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XTT Link Actions Developer Kit

XTT Link Actions provide a generic, extensible framework for direct, automated communication between external systems (e.g. ERP, QMS, WMS) and TraceLink's Multienterprise Information Network Tower (MINT) solution.

The XTT Link Actions Developer Kit includes two tools, the Link Action Sandbox and the Link Action Test Tool, which allows local testing of Link Actions by verifying data based on a given configuration. The tool provides feedback in the form of success/fail messages during script execution with matching results added to the configuration files.

No roles are required to run the Link Action Sandbox, as this is a standalone application running outside of Opus.

Getting Started

You will require the latest version of the following software:

- **Git** (Necessary ONLY if cloning repositories by command line)
- **Node and NPM**

Download Developer Kit

Start a terminal or command prompt session. Navigate to the folder that will hold your test repository. Use the following command to create the folder:

Windows:

```
md link_action
```

MacOS:

```
mkdir link_action
```

Clone the individual repositories

Navigate to the newly created folder:

```
cd link_action
```

Run the following commands to clone the repositories to your machine:

```
git clone https://github.com/tracelink/xtt-link-actions-sandbox
git clone https://github.com/tracelink/xtt-link-actions-test-tool
```

Install the Link Action Sandbox

The Link Action Sandbox mimics the TraceLink Link Action framework that executes Link Actions, permitting calls to be made to the external system from a local machine. This sandbox is required to run the Link Action Test tool.

From the top level folder you just created, navigate to the Link Action Sandbox folder.

```
cd link-action-sandbox
```

Run the install command to download the required node packages.

```
npm install
```

Return to the top level directory to continue configuration.

```
cd ..
```

Navigate to the test tool folder and run the installation to gather the required libraries for the tool:

```
cd link-action-test-tool
npm install
```

This installation is only needed once. You are ready to run the tool as many times as needed.

Configure the Link Action Developer Kit

Configure Transaction Schema Files

Transaction Schema Files, called MaxFiles, are JSON files that supply an entry for every possible field, along with a sample value, of the Link Action transaction (e.g. Purchase Order, Invoice, ASN). MaxFiles are needed for validating Inbound Link Actions and are used to help generate schemas for testing.

Start with a JSON file containing the payload for a specific action such as creating a purchase order. To do this:

1. Copy the desired payload from the documentation for your application into an empty text file.
2. Edit your new file, placing a value in every possible field, including optional fields. The values need not be real data, but should match the type specified. Preserve all nesting or object hierarchies in your specified payload.
3. Save this new file in your test folder.

For example: the snippet below taken from a purchase order maxFile would be saved to **link-action-sandbox/testData/Input/PurchaseOrder/Standard/Inbound/**

```
"billingAddress": {
    "addr1": "baner",
    "addr2": "stree 2",
    "addressee": "BM Ltd.",
    "addrPhone": "+1235345",
    "addrText": "Tracelink \nBM Ltd.\nbaner\nstree 2\npune Maharashtre
411002\nIndia",
    "attention": "Tracelink",
    "city": "pune",
    "country": {
        "id": "IN",
        "refName": "India"
    },
    "override": false,
    "state": "Maharashtre",
    "zip": "411002"
}
```

Click here for a sample max file.

Configure Link Action Test Tool

The Link Action Test Tool creates an integration with the customer’s external system via the Link Action Sandbox to perform tests.

You must obtain credentials from your system of record for these tests to run properly. (see below if you are the administrator).

Navigate to the testData folder in the link action sandbox and copy the secrets.json file to the link-action-test-tool/testData folder

```
cd link-action-sandbox/testData
```

Windows:

```
copy secrets.json ../../link-action-test-tool/testData
```

MacOS:

```
cp secrets.json ../../link-action-test-tool/testData
```

Sample secrets.json file

```
{
   "API_KEYS": {
       "CONSUMER_KEY": "YOUR_CONSUMER_KEY",
       "CLIENT_SECRET": "YOUR_CLIENT_SECRET",
       "TOKEN_URL": "URL_FOR_YOUR_SERVICE",
       "CERTIFICATE_PRIVATE_KEY": "YOUR_GENERATED_PRIVATE_KEY",
       "CERTIFICATE_ID": "CERTIFICATE_ID_FROM_UPLOADED_PRIVATE_KEY",
       "ALGORITHM": "PS256",
       "SCOPE": "rest_webservices"
   }
}
```

This file contains the credentials to facilitate communication with the external system for your test environment. You must supply the following items:

- **TOKEN_URL** - URL to the service that generates the authentication token (e.g. https://ab1234567.suitetalk.api.netsuite.com/services/rest/auth/oauth2/v1/token, where ab1234567 is your company identifier)
- **CONSUMER_KEY** - Value that identifies a specific user
- **CLIENT_SECRET** - Value used to authenticate the CONSUMER_KEY
- **CERTIFICATE_PRIVATE_KEY** - A cryptographic key that pairs with the uploaded public key. We create credentials in the next section.
- **CERTIFICATE_ID** - The identifier for the certificate being used

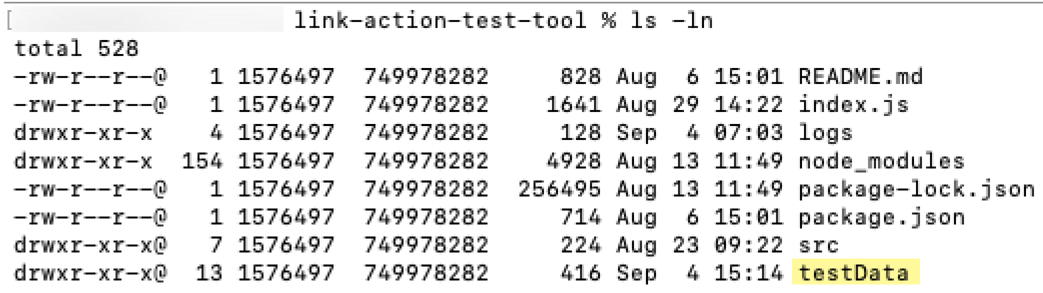
To generate the access credentials and system configuration details required for the secrets.json file, an administrator for your external system may use the following guide:

- **Admin Setup for NetSuite**

Once the admin steps have been completed and the secrets.json file values have been added, save it to the link-action-test-tool/testData folder.

Configuration files

The **testData** subfolder within the **link-action-test-tool** folder contains configuration files required for the test to run. The configuration files are updated with success/fail messages during script execution.



```
[[redacted] link-action-test-tool % ls -ln
total 528
-rw-r--r--@   1 1576497  749978282     828 Aug  6 15:01 README.md
-rw-r--r--@   1 1576497  749978282    1641 Aug 29 14:22 index.js
drwxr-xr-x    4 1576497  749978282     128 Sep  4 07:03 logs
drwxr-xr-x  154 1576497  749978282    4928 Aug 13 11:49 node_modules
-rw-r--r--@   1 1576497  749978282  256495 Aug 13 11:49 package-lock.json
-rw-r--r--@   1 1576497  749978282     714 Aug  6 15:01 package.json
drwxr-xr-x@   7 1576497  749978282     224 Aug 23 09:22 src
drwxr-xr-x@  13 1576497  749978282     416 Sep  4 15:14 testData
```

The transform test tool uses Excel spreadsheets to contain the configurations for each test. You must edit the configuration file for each test to reflect your current folder structure.

When you download the tool, there are sample configuration files that you may modify for your specific needs. The sample configurations allow you to test:

- Inbound Advanced Shipping Notice (ASN)
- Inbound Invoices
- Inbound purchase orders
- Outbound purchase orders
- Outbound sales orders

From the link-action-test-tool/testData folder, copy a sample file either in a graphical window or by running the copy command:

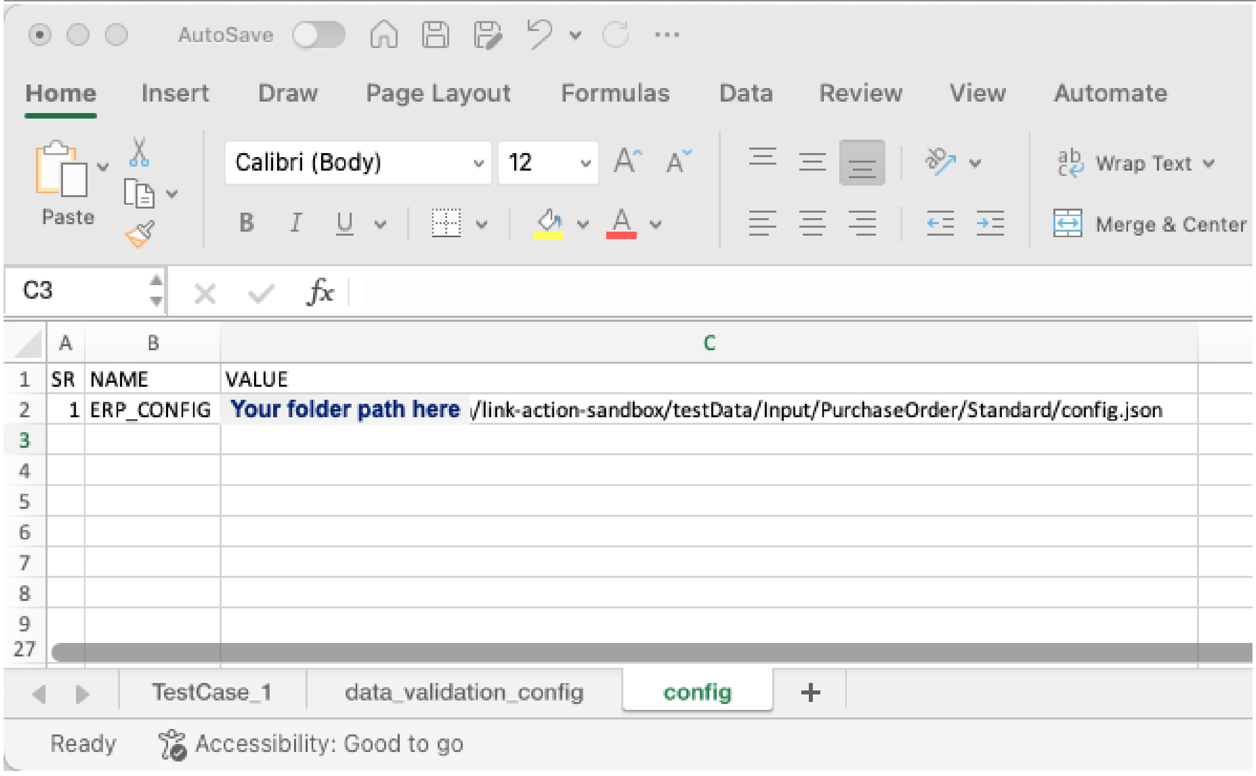
Windows:

```
copy NETSUITE_INVOICE_INBOUND_LINKACTION.xlsx
My_Sample_INBOUND_INVOICE.xlsx
```

MacOS:

```
cp NETSUITE_INVOICE_INBOUND_LINKACTION.xlsx
My_Sample_INBOUND_INVOICE.xlsx
```

Open the file for editing. On the **config** tab, update the folder location of your config.json file to reflect the location of your files. By default, it is in the link-action-sandbox/testData/Input folder in a subfolder that corresponds to your action. In the example below, the PurchaseOrder/Standard folder.



	A	B	C
1	SR	NAME	VALUE
2	1	ERP_CONFIG	**Your folder path here** /link-action-sandbox/testData/Input/PurchaseOrder/Standard/config.json

Before continuing, edit the config.json file you just referenced to contain the information relevant to your account.

Sample config.json

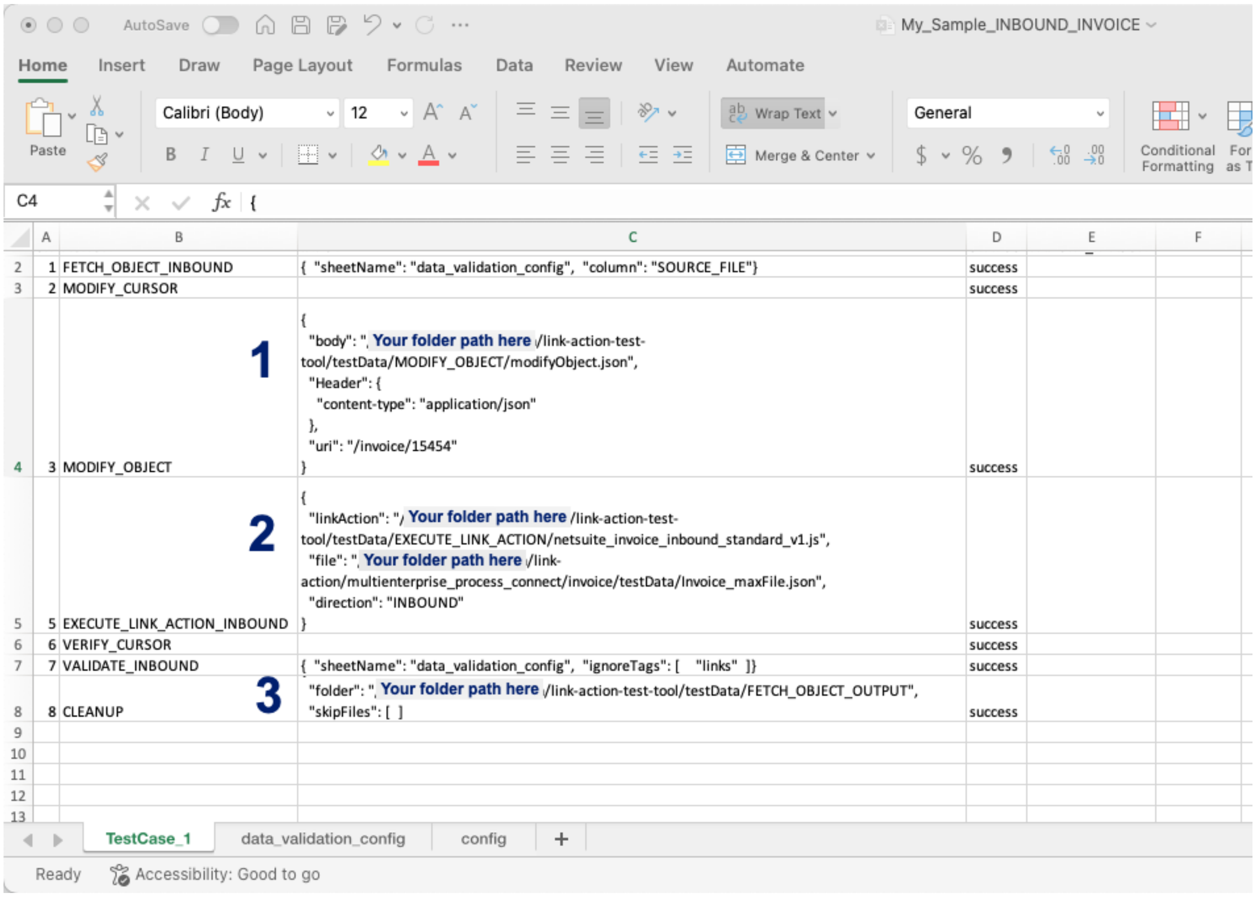
```
{
   "url":
"https://ab1234567.suitetalk.api.netsuite.com/services/rest/record/v1"
,
   "netSuiteAccountId": "1234567",
   "erp": "Netsuite",
   "dateFormat": "YYYY-MM-DD",
   "timeFormat": "HH:MI:SS AM",
   "dateTimeFormat": "YYYY-MM-DD HH:MI:SS AM",
   "suiteQLURL":
"https://ab1234567.suitetalk.api.netsuite.com/services/rest/query/v1/s
uiteql"
}
```

Where ab1234567 is your account number. Use only the numeric portion of the AccountId for the **netSuiteAccountId** field.

On the **TestCase_1** tab, update the locations for the following entries:

1. **MODIFY_OBJECT** - The location of the configuration file containing the payloads needed to create records in the system of record.
2. **EXECUTE_LINK_ACTION_INBOUND** - The location of the instruction file to execute the link action.

3. **CLEANUP** - The folder location the test tool uses for temporary files during testing. Files and folders in this location are deleted during script completion.



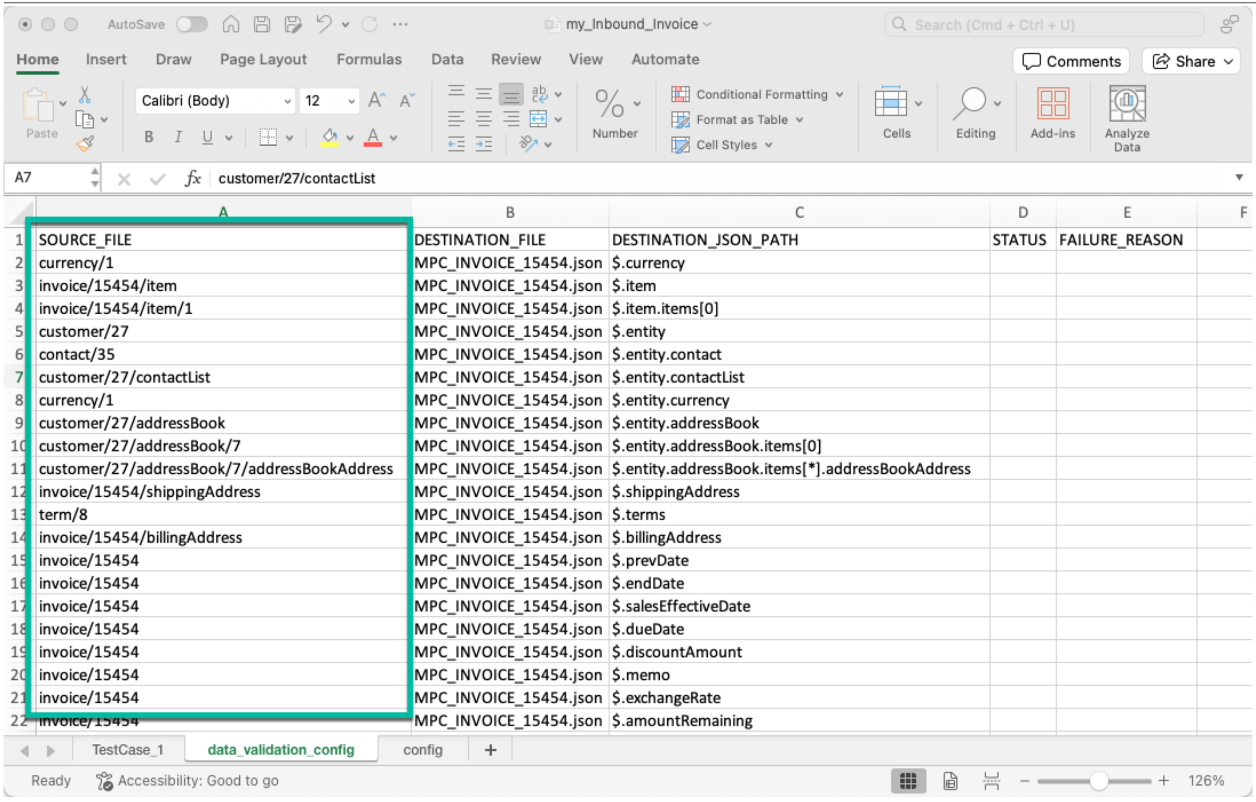
	A	B	C	D	E	F
2	1	FETCH_OBJECT_INBOUND	{ "sheetName": "data_validation_config", "column": "SOURCE_FILE"}	success		
3	2	MODIFY_CURSOR		success		

4	3	1
		MODIFY_OBJECT
			{
			"body": "Your folder path here/link-action-test-tool/testData/MODIFY_OBJECT/modifyObject.json",
			"Header": {
			"content-type": "application/json"
			},
			"uri": "/invoice/15454"
			}
				success		

5	5	2
		EXECUTE_LINK_ACTION_INBOUND
			{
			"linkAction": "/Your folder path here/link-action-test-tool/testData/EXECUTE_LINK_ACTION/netsuite_invoice_inbound_standard_v1.js",
			"file": "Your folder path here/link-action/multienterprise_process_connect/invoice/testData/Invoice_maxFile.json",
			"direction": "INBOUND"
			}
				success		

6	6	VERIFY_CURSOR		success		
7	7	VALIDATE_INBOUND	{ "sheetName": "data_validation_config", "ignoreTags": ["links"]}	success		
8	8	3 CLEANUP	"folder": "Your folder path here/link-action-test-tool/testData/FETCH_OBJECT_OUTPUT", "skipFiles": [ ]	success		
9						
10						
11						
12						
13						

On the **data_validation_config** tab, update the values in each row of the SOURCE_FILE column to match values for a record in your system of record.



	A	B	C	D	E
1	SOURCE_FILE	DESTINATION_FILE	DESTINATION_JSON_PATH	STATUS	FAILURE_REASON
2	currency/1	MPC_INVOICE_15454.json	$.currency		
3	invoice/15454/item	MPC_INVOICE_15454.json	$.item		
4	invoice/15454/item/1	MPC_INVOICE_15454.json	$.item.items[0]		
5	customer/27	MPC_INVOICE_15454.json	$.entity		
6	contact/35	MPC_INVOICE_15454.json	$.entity.contact		
7	customer/27/contactList	MPC_INVOICE_15454.json	$.entity.contactList		
8	currency/1	MPC_INVOICE_15454.json	$.entity.currency		
9	customer/27/addressBook	MPC_INVOICE_15454.json	$.entity.addressBook		
10	customer/27/addressBook/7	MPC_INVOICE_15454.json	$.entity.addressBook.items[0]		
11	customer/27/addressBook/7/addressBookAddress	MPC_INVOICE_15454.json	$.entity.addressBook.items[*].addressBookAddress		
12	invoice/15454/shippingAddress	MPC_INVOICE_15454.json	$.shippingAddress		
13	term/8	MPC_INVOICE_15454.json	$.terms		
14	invoice/15454/billingAddress	MPC_INVOICE_15454.json	$.billingAddress		
15	invoice/15454	MPC_INVOICE_15454.json	$.prevDate		
16	invoice/15454	MPC_INVOICE_15454.json	$.endDate		
17	invoice/15454	MPC_INVOICE_15454.json	$.salesEffectiveDate		
18	invoice/15454	MPC_INVOICE_15454.json	$.dueDate		
19	invoice/15454	MPC_INVOICE_15454.json	$.discountAmount		
20	invoice/15454	MPC_INVOICE_15454.json	$.memo		
21	invoice/15454	MPC_INVOICE_15454.json	$.exchangeRate		
22	invoice/15454	MPC_INVOICE_15454.json	$.amountRemaining		

The Link Action Developer Kit performs the following actions, which may be configured in the Excel files:

Action Name	Description
FETCH_OBJECT_INBOUND	Gets the data from ERP
MODIFY_CURSOR	Modifies the fetchedTillTime to a numeric representation of the current time
MODIFY_OBJECT	Creates a new record in the external system
EXECUTE_LINK_ACTION_INBOUND	Execute the link action
VERIFY_CURSOR	Valid only if MODIFY_CURSOR is used in an earlier step. Verifies the dates are current so that at least one record is returned.
VALIDATE_INBOUND	Compares the data from the external system against the output of the Link Action
CLEANUP	Deletes all files/folders under a given folder. It doesn’t perform any cleanup activity on ERP side

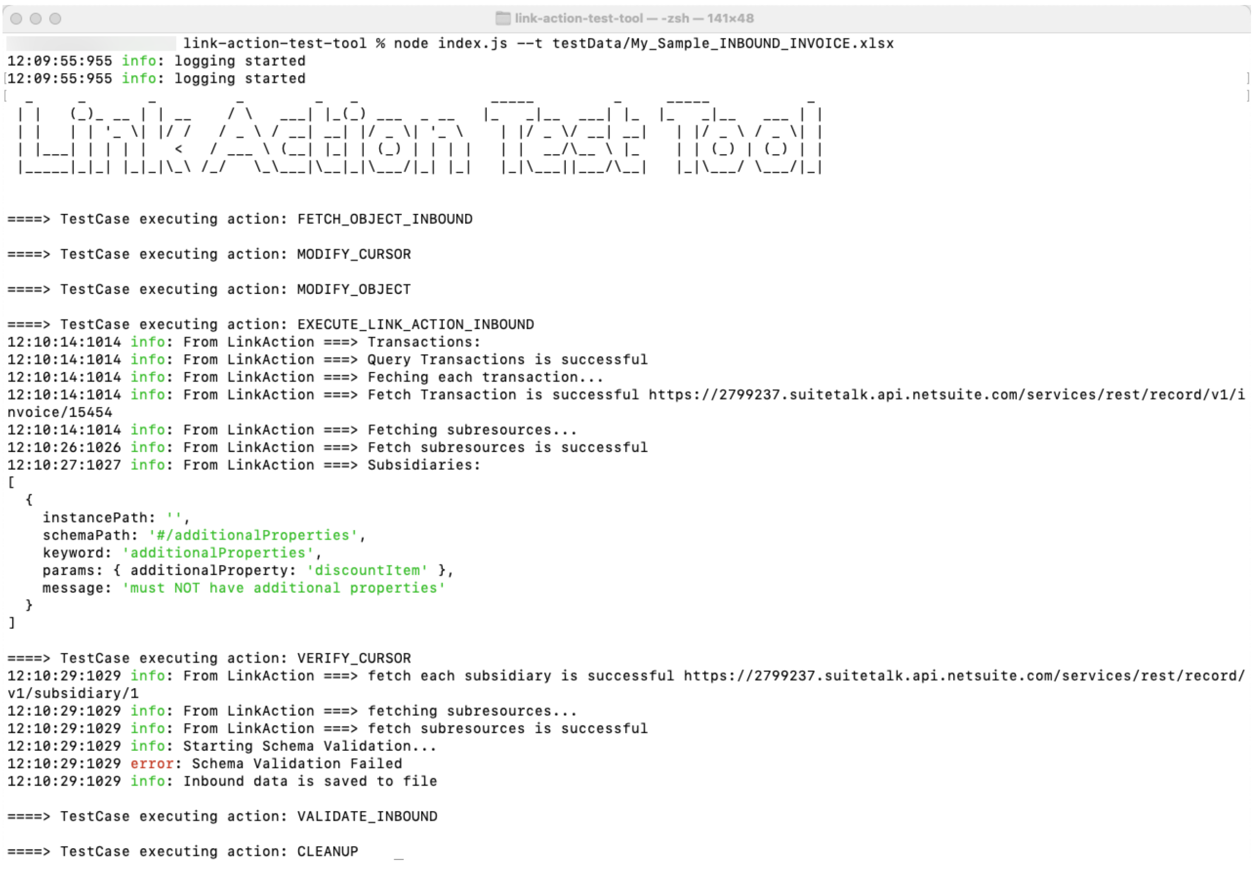
Running a test

Using a terminal window, navigate to the **link-action-test-tool** folder you created earlier.

Run the following command using a file that is provided for you:

```
node index.js --t testData/My_Sample_INBOUND_INVOICE.xlsx
```

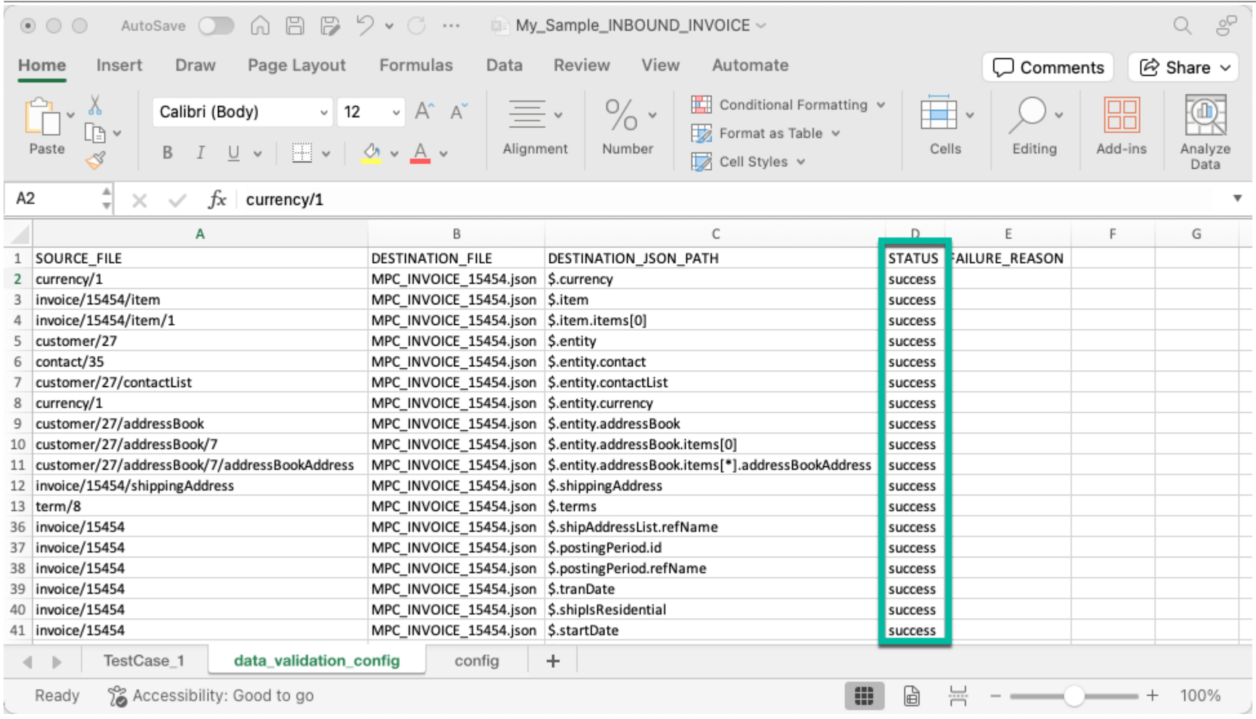
The command line provides text feedback on the status of the progress and pass/fail results of each.



```
[redacted] link-action-test-tool % node index.js --t testData/My_Sample_INBOUND_INVOICE.xlsx
12:09:55:955 info: logging started
12:09:55:955 info: logging started
 _     _       _        _        _   _               _____         _     _____           _
| |   (_)_ __ | | __   / \   ___| |_(_) ___  _ __   |_   _|__  ___| |_  |_   _|__   ___ | |
| |   | | '_ \| |/ /  / _ \ / __| __| |/ _ \| '_ \    | |/ _ \/ __| __|   | |/ _ \ / _ \| |
| |___| | | | |   <  / ___ \ (__| |_| | (_) | | | |   | |  __/\__ \ |_    | | (_) | (_) | |
|_____|_|_| |_|_|\_\/_/   \_\___|\__|_|\___/|_| |_|   |_|\___||___/\__|   |_|\___/ \___/|_|


====> TestCase executing action: FETCH_OBJECT_INBOUND

====> TestCase executing action: MODIFY_CURSOR

====> TestCase executing action: MODIFY_OBJECT

====> TestCase executing action: EXECUTE_LINK_ACTION_INBOUND
12:10:14:1014 info: From LinkAction ===> Transactions:
12:10:14:1014 info: From LinkAction ===> Query Transactions is successful
12:10:14:1014 info: From LinkAction ===> Feching each transaction...
12:10:14:1014 info: From LinkAction ===> Fetch Transaction is successful https://2799237.suitetalk.api.netsuite.com/services/rest/record/v1/i
nvoice/15454
12:10:14:1014 info: From LinkAction ===> Fetching subresources...
12:10:26:1026 info: From LinkAction ===> Fetch subresources is successful
12:10:27:1027 info: From LinkAction ===> Subsidiaries:
[
  {
    instancePath: '',
    schemaPath: '#/additionalProperties',
    keyword: 'additionalProperties',
    params: { additionalProperty: 'discountItem' },
    message: 'must NOT have additional properties'
  }
]

====> TestCase executing action: VERIFY_CURSOR
12:10:29:1029 info: From LinkAction ===> fetch each subsidiary is successful https://2799237.suitetalk.api.netsuite.com/services/rest/record/
v1/subsidiary/1
12:10:29:1029 info: From LinkAction ===> fetching subresources...
12:10:29:1029 info: From LinkAction ===> fetch subresources is successful
12:10:29:1029 info: Starting Schema Validation...
12:10:29:1029 error: Schema Validation Failed
12:10:29:1029 info: Inbound data is saved to file

====> TestCase executing action: VALIDATE_INBOUND

====> TestCase executing action: CLEANUP
```

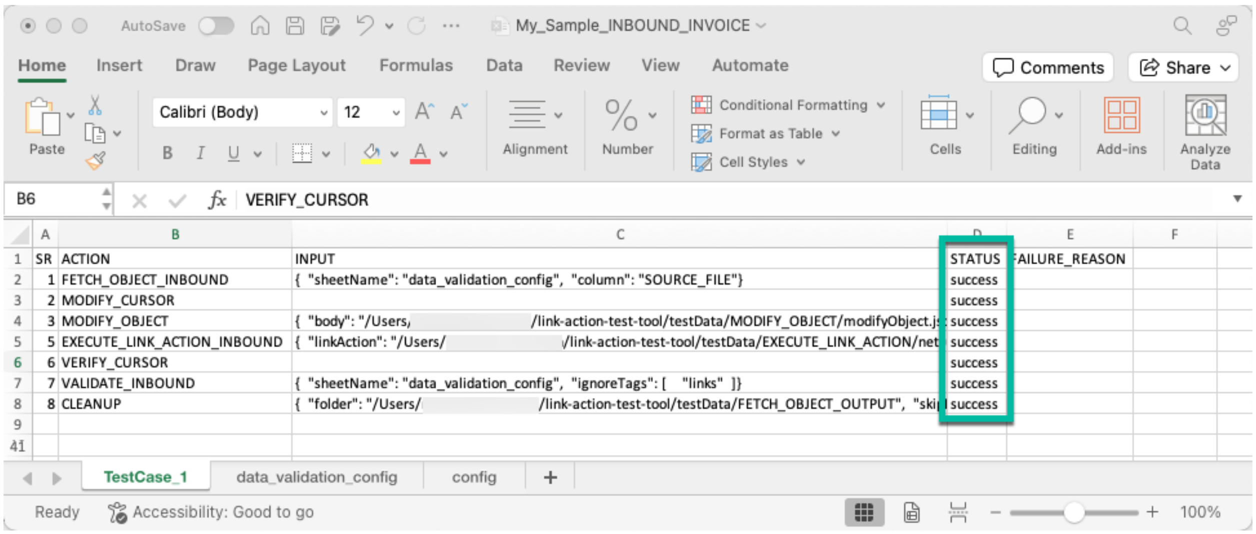
The script updates the test configuration file you created in the **testData** folder with pass or fail results. If the test fails, a reason is included.

The data_validation_config tab in the test configuration Excel file will produce similar output to the following on success:



	A	B	C	D	E
1	SOURCE_FILE	DESTINATION_FILE	DESTINATION_JSON_PATH	STATUS	FAILURE_REASON
2	currency/1	MPC_INVOICE_15454.json	$.currency	success	
3	invoice/15454/item	MPC_INVOICE_15454.json	$.item	success	
4	invoice/15454/item/1	MPC_INVOICE_15454.json	$.item.items[0]	success	
5	customer/27	MPC_INVOICE_15454.json	$.entity	success	
6	contact/35	MPC_INVOICE_15454.json	$.entity.contact	success	
7	customer/27/contactList	MPC_INVOICE_15454.json	$.entity.contactList	success	
8	currency/1	MPC_INVOICE_15454.json	$.entity.currency	success	
9	customer/27/addressBook	MPC_INVOICE_15454.json	$.entity.addressBook	success	
10	customer/27/addressBook/7	MPC_INVOICE_15454.json	$.entity.addressBook.items[0]	success	
11	customer/27/addressBook/7/addressBookAddress	MPC_INVOICE_15454.json	$.entity.addressBook.items[*].addressBookAddress	success	
12	invoice/15454/shippingAddress	MPC_INVOICE_15454.json	$.shippingAddress	success	
13	term/8	MPC_INVOICE_15454.json	$.terms	success	
36	invoice/15454	MPC_INVOICE_15454.json	$.shipAddressList.refName	success	
37	invoice/15454	MPC_INVOICE_15454.json	$.postingPeriod.id	success	
38	invoice/15454	MPC_INVOICE_15454.json	$.postingPeriod.refName	success	
39	invoice/15454	MPC_INVOICE_15454.json	$.tranDate	success	
40	invoice/15454	MPC_INVOICE_15454.json	$.shipIsResidential	success	
41	invoice/15454	MPC_INVOICE_15454.json	$.startDate	success	

The TestCase_1 tab in the test configuration Excel file will produce similar output to the following on success:



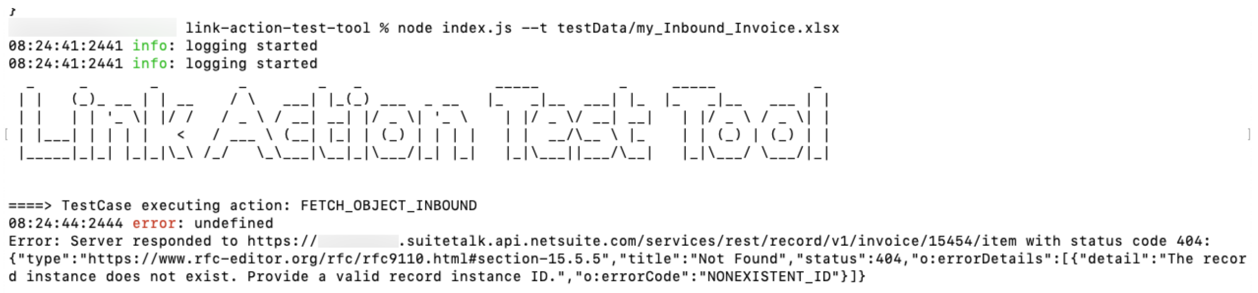
	A	B	C	D	E
1	SR	ACTION	INPUT	STATUS	FAILURE_REASON
2	1	FETCH_OBJECT_INBOUND	{ "sheetName": "data_validation_config", "column": "SOURCE_FILE"}	success	
3	2	MODIFY_CURSOR		success	
4	3	MODIFY_OBJECT	{ "body": "/Users/ /link-action-test-tool/testData/MODIFY_OBJECT/modifyObject.js	success	
5	5	EXECUTE_LINK_ACTION_INBOUND	{ "linkAction": "/Users/ /link-action-test-tool/testData/EXECUTE_LINK_ACTION/net	success	
6	6	VERIFY_CURSOR		success	
7	7	VALIDATE_INBOUND	{ "sheetName": "data_validation_config", "ignoreTags": ["links"]}	success	
8	8	CLEANUP	{ "folder": "/Users/ /link-action-test-tool/testData/FETCH_OBJECT_OUTPUT", "ski	success	
9					
41					

The results of these tests should be used to confirm or rule out configuration issues as a root cause of communication problems with your link actions.

Common Issues

Missing or incorrect data and unsuccessful token generation are common issues you may encounter. Below are some examples of error messages and a likely cause and resolution for each.

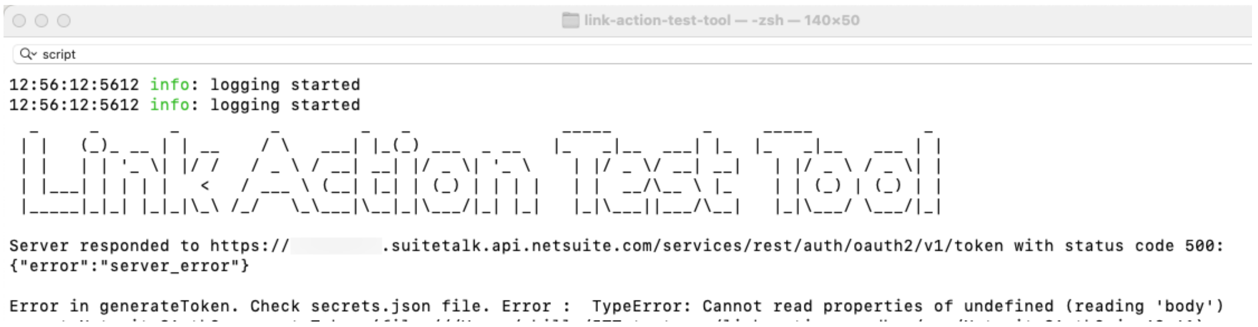
Sample error generated by using incorrect data:



```
[redacted] link-action-test-tool % node index.js --t testData/my_Inbound_Invoice.xlsx
08:24:41:2441 info: logging started
08:24:41:2441 info: logging started
 _     _       _        _        _   _               _____         _     _____           _ 
| |   (_)_ __ | | __   / \   ___| |_(_) ___  _ __   |_   _|__  ___| |_  |_   _|__   ___ | |
| |   | | '_ \| |/ /  / _ \ / __| __| |/ _ \| '_ \    | |/ _ \/ __| __|   | |/ _ \ / _ \| |
| |___| | | | |   <  / ___ \ (__| |_| | (_) | | | |   | |  __/\__ \ |_    | | (_) | (_) | |
|_____|_|_| |_|_|\_\/_/   \_\___|\__|_|\___/|_| |_|   |_|\___||___/\__|   |_|\___/ \___/|_|


====> TestCase executing action: FETCH_OBJECT_INBOUND
08:24:44:2444 error: undefined
Error: Server responded to https://[redacted].suitetalk.api.netsuite.com/services/rest/record/v1/invoice/15454/item with status code 404:
{"type":"https://www.rfc-editor.org/rfc/rfc9110.html#section-15.5.5","title":"Not Found","status":404,"o:errorDetails":[{"detail":"The recor
d instance does not exist. Provide a valid record instance ID.","o:errorCode":"NONEXISTENT_ID"}]}
```

In this situation, an incorrect invoice ID was sent. Fix this error by validating the information on the data_validation_config page of your test file against a valid record in your system.

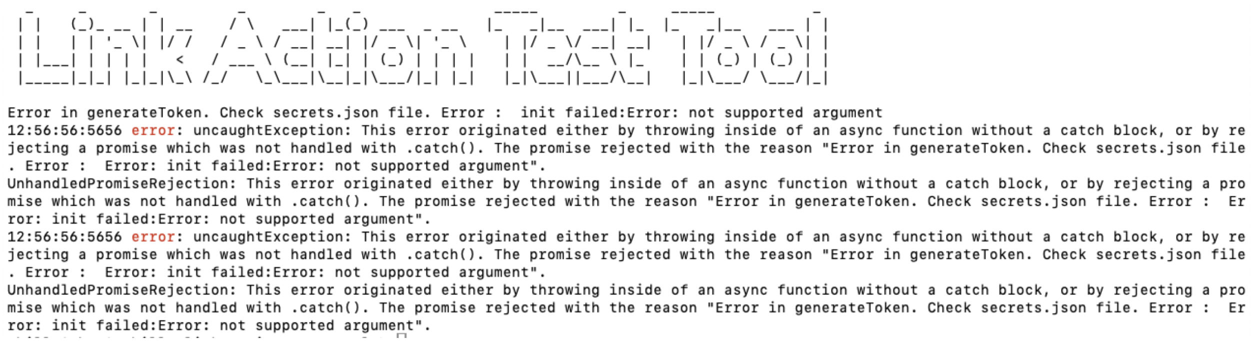
Sample error generated by using incorrect client credentials:



```
12:56:12:5612 info: logging started
12:56:12:5612 info: logging started
 _     _       _        _        _   _               _____         _     _____           _ 
| |   (_)_ __ | | __   / \   ___| |_(_) ___  _ __   |_   _|__  ___| |_  |_   _|__   ___ | |
| |   | | '_ \| |/ /  / _ \ / __| __| |/ _ \| '_ \    | |/ _ \/ __| __|   | |/ _ \ / _ \| |
| |___| | | | |   <  / ___ \ (__| |_| | (_) | | | |   | |  __/\__ \ |_    | | (_) | (_) | |
|_____|_|_| |_|_|\_\/_/   \_\___|\__|_|\___/|_| |_|   |_|\___||___/\__|   |_|\___/ \___/|_|

Server responded to https://[redacted].suitetalk.api.netsuite.com/services/rest/auth/oauth2/v1/token with status code 500:
{"error":"server_error"}

Error in generateToken. Check secrets.json file. Error :  TypeError: Cannot read properties of undefined (reading 'body')
```

This error was caused by using the incorrect CONSUMER_KEY value. Be sure to copy the correct values for your integration when creating it. CONSUMER_KEY and CLIENT_SECRET values are only displayed once.

Sample token generation error:



```
 _     _       _         _        _   _               _____         _     _____           _ 
| |   (_)_ __ | | __    / \   ___| |_(_) ___  _ __   |_   _|__  ___| |_  |_   _|__   ___ | |
| |   | | '_ \| |/ /   / _ \ / __| __| |/ _ \| '_ \    | |/ _ \/ __| __|   | |/ _ \ / _ \| |
| |___| | | | |   <   / ___ \ (__| |_| | (_) | | | |   | |  __/\__ \ |_    | | (_) | (_) | |
|_____|_|_| |_|_|\_\ /_/   \_\___|\__|_|\___/|_| |_|   |_|\___||___/\__|   |_|\___/ \___/|_|

Error in generateToken. Check secrets.json file. Error :  init failed:Error: not supported argument
12:56:56:5656 error: uncaughtException: This error originated either by throwing inside of an async function without a catch block, or by re
jecting a promise which was not handled with .catch(). The promise rejected with the reason "Error in generateToken. Check secrets.json file
. Error :  Error: init failed:Error: not supported argument".
UnhandledPromiseRejection: This error originated either by throwing inside of an async function without a catch block, or by rejecting a pro
mise which was not handled with .catch(). The promise rejected with the reason "Error in generateToken. Check secrets.json file. Error :  Er
ror: init failed:Error: not supported argument".
12:56:56:5656 error: uncaughtException: This error originated either by throwing inside of an async function without a catch block, or by re
jecting a promise which was not handled with .catch(). The promise rejected with the reason "Error in generateToken. Check secrets.json file
. Error :  Error: init failed:Error: not supported argument".
UnhandledPromiseRejection: This error originated either by throwing inside of an async function without a catch block, or by rejecting a pro
mise which was not handled with .catch(). The promise rejected with the reason "Error in generateToken. Check secrets.json file. Error :  Er
ror: init failed:Error: not supported argument".
```

This error likely indicates a problem copying the CERTIFICATE_PRIVATE_KEY value into the secrets.json file. Be sure to remove any line breaks or carriage returns from the text of the private key when copying this value.

Next Steps

Consult the Custom XTT Link Actions Developer Guide for more information on creating and working with Link Actions.