



Developing with the External Start feature: Nintex Workflow 2013

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Developing with the External Start feature

In Nintex Workflow 2013, the External Start feature provides a Windows service, named Nintex Workflow Start Service, with which you can interact to programmatically start site workflows published in Nintex Workflow. Each site workflow to be used with External Start must have at least one corresponding External Start endpoint URL and security key, which exposes the site workflow as a REST resource from the service.

Once exposed, the service provides the following REST operations for the site workflow:

- Send information about the workflow variables used by the site workflow
- Request to start the site workflow

For more information about External Start, see the Nintex Workflow 2013 product documentation.

Walkthrough

In Nintex Workflow 2013, External Start allows you to start site workflows without interacting with SharePoint 2013, by providing the ability to generate and associate endpoint URLs to site workflows published in Nintex Workflow. The endpoint URL is available as a REST resource from the External Start service, with which you can interact to retrieve information about the workflow variables required to start a workflow from the External Start service, and to request that the External Start service start a workflow.

The following walkthrough provides an overview of what's needed to use External Start to programmatically start a workflow.

- ["Configure Nintex Workflow to support the External Start feature" below](#)
- ["Generate an External Start endpoint URL and security key for a workflow" below](#)
- ["Get information about workflow variables" below](#)
- ["Start the workflow" on the next page](#)

Configure Nintex Workflow to support the External Start feature

Nintex Workflow 2013 must be configured to support the External Start feature, and the External Start feature must be enabled in Nintex Workflow Management. For more information about the requirements needed for the External Start feature, see the Nintex Workflow 2013 product documentation.

Generate an External Start endpoint URL and security key for a workflow

You cannot use the External Start feature without first generating an External Start endpoint URL and security key for a site workflow. For more information about generating an External Start endpoint URL and security key, see the Nintex Workflow 2013 product documentation.

For more information about the External Start endpoint URL and security key, see ["Endpoint URL" on page 3](#).

Get information about workflow variables

The variables for the workflow associated with the External Start endpoint URL can be retrieved or identified by performing a GET request.

Tip: Nintex recommends that you retrieve information about workflow variables before you attempt to start a workflow. The workflow associated with the External Start endpoint URL can change without notification, and you may want to validate the mappings between integrated system fields and the workflow variables up to date, to ensure the variables value will not be missing in the request. Ensure that the server can access <https://run.nintex.io> before attempting to start a workflow.

For more information about getting information about workflow variables, see ["Get workflow variables" on page 5](#).

Start the workflow

You can start a workflow by submitting a POST request to the External Start endpoint URL, in which the request headers contain the necessary hash-based message authentication code (HMAC) digest value needed to ensure authenticity of the request and the request body contains the workflow variable values, if needed, to start the workflow.

Note: You must have both an External Start endpoint URL and the corresponding security key to successfully request that the External Start service start a workflow. The security key is used to calculate the HMAC digest value from other values included in the header of the request. For more information about calculating the HMAC digest value, see ["Authentication and authorization" on page 4](#).

For more information about starting a workflow, see ["Start a workflow" on page 7](#).

Using the ExternalStart sample

The ExternalStart sample provides a Windows Forms application, with a simple REST client, to demonstrate how to use the External Start feature in Nintex Workflow 2013 to retrieve information about the workflow variables and start a site workflow.

Overview

The sample provides a Windows form that, given an External Start endpoint URL and security key, can retrieve information about the workflow variables defined by the site workflow associated with the endpoint URL, provide values for those workflow variables, and request that the External Start feature start the workflow.

The Windows form interacts with a service client class, **ExternalStartApiClient**, which encapsulates the REST operations provided by External Start. The service client class, in turn, uses a simple REST client class, **RestClient**, to invoke the corresponding REST operations and interact with the External Start feature. The **CalculateDigest** method, included in the **ExternalStartApiClient** class, demonstrates how to calculate the hash-based message authentication code (HMAC) digest value used to authenticate a request to start a workflow.

For more information about calculating the HMAC digest value, see ["Authentication and authorization" on page 4](#).

Interacting with the sample

Compile and run the sample. When the **ExternalStart sample** window appears, perform the following steps:

1. In **Endpoint URL**, provide the External Start endpoint URL of a site workflow to be started. For help, click on help content.
2. In **Security key**, provide the security key associated with the endpoint URL specified in **Endpoint URL**. For help, click on help content.
3. Click **Get variables**.

This step uses the **ExternalStartApiClient** class to retrieve a list of **WorkflowVariable** objects, each of which represents deserialized information about a workflow variable defined for the site workflow, and dynamically create controls in the Workflow variables group with which you can provide values for those workflow variables. If no workflow variables are available, a label indicating such is displayed in **Workflow variables**.

4. If needed, specify values for workflow variables in the controls provided in **Workflow variables**.

Tip: You can resize the form as needed to ensure that all of the controls in the **Workflow variables** group are visible.

5. Click **Start workflow**.

This step uses the **ExternalStartApiClient** class to construct and send a request to the endpoint URL to start the site workflow associated with that endpoint URL.

See Also

Concepts

["Walkthrough" on page 1](#)

Reference

["REST resources" below](#)

REST resources

The following section describes the REST resources and operations included with the External Start feature.

Endpoint URL

All of the resources and methods provided by the External Start API use the following root path as the endpoint URL:

```
https://run.nintex.io/x-start
```

Caution: Keep External Start endpoint URLs secure. Variable names and data types can be identified from the URLs when used outside the Nintex platform.

Aliases

An alias is created for each External Start endpoint URL generated for a workflow. The alias is appended to the root path when the endpoint URL is generated. The alias is unique to the endpoint URL, and a single workflow can have multiple aliases.

For example, the following example represents an External Start endpoint URL for a workflow, in which the workflow alias has been appended to the root path:

```
https://run.nintex.io/x-start/dxTXhwIuSs
```

Security keys

A security key is created for each External Start endpoint URL generated for a workflow. The security key is also unique to the endpoint URL, and a single workflow can have multiple security keys.

When interacting with the endpoint URL, the security key is not included in requests. Instead, the security key is used to calculate the hash-based message authentication code (HMAC) digest value included in requests. For more information about calculating HMAC digest values, see ["Authentication and authorization" on the next page](#).

For more information about endpoint URLs, aliases, and security keys in the External Start feature, see the Nintex Workflow 2013 product documentation.

Authentication and authorization

The External Start feature, included with Nintex Workflow 2013, requires that, for certain REST operations, you provide a hash-based message authentication code (HMAC) digest value with which to submit a request to start a workflow using that endpoint URL. For example, an HMAC digest value is required to submit a request to start a workflow, but not required to retrieve information about workflow variables.

The HMAC digest value is calculated using the following values:

- Security key
The security key is associated with the External Start endpoint URL, and generated by Nintex Workflow Management. Ensure that you have both the External Start endpoint URL and corresponding security key before sending a request to the External Start service to start a workflow. Ensure that you have the most current security key prior to calculating the HMAC for a request.
- HTTP method name
The HTTP method name of the request, in lower case. For example, to request that the External Start service start a workflow, this value would be set to "post".
- Endpoint URL
The relative path of the endpoint URL, in lower case.
- Nonce
A generated random token, used only once, for the request. Typically, a new GUID is used as the nonce for a request to the External Start service. The nonce is included in the request as the value of the **X-Api-Nonce** request header.
- Timestamp
A Coordinated Universal Time (UTC) timestamp, in ISO 8601 format, for the request. The timestamp is included in the request as the value of the **X-Api-Timestamp** request header.
- Request body
The body of the request, if included in the request.

The HMAC digest value must be calculated using the SHA-256 algorithm, by performing the following steps:

1. Concatenate a delimited string, using a colon (:) character as the delimiter, from the HTTP method name, endpoint URL, nonce, timestamp, and request body.
2. Encode the string in UTF-8 format.
3. Encode the security key in UTF-8 format.
4. Calculate a keyed hash with the SHA-256 algorithm, using the security key as the key and the delimited string as the data.

The resulting keyed hash value is then included in the request as the value of the **X-Api-Digest** header. The combination of HMAC digest value, nonce, and timestamp values must be provided in the corresponding request headers, and they can only be used for that request. For each request, a new nonce, timestamp, and HMAC digest value must be provided.

The following C# example, included with the ExternalStart sample, demonstrates how to calculate the HMAC. For more information about the ExternalStart sample, see ["Using the ExternalStart sample" on page 2](#).

```
public string CalculateDigest(string securityKey, string httpMethod, string path, string nonce,
    string timestamp, string requestBody)
{
    // The data values are concatenated into a single string, in which each data value is delimited by
    // a colon (:) character, which is then encoded as a UTF-8 byte array.
    var dataBytes = Encoding.UTF8.GetBytes(String.Join(":", httpMethod, path, nonce, timestamp,
        requestBody));
```

```
// The security key is encoded as a UTF-8 byte array.
var keyBytes = Encoding.UTF8.GetBytes(securityKey);

// Using the HMACSHA256 object provided by .NET Framework, the
// data values are hashed, using the security key. The value is
// converted into a string, and any dashes included after conversion are removed.
using (var hasher = new HMACSHA256(keyBytes))
{
    var hashBytes = hasher.ComputeHash(dataBytes);
    return BitConverter.ToString(hashBytes).Replace("-", "");
}
}
```

Get workflow variables

Retrieves information about the workflow variables available for the Nintex workflow associated with the specified External Start endpoint URL.

Request

Method	Request URI	HTTP Version
GET	{endpointURL}	HTTP/1.1

Request Parameters

Request Parameter	Description
endpointURL	Required. The External Start endpoint URL for the workflow. For more information about the endpoint URL, see "Endpoint URL" on page 3 .

Request Headers

The following table describes required and optional request headers.

Request Header	Description
Content-Type	Required. application/json; charset=utf-8

Request Body

This operation does not use a request body.

Response

The response includes an HTTP status code, header values, and a response body.

Response Codes

Code	Description
200	OK The workflow associated with the specified endpoint URL was found, and the response successfully returned workflow variables, if any, defined for that workflow.
400	Bad Request The workflow associated with the specified endpoint URL was not found, or the endpoint URL does not exist.

Response Headers

The following table describes response headers returned by a successful response.

Request Header	Description
Content-Length	Length, in octets, of the response body.
Content-Type	application/xml; charset=utf-8
Date	The date and time of the response.
X-CorrelationId	The correlation ID of the response.

Response Body

If the method was successful, a JavaScript Object Notation (JSON) array is returned that contains an object for each workflow variable defined in the workflow associated with the specified endpoint URL. Each object contains the following properties and values:

Property	Data type	Description												
Name	string	Required. The name of the workflow variable.												
Type	string	Required. The data type of the workflow variable.												
		<table border="1"> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Text</td> <td>A single line of text</td> </tr> <tr> <td>TextMultipleLine</td> <td>Multiple lines of text</td> </tr> <tr> <td>Number</td> <td>A floating-point or integer value</td> </tr> <tr> <td>DateTime</td> <td>A date/time value</td> </tr> <tr> <td>Boolean</td> <td>A Boolean value</td> </tr> </tbody> </table>	Value	Description	Text	A single line of text	TextMultipleLine	Multiple lines of text	Number	A floating-point or integer value	DateTime	A date/time value	Boolean	A Boolean value
Value	Description													
Text	A single line of text													
TextMultipleLine	Multiple lines of text													
Number	A floating-point or integer value													
DateTime	A date/time value													
Boolean	A Boolean value													
Required	Boolean	Required. If this property is set to true, a value must be provided for this workflow variable when the workflow is started; otherwise, a value is not required. If a value is not specified for a workflow variable, the default value, if specified, for that workflow variable is used instead.												

If the Nintex workflow associated with the endpoint URL does not define any workflow variables, an empty array is returned in the response body.

Otherwise, depending on the error, the method returns additional information about the error. For example, if the workflow alias in the specified endpoint URL does not exist, the response returns an HTTP 400 status code.

Remarks

This operation returns only workflow variables that satisfy the following criteria:

- In the Workflow designer, **Show on start form** is selected for the workflow variable.
- The workflow variable uses one of the following data types in Nintex Workflow 2013:
 - Single line of text
 - Multiple lines of text
 - Number
 - Date and Time
 - Yes/No
 - Integer

Example

The following example demonstrates how to use this operation to retrieve information about the workflow variables defined for a Nintex workflow associated with an External Start endpoint URL.

Request

The following GET request attempts to retrieve the workflow variables defined for the workflow associated with the specified endpoint URL.

```
https://run.nintex.io/x-start/aIoz0aEes7
```

Request Body

No request body is specified.

Response

An HTTP 200 response code is returned, indicating that the workflow associated with the endpoint URL was found. Information about workflow variables defined for that workflow, if any, are returned in the response body.

Response Body

The following response body contains a JSON-encoded array of objects, each of which represents a workflow variable. In this case, one workflow variable, named AccountNumber, is defined for the workflow.

```
[
  {
    "Name": "AccountNumber",
    "Type": "Text",
    "Required": true
  }
]
```

Start a workflow

Send a message to start the Nintex workflow associated with the specified External Start endpoint URL, optionally specifying values for workflow variables defined by that workflow.

Request

Method	Request URI	HTTP Version
POST	{endpointURL}	HTTP/1.1

Request Parameters

Request Parameter	Description
endpointURL	Required. The External Start endpoint URL for the workflow. For more information about the endpoint URL, see "Endpoint URL" on page 3 .

Request Headers

The following table describes required and optional request headers.

Request Header	Description
Content-Type	Required. application/json

Request Header	Description
X-API-Digest	Required. The hash-based message authentication code (HMAC) digest value with which to authenticate the request. For more information about the HMAC digest value, see "Authentication and authorization" on page 4 .
X-API-Nonce	Required. The nonce with which to authenticate the request. For more information about the nonce, see "Authentication and authorization" on page 4 .
X-API-Source	Optional. A user-specified string that identifies the source of the request. For example, if the request came from the ExternalStart sample, the header value is set to "ExternalStart" by the sample at the time of the request.
X-API-Timestamp	Required. A Coordinated Universal Time (UTC) timestamp, in ISO 8601 format.

Request Body

An object, serialized in JavaScript Object Notation (JSON), that represents the specified values of workflow variables to be used when starting the workflow. If no values are specified, a request body is not required. The object must contain one property for each specified workflow variable value, with the name of the property corresponding to the name of the workflow variable and the value of the property corresponding to the value of the workflow variable, as described in the following table:

Property	Data type	Description												
<name>	string	Required only if a value is specified for the corresponding workflow variable. The name of a workflow variable.												
<value>	varies	Required only if a value is specified for the corresponding workflow variable. The value of the workflow variable. The value must be serialized to an appropriate data type, depending on the workflow variable type, as described in the following table:												
		<table border="1"> <thead> <tr> <th>Workflow variable type</th> <th>Data type</th> </tr> </thead> <tbody> <tr> <td>Text</td> <td>string</td> </tr> <tr> <td>TextMultipleLine</td> <td>string</td> </tr> <tr> <td>Number</td> <td>number</td> </tr> <tr> <td>DateTime</td> <td>string</td> </tr> <tr> <td>Boolean</td> <td>boolean</td> </tr> </tbody> </table>	Workflow variable type	Data type	Text	string	TextMultipleLine	string	Number	number	DateTime	string	Boolean	boolean
Workflow variable type	Data type													
Text	string													
TextMultipleLine	string													
Number	number													
DateTime	string													
Boolean	boolean													

Response

The response includes an HTTP status code and header values.

Response Codes

Code	Description
200	<p>OK A message to start the workflow associated with the endpoint URL was successfully sent to the External Start service.</p> <div style="border: 1px solid blue; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p>Note: This response code does not indicate that the workflow has actually started, only that the message to start the workflow was successfully received by the External Start service. Other circumstances can prevent the workflow from starting. For more information about troubleshooting why a workflow didn't start when using External Start, see the Nintex Workflow 2013 product documentation.</p> </div>
400	<p>Bad Request The workflow associated with the specified endpoint URL was not found, or the endpoint URL does not exist.</p>

Response Headers

The following table describes response headers returned by a successful response.

Request Header	Description
Date	The date and time of the response.
X-CorrelationId	The correlation ID of the response.

Response Body

This operation does not return a response body.

Remarks

This method requests the External Start service to start the Nintex workflow associated with the specified External Start endpoint URL, using, if provided, the specified values for workflow variables. The method does not directly start the workflow, nor does it provide information on the workflow itself.

Example

The following example demonstrates how to use this operation to request that the External Start service starts the Nintex workflow associated with an External Start endpoint URL.

Request

The following POST request attempts to request that the External Start service starts the workflow associated with the specified endpoint URL.

```
https://run.nintex.io/x-start/aIoZ0aEes7
```

Request Body

The following request body defines a JSON object that specifies the values of several workflow variables, to be used when starting the workflow.

```
{
  "Name": "Dennis",
  "Description": "This is\r\na multiline text",
  "LeaveType": "Annual Leave",
  "UserId": 123,
  "DateStart": "2016-01-04",
  "DateEnd": "2016-01-04",
  "HalfDay": "false"
}
```

Response

An HTTP 200 response code is returned, indicating that request to start the workflow was successfully received by the External Start service.

Response Body

The response does not return a response body.