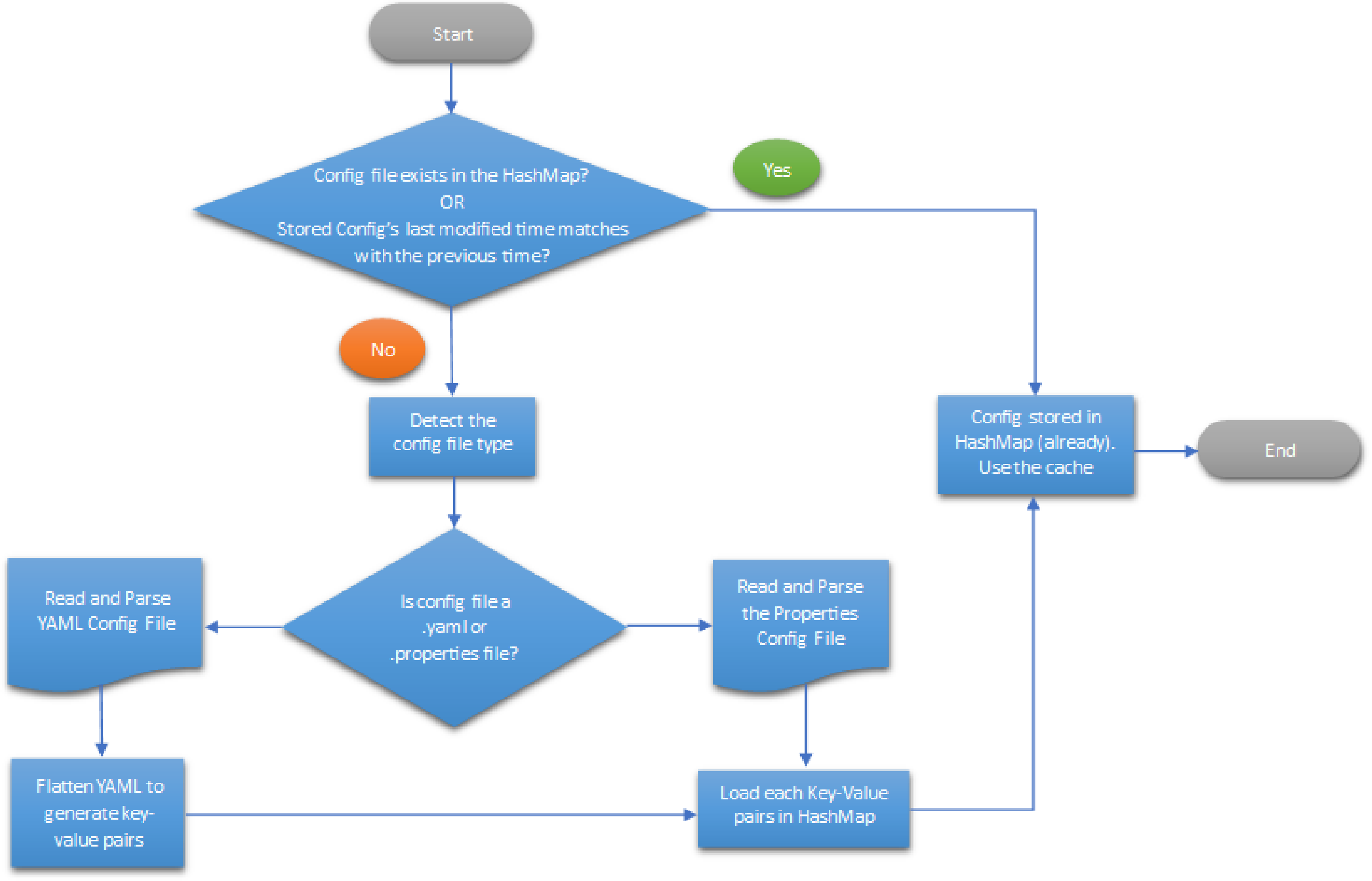
Using (Secured) YAML or Properties Config file as a DataStore in IBM App Connect Enterprise

This document demonstrates and implements a concept of using YAML or Properties file to use as a DataStore for lookup. Changing the config will `not` require the application to be redeployed or restarted. This can minimize maintenance time for an application as well as develop re-usable codes that can be dynamically configured.

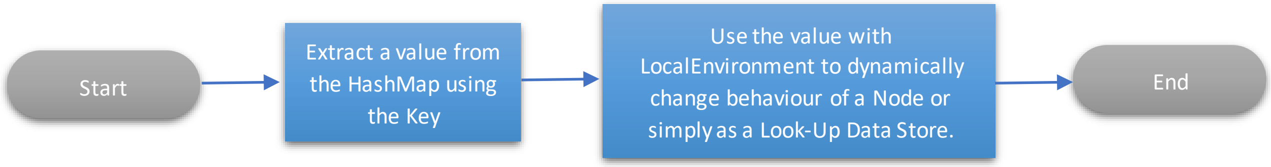
Features Implemented:

- ✓ Support for `YAML` or `Properties` config file
- ✓ Supports `AES/CBC/PKCS5PADDING` decryption [both – key level (similar to this) and file level (similar to this) decryption support]
- ✓ Local caching for better performance
- ✓ Auto-detect changes in config file. This reloads the config without redeploying/restarting application.
- ✓ YAML files can be bundled within BAR and hence no separate deployment/placing of files required. Properties file can be placed in the server running the ACE application.

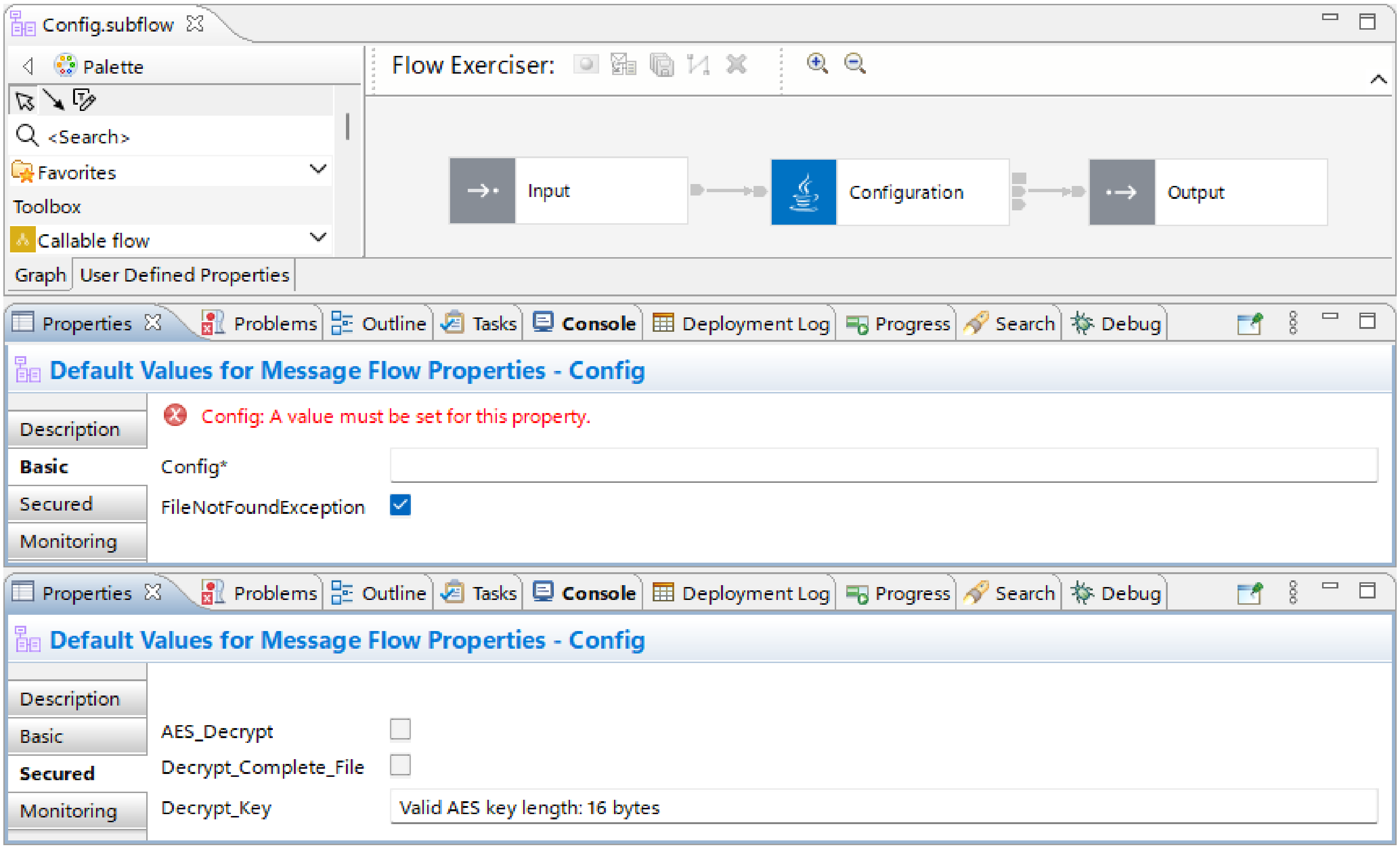
Understanding the flow-chart for implementation (simple version - not showing decryption capabilities)


Start
Config file exists in the HashMap?
OR
Stored Config's last modified time matches with the previous time?
Yes
No
Detect the config file type
Config stored in HashMap (already). Use the cache
End
Read and Parse YAML Config File
Is config file a .yaml or .properties file?
Read and Parse the Properties Config File
Flatten YAML to generate key-value pairs
Load each Key-Value pairs in HashMap

How to use stored Key-Value pairs


Start
Extract a value from the HashMap using the Key
Use the value with LocalEnvironment to dynamically change behaviour of a Node or simply as a Look-Up Data Store.
End

Implementation: Created a Subflow with 5 User Defined Properties as shown in the picture. Code can be found here.



Default Values for Message Flow Properties - Config

Config: A value must be set for this property.

Config*

FileNotFoundException ☑

Default Values for Message Flow Properties - Config

AES_Decrypt □

Decrypt_Complete_File □

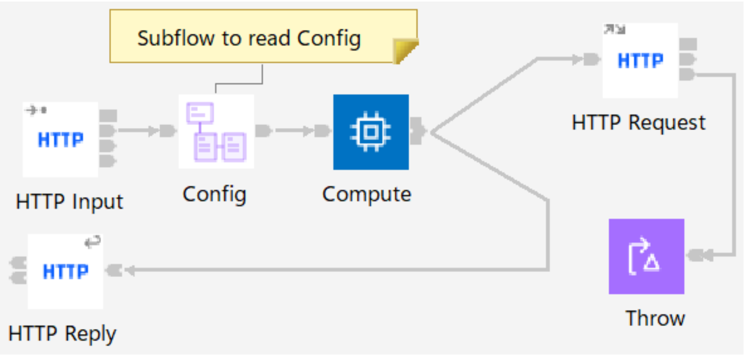
Decrypt_Key: Valid AES key length: 16 bytes

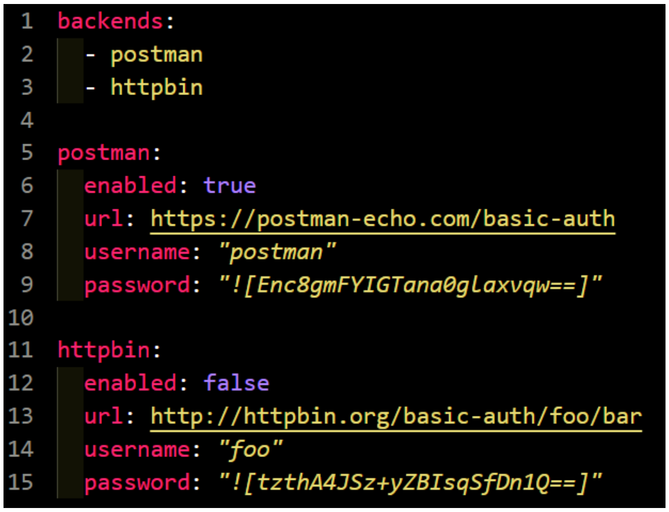
Testing with a Message Flow: Created a message flow which will read app-dev.conf.yaml. The YAML contains 2 backend details (postman and httpbin). Depending on the flag `enabled`, we will dynamically invoke the backends. The backends are Basic-Auth protected and hence require a username and password to invoke successfully. Stored the password after encrypting. Key (and Vector) used for encryption – *AESEncryptionKey*

Supported Operations in the Test message Flow:

`POST http://localhost:7800/mylookupflow` – invoke backends based on enabled flag. Backend error (in case of Auth failure will generate an exception)

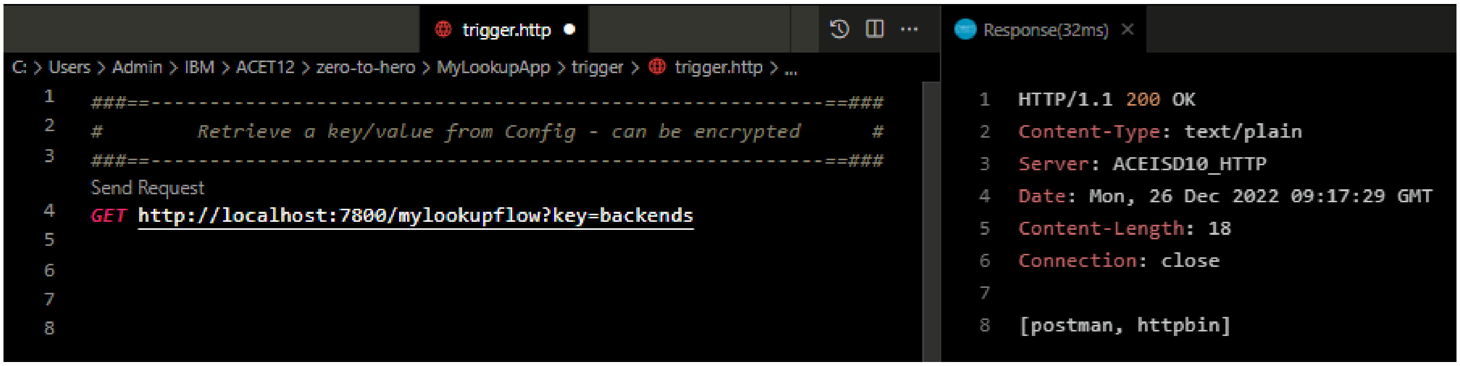
`GET http://localhost:7800/mylookupflow?key={key_to_extract}` – this is to test if the key-values are extracted correctly (decrypted in case values are encrypted)





```yaml
backends:
  - postman
  - httpbin

postman:
  enabled: true
  url: https://postman-echo.com/basic-auth
  username: "postman"
  password: "![Enc8gmFYIGTana0glaxvqw==]"

httpbin:
  enabled: false
  url: http://httpbin.org/basic-auth/foo/bar
  username: "foo"
  password: "![tzthA4JSz+yZBIsqSfDn1Q==]"
```

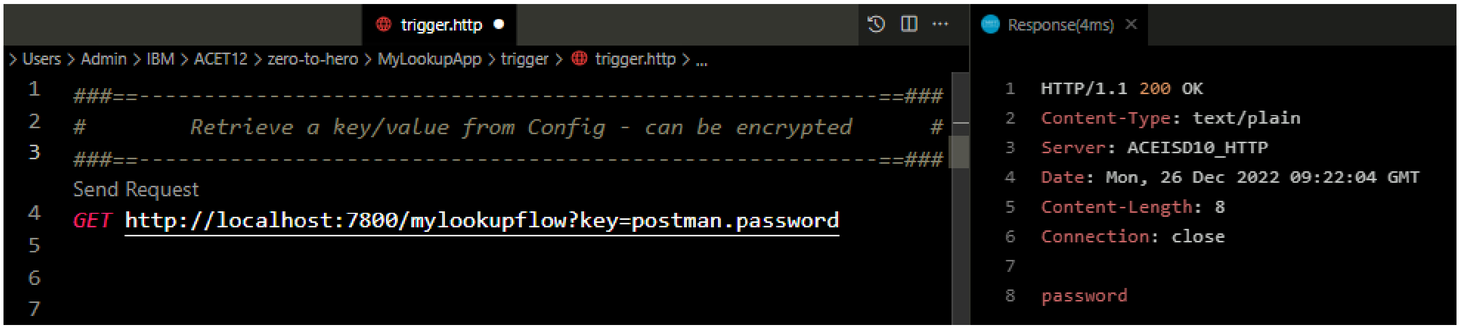
Test 1: Retrieving a key-value using `GET` method


trigger.http
Response(32ms)
C: > Users > Admin > IBM > ACET12 > zero-to-hero > MyLookupApp > trigger > trigger.http > ...

```
###==-----------------------------------------------------------==###
#         Retrieve a key/value from Config - can be encrypted       #
###==-----------------------------------------------------------==###
Send Request
GET http://localhost:7800/mylookupflow?key=backends
```

```
HTTP/1.1 200 OK
Content-Type: text/plain
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 09:17:29 GMT
Content-Length: 18
Connection: close

[postman, httpbin]
```

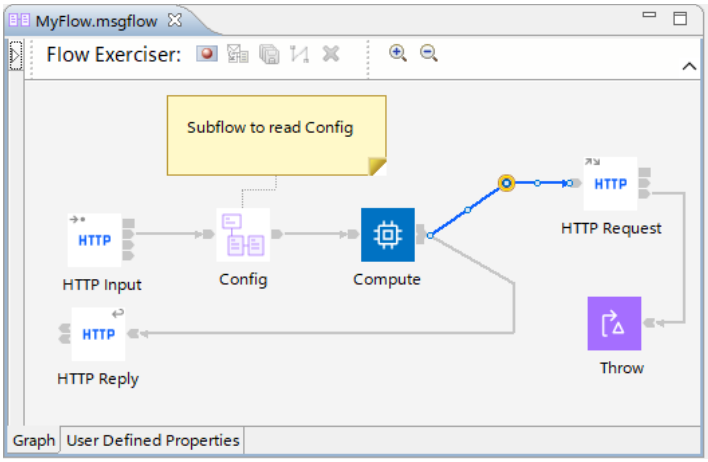
Test 2: Retrieving a *secured* key-value using `GET` method (password is the decrypted value of FZ87o1JZchI2kjQ/lzX2hg==)

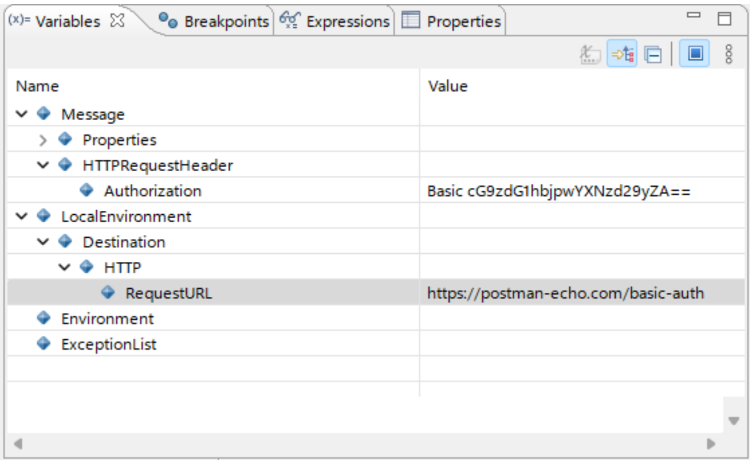

trigger.http
Response(4ms)
> Users > Admin > IBM > ACET12 > zero-to-hero > MyLookupApp > trigger > trigger.http > ...

```
###==-----------------------------------------------------------==###
#         Retrieve a key/value from Config - can be encrypted       #
###==-----------------------------------------------------------==###
Send Request
GET http://localhost:7800/mylookupflow?key=postman.password
```

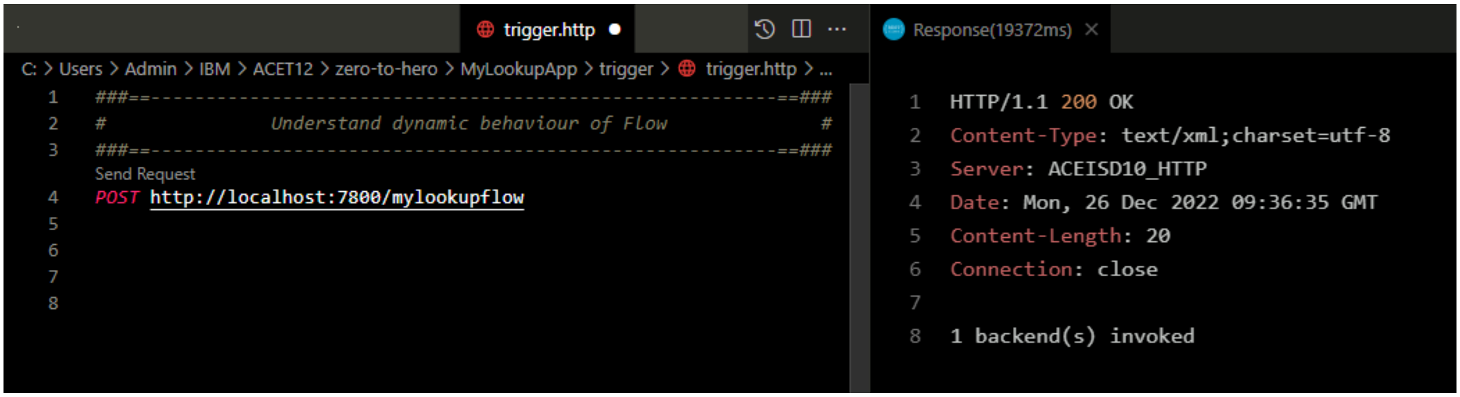
```
HTTP/1.1 200 OK
Content-Type: text/plain
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 09:22:04 GMT
Content-Length: 8
Connection: close

password
```

Test 3: Invoking Message Flow with `POST` method. postman.enabled is true and httpbin.enabled is false. Expected result: only Postman backend will be invoked and final response will be `1 backend(s) invoked.`





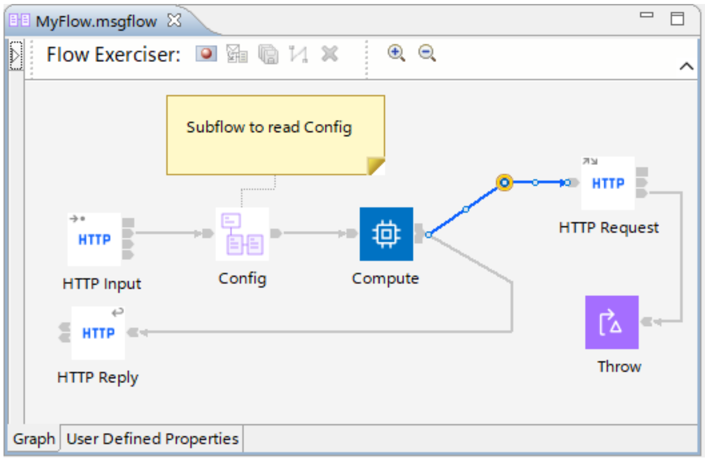
Name	Value
Message	
Properties	
HTTPRequestHeader	
Authorization	Basic cG9zdG1hbjpwYXNzd29yZA==
LocalEnvironment	
Destination	
HTTP	
RequestURL	https://postman-echo.com/basic-auth
Environment	
ExceptionList	

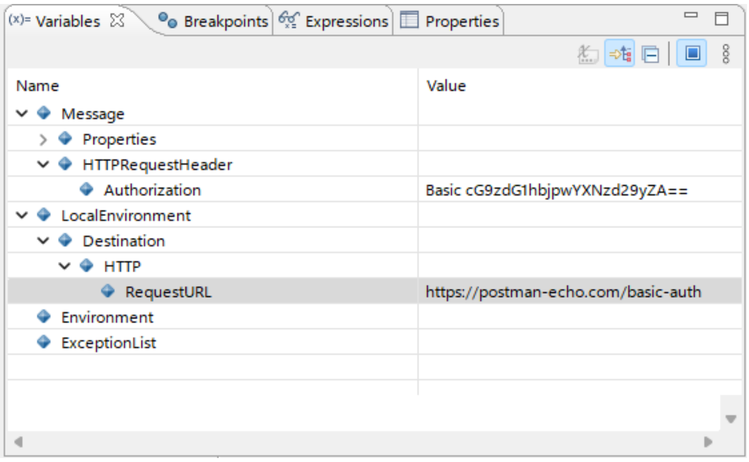

trigger.http
Response(19372ms)
C: > Users > Admin > IBM > ACET12 > zero-to-hero > MyLookupApp > trigger > trigger.http > ...

```
###==-----------------------------------------------------------==###
#                Understand dynamic behaviour of Flow               #
###==-----------------------------------------------------------==###
Send Request
POST http://localhost:7800/mylookupflow
```

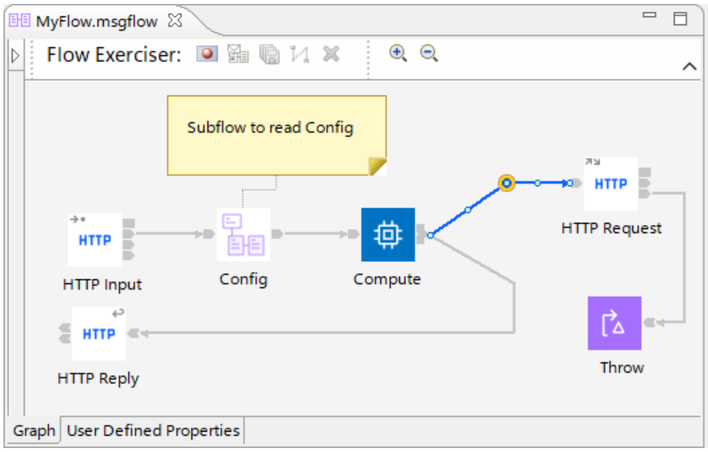
```
HTTP/1.1 200 OK
Content-Type: text/xml;charset=utf-8
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 09:36:35 GMT
Content-Length: 20
Connection: close

1 backend(s) invoked
```

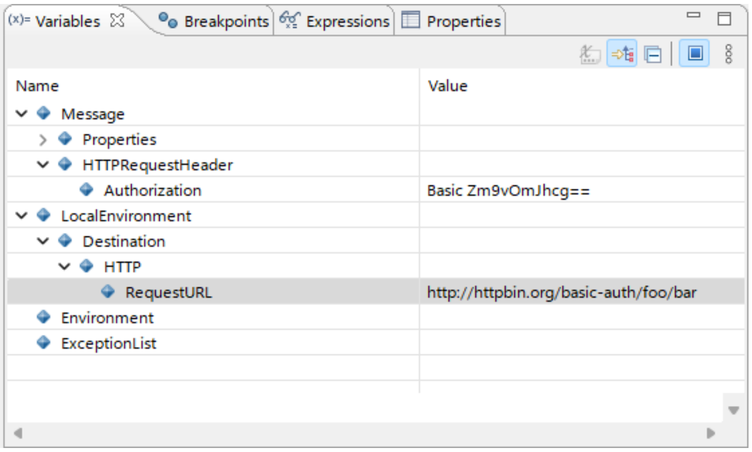
Test 4: Invoking Message Flow with `POST` method. postman.enabled is true and httpbin.enabled is true. Expected result: Postman and HTTPBin backends will be invoked and final response will be `2 backend(s) invoked.` Application was not redeployed or restarted, only config was edited.



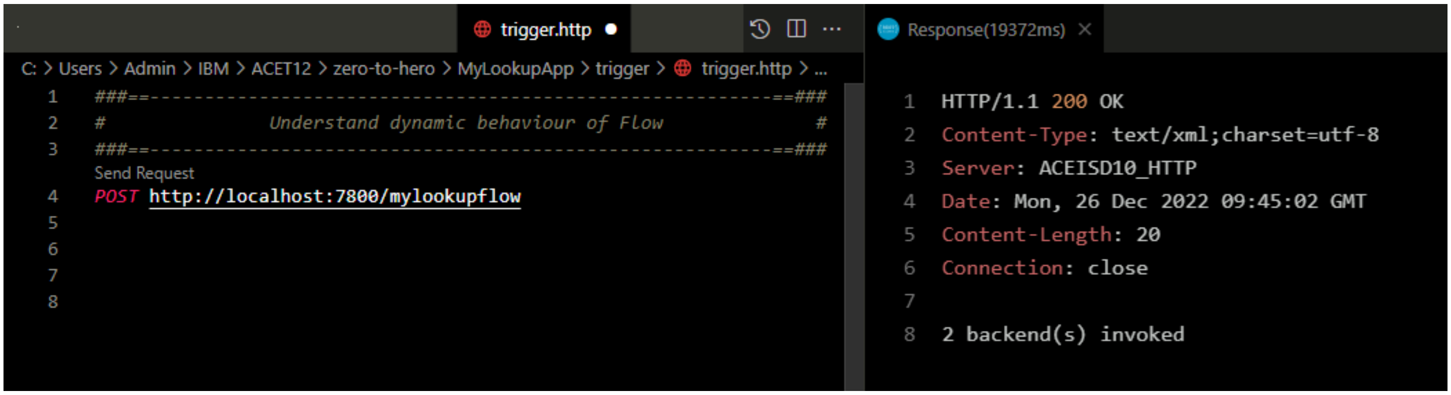


Name	Value
Message	
Properties	
HTTPRequestHeader	
Authorization	Basic cG9zdG1hbjpwYXNzd29yZA==
LocalEnvironment	
Destination	
HTTP	
RequestURL	https://postman-echo.com/basic-auth
Environment	
ExceptionList	





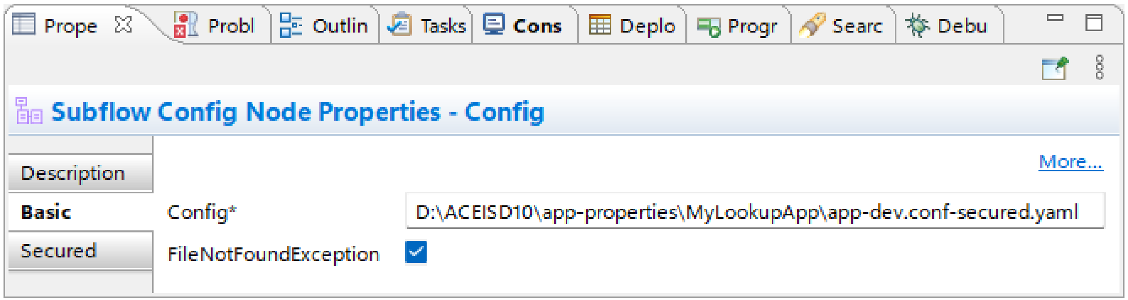
Name	Value
Message	
Properties	
HTTPRequestHeader	
Authorization	Basic Zm9vOmJhcg==
LocalEnvironment	
Destination	
HTTP	
RequestURL	http://httpbin.org/basic-auth/foo/bar
Environment	
ExceptionList	


trigger.http
Response(19372ms)
C: > Users > Admin > IBM > ACET12 > zero-to-hero > MyLookupApp > trigger > trigger.http > ...

```
###==-------------------------------------------------------------==###
#                Understand dynamic behaviour of Flow                #
###==-------------------------------------------------------------==###
Send Request
POST http://localhost:7800/mylookupflow
```

```
HTTP/1.1 200 OK
Content-Type: text/xml;charset=utf-8
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 09:45:02 GMT
Content-Length: 20
Connection: close

2 backend(s) invoked
```

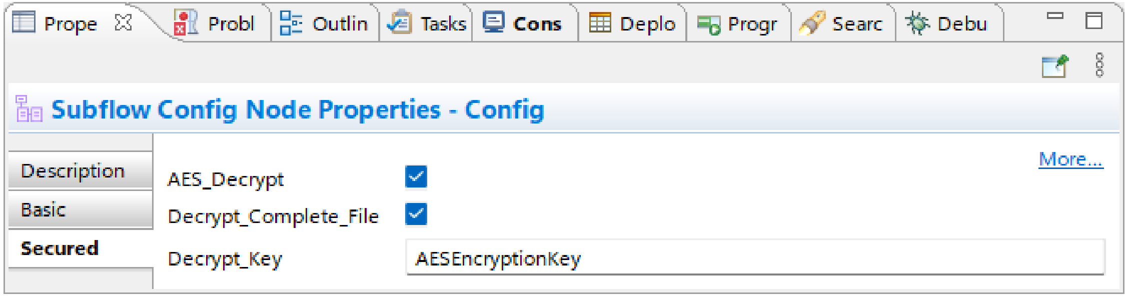
Test 5: Testing with full encrypted file. Changing the User Defined Variable values as shown. Since the app-dev.conf-secured.yaml consists of encrypted values, for reference, app-dev.conf-unsecured.yaml contains the same data in unencrypted format. Using this to retrieve key-value pairs to check if decryption works as expected.



Subflow Config Node Properties - Config

Config* D:\ACEISD10\app-properties\MyLookupApp\app-dev.conf-secured.yaml

FileNotFoundException ☑



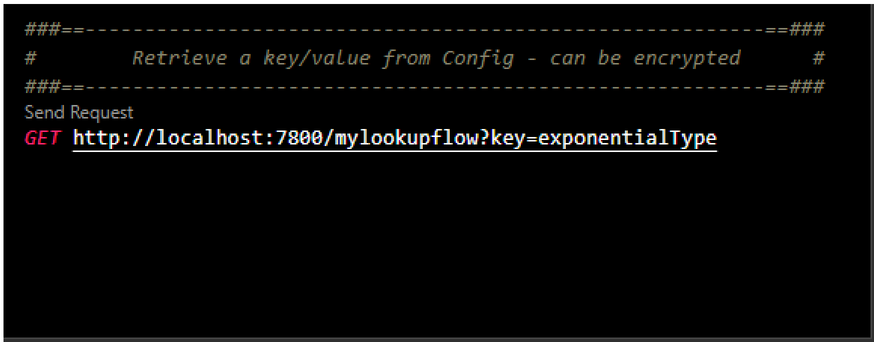
Subflow Config Node Properties - Config

AES_Decrypt ☑

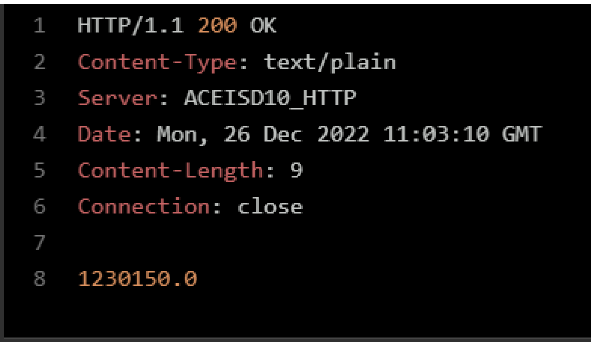
Decrypt_Complete_File ☑

Decrypt_Key AESEncryptionKey

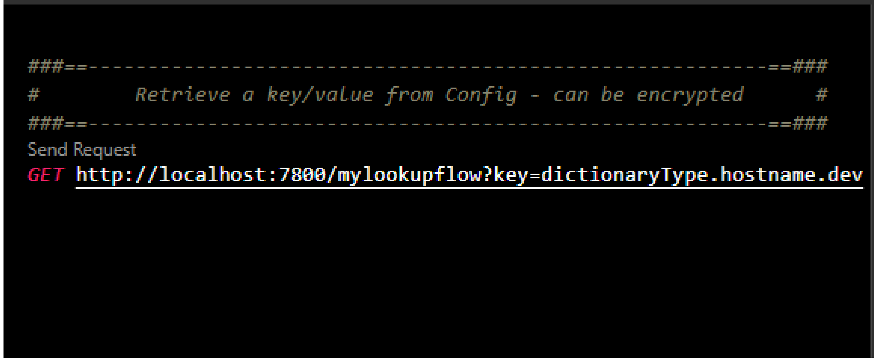
Invoked the service refering the keys from app-dev.conf-unsecured.yaml and matching with the expected results. The response received and response expected matched. Hence, the encrypted file (entire file and not just the values of the Key) was decrypted successfully.



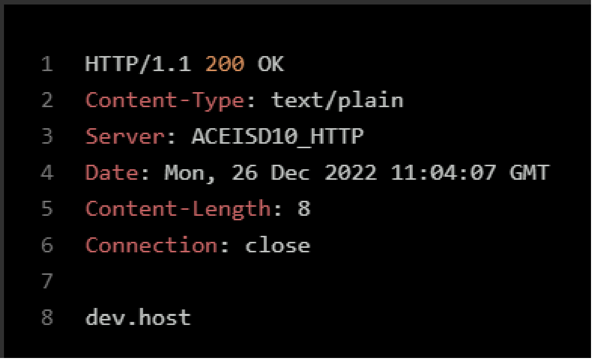
```
###==============================================================###
#        Retrieve a key/value from Config - can be encrypted      #
###==============================================================###
Send Request
GET http://localhost:7800/mylookupflow?key=exponentialType
```



```
HTTP/1.1 200 OK
Content-Type: text/plain
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 11:03:10 GMT
Content-Length: 9
Connection: close

1230150.0
```



```
###==============================================================###
#        Retrieve a key/value from Config - can be encrypted      #
###==============================================================###
Send Request
GET http://localhost:7800/mylookupflow?key=dictionaryType.hostname.dev
```



```
HTTP/1.1 200 OK
Content-Type: text/plain
Server: ACEISD10_HTTP
Date: Mon, 26 Dec 2022 11:04:07 GMT
Content-Length: 8
Connection: close

dev.host
```