters	<ul style="list-style-type: none"> • <code>index</code> Required; Nth day of month. • <code>date</code> Date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z</code> <p>Default is the current date.</p> <ul style="list-style-type: none"> • <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. • <code>reverse</code> Optional; Specification (<code>true</code> or <code>false</code>) for starting from the end of the month. Default is <code>false</code>.

Examples	<pre> \${_dayOfMonth(5)} → 2012-08-05 \${_dayOfMonth(15, '2012-09-01', 'MM/dd/yyyy')} → 09/15/2012 \${_dayOfMonth(1, '2012-09-01', "", true)} → 2012-09-30 </pre>
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9.12.7.13 Return Nth Day of Week in Month

Description	<p>Returns the Nth day of week in month for the month of the date specified. Optionally, can start from the end of the month.</p> <ul style="list-style-type: none"> If the index is less than 1 or greater than 5., the function will remain unresolved. If the date for the nth day-of-week is not in the same month as the specified date, the function will remain unresolved.
Syntax	<pre> \${_dayOfWeekInMonth(index, dow, ['date', 'format', reverse])} </pre>
Parameters	<ul style="list-style-type: none"> index Required; Nth day of week in month. dow Required; day of week. Values are <code>sun</code>, <code>mon</code>, <code>tue</code>, <code>wed</code>, <code>thu</code>, <code>fri</code>, and <code>sat</code> (not case-sensitive). date Optional; date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> yyyy-MM-dd yyyy-MM-dd HH:mm yyyy-MM-dd HH:mm:ss yyyy-MM-dd HH:mm Z yyyy-MM-dd HH:mm:ss Z. yyyy-MM-dd HH:mm:ss.SSS yyyy-MM-dd HH:mm:ss.SSS Z. Default is the current date. format Optional; Format of returned date. Default is yyyy-MM-dd. For details on the format parameter, see SimpleDateFormat (Java Platform SE 8) reverse Optional; Specification (true or false) for starting from the end of the month. Default is false.
Examples	<pre> \${_dayOfWeekInMonth(1, 'tue')} → 2024-07-02 \${_dayOfWeekInMonth(2, 'wed', '2024-09-01')} → 2024-09-11 \${_dayOfWeekInMonth(1, 'sun', '2024-09-01', "", true)} → 2024-09-29 </pre>

9.12.7.14 Return Nth Day of Week in Month (Advanced)

Description	<p>Returns the Nth day of week in month, after applying offsets, for the month of the date specified. Optionally, can start from the end of the month.</p> <ul style="list-style-type: none"> If the index is less than 1 or greater than 5., the function will remain unresolved. If the date for the nth day-of-week is not in the same month as the specified date, the function will remain unresolved.
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Syntax	<code>\${_dayOfWeekInMonthAdv(index, dow, ['date', 'format', reverse, year_offset, month_offset, day_offset, use_business_days]) }</code>
Parameters	<ul style="list-style-type: none"> <code>index</code> Required; Nth day of week in month. <code>dow</code> Required; day of week. Values are <code>sun</code>, <code>mon</code>, <code>tue</code>, <code>wed</code>, <code>thu</code>, <code>fri</code>, and <code>sat</code> (not case-sensitive). <code>date</code> Optional; date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> <code>yyyy-MM-dd</code> <code>yyyy-MM-dd HH:mm</code> <code>yyyy-MM-dd HH:mm:ss</code> <code>yyyy-MM-dd HH:mm Z</code> <code>yyyy-MM-dd HH:mm:ss Z.</code> <code>yyyy-MM-dd HH:mm:ss.SSS</code> <code>yyyy-MM-dd HH:mm:ss.SSS Z.</code> Default is the current date. <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. For details on the format parameter, see SimpleDateFormat (Java Platform SE 8) <code>reverse</code> Optional; Specification (true or false) for starting from the end of the month. Default is false. <code>year_offset</code> Optional; +/- number of years to offset. <code>month_offset</code> Optional; +/- number of months to offset. <code>day_offset</code> Optional; +/- number of days to offset. <code>use_business_days</code> Optional; Specification (true or false) for whether <code>day_offset</code> is for business days. Default is false.
Examples	<pre> \${_dayOfWeekInMonthAdv(1, 'tue', "", false, 1) --> 2026-07-02 \${_dayOfWeekInMonthAdv(2, 'wed', '2025-09-15', "", false, 0, -2) --> 2025-09-08 \${_dayOfWeekInMonthAdv(1, 'sun', '2025-09-15', "", true, 0, 0, 2, false) --> 2025-09-30 </pre>

9.12.7.15 Return Nth Weekday of Month

Description	Returns the Nth weekday (i.e. Monday-Friday) of month for the month of the date specified. Optionally, can start from the end of the month.
Syntax	<code>\${_weekdayOfMonth(index, ['date', 'format', reverse]) }</code>

Parameters	<ul style="list-style-type: none"> • <code>index</code> Required; Nth weekday of month. • <code>date</code> Optional; date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z.</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z.</code> • <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. For details on the format parameter, see SimpleDateFormat (Java Platform SE 8) • <code>reverse</code> Optional; Specification (true or false) for starting from the end of the month. Default is <code>false</code>. <p>Default is the current date.</p>
Examples	<pre> \${_weekdayOfMonth(1)} → 2024-07-01 \${_weekdayOfMonth(2,'2024-09-01')} → 2024-09-03 \${_weekdayOfMonth(1,'2024-09-01','',true)} → 2024-09-30 </pre>

9.12.7.16 Return Nth Weekday of Month (Advanced)

Description	Returns the Nth weekday (i.e. Monday-Friday) of month, after applying offsets, for the month of the date specified. Optionally, can start from the end of the month.
Syntax	<code> \${_weekdayOfMonthAdv(index, ['date', 'format', reverse, year_offset, month_offset, day_offset, use_business_days]) </code>

Parameters	<ul style="list-style-type: none"> • <code>index</code> Required; Nth weekday of month. • <code>date</code> Optional; date (and time) is specified in any of the following formats: <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z.</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z.</code> Default is the current date. • <code>format</code> Optional; Format of returned date. Default is <code>yyyy-MM-dd</code>. For details on the format parameter, see SimpleDateFormat (Java Platform SE 8) • <code>reverse</code> Optional; Specification (true or false) for starting from the end of the month. Default is false. • <code>year_offset</code> Optional; +/- number of years to offset. • <code>month_offset</code> Optional; +/- number of months to offset. • <code>day_offset</code> Optional; +/- number of days to offset. • <code>use_business_days</code> Optional; Specification (true or false) for whether <code>day_offset</code> is for business days. Default is false.
Examples	<pre> \${_weekdayOfMonthAdv(2, '2025-02-15', "", false, 1) --> 2026-02-04 \${_weekdayOfMonthAdv(1, '2025-05-15', "", true, 0, -2) --> 2025-03-30 \${_weekdayOfMonthAdv(6, '2025-09-15', "", false, 0, 0, 2, false) --> 2025-09-10 </pre>

9.12.7.17 Return Number of Business Days between Dates

Description	<p>Returns the number of business days between <code>date1</code> and <code>date2</code>.</p> <ul style="list-style-type: none"> • If return value is <code>> 0</code>, <code>date2</code> is after <code>date1</code>. • If return value is <code>< 0</code>, <code>date2</code> is before <code>date1</code>. • If return value is <code>0</code>, <code>date1</code> is equal to <code>date2</code>. <p>The start date is inclusive, but the end date is not.</p> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>Whether a holiday is treated as a business day or a non-business day is specified by the Exclude Holidays for Business Days Universal Controller system property.</p> </div>
Syntax	<pre> \${_businessDaysBetween('date1', 'date2')} </pre>

Parameters	<ul style="list-style-type: none"> • <code>date1</code> Required. • <code>date2</code> Required. <p><code>date1</code> and <code>date2</code> are specified in any of the following formats:</p> <ul style="list-style-type: none"> • <code>yyyy-MM-dd</code> • <code>yyyy-MM-dd HH:mm</code> • <code>yyyy-MM-dd HH:mm:ss</code> • <code>yyyy-MM-dd HH:mm Z</code> • <code>yyyy-MM-dd HH:mm:ss Z</code> • <code>yyyy-MM-dd HH:mm:ss.SSS</code> • <code>yyyy-MM-dd HH:mm:ss.SSS Z</code>
Example	<pre>\$_businessDaysBetween('2012-08-01','2012-09-01') → 23</pre>

9.12.8 Mathematical Functions

9.12.8.1 Add

Description	Return the sum of the augend added with the addend.
Syntax	<code>\$_add(augend, addend)</code>
Parameters	<ul style="list-style-type: none"> • <code>augend</code> Integer to which the <code>addend</code> is being added. • <code>addend</code> Integer being added to the <code>augend</code>.
Example	<pre>\$_add('77', '33') → 110</pre> <p>Using Variables for augend and addend (<code>\$_augend = 17</code>, <code>\$_addend = 5</code>):</p> <pre>\$_add('\$_augend','\$_addend') → 22</pre>

9.12.8.2 Divide

Description	Return the quotient of the dividend divided by divisor.
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Syntax	<code>\$_divide(dividend, divisor)</code>
Parameters	<ul style="list-style-type: none"> <code>dividend</code> Integer being divided by the <code>divisor</code>. <code>divisor</code> Integer being used to divide the <code>dividend</code>.
Example	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <code>\$_divide('7','20') → 0</code> <code>\$_divide('20','7') → 2</code> <code>\$_divide('20','5') → 4</code> </div> <p>Using Variables for dividend and divisor (<code>\$(dividend) = 100</code>, <code>\$(divisor) = 5</code>)</p> <div style="border: 1px solid black; padding: 5px;"> <code>\$_divide('\$(dividend)','\$(divisor)') → 20</code> </div>

9.12.8.3 Multiply

Description	Return the product of the multiplicand multiplied with the multiplier.
Syntax	<code>\$_multiply(multiplicand, multiplier)</code>
Parameters	<ul style="list-style-type: none"> <code>multiplicand</code> Integer being multiplied by the <code>multiplier</code>. <code>multiplier</code> Integer being used to multiply the <code>multiplicand</code>.
Example	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <code>\$_multiply('7','20') → 140</code> </div> <p>Using Variables for multiplicand and multiplier (<code>\$(multiplicand) = 100</code>, <code>\$(multiplier) = 5</code>):</p> <div style="border: 1px solid black; padding: 5px;"> <code>\$_multiply('\$(multiplicand)','\$(multiplier)') → 500</code> </div>

9.12.8.4 Return Absolute Value

Description	Return the absolute value of the parameter.
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Syntax	<code>{_abs(parameter)}</code>
Parameters	<ul style="list-style-type: none"> <code>parameter</code> Integer (positive or negative value).
Example	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> $\\${_abs}(-1200) \rightarrow 1200$ $\\${_abs}(1200) \rightarrow 1200$ </div> <p>Using Variables for parameter ($\\${parameter} = -100$):</p> <div style="border: 1px solid black; padding: 5px;"> $\\${_abs}(\\${parameter}) \rightarrow 100$ </div>

9.12.8.5 Return Modulo

Description	Return the modulo (remainder) of the dividend divided by divisor.
Syntax	<code>\$_mod(dividend, divisor)</code>
Parameters	<ul style="list-style-type: none"> <code>dividend</code> Integer being divided by the <code>divisor</code>. <code>divisor</code> Integer being used to divide the <code>dividend</code>.
Example	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> $\\${_mod}(10, 2) \rightarrow 0$ $\\${_mod}(10, 3) \rightarrow 1$ $\\${_mod}(70, 65) \rightarrow 5$ </div> <p>Using Variables for dividend and divisor ($\\${dividend} = 23$, $\\${divisor} = 5$):</p> <div style="border: 1px solid black; padding: 5px;"> $\\${_mod}(\\${dividend}, \\${divisor}) \rightarrow 3$ </div>

9.12.8.6 Subtract

Description	Return the difference of the subtrahend subtracted from the minuend.
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Syntax	<code>\$_subtract(minuend, subtrahend)</code>
Parameters	<ul style="list-style-type: none"> <code>minuend</code> Integer from which the <code>subtrahend</code> is being subtracted. <code>subtrahend</code> Integer being subtracted from the <code>minuend</code>.
Example	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <code>\$_subtract('77','33') → 44</code> <code>\$_subtract('33','77') → -44</code> </div> <p>Using Variables for minuend and subtrahend (<code>\$_minuend = 100</code>, <code>\$_subtrahend = 5</code>):</p> <div style="border: 1px solid black; padding: 5px;"> <code>\$_subtract('\$_minuend','\$_subtrahend') → 95</code> </div>

9.12.9 Other Task Functions

9.12.9.1 Business Services Membership

Description	Resolves to a delimited list of business service names the task instance is a member of.
Syntax	<code>\$_businessServices(['resultDelimiter'])</code>
Parameters	<ul style="list-style-type: none"> <code>resultDelimiter</code> Optional; Delimiter to use when concatenating business service names. If not specified, "," will be used.
Example	<p>If a task instance is a member of business services A, B, and C.</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <code>\$_businessServices()</code> → A, B, C </div> <div style="border: 1px solid black; padding: 5px;"> <code>\$_businessServices('\n')</code> → A B C </div> <p>If a task instance is not a member of any business service, the function will evaluate to empty.</p>

9.12.9.2 Execution User Email

Description	Resolves to the email of the execution user.
Syntax	<code>\${_executionUserEmail() }</code>
Parameters	n/a
Example	<p>If a task instance execution user's email address is <code>user@stonebranch.com</code>.</p> <pre> \${_executionUserEmail()} → user@stonebranch.com </pre>

9.12.10 Output Functions

(For Web Service output, see [Web Service Functions](#).)

Note

A prerequisite for the use of these functions is that **Automatic Output Retrieval** and **Wait For Output** are selected at task level, with the exception of the EXTENSION output type.

9.12.10.1 Output CSV Record Count

Description	<p>Resolves to the record count of CSV data for the specified output Type.</p> <ul style="list-style-type: none"> If the output record of the specified outputType cannot be found, the function will remain unresolved. If the output is blank, the function will resolve to 0.
Syntax	<code>\${_outputCsvRecordCount('<outputType>')}</code>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLIST.

Example	STDOUT
	<pre>"A","B","C","D" "E","F","G","H"</pre>
	Function
	<pre>\$_outputCsvRecordCount('STDOUT') → 2</pre>

9.12.10.2 Output CSV Record Value Count

Description	<p>Resolves to the count of CSV data for the specified record index of the specified outputType.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0
Syntax	<pre>\$_outputCsvRecordValueCount('outputType', recordIndex)</pre>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>recordIndex</code> Required; Zero-based record index number.
Example	<p>STDOUT</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_outputCsvRecordValueCount('STDOUT','1') → 4</pre>

9.12.10.3 Output CSV Record Value

Description	<p>Resolves to the value of CSV data for the specified record index & value index of the specified outputType.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<code>\$_outputCsvRecordValue('outputType', recordIndex, valueIndex)</code>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>recordIndex</code> Required; Zero-based record index number. • <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>STDOUT</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_outputCsvRecordValue('STDOUT','1','2') → G</pre>

9.12.10.4 Output TSV Record Count

Description	<p>Resolves to the record count of TSV data for the specified outputType value.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0.
Syntax	<code>\$_outputTsvRecordCount(<outputType>)</code>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Name of the variable.

Example	STDOUT
	<pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre>
	Function
	<pre>\$_outputTsvRecordCount('STDOUT') → 2</pre>

9.12.10.5 Output TSV Record Value Count

Description	Resolves to the count of TSV data for the specified record index of the specified outputType. <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0.
Syntax	<code>\$_outputTsvRecordValueCount('outputType', recordIndex)</code>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLIST. • <code>recordIndex</code> Required; Zero-based record index number.
Example	STDOUT
	<pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre>
	Function
	<pre>\$_outputTsvRecordValueCount('STDOUT','1') → 4</pre>

9.12.10.6 Output TSV Record Value

Description	Resolves to the value of TSV data for the specified record index & value index of the specified outputType. <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<code>\$_outputTsvRecordValue('outputType', recordIndex, valueIndex)</code>

Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>recordIndex</code> Required; Zero-based record index number. • <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>STDOUT</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\${_outputTsvRecordValue('STDOUT','1','2')} → G</pre>

9.12.10.7 Output CSV Record Count From Task

Description	<p>Resolves to the record count of CSV output data, of the specified outputType, of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0.
Syntax	<pre>\${_outputCsvRecordCountFromTask('siblingName', 'outputType')}</pre>
Parameters	<ul style="list-style-type: none"> • <code>siblingName</code> Required; Name of a sibling task instance. • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG.
Example	<p>STDOUT</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\${_outputCsvRecordCountFromTask('task-2','STDOUT')} → 2</pre>

9.12.10.8 Output CSV Record Value Count From Task

Description	<p>Resolves to the value count of CSV output data, of the specified outputType, & recordIndex of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0.
Syntax	<code>\$_outputCsvRecordValueCountFromTask('siblingName','outputType','recordIndex')</code>
Parameters	<ul style="list-style-type: none"> • <code>siblingName</code> Required; Name of a sibling task instance. • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>recordIndex</code> Required; Zero-based record index number.
Example	<p>STDOUT</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_outputCsvRecordValueCountFromTask('task-2','STDOUT','1') → 4</pre>

9.12.10.9 Output CSV Record Value From Task

Description	<p>Resolves to the value of CSV output data, of the specified outputType, recordIndex & valueIndex of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<code>\$_outputCsvRecordValueFromTask('siblingName','outputType', recordIndex, valueIndex)</code>

Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>recordIndex</code> Required; Zero-based record index number. <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>STDOUT</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_outputCsvRecordValueFromTask('task-2','STDOUT','1','2')} → G</pre>

9.12.10.10 Output TSV Record Count From Task

Description	<p>Resolves to the record count of TSV output data, of the specified outputType, of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record of the specified outputType cannot be found, the function will remain unresolved. If the output is blank, the function will resolve to 0.
Syntax	<pre>\$_outputTsvRecordCountFromTask('siblingName','outputType')</pre>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Name of the variable.
Example	<p>STDOUT</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_outputTsvRecordCountFromTask('task-2','STDOUT')} → 2</pre>

9.12.10.11 Output TSV Record Value Count From Task

Description	<p>Resolves to the value count of TSV output data, of the specified outputType, & recordIndex of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0.
Syntax	<code>\$_outputTsvRecordValueCountFromTask('siblingName','outputType','recordIndex')</code>
Parameters	<ul style="list-style-type: none"> • <code>siblingName</code> Required; Name of a sibling task instance. • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>recordIndex</code> Required; Zero-based record index number.
Example	<p>STDOUT</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_outputTsvRecordValueCountFromTask('task-1','STDOUT','1') → 4</pre>

9.12.10.12 Output TSV Record Value From Task

Description	<p>Resolves to the value of TSV output data, of the specified outputType, recordIndex & valueIndex of the task instance specified by the siblingName parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<code>\$_outputTsvRecordValueFromTask('siblingName','outputType', recordIndex, valueIndex)</code>

Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>recordIndex</code> Required; Zero-based record index number. <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>STDOUT</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_outputTsvRecordValueFromTask('task-2','STDOUT','1','2')} → G</pre>

9.12.10.13 Output Delimited Value Count

Description	<p>Resolves to the count of comma delimited output data, of the specified outputType, of the task instance that is resolving the function.</p> <ul style="list-style-type: none"> If the output record of the specified outputType cannot be found, the function will remain unresolved. If the output is blank, the function will resolve to 0.
Syntax	<pre>\$_outputDelimitedValueCount('outputType', ['delimiter', splitPreserveAllTokens])</pre>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (.). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.
Example	<p>STDOUT</p> <pre>A:::C:D</pre> <p>Function</p> <pre>\$_outputDelimitedValueCount('STDOUT', '::') → 4 \$_outputDelimitedValueCount('STDOUT', '::', true) → 5</pre>

9.12.10.14 Output Delimited Value

Description	<p>Resolves to the value of specified valueIndex for comma delimited output data, of the specified outputType, of the task instance that is resolving the function.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<pre>\$_outputDelimitedValue('outputType', valueIndex, ['delimiter', splitPreserveAllTokens])</pre>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>valueIndex</code> Required; Zero-based value index number. • <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (,). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. • <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.
Example	<p>STDOUT</p> <pre>A:B::C:D</pre> <p>Function</p> <pre>\$_outputDelimitedValue('STDOUT','2',',') → C \$_outputDelimitedValue('STDOUT','2',',', true) → "</pre>

9.12.10.15 Output Delimited Value Count From Task

Description	<p>Resolves to the count of comma delimited output data, of the specified outputType, of the task instance specified by the siblingName parameter.</p> <ul style="list-style-type: none"> • If the output record of the specified outputType cannot be found, the function will remain unresolved. • If the output is blank, the function will resolve to 0.
Syntax	<pre>\$_outputDelimitedValueCountFromTask('siblingName','outputType', ['delimiter', splitPreserveAllTokens])</pre>

Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (.). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.
Example	<p>STDOUT</p> <pre>A:B::C:D</pre> <p>Function</p> <pre> \${_outputDelimitedValueCountFromTask('task-2', 'STDOUT', ':') → 4 \${_outputDelimitedValueCountFromTask('task-2', 'STDOUT', ':', true)} → 5 </pre>

9.12.10.16 Output Delimited Value From Task

Description	<p>Resolves to the value of specified valueIndex for comma delimited output data, of the specified outputType, of the task instance specified by the siblingName parameter.</p> <ul style="list-style-type: none"> If the output record of the specified outputType cannot be found, the function will remain unresolved. If the output is blank, the function will remain unresolved. If an index is invalid, the function will remain unresolved.
Syntax	<pre> \${_outputDelimitedValueFromTask('siblingName','outputType', valueIndex, ['delimiter', splitPreserveAllTokens])} </pre>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>valueIndex</code> Required; Zero-based value index number. <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (.). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.

Example	STDOUT
	A:B::C:D
Function	Function
	<pre> \${_outputDelimitedValueFromTask('task-2', 'STDOUT','2',':')} → C \${_outputDelimitedValueFromTask('task-2', 'STDOUT','2',':', true)} → " </pre>

9.12.10.17 Task Instance Output

Description	Resolves to the output data, of the specified <code>outputType</code> , of the task instance that is resolving the function. <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<code>\$_output('outputType'[, 'defaultValue'])</code>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>defaultValue</code> Optional; Default value to return if the output data is not found. Default is empty (").

9.12.10.18 Sibling Task Instance Output

Description	Resolves to the output data, of the specified <code>outputType</code> , of the task instance specified by the <code>siblingName</code> parameter. <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<code>\$_outputFromTask('siblingName', 'outputType'[, 'defaultValue'])</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>defaultValue</code> Optional; Default value to return if the output data is not found. Default is empty (").

9.12.10.19 Task Instance Output Number of Lines

Description	Resolves to the number of lines of output data, of the specified <code>outputType</code> , of the task instance that is resolving the function. <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<code>\$_outputNumberOfLines('outputType')</code>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG.
Example	<p>STDOUT</p> <pre>A B C</pre> <p>Function</p> <pre>\$_outputNumberOfLines('STDOUT') → 3</pre>

9.12.10.20 Sibling Task Instance Output Number of Lines

Description	Resolves to the number of lines of output data, of the specified <code>outputType</code> , of the task instance specified by the <code>siblingName</code> parameter. <ul style="list-style-type: none"> The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance. If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<code>\$_outputNumberOfLinesFromTask('siblingName', 'outputType')</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG.

Example	STDOUT
	<pre>A B C</pre>
	Function
	<pre>\$_outputNumberOfLinesFromTask('task-2', 'STDOUT') → 3</pre>

9.12.10.21 Task Instance Output by Specific Line(s)

Description	<p>Resolves to the specified line(s) of output data, of the specified <code>outputType</code>, of the task instance that is resolving the function.</p> <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<pre>\$_outputLines('outputType', startLine, numberOfLines[, 'defaultValue', 'resultDelimiter'])</pre>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>startLine</code> Required; Start line, where 1 is the first line and -1 is the last line. <code>numberOfLines</code> Required; Number of lines to return starting from the <code>startLine</code>. <code>defaultValue</code> Optional; Default value to return if no lines qualify. Default is empty ("") <code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.
Example	STDOUT
	<pre>A B C D</pre>
	Function
	<pre>\$_outputLines('STDOUT', 1, 2) → A B \$_outputLines('STDOUT', 1, 2, ",") → A,B</pre>

9.12.10.22 Sibling Task Instance Output by Specific Line(s)

Description	<p>Resolves to the specified line(s) of output data, of the specified <code>outputType</code>, of the task instance specified by the <code>siblingName</code> parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<pre>\$_outputLinesFromTask('siblingName', 'outputType', startLine, numberOfLines[, 'defaultValue', 'resultDelimiter'])</pre>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLIST. <code>startLine</code> Required; Start line, where 1 is the first line and -1 is the last line. <code>numberOfLines</code> Required; Number of lines to return starting from the <code>startLine</code>. <code>defaultValue</code> Optional; Default value to return if no lines qualify. Default is empty ("). <code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.
Example	<p>STDOUT</p> <pre>A B C D</pre> <p>Function</p> <pre>\$_outputLines('STDOUT', 1, 2) → A B \$_outputLinesFromTask('task2', 'STDOUT', 1, 2, ",") → A,B</pre>

9.12.10.23 Task Instance Output by Line(s) Matching Regular Expression

Description	Resolves to the line(s) of output data that match the specified regular expression, of the specified <code>outputType</code> , of the task instance that is resolving the function by specifying a regular expression. <ul style="list-style-type: none"> • The complete output line is returned. • If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<code>\$_outputLinesByRegex('outputType', 'regexPattern'[, maxCount, numberOfLinesBefore, numberOfLinesAfter, 'defaultValue', 'resultDelimiter'])</code>
Parameters	<ul style="list-style-type: none"> • <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. • <code>regexPattern</code> Required; Regular expression used for determining if a line matches. Regular expression must match the whole line (see Example, below). • <code>maxCount</code> Optional; Maximum number of matching lines to return. Default is 1. • <code>numberOfLinesBefore</code> Optional; Number of lines before each matching line to return along with the matching line. Default is 0. • <code>numberOfLinesAfter</code> Optional; Number of lines after each matching line to return along with the matching line. Default is 0. • <code>defaultValue</code> Optional; Default value to return if no lines match the regular expression. Default is empty (""). • <code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.
Example	STDOUT <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> Some_Text ABC=Some_String More_Text </div> Function <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <pre> \$_outputLinesByRegex('STDOUT', '^ABC=') → /* Returns empty (the whole line was not matched) */ \$_outputLinesByRegex('STDOUT', '^ABC=.*') → ABC=Some_String </pre> </div>

9.12.10.24 Sibling Task Instance Output by Line(s) Matching Regular Expression

Description	<p>Resolves to the line(s) of output data that match the specified regular expression, of the specified <code>outputType</code>, of the task instance specified by the <code>siblingName</code> parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record of the specified <code>outputType</code> cannot be found, the function will remain unresolved.
Syntax	<pre> \${_outputLinesByRegexFromTask('siblingName', 'outputType', 'regexPattern'[, maxCount, numberOfLinesBefore, numberOfLinesAfter, 'defaultValue', 'resultDelimiter'])} </pre>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>regexPattern</code> Required; Regular expression used for determining if a line matches. <code>maxCount</code> Optional; Maximum number of matching lines to return. Default is 1. <code>numberOfLinesBefore</code> Optional; Number of lines before each matching line to return along with the matching line. Default is 0. <code>numberOfLinesAfter</code> Optional; Number of lines after each matching line to return along with the matching line. Default is 0. <code>defaultValue</code> Optional; Default value to return if no lines match the regular expression. Default is empty (""). <code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.
Example	<p>STDOUT</p> <pre> Some_Text ABC=Some_String More_Text </pre> <p>Function</p> <pre> \${_outputLinesByRegexFromTask('task2', 'STDOUT', '^ABC=')} → /* Returns empty (the whole line was not matched) */ \${_outputLinesByRegexFromTask('task2', 'STDOUT', '^ABC=.*')} → ABC=Some_String </pre>

9.12.10.25 Task Instance Output By XPath

Description	<p>Resolves to the XML output data of the task instance that is resolving the function, corresponding to the evaluated XPath expression.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found, but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<code>\$_outputXPath('outputType', 'xpathExpression'[, 'defaultValue', 'delimiter', prettyPrint])}</code>
Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>xpathExpression</code> Required; XPath expression. https://www.w3schools.com/xml/xpath_intro.asp <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). <code>delimiter</code> Optional; If <code>xpathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not XML output will be pretty printed (indented). Default is false.
Example	<p>XML</p> <pre><message> <code>10</code> </message></pre> <p>Function</p> <pre>\$_outputXPath('STDOUT', '//code/text()')</pre> <p>Result</p> <pre>10</pre>

9.12.10.26 Sibling Task Instance Output By XPath

Description	<p>Resolves to the XML output data of the task instance specified by the <code>siblingName</code>, corresponding to the evaluated XPath expression.</p> <p>The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<code>\$_outputXPathFromTask('siblingName', 'outputType', 'xpathExpression'[, 'defaultValue', 'delimiter', prettyPrint])}</code>

Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>xPathExpression</code> Required; XPath expression. https://www.w3schools.com/xml/xpath_intro.asp <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). <code>delimiter</code> Optional; If <code>xPathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not XML output will be pretty printed (indented). Default is false.
Example	<p>XML</p> <pre><message> <code>10</code> </message></pre> <p>Function</p> <pre>\$_outputXPathFromTask('Sibling_With_XML_Output', 'STDOUT', '//code/text()')</pre> <p>Result</p> <pre>10</pre>

9.12.10.27 Task Instance Output By JsonPath

Description	<p>Resolves to the JSON output data of the task instance that is resolving the function, corresponding to the evaluated JsonPath expression.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value. <div style="border: 2px solid orange; padding: 10px; margin-top: 10px;"> <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p> </div>
Syntax	<pre>\$_outputJsonPath('outputType', 'pathExpression'[, 'defaultValue', 'delimiter', prettyPrint])</pre>

Parameters	<ul style="list-style-type: none"> outputType Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. PathExpression Required; JsonPath expression. https://github.com/json-path/Jsonpath defaultValue Optional; Default value to return if the result is not found. Default is empty (""). delimiter Optional; If pathExpression evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). prettyPrint Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>JSON</p> <pre>{ "code": 10 }</pre> <p>Function</p> <pre>\$_outputJsonPath('STDOUT', '\$.code')</pre> <p>Result</p> <pre>10</pre>

9.12.10.28 Sibling Task Instance Output By JsonPath

Description	<p>Resolves to the JSON output data of the task instance specified by the <code>siblingName</code>, corresponding to the evaluated JsonPath expression. The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value. <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p> </div>
Syntax	<pre>\$_outputJsonPathFromTask('siblingName', 'outputType', 'pathExpression'[, 'defaultValue', 'delimiter', 'prettyPrint'])</pre>

Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>PathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty (""). <code>delimiter</code> Optional; If <code>pathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>JSON</p> <pre>{ "code": 10 }</pre> <p>Function</p> <pre>\${_outputJsonPathFromTask('Sibling_With_JSON_Output', 'STDOUT', '\$.code')}</pre> <p>Result</p> <pre>10</pre>

9.12.10.29 Task Instance Output By JsonPath As Array

Description	<p>Resolves to the JSON output data of the task instance that is resolving the function, corresponding to the evaluated JsonPath expression.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value. <div style="border: 2px solid orange; padding: 10px; margin-top: 10px;"> <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p> </div>
Syntax	<pre>\${_outputJsonPathAsArray('outputType', 'pathExpression'[, 'defaultValue', prettyPrint])}</pre>

Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>PathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty (""). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>JSON</p> <pre>[{ "message" : "Hello", "code" : 10 }, { "message" : "World!", "code" : 20 }]</pre> <p>Function</p> <pre>\$_outputJsonPathAsArray('STDOUT', '\$[*].message', "", true)}</pre> <p>Result</p> <pre>["Hello", "World!"]</pre>

9.12.10.30 Sibling Task Instance Output By JsonPath As Array

Description	<p>Resolves to the JSON output data of the task instance specified by the <code>siblingName</code>, corresponding to the evaluated JsonPath expression.</p> <p>The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value. <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p> </div>
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Syntax	<code>\$_outputJsonPathFromTask('siblingName', 'outputType', 'pathExpression'[, 'defaultValue', prettyPrint])</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to resolve: STDOUT, STDERR, FILE, EXTENSION, or JOBLOG. <code>PathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>JSON</p> <pre>[{ "message": "Hello", "code": 10 }, { "message": "World!", "code": 20 }]</pre> <p>Function</p> <pre>\$_outputJsonPathFromArrayFromTask('Sibling_With_JSON_Output', 'STDOUT', '\$[*].message')</pre> <p>Result</p> <pre>["Hello","World!"]</pre>

9.12.10.31 Task Instance Output Path

Description	<p>Returns a token representing the path to a temporary file containing the specified task instance output data.</p> <ul style="list-style-type: none"> <code>\$(ops_output_path_<instanceId>_<outputType>_<fileExtension>)</code>
Syntax	<code>\$_outputPath('outputType'[, 'fileExtension'])</code>

Parameters	<ul style="list-style-type: none"> <code>outputType</code> Required; Type of output to create a temporary file for: STDOUT, STDERR, FILE, EXTENSION, JOBLOG, WEBSERVICE, SQL, STOREDPROC. <code>fileExtension</code> Optional; The extension to use for the temporary file. Can be a maximum of 10 characters. <ul style="list-style-type: none"> For SQL and STOREDPROC <code>outputType</code>, the result set is translated to comma-separated values (csv), or tab-separated values (tsv), and, therefore, only csv (default) and tsv are supported file extensions. For any other <code>outputType</code>, the default file extension is txt. 								
Example	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center; vertical-align: top;">1 2</td> <td> <pre>application.exe -file \${_outputPath('STDOUT')} → application.exe -file \$ (ops_output_path_1638302212442528629FTPBE4AJQV2FT_stdout_txt)</pre> </td> </tr> <tr> <td style="width: 50px; text-align: center; vertical-align: top;">1 2</td> <td> <pre>application.exe -file \${_outputPath('SQL')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_csv)</pre> </td> </tr> <tr> <td style="width: 50px; text-align: center; vertical-align: top;">1 2</td> <td> <pre>application.exe -file \${_outputPath('SQL', 'tsv')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_tsv)</pre> </td> </tr> <tr> <td style="width: 50px; text-align: center; vertical-align: top;">1 2</td> <td> <pre>application.exe -file \${_outputPath('EXTENSION', 'json')} → application.exe -file \$ (ops_output_path_16395032122941876710AI9SM79CNC2V_extension_json)</pre> </td> </tr> </table>	1 2	<pre>application.exe -file \${_outputPath('STDOUT')} → application.exe -file \$ (ops_output_path_1638302212442528629FTPBE4AJQV2FT_stdout_txt)</pre>	1 2	<pre>application.exe -file \${_outputPath('SQL')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_csv)</pre>	1 2	<pre>application.exe -file \${_outputPath('SQL', 'tsv')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_tsv)</pre>	1 2	<pre>application.exe -file \${_outputPath('EXTENSION', 'json')} → application.exe -file \$ (ops_output_path_16395032122941876710AI9SM79CNC2V_extension_json)</pre>
1 2	<pre>application.exe -file \${_outputPath('STDOUT')} → application.exe -file \$ (ops_output_path_1638302212442528629FTPBE4AJQV2FT_stdout_txt)</pre>								
1 2	<pre>application.exe -file \${_outputPath('SQL')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_csv)</pre>								
1 2	<pre>application.exe -file \${_outputPath('SQL', 'tsv')} → application.exe -file \$ (ops_output_path_1639503212294078671DNPMULGSEVMHT_sql_tsv)</pre>								
1 2	<pre>application.exe -file \${_outputPath('EXTENSION', 'json')} → application.exe -file \$ (ops_output_path_16395032122941876710AI9SM79CNC2V_extension_json)</pre>								

9.12.10.32 Sibling Task Instance Output Path

Description	Returns a token representing the path to a temporary file containing the specified sibling task instance output data. <ul style="list-style-type: none"> <code>\$(ops_output_path_<instanceId>_<outputType>_<fileExtension>)</code>
Syntax	<code>`\${_outputPathFromTask('siblingName', 'outputType'[, 'fileExtension'])}`</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>outputType</code> Required; Type of output to create a temporary file for: STDOUT, STDERR, FILE, EXTENSION, JOBLOG, WEBSERVICE, SQL, STOREDPROC. <code>fileExtension</code> Optional; The extension to use for the temporary file. Can be a maximum of 10 characters. <ul style="list-style-type: none"> For SQL and STOREDPROC <code>outputType</code>, the result set is translated to comma-separated values (csv), or tab-separated values (tsv), and, therefore, only csv (default) and tsv are supported file extensions. For any other <code>outputType</code>, the default file extension is txt.

Example	
	<pre> 1 application.exe -file \${_outputPathFromTask('Sibling_Instance_Name', 'STDERR')} 2 → application.exe -file \$ (ops_output_path_1639503212294128671YL1B04U30T55P_stderr_txt) </pre>
	<pre> 1 application.exe -file \${_outputPathFromTask('Sibling_Instance_Name', 'STOREDPROC')} 2 → application.exe -file \$ (ops_output_path_1639503212294197671Q13UV8MSH6355_storedproc_csv) </pre>
	<pre> 1 application.exe -file \${_outputPathFromTask('Sibling_Instance_Name', 'STOREDPROC', 'tsv')} 2 → application.exe -file \$ (ops_output_path_1639503212294197671Q13UV8MSH6355_storedproc_tsv) </pre>
	<pre> 1 application.exe -file \${_outputPathFromTask('Sibling_Instance_Name', 'WEBSERVICE', 'json')} 2 → application.exe -file \$ (ops_output_path_1639503212294088671CAWMP3VNQ468B_webservice_json) </pre>

9.12.11 SAP Connection Functions

9.12.11.1 Returns Property of an SAP Connection

Description	Returns a token representing the property associated with an SAP connection
Syntax	<code>\${_sapConnection('<sap_connection_name>', '<property_name>')}</code>

Parameters	<ul style="list-style-type: none"> • <code>sap_connection_name</code> Required; Name of the SAP Connection. • <code>property_name</code> Required; Name of the SAP Connection property. <ul style="list-style-type: none"> • <code>description</code> • <code>name</code> • <code>sap_ashost</code> • <code>sap_client</code> • <code>sap_connection_type</code> • <code>sap_group</code> • <code>sap_gwhost</code> • <code>sap_gwserv</code> • <code>sap_mshost</code> • <code>sap_mysapso2</code> • <code>sap_r3name</code> • <code>sap_saprouter</code> • <code>sap_snc_lib</code> • <code>sap_snc_mode</code> • <code>sap_snc_myname</code> • <code>sap_snc_partnername</code> • <code>sap_snc_qop</code> • <code>sap_snc_sso</code> • <code>sap_sysnr</code> • <code>sap_use_symbolic_names</code> • <code>sap_x509cert</code>
Example	<pre> \${_sapConnection('sap1', 'sap_connection_type')} → \$(ops_unv_sap_connection_sap_connection_type_3ac17d7f3ecb4df0b81aec9c7a24a38c) </pre>

9.12.12 Script Functions

9.12.12.1 Returns Path to Data Script

Description	Returns a token representing the path to a Data Scripts that you want to Embedding a Data Script .
Syntax	<pre> \${_scriptPath('script_name')} </pre>

Parameters	<ul style="list-style-type: none"> <code>script_name</code> Required; Name of the Data Script.
Example	<p>MyDataScript UUID</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> 507ffdbd0eba4b62b0e31e0fd22f6bec </div> <p>Function</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <code>\${_scriptPath('MyDataScript')} → \$(ops_unv_script_path_507ffdbd0eba4b62b0e31e0fd22f6bec)</code> </div> <div style="border: 2px solid #ffcc00; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>The Agent will replace the resolved token with a path to a temporary file containing the content of the Data Script. For additional details, refer to Embedding a Data Script.</p> </div>

Note

`_scriptPath` requires Agent 6.4.0.0 or later.

9.12.13 SQL/Stored Procedure Functions

9.12.13.1 Return Column Names for SQL Results from Current Task

Description	Returns the column names for the SQL results from the current SQL or Stored Procedure task. Column names are separated by the specified <code>separator</code> .
Syntax	<code>\${_resultsColumnNames(['separator'])}</code>
Parameters	<ul style="list-style-type: none"> <code>separator</code> Optional; Column name separator. Default is comma (,).

9.12.13.2 Return Column Names for SQL Results from Sibling Task

Description	Returns the column names for the SQL results from a sibling SQL or Stored Procedure task, within the same workflow. Column names are separated by the specified <code>separator</code> .
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Syntax	<code>\$_resultsColumnNamesFromTask('name' [, 'separator'])</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of the sibling task that the results should come from. The task must be within the same workflow. <code>separator</code> Optional; Column name separator. Default is comma (,).

9.12.13.3 Return SQL Results from Current Task

Description	Returns all SQL results from the current SQL or Stored Procedure task. Columns are separated by the specified <code>separator</code> and rows are separated by a new line.
Syntax	<code>\$_resultsAll(['separator', 'rowSeparator'])</code>
Parameters	<ul style="list-style-type: none"> <code>separator</code> Optional; Column separator. Default is comma (,). <code>rowSeparator</code> Optional; Overrides default New Line character.

9.12.13.4 Return SQL Results from Sibling Task

Description	Returns all SQL results from a sibling SQL or Stored Procedure task, within the same workflow. Columns are separated by the specified <code>separator</code> and rows are separated by a new line.
Syntax	<code>\$_resultsAllFromTask('name' [, 'separator', 'rowSeparator'])</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of the task that the results should come from. The task must be within the same workflow. <code>separator</code> Optional; Column separator. Default is comma (,). <code>rowSeparator</code> Optional; Overrides default New Line character.

9.12.13.5 Return SQL Warnings from Current Task

Description	Returns all SQL warnings from the current SQL or Stored Procedure task. Columns are separated by the specified <code>separator</code> and rows are separated by a new line.
Syntax	<code>\$_SQLWarnings(['separator'])</code>
Parameters	<ul style="list-style-type: none"> <code>separator</code> Optional; Column separator. Default is comma (,).

9.12.13.6 Return SQL Warnings from Sibling Task

Description	Returns all SQL warnings from a sibling SQL or Stored Procedure task, within the same workflow. Columns are separated by the specified <code>separator</code> and rows are separated by a new line.
Syntax	<code>\${_SQLWarningsFromTask('name'[, 'separator'])}</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of the sibling task that the warnings should come from. The task must be within the same workflow. <code>separator</code> Optional; Column separator. Default is comma (,).

9.12.13.7 Return String Value of Row/Column by Column Name

Description	Returns the string value of a row/column from a previously executed SQL task within the same workflow, or from the current SQL task.
Syntax	<code>\${_resultsColumn('name', 'colname'[, rownum, 'default_value'])}</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of a sibling SQL task within the same workflow from which you want the function to fetch results. If you want to execute the function against the current task, use an empty string for the name parameter. <code>colname</code> Required; Name of column to retrieve. <code>rownum</code> Optional; Numeric row number in result set to retrieve. Default is 1. <code>default_value</code> Optional; Default value to return if result not found.

9.12.13.8 Return String Value of Row/Column by Column Number

Description	Returns the string value of a row/column from a previously executed SQL task within the same workflow, or from the current SQL task.
Syntax	<code>\${_resultsColumnByNo('name', colnum[, rownum, 'default_value'])}</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of a sibling SQL task within the same workflow from which you want the function to fetch results. If you want to execute the function against the current task, use an empty string for the name parameter. <code>colnum</code> Required; Number of column to retrieve. First column in result is 1, second is 2, and so on. <code>rownum</code> Optional; Numeric row number in result set to retrieve. Default is 1. <code>default_value</code> Optional; Default value to return if result not found.

9.12.13.9 Return String Values of Columns

Description	Returns the string values of columns in a specific row in CSV (comma-separated values) format, from a previously executed SQL task within the same workflow, or from the current SQL task.
Syntax	<code>\${_resultsColumnsCSV('name' [, rownum]) }</code>
Parameters	<ul style="list-style-type: none"> <code>name</code> Required; Name of a sibling SQL task within the same workflow from which you want the function to fetch results. If you want to execute the function against the current task, use an empty string for the <code>name</code> parameter. <code>rownum</code> Optional; Numeric row number in result set to retrieve. Default is 1.

9.12.14 String Functions

String Functions can accept:

- String content in a String parameter.
- Variable name in a String parameter (prefixed with `_var`) from which string content can be obtained.
- Integer and Boolean parameters.

For String functions that accept a String value parameter directly, the value parameter can be specified using hard-coded text, variables, functions, or any combination of the three.

Note

When using String functions that accept a String value parameter directly, you should be aware of expectations with respect to escape characters and escape sequences (see [Escape Sequences](#), below).

For String functions that accept a variable name parameter, the fully resolved value of the variable by the specified name will be used as the String value argument. The variable must be fully resolvable and must not contain a function.

Note

Indexing functions use zero-based numbering; that is, the initial element is assigned the index 0.

9.12.14.1 Escape Sequences

An escape character preceded by a backslash (`\`) is an escape sequence (see the following table for a list of escape sequences).

If you are using a String function to manipulate a String value that potentially may contain an escape sequence, you should use the String function that accepts a variable name parameter to allow for passing the value to the function without the escape sequence being interpreted.

Escape Sequences	Escape Sequence Description
\t	Insert a tab in the text at this point.
\b	Insert a backspace in the text at this point.
\n	Insert a newline in the text at this point.
\r	Insert a carriage return in the text at this point.
\f	Insert a formfeed in the text at this point.
\'	Insert a single quote character in the text at this point.
\"	Insert a double quote character in the text at this point.
\\	Insert a backslash character in the text at this point.

9.12.14.2 Convert Characters in Value to Lower Case

Description	Converts all of the characters in the <code>value</code> to lower case using the rules of the default locale.
Syntax	<code>\$_toLowerCase('value')</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; String to convert to lower case.
Example	<pre>\$_toLowerCase('MyString') → mystring</pre>

9.12.14.3 Convert Characters in Variable to Lower Case

Description	Converts all of the characters in the variable to lower case using the rules of the default locale.
Syntax	<code>\$_varToLowerCase('variableName')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function.

Example	my_var =
	"Variable Value"
	Function
	\${_varToLowerCase('my_var')} → variable value

9.12.14.4 Convert Characters in Value to Upper Case

Description	Converts all of the characters in the <code>value</code> to upper case using the rules of the default locale.
Syntax	<code>\${_toUpperCase('value')}</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; String to convert to upper case.
Example	\${_toUpperCase('MyString')} → MYSTRING

9.12.14.5 Convert Characters in Variable to Upper Case

Description	Converts all of the characters in the variable to upper case using the rules of the default locale.
Syntax	<code>\${_varToUpperCase('variableName')}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function.
Example	my_var = <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">"Variable Value"</div> Function <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">\${_varToUpperCase('my_var')} → VARIABLE VALUE</div>

9.12.14.6 Escape Characters in Variable Using XML Entities

Description	Escapes the characters in a variable value using XML entities.
Syntax	<code>\$_varEscapeXml('variableName')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. The variable value will be escaped for insertion into XML.
Example	<p>escape_me =</p> <pre>"`1234567890\E-=[\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre> <p>Function</p> <pre>\$_varEscapeXml('escape_me') → `1234567890\E-=[\;&apos;,./ ~!@#\$\$%^&amp;*()_+{} :"&lt;&gt;?"</pre>

9.12.14.7 Escape Characters in Variable Using JSON String Rules

Description	Escapes the characters in a variable value using JSON string values.
Syntax	<code>\$_varEscapeJson('variableName')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. The variable value will be escaped for insertion into JSON.
Example	<p>escape_me =</p> <pre>"`1234567890\E-=[\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre> <p>Function</p> <pre>\$_varEscapeJson('escape_me') → `1234567890\\E-=[\;',.√ ~!@#\$\$%^&*()_+{} :"<>?"</pre>

9.12.14.8 Escape Characters in Variable Using JavaScript String Rules

Description	Escapes the characters in a variable value using JavaScript String rules.
Syntax	<code>\${_varEscapeJavaScript('variableName')}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. The variable value will be escaped for insertion into JavaScript.
Example	<p>escape_me =</p> <pre>"`1234567890\E-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre> <p>Function</p> <pre>\${_varEscapeJavaScript('escape_me')} → `1234567890\E-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre>

9.12.14.9 Escape Characters in Variable Using HTML Entities

Description	Escapes the characters in a variable value using HTML entities. (Supports all known HTML 4.0 entities.)
Syntax	<code>\${_varEscapeHtml('variableName')}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. The variable value will be escaped for insertion into HTML.
Example	<p>escape_me =</p> <pre>"`1234567890\E-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre> <p>Function</p> <pre>\${_varEscapeHtml('escape_me')} → `1234567890\E-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre>

9.12.14.10 Escape Characters in Variable as a Literal Pattern

Description	Returns a literal regular expression pattern String for the value of the specified variable. This method produces a String that can be used to create a Pattern that would match the String as if it were a literal pattern.
Syntax	<code>\$_varLiteralPattern('variableName')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. The variable value will be escaped for insertion into a regular expression as a literal pattern.
Example	<p>escape_me =</p> <pre>"1234567890\E-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?"</pre> <p>Function</p> <pre>\$_varLiteralPattern('escape_me') → \Q`1234567890\E\E\Q-=[]\;',./ ~!@#\$\$%^&*()_+{} :"<>?\E</pre>

9.12.14.11 Randomly Generate a String

Description	Randomly generates a String with a specified length.
Syntax	<code>\$_randomString(length[, 'excludeCharacters', 'defaultCharacters'])</code>
Parameters	<ul style="list-style-type: none"> <code>length</code> Required; String length. <code>excludeCharacters</code> Optional; String containing characters to exclude from the default character set. <code>defaultCharacters</code> Optional; String for overriding default character set. <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>The following characters are included in the default character set, in addition to the space character. ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz1234567890`-~!@#\$\$%^&*()_+[]\{} :;'\',./<>?</p> </div>
Example	<pre>\$_randomString(24, " 'ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890@#\$\$%*') → 5*L8T1RN#\$AQWEKPA@BQ19JD</pre>

9.12.14.12 Replace Substring of Value with Regular Expression

Description	Replaces each substring of value that matches the specified Wildcards and Regular Expressions, regex , with the specified replacement.
Syntax	<code>\$_replaceAll('value', 'regex', 'replacement')</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; Input string. <code>regex</code> Required; Regular expression. <code>replacement</code> Required; Replacement string.
Example	<pre>\$_replaceAll('Some text', '[ex]', 'Z') → SomZ tZZt</pre>

9.12.14.13 Replace Substring of Variable with Regular Expression

Description	Replaces each substring of <code>variableName</code> that matches the specified Wildcards and Regular Expressions, regex , with the specified replacement.
Syntax	<code>\$_varReplaceAll('variableName', 'regex', 'replacement')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. <code>regex</code> Required; Regular expression. <code>replacement</code> Required; Replacement string.
Example	<pre>my_var =</pre> <pre>"Variable Value"</pre> <pre>Function</pre> <pre>\$_varReplaceAll('my_var', '[^ae]', 'x') → xxxaxxxaxxe</pre>

9.12.14.14 Return Base64 Encoded String

Description	Returns the value of the specified variable encoded using the Base64 encoding scheme.
Syntax	<code>\${_varEncodeBase64('variableName'[, 'charset'])}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable whose value will be encoded using the Base64 encoding scheme. <code>charset</code> Optional; Name of the charset; default UTF-8.
Example	<p>rawstring =</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">"Test String"</div> <p>Function</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><code>\${_varEncodeBase64('rawstring')} → VGVzdCBTdHJpbmc=</code></div>

9.12.14.15 Return Copy of Value with Whitespace Omitted

Description	Returns a copy of <code>value</code> , with leading and trailing whitespace omitted.
Syntax	<code>\${_trim('value')}</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; String to trim.
Example	<div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><code>\${_trim(' My String ')} → My String</code></div>

9.12.14.16 Return Copy of Variable with Whitespace Omitted

Description	Returns a copy of <code>variableName</code> , with leading and trailing whitespace omitted.
Syntax	<code>\${_varTrim('variableName')}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function.

Example	<pre>my_var =</pre> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre>" Variable Value "</pre> </div> <p>Function</p> <div style="border: 1px solid black; padding: 5px;"> <pre>\${_varTrim('my_var')} = Variable Value</pre> </div>
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9.12.14.17 Return Index of Substring in String Value

Description	Returns the index within the string value of the first occurrence of the specified substring, <code>str</code> .
Syntax	<code>\${_indexOf('value', 'str')}</code>
Parameters	<ul style="list-style-type: none"> • <code>value</code> Any string. • <code>str</code> Substring to search for. If the <code>str</code> argument occurs as a substring within the value, then the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned.
Examples	<pre>\${_indexOf('MyString', 'tr')} → 3 \${_indexOf('MyString', 'x')} → -1</pre>

9.12.14.18 Return Index of Substring in String Variable

Description	Returns the index within the string variable of the first occurrence of the specified substring, <code>str</code> .
Syntax	<code>\${_varIndexOf('variableName', 'str')}</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable being passed into the function. • <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs as a substring within the variable, the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned.

Examples	my_var = <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">"Variable Value"</div> Function <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> \${_varIndexOf('my_var', 'a')} → 1 \${_varIndexOf('my_var', 'x')} → -1 </div>
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9.12.14.19 Return Index of Substring Plus Offset in String Value

Description	Returns the index within this string of the first occurrence of the specified substring plus the specified offset. The integer returned is the smallest value.
Syntax	<code>\${_indexOfWithOffset('value', 'str', offset)}</code>
Parameters	<ul style="list-style-type: none"> • <code>value</code> Required; Any string. • <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs as a substring within the value, then the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned. • <code>offset</code> Required; Number (positive or negative) to offset the found index.
Examples	<div style="border: 1px solid black; padding: 5px;"> \${_indexOfWithOffset('MyString', 'tr', 1)} → 4 \${_indexOfWithOffset('MyString', 'x', 1)} → -1 </div>

9.12.14.20 Return Index of Substring Plus Offset in String Variable

Description	Returns the index within this string of the first occurrence of the specified substring plus the specified offset. The integer returned is the smallest variable.
Syntax	<code>\${_varIndexOfWithOffset('variableName', 'str', offset)}</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable being passed into the function. • <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs as a substring within the variable, then the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned. • <code>offset</code> Required; Number (positive or negative) to offset the found index.

Examples	my_var =
	"Variable Value"
	Function
	<pre> \${_varIndexOfWithOffset('my_var', 'a')} → 2 \${_varIndexOfWithOffset('my_var', 'x')} → -1 </pre>

9.12.14.21 Return Index of Rightmost Occurrence of Substring in String Value

Description	Returns the index within the string value of the rightmost occurrence of the specified substring, <code>str</code> .
Syntax	<code>\${_lastIndexOf('value', 'str')}</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; Any string. <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs one or more times as a substring within the value, then the index of the first character of the last such substring is returned. If it does not occur as a substring, -1 is returned.
Examples	<pre> \${_lastIndexOf('Some text', 'e')} → 6 \${_lastIndexOf('Some text', 'a')} → -1 </pre>

9.12.14.22 Return Index of Rightmost Occurrence of Substring in String Variable

Description	Returns the index within the string variable of the rightmost occurrence of the specified substring, <code>str</code> .
Syntax	<code>\${_varLastIndexOf('variableName', 'str')}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs one or more times as a substring within the variable, then the index of the first character of the last such substring is returned. If it does not occur as a substring, -1 is returned.

Examples	my_var =
	"Variable Value"
	Function
	$\${_varLastIndexOf('my_var', 'a')} \rightarrow 10$ $\${_varLastIndexOf('my_var', 'x')} \rightarrow -1$

9.12.14.23 Return Index of Rightmost Occurrence of Substring Plus Offset in String Value

Description	Returns the index within this string of the rightmost occurrence of the specified substring, plus the specified offset. The returned index is the largest value.
Syntax	$\${_lastIndexOfWithOffset('value', 'str', offset)}$
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; Any string. <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs as a substring within the value, then the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned. <code>offset</code> Required; Number (positive or negative) to offset the found index.
Examples	$\${_lastIndexOfWithOffset('Some text', 'e', 1)} \rightarrow 7$ $\${_lastIndexOfWithOffset('Some text', 'a', 1)} \rightarrow -1$

9.12.14.24 Return Index of Rightmost Occurrence of Substring Plus Offset in String Variable

Description	Returns the index within this string of the rightmost occurrence of the specified substring, plus the specified offset. The returned index is the largest variable.
Syntax	$\${_varLastIndexOfWithOffset('variableName', 'str', offset)}$
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. <code>str</code> Required; Substring to search for. If the <code>str</code> argument occurs as a substring within the variable, then the index of the first character of the first such substring is returned; if it does not occur as a substring, -1 is returned. <code>offset</code> Required; Number (positive or negative) to offset the found index.

Examples	my_var = "Variable Value"
	Function <pre> \${_varLastIndexOfWithOffset('my_var', 'a', 1)} → 11 \${_varLastIndexOfWithOffset('my_var', 'x', 1)} → -1 </pre>

9.12.14.25 Return Length of Value

Description	Returns the length of <code>value</code> .
Syntax	<code>\${_length('value')}</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; Any string.
Example	<pre> \${_length('Some text')} → 9 </pre>

9.12.14.26 Return Length of Variable

Description	Returns the length of <code>variableName</code> .
Syntax	<code>\${_varLength('variableName'[, useEmptyForUndefined])}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. <code>useEmptyForUndefined</code> Optional; Specification (true or false) for the handling of a missing variable name. Default is false. <ul style="list-style-type: none"> If <code>useEmptyForUndefined</code> = true, the function will return 0. If <code>useEmptyForUndefined</code> = false, the function will remain unresolved if the variable name does not exist.

Example	my_var =
	"Variable Value"
	Function
	\${_varLength('my_var')} → 14

9.12.14.27 Return New String that is Substring of Value

Description	Returns a new string that is a substring of <code>value</code> . The substring begins at <code>beginIndex</code> and extends to the character at <code>endIndex -1</code> .
Syntax	<code>\${_substring('value', beginIndex[, endIndex])}</code>
Parameters	<ul style="list-style-type: none"> <code>value</code> Required; String to make a substring from. <code>beginIndex</code> Required; Beginning index, inclusive. <code>endIndex</code> Optional; Ending index, exclusive.
Examples	<pre> \${_substring('hamburger', 4, 8)} → urge \${_substring('smiles', 1, 5)} → mile </pre>

9.12.14.28 Return New String that is Substring of Variable

Description	Returns a new string that is a substring of <code>variableName</code> . The substring begins at <code>beginIndex</code> and extends to the character at <code>endIndex -1</code> .
Syntax	<code>\${_varSubstring('variableName', beginIndex[, endIndex])}</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable being passed into the function. <code>beginIndex</code> Required; Beginning index, inclusive. <code>endIndex</code> Optional; Ending index, exclusive.

Examples	Variables
	<pre>food = "hamburger" face = "smiles"</pre>
	Function
	<pre>\$_varSubstring('food', 4, 8) → urge \$_varSubstring('face', 1, 5) → mile</pre>

9.12.14.29 Return URL-Encoded String

Description	Returns a URL-encoded string according to the ASCII Encoding Reference for UTF-8; all non-alphanumeric characters are replaced with their equivalent hexadecimal escape sequences.
Syntax	<code>\$_varEncodeUrl('variableName')</code>
Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; Name of the variable whose value will be converted to a URL encoded string.
Example	<p>rawstring =</p> <pre>"ABC\$%^----DEF"</pre> <p>Function</p> <pre>\$_varEncodeUrl('rawstring') → ABC%24%25%5E----DEF</pre>

9.12.14.30 Variable By XPath

Description	<p>Resolves to the evaluated XPath expression applied to the value of the specified variable.</p> <ul style="list-style-type: none"> If the variable is unresolved, the function will remain unresolved. If the variable is undefined, blank, or the path expression does not yield a result, the function will resolve to the default value.
Syntax	<code>\$_varXPath('variableName', 'XPathExpression', ['defaultValue', 'delimiter', 'prettyPrint'])</code>

Parameters	<p><code>variableName</code> Required; The name of the variable to apply the XPath expression to.</p> <p><code>xPathExpression</code> Required; XPath expression. https://www.w3schools.com/xml/xpath_intro.asp</p> <p><code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty (").</p> <p><code>delimiter</code> Optional; If <code>xPathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n).</p> <p><code>prettyPrint</code> Optional; Specification (true or false) for whether or not XML will be pretty printed (indented). Default is false.</p>
Example	<p>my_variable =</p> <pre data-bbox="209 701 1533 884"><message> <code>10</code> </message></pre> <p>Function</p> <pre data-bbox="209 987 1533 1102">\${_varXPath('my_variable', '//code/text()')} → 10</pre>

9.12.14.31 Variable By JsonPath

Description	<p>Resolves to the evaluated JsonPath expression applied to the value of the specified variable.</p> <ul style="list-style-type: none"> • If the variable is unresolved, the function will remain unresolved. • If the variable is undefined, blank, or the path expression does not yield a result, the function will resolve to the default value. <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p>
Syntax	<code>\${_varJsonPath('variableName', 'pathExpression'[, 'defaultValue', 'delimiter', prettyPrint])}</code>

Parameters	<p><code>variableName</code> Required; The name of the variable to apply the JsonPath expression to.</p> <p><code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/JsonPath</p> <p><code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("").</p> <p><code>delimiter</code> Optional; If <code>pathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n).</p> <p><code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON will be pretty printed (indented). Default is false.</p>
Example	<p>my_variable =</p> <pre style="border: 1px solid #ccc; padding: 10px;">{ "code": 10 }</pre> <p>Function</p> <pre style="border: 1px solid #ccc; padding: 10px;">\${_varJsonPath('my_variable', '\$.code')} → 10</pre>

9.12.14.32 Variable By JsonPath As Array

Description	<p>Resolves to the evaluated JsonPath expression applied to the value of the specified variable.</p> <ul style="list-style-type: none"> • If the variable is unresolved, the function will remain unresolved. • If the variable is undefined, blank, or the path expression does not yield a result, the function will resolve to the default value. <div style="border: 2px solid orange; padding: 10px; margin-top: 10px;"> <p>When using a JsonPath function, the output must be ONLY a JSON formatted string. If the output contains leading or trailing text, the function will fail to work properly.</p> </div>
Syntax	<code>\${_varJsonPathAsArray('variableName', 'pathExpression'[, 'defaultValue', prettyPrint])}</code>
Parameters	<p><code>variableName</code> Required; The name of the variable to apply the JsonPath expression to.</p> <p><code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/JsonPath</p> <p><code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("").</p> <p><code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON will be pretty printed (indented). Default is false.</p>

Example	<p>my_variable =</p> <pre>[{ "message": "Hello", "code": 10 }, { "message": "World!", "code": 20 }]</pre> <p>Function</p> <pre>\$_varJsonPathAsArray('my_variable', '[\$*].message', "", true) → ["Hello", "World!"]</pre>
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9.12.14.33 Variable Number of Lines

Description	<p>Resolves to the number of lines the value of the specified variable has.</p> <ul style="list-style-type: none"> • If the variable is unresolved, the function will remain unresolved. • If the variable is undefined, or blank, the function will resolve to 0.
Syntax	<pre>\$_varNumberOfLines('variableName')</pre>
Parameters	<p>variableName Required; The name of the variable to return the number of lines for.</p>
Example	<p>my_variable =</p> <pre>Line 1 Line 2 Line 3</pre> <p>Function</p> <pre>\$_varNumberOfLines('my_variable') → 3</pre>

9.12.14.34 Variable By Specific Line(s)

Description	Resolves to the specified line(s) of variable data for the specified variable. <ul style="list-style-type: none"> • If the variable is unresolved, the function will remain unresolved. • If the variable is undefined, blank, or no lines qualify, the function will resolve to the default value.
Syntax	<code>\$_varLines('variableName', startLine, numberOfLines[, 'defaultValue', 'resultDelimiter'])</code>
Parameters	<p><code>variableName</code> Required; The name of the variable to apply the function to.</p> <p><code>startLine</code> Required; Start line, where 1 is the first line and -1 is the last line.</p> <p><code>numberOfLines</code> Required; Number of lines to return starting from the <code>startLine</code>.</p> <p><code>defaultValue</code> Optional; Default value to return if no lines qualify. Default is empty (").</p> <p><code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.</p>
Example	<p>my_variable =</p> <pre> Line 1 Line 2 Line 3 Line 4 </pre> <p>Function</p> <pre> \$_varLines('my_variable', 2, 2) → Line 2 Line 3 </pre>

9.12.14.35 Variable By Line(s) Matching Regular Expression

Description	Resolves to the line(s) of variable data that match the specified regular expression, of the specified variable. <ul style="list-style-type: none"> • If the variable is unresolved, the function will remain unresolved. • If the variable is undefined, blank, or no lines qualify, the function will resolve to the default value.
Syntax	<code>\$_varLinesByRegex('variableName', 'regexPattern', maxCount, numberOfLinesBefore, numberOfLinesAfter, 'defaultValue', 'resultDelimiter')</code>

Parameters	<p><code>variableName</code> Required; The name of the variable to apply the function to.</p> <p><code>regexPattern</code> Required; Regular expression used for determining if a line matches. Regular expression must match the whole line (see Example, below).</p> <p><code>maxCount</code> Optional; Maximum number of matching lines to return. Default is 1.</p> <p><code>numberOfLinesBefore</code> Optional; Number of lines before each matching line to return along with the matching line. Default is 0.</p> <p><code>numberOfLinesAfter</code> Optional; Number of lines after each matching line to return along with the matching line. Default is 0.</p> <p><code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("").</p> <p><code>resultDelimiter</code> Optional; Delimiter to use when concatenating matching lines. If not specified, "\n" or "\r\n" depending on original output line endings.</p>
Example	<p>my_variable =</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre>Some_Text ABC=Some_String More_Text</pre> </div> <p>Function</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre>\$_varLinesByRegex('my_variable', '^ABC=') → /* Returns empty (the whole line was not matched) */ \$_varLinesByRegex('my_variable', '^ABC=.*') → ABC=Some_String</pre> </div>

9.12.14.36 Variable Path

Description	<p>Returns a token representing the path to a temporary file containing the value of the specified variable.</p> <ul style="list-style-type: none"> <code>\$(ops_variable_path_<variableName><fileExtension>)</code>
Syntax	<pre>\$_varPath('variableName'[, 'fileExtension'])</pre>
Parameters	<p><code>variableName</code> Required; The variable to create a temporary file for.</p> <p><code>fileExtension</code> Optional; The extension to use for the temporary file. Can be a maximum of 10 characters. Default is txt.</p>

Examples	<pre> application.exe -file \${_varPath('my_variable')} → application.exe -file \$(ops_variable_path_my_variable_txt) application.exe -file \${_varPath('my_variable', 'csv')} → application.exe -file \$(ops_variable_path_my_variable_csv) </pre>
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9.12.14.37 Variable CSV Record Count

Description	Resolves to the CSV data record count for the specified variable. <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will resolve to 0.
Syntax	<code>\${_varCsvRecordCount(<variableName>)}</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable.
Example	my_variable = <pre> "A","B","C","D" "E","F","G","H" </pre> Function <pre> \${_varCsvRecordCount('my_variable')} → 2 </pre>

9.12.14.38 Variable CSV Record Value Count

Description	Resolves to the CSV record value count for the specified variable and record index. <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0.
Syntax	<code>\${_varCsvRecordValueCount('variableName', recordIndex)}</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable. • <code>recordIndex</code> Required; Zero-based record index number.

Example	<p>my_variable =</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_varCsvRecordValueCount('my_variable','1')} → 4</pre>
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9.12.14.39 Variable CSV Record Value

Description	<p>Resolves to the CSV record value for the specified variable, record index, and variable index.</p> <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<pre>\$_varCsvRecordValue('variableName', recordIndex, valueIndex)}</pre>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable. • <code>recordIndex</code> Required; Zero-based record index number.. • <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>my_variable =</p> <pre>"A","B","C","D" "E","F","G","H"</pre> <p>Function</p> <pre>\$_varCsvRecordValue('my_variable','1', '2')} → G</pre>

9.12.14.40 Variable TSV Record Count

Description	Resolves to the TSV data record count for the specified variable. <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will resolve to 0.
Syntax	<code>\$_varTsvRecordCount('<variableName>')</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable.
Example	<p>my_variable =</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_varTsvRecordCount('my_variable') → 2</pre>

9.12.14.41 Variable TSV Record Value Count

Description	Resolves to the TSV record value count for the specified variable and record index. <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will resolve to 0. • If an index is invalid, the function will resolve to 0.
Syntax	<code>\$_varTsvRecordValueCount('variableName', recordIndex)</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable. • <code>recordIndex</code> Required; Zero-based record index number.

Example	<p>my_variable =</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_varTsvRecordValueCount('my_variable','1') → 4</pre>
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9.12.14.42 Variable TSV Record Value

Description	<p>Resolves to the value of TSV data for the specified record index & value index of the specified variable.</p> <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<pre>\$_varTsvRecordValue('variableName', recordIndex, valueIndex)</pre>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; Name of the variable. • <code>recordIndex</code> Required; Zero-based record index number. • <code>valueIndex</code> Required; Zero-based value index number.
Example	<p>my_variable =</p> <pre>"A" "B" "C" "D" "E" "F" "G" "H"</pre> <p>Function</p> <pre>\$_varTsvRecordValueCount('my_variable','1') → 4</pre>

9.12.14.43 Var Delimited Value Count

Description	<p>Resolves to the count of delimited values for the specified variable.</p> <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will resolve to 0.
Syntax	<code>\$_varDelimitedValueCount('variableName', ['delimiter', splitPreserveAllTokens])</code>
Parameters	<ul style="list-style-type: none"> • <code>variableName</code> Required; The name of the variable to return the count of delimited strings. • <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (.). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. • <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.
Example	<p>my_variable =</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>A:B::C:D</p> </div> <p>Function</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre>\$_varDelimitedValueCount('my_variable',':') → 4 \$_varDelimitedValueCount('my_variable',':', true) → 5</pre> </div>

9.12.14.44 Var Delimited Value

Description	<p>Resolves to the indexed value of delimited values for the specified variable.</p> <ul style="list-style-type: none"> • If the variable name is undefined, the function will remain unresolved. • If the variable value is unresolved, the function will remain unresolved. • If the variable is undefined, or the variable value is blank, the function will remain unresolved. • If an index is invalid, the function will remain unresolved.
Syntax	<code>\$_varDelimitedValue('variableName', valueIndex, ['delimiter', splitPreserveAllTokens])</code>

Parameters	<ul style="list-style-type: none"> <code>variableName</code> Required; The name of the variable to return the indexed value of delimited strings. <code>valueIndex</code> Required; Zero-based value index number. <code>delimiter</code> Optional; delimiter to split the output. Default delimiter is comma (,). If you specify more than one character for the delimiter parameter, each of the characters you specify will be treated as a delimiter. <code>splitPreserveAllTokens</code> Optional; Specifies that adjacent delimiters are treated as delimiters for empty tokens; otherwise, adjacent delimiters are treated as one delimiter. Default is false.
Example	<p>my_variable =</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>A:B::C:D</p> </div> <p>Function</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> \${_varDelimitedValue('my_variable','2',':')} → C \${_varDelimitedValue('my_variable','2',':', true)} → " </pre> </div>

9.12.15 System Functions

9.12.15.1 Display Variables

Description	Displays all the defined and built-in variables associated with the task instance.
Syntax	<code>\${_scope}</code>
Parameters	(none)
Example	<pre> \${_scope} → {ops_workflow_id=, ops_task_type=Unix, ops_status=DEFINED, ops_retry_interval=60, ops_exit_code=0, ops_retry_maximum=0, ops_cmd_parms=, ops_cmd=ls -la; exit \${_random('9')};, ops_retry_count=0, ops_agent_id=67e4994143d2617201cdf4ba9df9ab0a, ops_task_id=84880af243d26172019aa1d25988a8f9, ops_task_name=uc - Linux Ls} </pre>

9.12.15.2 Generate Random Number

Description	Generates a random number between <code>max</code> (inclusive) and <code>min</code> (inclusive)
Syntax	<code>\${_random([max, min])}</code>
Parameters	<ul style="list-style-type: none"> <code>max</code> Optional; Upper bound (inclusive) on the random number. Default is 9. <code>min</code> Optional; Lower bound (inclusive) on the random number. Default is 0.
Example	<code>\${_random(1, 100)}</code> → 91

9.12.15.3 Resolve to GUID (Globally Unique ID)

Description	Resolves to a 32-byte GUID (Globally Unique ID).
Syntax	<code>\${_guid}</code>
Parameters	(none)
Example	<code>\${_guid}</code> → d11b8597eb024105b5c920a369fb32e7

9.12.15.4 Resolve to Host Name

Description	Resolves to the hostname of the machine running the Controller, if available.
Syntax	<code>\${_hostname}</code>
Parameters	(none)

9.12.15.5 Resolve to IP Address

Description	Resolves to the IP address of the machine running the Controller.
Syntax	<code>\${_ipaddress}</code>

Parameters	(none)
-------------------	--------

9.12.15.6 Resolve to the Sibling SYS_ID

Description	Resolves to the sys_id of the first task instance found within the same workflow specified by the sibling name.
Syntax	<code>\${_siblingid('sibling_name')}</code>
Parameters	<ul style="list-style-type: none"> <code>sibling_name</code> Required; Sibling name.

9.12.15.7 Resolve to Variable Value

Description	Locates the specified variable in the specified sibling task instance within the same workflow and resolves to the variable value.
Syntax	<code>\${_varLookup('sibling_name', 'variable_name'[, 'def'])}</code>
Parameters	<ul style="list-style-type: none"> <code>sibling_name</code> Required; Name of the sibling task instance from which the function is collecting the variable value. <code>variable_name</code> Required; Name of the variable being collected by the function. <code>def</code> Optional; Default value to return if the variable is not defined in the sibling task instance.
Example	<p>my_var =</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <pre>"Variable Value"</pre> </div> <p>Function</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <pre>\${_varLookup('task-2', 'my_var', '-1')} → Variable Value</pre> </div> <p>If my_var does not exist</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <pre>\${_varLookup('task-2', 'my_var', '-1')} → -1</pre> </div>

9.12.15.8 Resolve Variable

Description	Resolves the variable specified by the <code>variable_name</code> parameter and substitutes the <code>default_value</code> if the variable cannot be resolved.
Syntax	<code>\$_resolve('variable_name', 'default_value')</code>
Parameters	<ul style="list-style-type: none"> <code>variable_name</code> Required; Variable name. <code>default_value</code> Required; Default value to use if the variable cannot be resolved.
Example	<p>my_var =</p> <pre>"Variable Value"</pre> <p>Function</p> <pre>\$_resolve('my_var', '-1') → Variable Value</pre> <p>If my_var does not exist</p> <pre>\$_resolve('my_var', '-1') → -1</pre>

9.12.15.9 Resolve Variable (Advanced)

Description	Resolves the variable specified by the <code>variable_name</code> parameter and substitutes the default value if the variable cannot be resolved.
Syntax	<code>\$_resolveadv('variable_name', 'default_value', [use_default_if_blank])</code>
Parameters	<ul style="list-style-type: none"> <code>variable_name</code> Required; Variable name. <code>default_value</code> Required; Default value to use if the variable cannot be resolved. <code>use_default_if_blank</code> Optional; Specification (true or false) for whether or not to use the default value if the variable is empty or blank. (If <code>use_default_if_blank</code> is false, <code>_resolveadv</code> behaves like _resolve.)

Example	my_var =
	<code>"Variable Value"</code>
	Function
	<code>\${_resolveadv('my_var', '-1', true)} → Variable Value</code>
	If my_var is blank or does not exist
	<code>\${_resolveadv('my_var', '-1', true)} → -1</code>

9.12.16 Universal Task Functions

9.12.16.1 Convert Array Field Variable

Description	<p>Given the variable name representing the Array field, generate a String of delimited Array field entry data.</p> <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p>The function will remain unresolved if the Array field contains unresolved variables or functions.</p> </div>
Syntax	<code>\${_convertArrayFieldVariable('arrayFieldVariableName'[, 'delimiter', 'separator', 'keyQuote', 'valueQuote'])}</code>
Parameters	<ul style="list-style-type: none"> • <code>arrayFieldVariableName</code> Required; Name of the variable for the Array Field; for example, ops_af_p2. • <code>delimiter</code> Optional; Value to be used to delimit the Name from the Value. Default is =. • <code>separator</code> Optional; Value to be used to separate one entry/row from the next. Default is comma (,). • <code>keyQuote</code> Optional; Quoting to be used around the Name. Default is "no quoting." • <code>valueQuote</code> Optional; Quoting to be used around the Value. Default is "no quoting."

Example

ops_af_p1

```
P1A=5
P1B=42
```

ops_af_p2

```
P2A=Red
P2B=White
P2C=Blue
```

```
$_convertArrayFieldVariable('ops_af_p1')
P1A=5,P1B=42
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', '=')
P1A=5,P1B=42
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', ':')
P1A:5,P1B:42
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', ':', ';')
P1A:5;P1B:42
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', '::', ',', '\')
'P1A'::5,'P1B'::42
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', '=', ',', '\', '')
'P1A'="5",'P1B'="42"
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', '"', '"', '\', '\')
'P1A'='5','P1B'='42'
-----
```

```
$_convertArrayFieldVariable('ops_af_p1', ':', '\n', '\', '\')
'P1A':5
'P1B':42
-----
```

```
$_convertArrayFieldVariable('ops_af_p2')
P2A=Red,P2B=White,P2C=Blue
-----
```

```
$_convertArrayFieldVariable('ops_af_p2', '=')
P2A=Red,P2B=White,P2C=Blue
-----
```

```

${_convertArrayFieldVariable('ops_af_p2', ':')}
P2A:Red,P2B:White,P2C:Blue
-----
    
```

```

${_convertArrayFieldVariable('ops_af_p2', ':', ';')}
P2A:Red;P2B:White;P2C:Blue
-----
    
```

```

${_convertArrayFieldVariable('ops_af_p2', '::', '::', '\')}
'P2A':Red,'P2B':White,'P2C':Blue
-----
    
```

```

${_convertArrayFieldVariable('ops_af_p2', '=', '::', '\', '')}
'P2A'="Red",'P2B'="White",'P2C'="Blue"
-----
    
```

```

${_convertArrayFieldVariable('ops_af_p2', ", ", '\', '\')}
'P2A'='Red','P2B'='White','P2C'='Blue'
-----
    
```

```

${_convertArrayFieldVariable('ops_af_p2', ':', '\n', '\', '\')}
'P2A':Red
'P2B':White
'P2C':Blue
-----
    
```

9.12.16.2 Get Array Field Variable Value

Description	Given the variable name representing the Array field and the name of an entry in the Array field, return the value for the entry.
Syntax	<code>\$_getArrayFieldVariableValue('arrayFieldVariableName', 'name')</code>
Parameters	<ul style="list-style-type: none"> <code>arrayFieldVariableName</code> Required; Name of the variable for the Array Field; for example, <i>ops_af_p1</i>. <code>name</code> Required; Name of the entry for which the value is to be returned.

Example	ops_af_p1
	<p>P1A=5 P1B=42</p>
	ops_af_p2
	<p>P2A=Red P2B=White P2C=Blue</p>
	<pre> P1A = \${_getArrayFieldVariableValue('ops_af_p1', 'P1A')} ----- P1A=5 ----- P1B = \${_getArrayFieldVariableValue('ops_af_p1', 'P1B')} ----- P1B=42 ----- P2A = \${_getArrayFieldVariableValue('ops_af_p2', 'P2A')} ----- P2A=Red ----- P2B = \${_getArrayFieldVariableValue('ops_af_p2', 'P2B')} ----- P2B=White ----- P2C = \${_getArrayFieldVariableValue('ops_af_p2', 'P2C')} ----- P2C=Blue ----- </pre>

9.12.17 Web Service Functions

All functions will remain unresolved if no Web Service output record can be found for the task instance, for the current attempt.

All functions will remain unresolved if a required parameter either is not specified or specified incorrectly.

9.12.17.1 Raw Output from Web Service Task

Description	<p>Resolves to the raw output data of the Web Service task instance that is resolving the function.</p> <ul style="list-style-type: none"> • If the output record cannot be found, the function will remain unresolved. • If the output record is found, but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<pre>\$_responseRaw(['default_value'])</pre>
Parameters	<ul style="list-style-type: none"> • <code>default_value</code> Optional; Default value to return if the result is not found. Default is empty ("").
Examples	<p>Function</p> <pre>\$_responseRaw</pre> <p>XML Response</p> <pre><?xml version="1.0" encoding="UTF-8" standalone="yes"?> <command-response> <type>set_variable</type> <success>>true</success> <info>No changes detected for variable variableName, ignoring Set Variable command.</info> <errors></errors> </command-response></pre> <p>JSON Response</p> <pre>{ "type": "set_variable", "success": true, "info": "No changes detected for variable my_var, ignoring Set Variable command.", "errors": "" }</pre>

9.12.17.2 Raw Output from Sibling Web Service Task

Description	<p>Resolves to the raw output data of the Web Service task instance specified by the <code>siblingName</code> parameter.</p> <p>The sibling task instance must be within the same workflow, and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record cannot be found, the function will remain unresolved. • If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
--------------------	--

Syntax	<code>\${_responseRawFromTask('siblingName'[, 'defaultValue'])}</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>default_value</code> Optional; Default value to return if the result is not found. Default is empty (").
Examples	<p>Function</p> <pre> \${_responseRawFromTask('task2')} </pre> <p>XML Response</p> <pre> <?xml version="1.0" encoding="UTF-8" standalone="yes"?> <command-response> <type>set_variable</type> <success>>true</success> <info>No changes detected for variable variableName, ignoring Set Variable command.</info> <errors></errors> </command-response> </pre> <p>JSON Response</p> <pre> { "type": "set_variable", "success": true, "info": "No changes detected for variable my_var, ignoring Set Variable command.", "errors": "" } </pre>

9.12.17.3 XML Output Data from Web Service Task

Description	<p>Resolves to the XML output data of the Web Service task instance that is resolving the function, corresponding to the evaluated XPath expression.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found, but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<code>\${_responseXPath('XPathExpression'[, 'defaultValue', 'delimiter', prettyPrint])}</code>

Parameters	<ul style="list-style-type: none"> xPathExpression Required; XPath expression, https://www.w3schools.com/xml/xpath_intro.asp defaultValue Optional; Default value to return if the result is not found. Default is empty ("). delimiter Optional; If <code>xPathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (<code>\n</code>). prettyPrint Optional; Specification (true or false) for whether or not XML output will be pretty printed (indented). Default is false.
Examples	<p>If you want to obtain the <code>info</code> element text from the following Web Service Task XML output, you could use either of two examples for this Function.</p> <pre><?xml version="1.0" encoding="UTF-8" standalone="yes"?> <command-response> <type>set_variable</type> <success>>true</success> <info>No changes detected for variable <i>variableName</i>, ignoring Set Variable command.</info> <errors></errors> </command-response></pre> <p>Example 1</p> <pre>\$_responseXPath(//info)}</pre> <p>Select the <code>info</code> node in the document no matter where it is.</p> <p>Example 2</p> <pre>\$_responseXPath(/command-response/info)}</pre> <p>Select the <code>info</code> node from a specific path in the document, starting from the root node.</p> <p>Using either of these examples will resolve to the following: No changes detected for variable <code>variableName</code>, ignoring Set Variable command.</p>

9.12.17.4 XML Output Data From Sibling Web Service Task

Description	<p>Resolves to the XML output data of the Web Service task instance specified by the <code>siblingName</code>, corresponding to the evaluated XPath expression.</p> <p>The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<pre>\$_responseXPathFromTask('siblingName', 'XPathExpression'[, 'defaultValue', 'delimiter', prettyPrint]) }</pre>

<p>Parameters</p>	<ul style="list-style-type: none"> • <code>siblingName</code> Required; Name of a sibling task instance. • <code>xPathExpression</code> Required; XPath expression, https://www.w3schools.com/xml/xpath_intro.asp • <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). • <code>delimiter</code> Optional; If <code>xPathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). • <code>prettyPrint</code> Optional; Specification (true or false) for whether or not XML output will be pretty printed (indented). Default is false.
<p>Examples</p>	<p>If you want to obtain the <code>info</code> element text from the following Web Service Task XML output, you could use either of two examples for this Function.</p> <pre><?xml version="1.0" encoding="UTF-8" standalone="yes"?> <command-response> <type>set_variable</type> <success>>true</success> <info>No changes detected for variable <i>variableName</i>, ignoring Set Variable command.</info> <errors></errors> </command-response></pre> <p>Example 1</p> <pre>\$_responseXPath('task2', '//info')</pre> <p>Select the info node in the document no matter where it is.</p> <p>Example 2</p> <pre>\$_responseXPath('task2', '/command-response/info')</pre> <p>Select the info node from a specific path in the document, starting from the root node.</p> <p>Using either of these examples will resolve to the following: No changes detected for variable <code>variableName</code>, ignoring Set Variable command.</p>

9.12.17.5 JSON Output Data From Web Service Task

<p>Description</p>	<p>Resolves to the JSON output data of the Web Service task instance that is resolving the function, corresponding to the evaluated JsonPath expression.</p> <ul style="list-style-type: none"> • If the output record cannot be found, the function will remain unresolved. • If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
<p>Syntax</p>	<pre>\$_responseJsonPath('pathExpression'[, 'defaultValue', 'delimiter', prettyPrint]) }</pre>

Parameters	<ul style="list-style-type: none"> <code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). <code>delimiter</code> Optional; If <code>pathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>Given the following Web Service Task JSON output:</p> <pre style="border: 1px solid #ccc; padding: 10px;"> { "type" : "set_variable", "success" : true, "info" : "No changes detected for variable my_var, ignoring Set Variable command.", "errors" : "" }</pre> <p>Function</p> <pre style="border: 1px solid #ccc; padding: 10px;"> \${_responseJsonPath('\$.info')} → No changes detected for variable my_var, ignoring Set Variable command.</pre>

9.12.17.6 JSON Output Data From Sibling Web Service Task

Description	<p>Resolves to the JSON output data of the Web Service task instance specified by the <code>siblingName</code>, corresponding to the evaluated JsonPath expression.</p> <p>The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> If the output record cannot be found, the function will remain unresolved. If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<code>\${_responseJsonPathFromTask('siblingName','pathExpression'[, 'defaultValue', 'delimiter', prettyPrint])}</code>
Parameters	<ul style="list-style-type: none"> <code>siblingName</code> Required; Name of a sibling task instance. <code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty ("). <code>delimiter</code> Optional; If <code>pathExpression</code> evaluates to multiple results, the delimiter to be used to separate those results. Default is new line character (\n). <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.

Example	<p>Given the following Web Service Task JSON output:</p> <pre> { "type": "set_variable", "success": true, "info": "No changes detected for variable my_var, ignoring Set Variable command.", "errors": "" } </pre>
	<p>Function</p> <pre> \${_responseJsonPathFromTask('task2', '\${.info'})} → No changes detected for variable my_var, ignoring Set Variable command. </pre>

9.12.17.7 JSON Output Data As Array From Web Service Task

Description	<p>Resolves to the JSON output data of the Web Service task instance that is resolving the function, corresponding to the evaluated JsonPath expression.</p> <ul style="list-style-type: none"> • If the output record cannot be found, the function will remain unresolved. • If the output record is found but the path expression does not yield a result, the function will resolve to the default value.
Syntax	<pre> \${_responseJsonPathAsArray('pathExpression'[, 'defaultValue', prettyPrint])} </pre>
Parameters	<ul style="list-style-type: none"> • <code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath • <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty (""). • <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>Given the following Web Service Task JSON output:</p> <pre> { "type": "set_variable", "success": true, "info": "No changes detected for variable my_var, ignoring Set Variable command.", "errors": "" } </pre>
	<p>Function</p> <pre> \${_responseJsonPathAsArray('\${.info'})} → ["No changes detected for variable my_var, ignoring Set Variable command."] </pre>

9.12.17.8 JSON Output Data As Array From Sibling Web Service Task

Description	<p>Resolves to the JSON output data of the Web Service task instance specified by the siblingName, corresponding to the evaluated JsonPath expression.</p> <p>The sibling task instance must be within the same workflow and the Execution User of the task instance that is resolving the function must have Read permission for the sibling task instance.</p> <ul style="list-style-type: none"> • If the output record cannot be found, the function will remain unresolved. • If the output record is found but the path expression doesn't yield a result, the function will resolve to the default value.
Syntax	<pre>\$_responseJsonPathAsArrayFromTask('siblingName', 'pathExpression'[, 'defaultValue', prettyPrint])</pre>
Parameters	<ul style="list-style-type: none"> • <code>siblingName</code> Required; Name of a sibling task instance. • <code>pathExpression</code> Required; JsonPath expression. https://github.com/json-path/Jsonpath • <code>defaultValue</code> Optional; Default value to return if the result is not found. Default is empty (""). • <code>prettyPrint</code> Optional; Specification (true or false) for whether or not JSON output will be pretty printed (indented). Default is false.
Example	<p>Given the following Web Service Task JSON output:</p> <pre>{ "type": "set_variable", "success": true, "info": "No changes detected for variable my_var, ignoring Set Variable command.", "errors": "" }</pre> <p>Function</p> <pre>\$_responseJsonPathAsArrayFromTask('task2', '\$.info') → ["No changes detected for variable my_var, ignoring Set Variable command."]</pre>

10 Virtual Resources

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10.1 Overview

A virtual resource allows you to set up a throttling scheme that will manage the number of specific tasks that can run at one time.

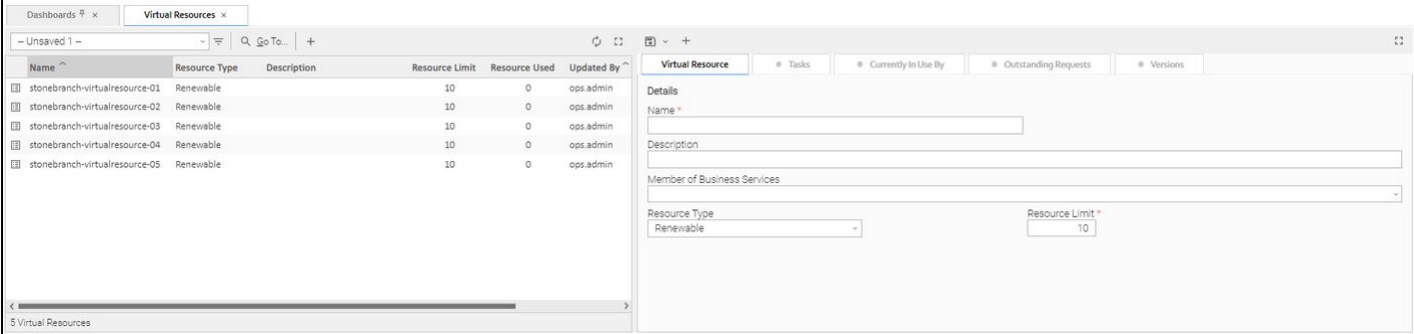

10.1.1 Using a Virtual Resource

Outlined below is the basic procedure and processing flow for using a virtual resource:

Step 1	<p>Create a virtual resource.</p> <p>There are three types of virtual resources:</p> <ol style="list-style-type: none"> 1. Renewable Resources that renew; that is, when a task has finished using them, they can be returned and made available to other tasks sharing the same resources. 2. Boundary Resources that are like "windows." Only those tasks defined to fit through that window (or Resource Limit) will run. For example, if you define a Boundary Resource with Resource Limit of 5, and Task A requires a window (amount) of 5, Task B requires a window (amount) of 5, and Task C requires a window (amount) of 10, both A and B will run. However, C will go into a Resource Wait state. If the Boundary Resource is updated to a Resource Limit of 10, C will run. 3. Depletable Resources that do not renew. Once consumed by a task, they are gone.
Step 2	Assign a resource limit to the virtual resource as appropriate for the resource type.
Step 3	Assign tasks to the virtual resource.
Step 4	Specify the number of resource units that each task will consume. For example, a task that requires a small amount of processing power might consume one unit; a task that requires a high amount of resources might consume three units. The number of units you specify for each task is relative to the maximum number that you assign to the resource.
Step 5	Save the virtual resource record.


Step 6	<p>When a task with a virtual resource requirement launches, Universal Controller checks the virtual resource record to see if enough units are available to run the task, based on what other tasks assigned to that virtual resource are currently running.</p> <ul style="list-style-type: none"> • If enough units are available, the task runs and the number of available units is decremented by the amount specified in the task. For example, if the resource has a maximum of ten and the task uses two, the remaining amount available on that virtual resource for use by other tasks is eight. • If there are not enough units available, the task is put into Resource Wait status and is listed in the Outstanding Requests tab in the virtual resource. When the required amount of resource becomes available, the task is launched. • If multiple tasks are in Resource Wait status, the virtual resource priority is used to determine which task will be first to acquire the resource when it becomes available.
Step 7	<p>Tabs on the Virtual Resource record keep track of tasks that are currently "running" on this virtual resource and tasks that are waiting to "run" on this virtual resource.</p>

10.2 Creating a Virtual Resource

Step 1	<p>From the Automation Center navigation pane, select Other > Virtual Resources. The Virtual Resources list displays:</p> <p>To the right of the list, Virtual Resource Details for a new Virtual Resource record displays.</p>
	 <p>The screenshot shows a web interface with a table of virtual resources and a details form to the right. The table has columns for Name, Resource Type, Description, Resource Limit, Resource Used, and Updated By. The details form includes fields for Name, Description, Member of Business Services, Resource Type, and Resource Limit.</p>
Step 2	<p>Enter / select Details for a new Virtual Resource, using the field descriptions below as a guide.</p> <ul style="list-style-type: none"> • Required fields display an asterisk (*) after the field name. • Default values for fields, if available, display automatically. <p>To display more of the Details fields on the screen, you can either:</p> <ul style="list-style-type: none"> • Use the scroll bar. • Temporarily hide the list above the Details. • Click the + button above the list to display a pop-up version of the Details.
Step 3	<p>Click a  button. The Virtual Resource record is added to the database, and all buttons and tabs in the Virtual Resource Details are enabled.</p>

Note

To [open](#) an existing record on the list, either:

- Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the  button that displays above and below the Details.)
- Clicking the [Details icon](#) next to a record name in the list, or right-click a record in the list and then click **Open** in the [Action menu](#) that displays, to display a pop-up version of the record Details.

- Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the [Action menu](#) that displays, to display the record Details under a new tab on the record list page (see [Record Details as Tabs](#)).

10.2.1 Virtual Resource Details

The following Virtual Resource Details is for an existing Virtual Resource. See the [field descriptions](#), below, for a description of all fields that display in the Virtual Resource Details.

The screenshot shows a web interface titled "Virtual Resource Details: stonebranch-virtualresource-01". It features a navigation bar with tabs: "Virtual Resource" (selected), "Tasks", "Currently In Use By", "Outstanding Requests", and "Versions". Below the tabs is a "Details" section containing the following fields:

- Name ***: A text input field containing "stonebranch-virtualresource-01".
- Version**: A numeric input field containing "1".
- Description**: A large empty text area.
- Member of Business Services**: A dropdown menu.
- Resource Type**: A dropdown menu with "Renewable" selected.
- Resource Limit ***: A numeric input field containing "10".
- Resource Used**: A numeric input field containing "0".

Note

This sample Virtual Resource Details shows a Resource Limit of 1. Because each task has a minimum value of 1, this virtual resource would be limited to running only one task at a time.

For information on how to access additional details - such as [Metadata](#) and complete [database Details](#) - for Virtual Resources (or any type of record), see [Records](#).

10.2.2 Virtual Resource Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in the Virtual Resource Details.

Field Name	Description
Details	This section contains detailed information about the Virtual Resource.
Name	Name used within the Controller to identify this resource. Up to 40 alphanumeric. It is the responsibility of the user to develop a workable naming scheme for resources.

Version	System-supplied; version number of the current record, which is incremented by the Controller every time a user updates a record. Click the Versions tab to view previous versions. For details, see Record Versioning .
Description	Description of this record. Maximum length is 255 characters.
Member of Business Services	User-defined; Allows you to select one or more Business Services that this record belongs to. (You also can Check All or Uncheck All Business Services for this record.) You can select up to 62 Business Services for any record type, and enter a maximum of 2048 characters for each Business Service. If the Business Service Visibility Restricted Universal Controller system property is set to true, depending on your assigned (or inherited) Permissions or Roles , Business Services available for selection may be restricted.
Resource Type	Type of resource . Options: <ul style="list-style-type: none"> • Renewable • Boundary • Depletable
Resource Limit	Maximum number of units available for this resource.
Resource Used	If Resource Type = Renewable; system-supplied. Number of units currently in use, as of the time you opened the record.
Metadata	This section contains Metadata information about this record.
UUID	Universally Unique Identifier of this record.
Updated By	Name of the user that last updated this record.
Updated	Date and time that this record was last updated.
Created By	Name of the user that created this record.
Created	Date and time that this record was created.
Buttons	This section identifies the buttons displayed above and below the Virtual Resource Details that let you perform various actions.
Save	Saves a new record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplay empty Details so that you can create another record.
Save & View	Saves a new record in the Controller database and continues to display that record.
New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this record.
Tabs	This section identifies the tabs across the top of the Virtual Resource Details that provide access to additional information about the Virtual Resource.
Tasks	Lists tasks that are assigned to this virtual resource.
Currently In Use By	Lists the task instances that have acquired this virtual resource and the number of units acquired, at the time you opened this virtual resource record.

Outstanding Requests	Lists the task instances that are currently waiting to acquire this virtual resource, and the number of units required for each waiting task instance, at the time you opened this record.
Versions	Stores copies of all previous versions of the current record. See Record Versioning .

10.3 Assigning Tasks to a Virtual Resource

Note

You can also assign a task to a virtual resource from a task Details.


Step 1 [Open](#) the Virtual Resource record that you want to assign tasks to.

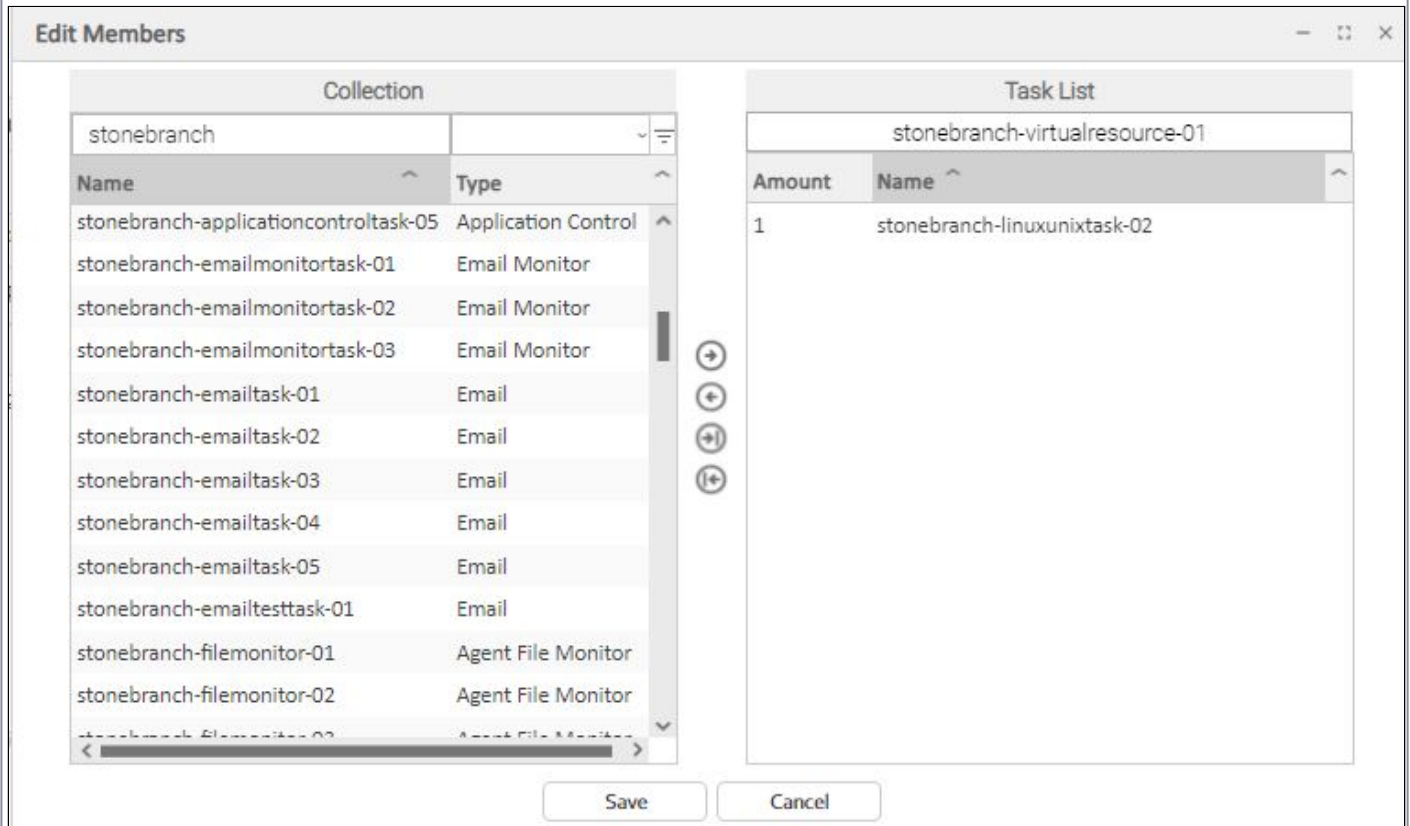
Step 2 Click the Tasks tab. A list of any tasks assigned to the Virtual Resource displays.

The screenshot shows a web interface for 'Virtual Resource Details: stonebranch-virtualresource-01'. It features a navigation bar with tabs: 'Virtual Resource', 'Tasks' (selected), 'Currently In Use By', 'Outstanding Requests', and 'Versions'. Below the tabs, it indicates '1 Task Virtual Resource'. A table displays the task details:

Task	Amount	Updated By	Updated
stonebranch-linuxunixtask-02	1	ops.admin	2014-07-02 13:22:43 -0400

Step 3

Click the  button. The Edit Members pop-up dialog displays:



Edit Members

Collection

stonebranch

Name	Type
stonebranch-applicationcontroltask-05	Application Control
stonebranch-emailmonitortask-01	Email Monitor
stonebranch-emailmonitortask-02	Email Monitor
stonebranch-emailmonitortask-03	Email Monitor
stonebranch-emailtask-01	Email
stonebranch-emailtask-02	Email
stonebranch-emailtask-03	Email
stonebranch-emailtask-04	Email
stonebranch-emailtask-05	Email
stonebranch-emailtesttask-01	Email
stonebranch-filemonitor-01	Agent File Monitor
stonebranch-filemonitor-02	Agent File Monitor
stonebranch-filemonitor-03	Agent File Monitor

Task List

stonebranch-virtualresource-01

Amount	Name
1	stonebranch-linuxunixtask-02

Save Cancel

- The **Collection** window lists tasks that are not assigned to this virtual resource.
- The **Tasks List** window lists tasks that refer to this virtual resource.

Step 4

To filter the Tasks listed in the Collection window, you can do either or both of the following:

- Enter characters in the text field above the **Task Name** column. Only tasks containing that sequence of characters will display in the list.
- Select a task type from the drop-down list above the **Type** column.

Step 5

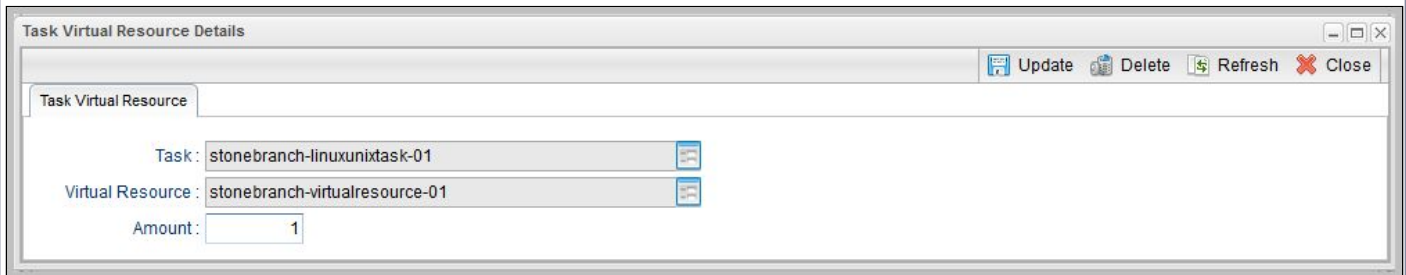
To assign a task to the Virtual Resource, move the task from the **Collection** window to the **Tasks List** window:


1. To move a single task, double-click it or click it once and then click the -> arrow.
2. To move multiple tasks, Ctrl-click them and then click the > arrow.
3. To move all tasks, click the >> arrow.

To unassign a task to the Virtual Resource, move the task from the **Tasks List** windows to the **Collection** window:

1. To move a single task, double-click it or click it once and then click the <- arrow.
2. To move multiple tasks, Ctrl-click them and then click the < arrow.
3. To move all tasks, click the << arrow.

Step 6 The default **Amount** for each task assigned to a Virtual Resource is 1. To change the **Amount**, click the icon next to the **Task** name in the Tasks tab list or double-click anywhere in the task row. A Task Virtual Resource Details pop-up displays



Change the **Amount** as desired and click .

Step 7 Click .

10.4 Resetting a Renewable Virtual Resource

You can reset the **Resource Used** amount of a **Renewable** virtual resource to accurately reflect the actual number of resources **currently in use**.

Resetting a **Renewable** virtual resource requires the [ops_admin](#) role.

(For **Boundary** and **Depletable** virtual resources, the **Resource Used** amount is always reset to 0, as it does not apply to these types of virtual resources.)

Step 1 Access the [Action menu](#) for the Virtual Resource that you want to reset.

Step 2 Click **Reset Virtual Resource**.

Name ^	Resource Type	Description	Resource Limit	Resource Used	Updated By ^
stonebranch-virtualresource-01	Renewable		10	0	ops.admin
stonebranch-virtualresource-02	Renewable		10	0	ops.admin
stonebranch-virtualresource-03	Renewable		10	0	ops.admin
stonebranch-virtualresource-04	Renewable		10	0	ops.admin
stonebranch-virtualresource-05	Renewable		10	0	ops.admin

- Open
- Open In Tab
- View Bundles
- Add To Bundle...
- Promote...
- Reset Virtual Resource**
- Update...
- Download
- Delete
- Details >
- Refresh

This resets the [Resource Used](#) amount to the [Currently In Use By](#) value.