ADVANCED TOPICS

ADVANCED TOPICS

GITLAB AND GITFLOW

GitLab

- Request GitLab access using this form

GitFlow

- a branching model for Git, created by Vincent Driessen
- very well suited to collaboration and scaling the development team

Key Benefits

- Parallel Development
  - new development are isolated from finished work
    - new development is done in **feature** branches, and will only be merged back to the **develop** branch if new feature is done
  - for *interruptions*, commit and then create new feature
    - when finished with new feature, commit and then checkout previous task

- Collaboration
  - **specific branches for features** so developers can easily collaborate on the same feature

GitFlow

Key Benefits

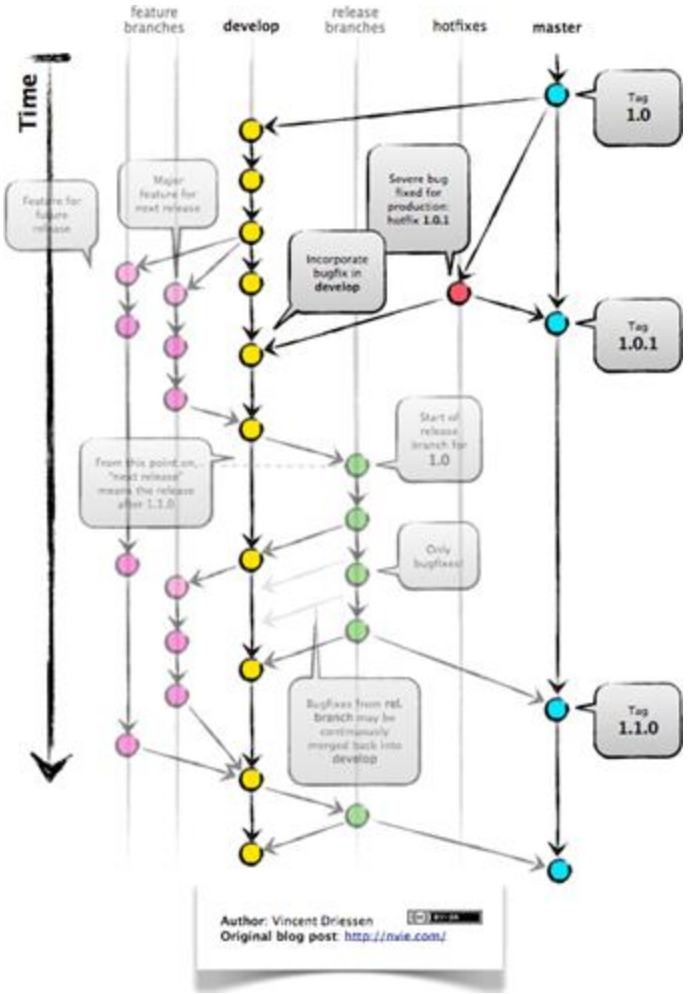
- Release Staging Area
  - **develop** branch - a *staging area* for all completed features that have not been released yet
- Support For Emergency Fixes
  - **hotfix** branches - branches made from a tagged release for making emergency fixes, and when finished, merged back into both **master** and **develop** to make sure the hotfix is not accidentally lost

References:

- https://www.atlassian.com/git/tutorials/comparing-workflows/gitflow-workflow
- https://nvie.com/posts/a-successful-git-branching-model/

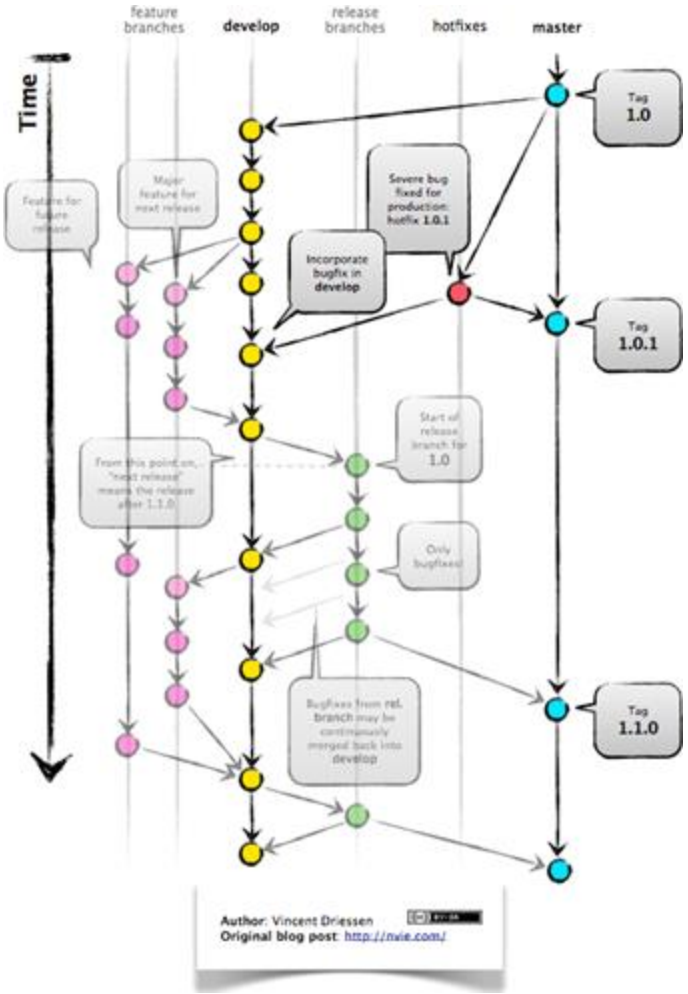
GitFlow

- new development (features) are built in **feature** branches branched off from the **develop** branch and will be merged back to **develop** branch when ready for release
- when ready for release, **release** branch is branched off from **develop** to a suitable test environment, tested, and problems are fixed directly in the release branch.
- **deploy → test → fix → redeploy → retest**



GitFlow

- when the release is finished, the **release** branch is merged to **master, and develop** branches to make sure changes are not accidentally lost
- **master** branch tracks release code only, and the only commits in this branch are merges from **release, and hotfix** branches
- **hotfix** branches are branched off directly from a tagged release in the **master** branch, and when finished are merged back to **master, and develop**



ADVANCED TOPICS

SECURE CONFIGURATION PROPERTIES

Secure Configuration Properties

- encrypting configuration properties as another security level for applications
  1. Create a source configuration properties file.
     - `.yaml` or `.properties`
  2. Define secure properties by enclosing the encrypted values between the sequence `![value]`.
  3. Encrypt the property using **Secure Properties Tool.**
  4. Configure the file in the project with the **Mule Secure Configuration Properties Extension Module.**
     - via XML or in Studio
     - use `secure::` to load the key

Encrypting

Text Strings

```
java -cp
  secure-properties-tool.jar
  com.mulesoft.tools.SecurePropertiesTool \
string \                          → method
encrypt \                         → operation
Blowfish \                        → algorithm
CBC \
                  → mode
mulesoft \                        → key
"some value to encrypt"           → value
```

Properties Inside a File

```
java -cp
  secure-properties-tool.jar
  com.mulesoft.tools.SecurePropertiesTool \
file \
                  → method
encrypt \                         → operation
Blowfish \                        → algorithm
CBC \
                  → mode
mulesoft \                        → key
example_in.yaml                   → input file
example_out.yaml                  → output
file
```

All Contents of a File

```
java -cp
  secure-properties-tool.jar
  com.mulesoft.tools.SecurePropertiesTool \
file-level \                      → method
encrypt \                         → operation
Blowfish \                        → algorithm
CBC \
                  → mode
mulesoft \                        → key
example_in.yaml                   → input file
example_out.yaml                  → output
file
```

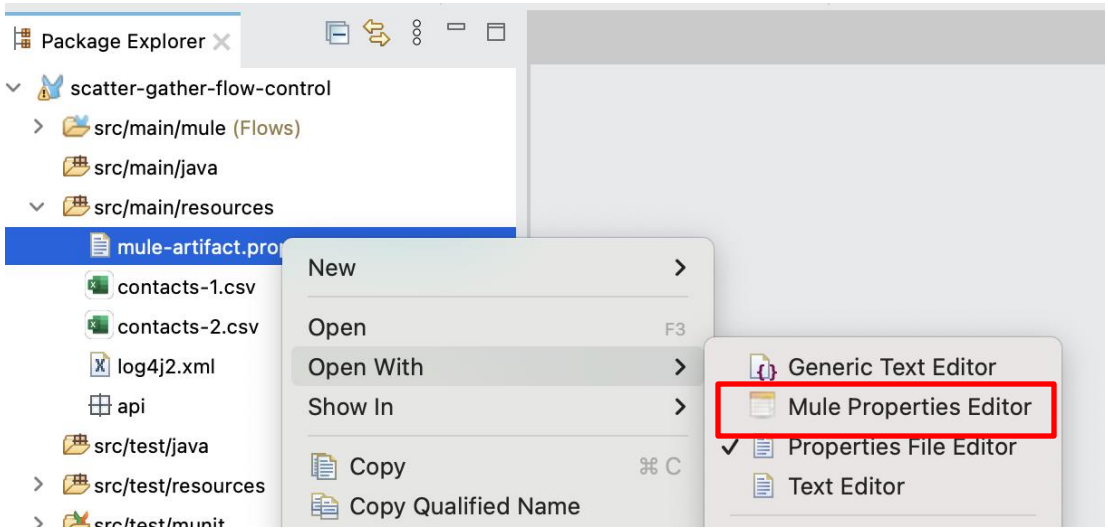
Reference:

- https://docs.mulesoft.com/mule-runtime/latest/secure-configuration-properties

Encryption with Anypoint Studio (1/4)

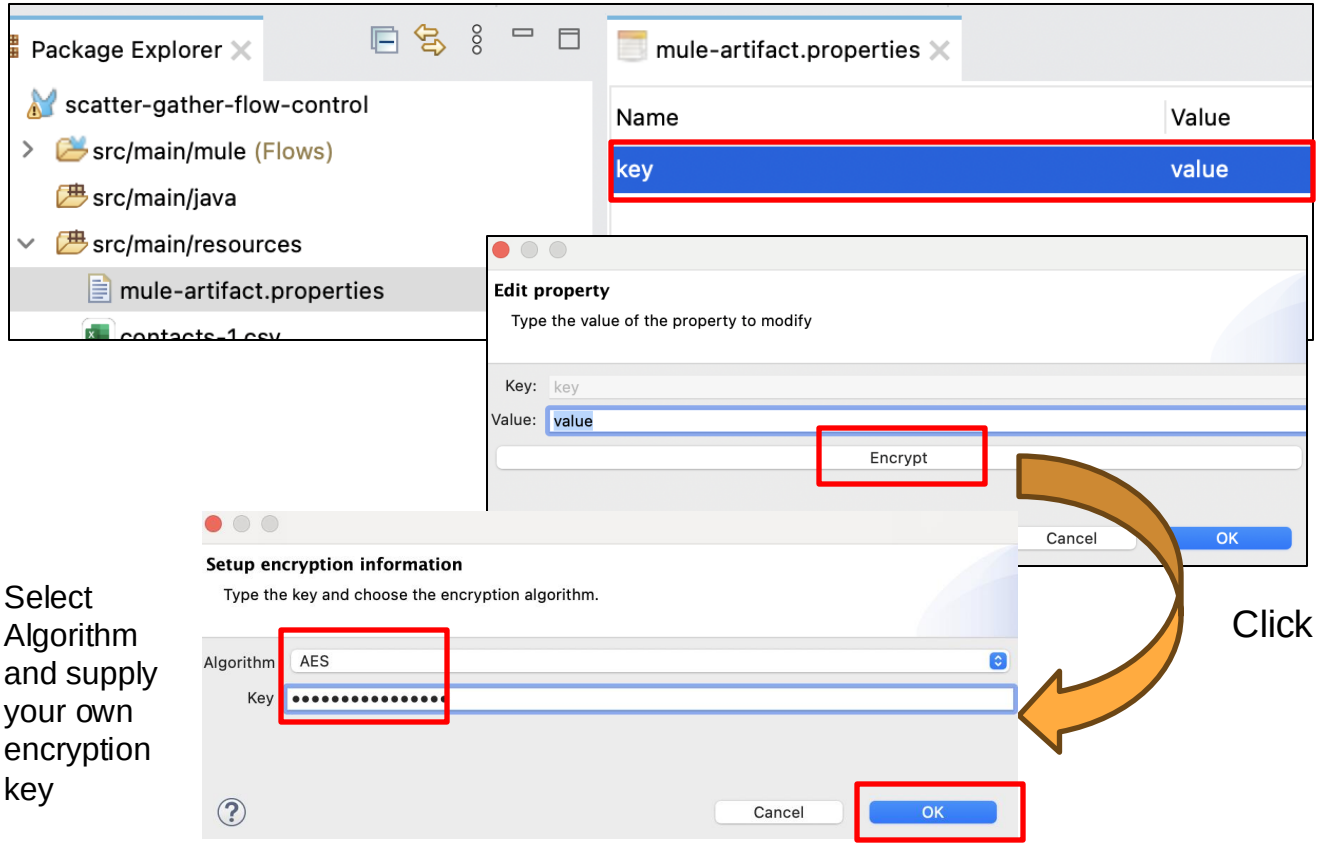
- Encryption Tool Installation
  - https://help.salesforce.com/s/articleView?id=001123741&type=1

Encryption with Anypoint Studio (2/4)



Open the properties file using the Mule Properties Editor

Encryption with Anypoint Studio (3/4)

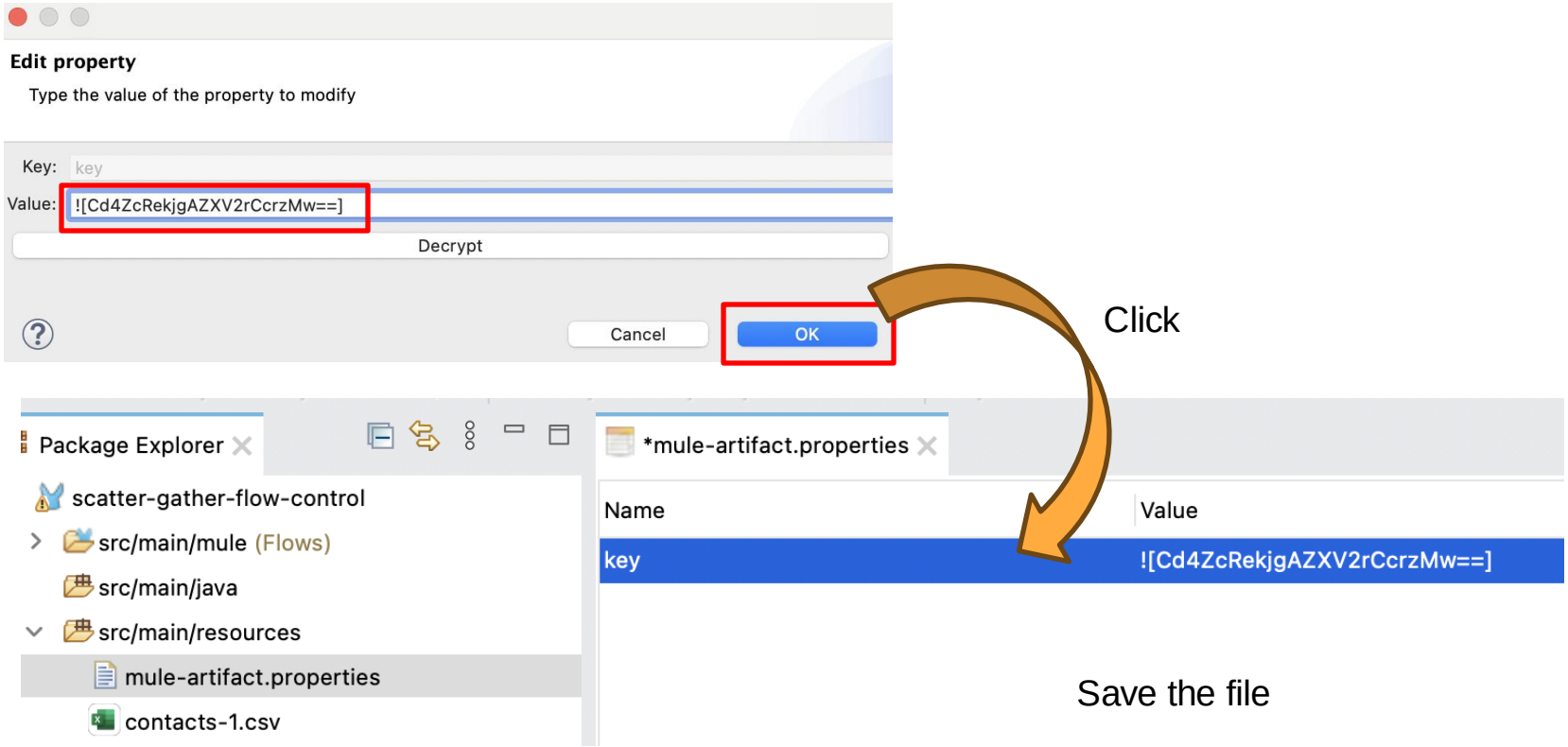


Double click

Click

Select Algorithm and supply your own encryption key

Encryption with Anypoint Studio (4/4)



ADVANCED TOPICS

MASK PROPERTIES IN CLOUDHUB

Mask Properties in CloudHub

- CloudHub supports safely hidden application properties, in which the name of the property is visible in Anypoint Runtime Manager, but the value is not displayed or retrievable by any user. CloudHub resolves the property at runtime without exposing the sensitive information.

Mask Properties in CloudHub

- to create safely hidden application properties:

1. Add the properties to the appropriate file:
   For Mule 4.0 and later, in the `mule-artifact.json` file under the `secureProperties` key, list the property names to safely hide as a comma-separated array:
2. Deploy the application to CloudHub.
3. In the **Applications** page, click the application name and then click **Settings**.

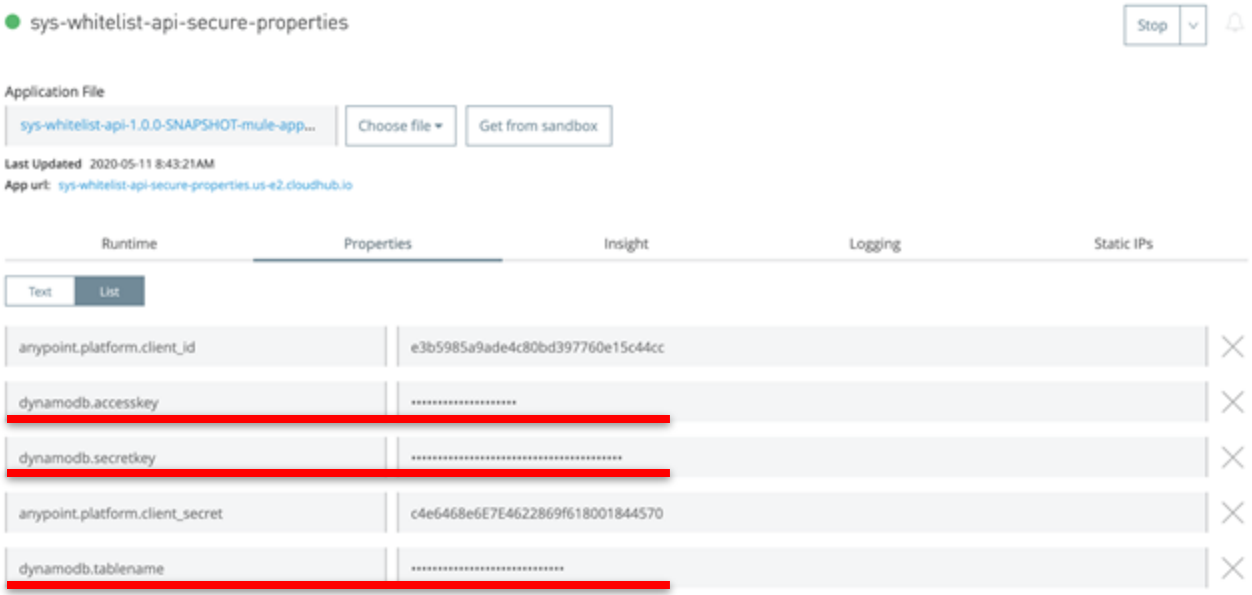
```
{
  "configs": [
    "testprops-app.xml"
  ],
  "secureProperties": ["password", "birthdate"],
  "redeploymentEnabled": true,
  "name": "secure-properties",
  "minMuleVersion": "4.2.1",
  "requiredProduct": "MULE_EE",
  "classLoaderModelLoaderDescriptor": {
    "id": "mule",
    "attributes": {
      "exportedResources": []
    }
  },
  "bundleDescriptorLoader": {
    "id": "mule",
    "attributes": {}
  }
}
```

Mask Properties in CloudHub

4. In the **Properties** tab, click List and then enter your application.
5. Click **Apply Changes**.
6. Redeploy or restart the app.

Mask Properties in CloudHub

```
{
    "minMuleVersion": "4.2.2",
    "secureProperties": [
        "dynamodb.accesskey",
        "dynamodb.secretkey",
        "dynamodb.tablename"
    ]
}
```



ADVANCED TOPICS

API Specifications as Exchange Dependencies

API Specifications as Exchange Dependencies

Reference: https://docs.mulesoft.com/studio/latest/api-development-studio#api-specifications-as-exchange-dependencies

ADVANCED TOPICS

DEPLOY TO CLOUDHUB
(MAVEN DEPLOYMENT)

Deploy To CloudHub (Maven Deployment)

- Prerequisite:
  - Apache Maven
  - Connected app (reference)
- include these in pom.xml, and configure deployment strategy

Mule Maven Plugin

```
<plugin>
  <groupId>org.mule.tools.maven</groupId>
  <artifactId>mule-maven-plugin</artifactId>
  <version>3.4.0</version>
  <extensions>true</extensions>
  <configuration>
    <classifier>mule-application</classifier>
    <cloudHubDeployment>
      <uri>https://anypoint.mulesoft.com</uri>
      <muleVersion>${app.runtime}</muleVersion>
      <connectedAppClientId>${connectedAppClientId}</connectedAppClientId>
      <connectedAppClientSecret>${connectedAppClientSecret}</connectedAppClientSecret>
      <connectedAppGrantType>client_credentials</connectedAppGrantType>
    </cloudHubDeployment>
  </configuration>
</plugin>
```

Mule Maven Plugin Repository

```
<pluginRepositories>
  <pluginRepository>
    <id>mule-public</id>
    <url>https://repository.mulesoft.org/
      nexus/content/repositories/releases</url>
  </pluginRepository>
</pluginRepositories>
```

Deploy To CloudHub (Maven Deployment)

Mule Maven Plugin (more detailed)

```
<plugin>
  <groupId>org.mule.tools.maven</groupId>
  <artifactId>mule-maven-plugin</artifactId>
  <version>${mule.maven.plugin.version}</version>
  <extensions>true</extensions>
  <configuration>
    <classifier>mule-application</classifier>
    <cloudHubDeployment>
      <uri>https://anypoint.mulesoft.com</uri>
      <muleVersion>${app.runtime}</muleVersion>
      <connectedAppClientId>${connectedAppClientId}</connectedAppClientId>
      <connectedAppClientSecret>${connectedAppClientSecret}</connectedAppClientSecret>
      <connectedAppGrantType>client_credentials</connectedAppGrantType>
      <applicationName>${cloudhub.application.name}</applicationName>
      <environment>${cloudhub.environment}</environment>
      <workers>${cloudhub.workers}</workers>
      <workerType>${cloudhub.worker.type}</workerType>
      <objectStoreV2>${cloudhub.objectstorev2}</objectStoreV2>
      <region>${cloudhub.region}</region>
      <properties>
        <anypoint.platform.client_id>${anypoint.platform.client_id}</anypoint.platform.client_id>
        <anypoint.platform.client_secret>${anypoint.platform.client_secret}</anypoint.platform.client_secret>
      </properties>
    </cloudHubDeployment>
  </configuration>
</plugin>
```

Deploy To CloudHub (Maven Deployment)

- in terminal run the following commands:
  `mvn clean package deploy -DmuleDeploy`

- add runtime properties in the command
  `-DconnectedAppClientId=`*`connectedAppClientId`*
  `-DconnectedAppClientSecret=`*`connectedAppClientSecret`*

Reference:

- https://docs.mulesoft.com/mule-runtime/latest/deploy-to-cloudhub
- https://docs.mulesoft.com/access-management/connected-apps-developers

Deploy To CloudHub (Maven Deployment)

sys-whitelist-api-mac-test	CloudHub	Started	4.2.2	2020-05-06 13:37:38

```
--- mule-maven-plugin:3.3.5:deploy (default-deploy) @ sys-whitelist-api ---
Deploying artifact sys-whitelist-api-mac-test
Creating application: sys-whitelist-api-mac-test
Starting application: sys-whitelist-api-mac-test
Checking if application: sys-whitelist-api-mac-test has started
Artifact sys-whitelist-api-mac-test deployed
------------------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------------------
Total time:  20:05 min
Finished at: 2020-05-06T13:38:39+08:00
------------------------------------------------------------------------
```

GET http://sys-whitelist-api-mac-test.us-e2.cloudhub.io/api/whi Send

Params Auth Headers (9) Body Pre-req. Tests Settings

none

This request does not have a body

Body Cookies Headers (5) Test Results 200 OK 2.60 s 252 B Save

Pretty Raw Preview Visualize JSON

```
1 {
2   "transactionId": "20200204-004-003",
3   "mobileNumber": "9171234567",
4   "status": "0"
5 }
```

ADVANCED TOPICS

DEPLOY TO CLOUDHUB 2.0
(MAVEN DEPLOYMENT)

Deploy To CloudHub 2.0 (Maven Deployment)

- Prerequisite:
  - Apache Maven
  - Connected app (reference)
- include these in pom.xml, and configure deployment strategy

Mule Maven Plugin

```
<plugin>
  <groupId>org.mule.tools.maven</groupId>
  <artifactId>mule-maven-plugin</artifactId>
  <version>3.7.1</version>
  <extensions>true</extensions>
  <configuration>
    <cloudhub2Deployment>
      <uri>https://anypoint.mulesoft.com</uri>
      <provider>MC</provider>
      <environment>${environment}</environment>
      <target>${targetName}</target>
      <muleVersion>${muleVersion}</muleVersion>
      <connectedAppClientId>${connectedAppClientId}</connectedAppClientId>
      <connectedAppClientSecret>${connectedAppClientSecret}</connectedAppClientSecret>
      <connectedAppGrantType>client_credentials</connectedAppGrantType>
</cloudhub2Deployment>
  </configuration>
</plugin>
```

Mule Maven Plugin Repository

```
<pluginRepositories>
  <pluginRepository>
    <id>mule-public</id>
    <url>https://repository.mulesoft.org/
      nexus/content/repositories/releases</url>
  </pluginRepository>
</pluginRepositories>
```

Deploy To CloudHub 2.0 (Maven Deployment)

Mule Maven Plugin (more detailed)

```
<plugin>
  <groupId>org.mule.tools.maven</groupId>
  <artifactId>mule-maven-plugin</artifactId>
  <version>3.7.1</version>
  <extensions>true</extensions>
  <configuration>
    <cloudhub2Deployment>
      <uri>https://anypoint.mulesoft.com</uri>
      <provider>MC</provider>
      <environment>${environment}</environment>
      <target>${targetName}</target>
      <muleVersion>${muleVersion}</muleVersion>
      <connectedAppClientId>${connectedAppClientId}</connectedAppClientId>
      <connectedAppClientSecret>${connectedAppClientSecret}</connectedAppClientSecret>
      <connectedAppGrantType>client_credentials</connectedAppGrantType>
      <applicationName>${appName}</applicationName>
      <replicas>1</replicas>
      <vCores>1</vCores>
      <deploymentSettings>
        <http>
          <inbound>
            <publicUrl>${publicURL}</publicUrl>
            <forwardSslSession>true</forwardSslSession>
            <lastMileSecurity>true</lastMileSecurity>
          </inbound>
        </http>
      </deploymentSettings>
    </cloudhub2Deployment>
  </configuration>
</plugin>
```

Deploy To CloudHub 2.0 (Maven Deployment)

- in terminal run the following commands:
  `mvn clean package deploy -DmuleDeploy`

- add runtime properties in the command
  `-DconnectedAppClientId=`*`connectedAppClientId`*
  `-DconnectedAppClientSecret=`*`connectedAppClientSecret`*

Reference:

- https://docs.mulesoft.com/mule-runtime/latest/deploy-to-cloudhub-2
- https://docs.mulesoft.com/access-management/connected-apps-developers

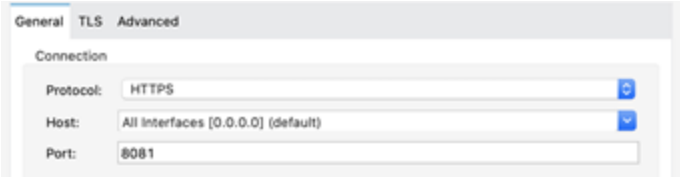
ADVANCED TOPICS

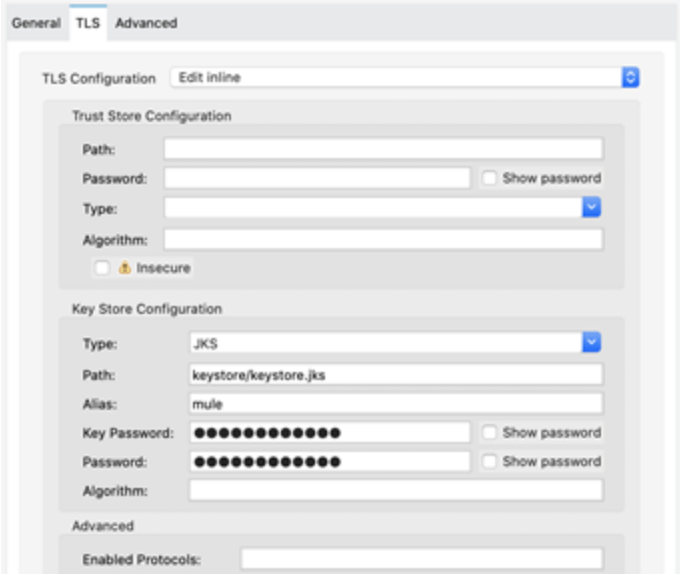
HTTPS IMPLEMENTATION LOCAL

HTTPS Implementation Local

- **Keystore** is a server-side asset that stores the private keys and the certificates with their public and private keys

1. Create the **keystore** and certificate
2. Include the **keystore** to the resources
3. Change the HTTP Protocol to HTTPS Protocol.
4. Go to **TLS Tab** add the **Key Store Configuration**.
5. Test using the https:// endpoint.





References:

- https://dzone.com/articles/using-https-in-mule
- https://docs.mulesoft.com/mule-runtime/4.6/tls-configuration

ADVANCED TOPICS

API AUTODISCOVERY

API Autodiscovery

- a mechanism that manages an API from API Manager by pairing the deployed application to an API created on the platform
- API Management includes tracking, enforcing policies if you apply any, and reporting API analytics
- critical to the Autodiscovery process is identifying the API by providing the API name and version

References:

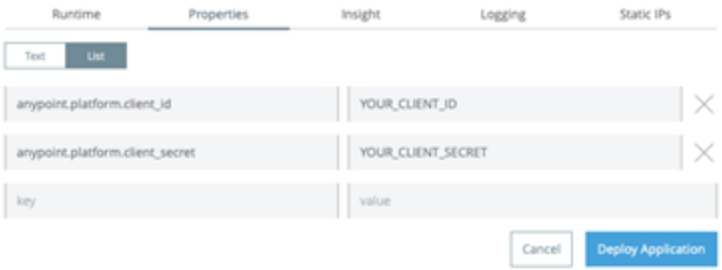
- https://developer.mulesoft.com/tutorials-and-howtos/quick-start/deploying-managing-your-first-api
- https://docs.mulesoft.com/api-manager/1.x/api-auto-discovery
- https://docs.mulesoft.com/mule-gateway/mule-gateway-config-autodiscovery-mule4

API Autodiscovery

1. Go to **Management Center** > **API Manager.**
2. Click the **Manage API button** and then **Manage API from Exchange.**
3. Select the API you want to manage, and the other fields will be automatically filled. Tick the checkbox for Mule 4 application. Save.
4. After that, you will see an **API ID for Autodiscovery**. Copy this.
5. Get the Environment credentials from **Management Center** > **Access Management** > **Environments** and select the environment you will be using. Get the **Client ID** and **Client Secret**, these will be used in the deployment.

API Autodiscovery

6. Go to Anypoint Studio. Create an **API Autodiscovery Configuration**. Set the API ID as from step 4. Set your main flow as the Flow Name.
7. Deploy the application with the following properties in Cloudhub:



6. You can now go back to API Manager and see that the "Status" column of your API is now marked as Active with a green dot next to it. This means the app has successfully registered with the gateway and you can manage it.

ADVANCED TOPICS

CLIENT ID ENFORCEMENT POLICY

Client ID Enforcement Policy

- restricts access to a protected resource by allowing requests only from registered client applications
- ensures that the client credentials sent on each request have been approved to consume the API.

Reference:

- https://docs.mulesoft.com/gateway/latest/policies-included-client-id-enforcement

Client ID Enforcement Policy

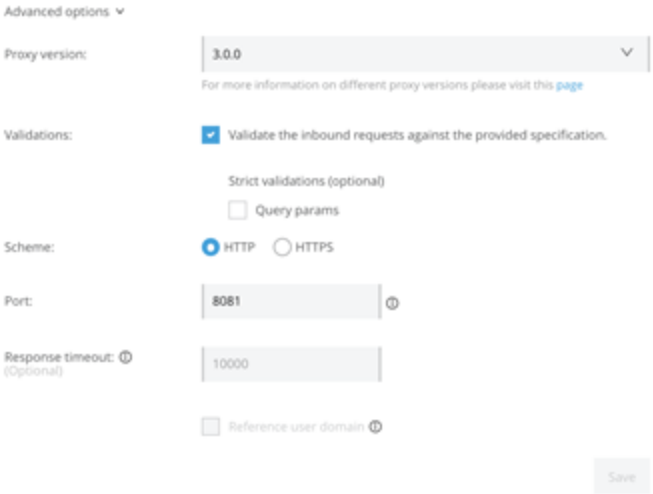
1. Go to **Management Center** > **API Manager**.
2. Select the API to add the policy and the select **Policies**.
3. Click **Apply New Policy** button and select **Client ID Enforcement**.
4. Go to **Exchange** and select the API.
5. On the top right corner, click the button, and **Request Access** button and this will give **client_id** and **client_secret** of the application.
6. Add **client_id** and **client_secret** to the header of your request.

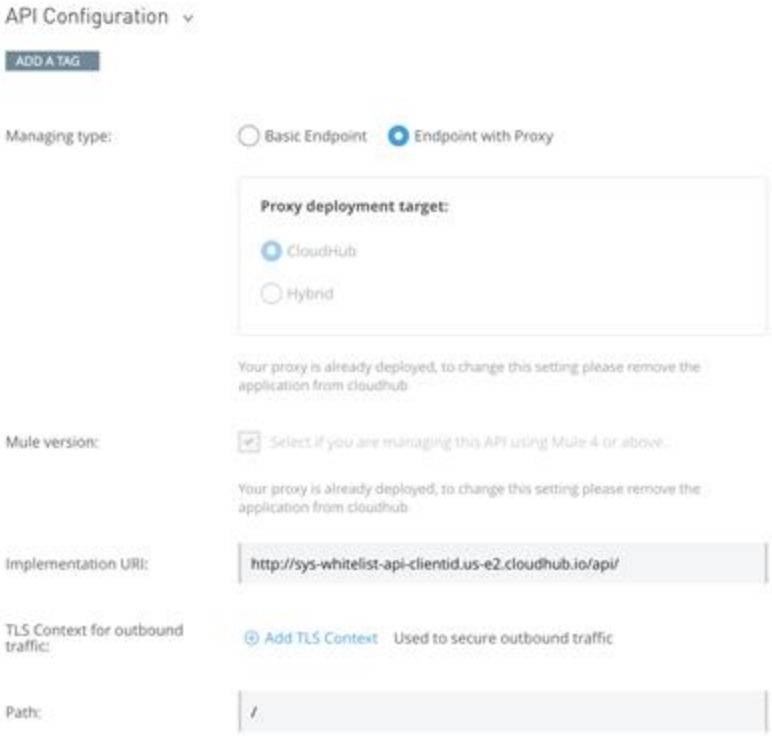
ADVANCED TOPICS

HTTP PROXY IN CLOUDHUB

HTTP Proxy in CloudHub

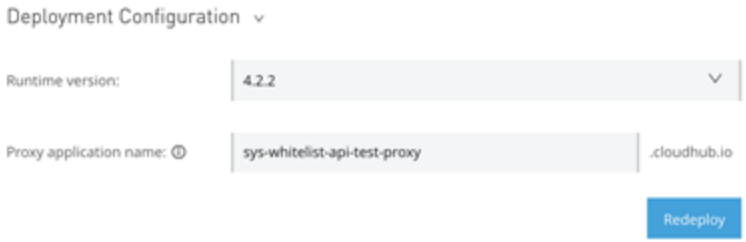
1. Go to **API Manager.**
2. Select the API you want to put a proxy on.
3. Go to **Settings**, and in the API Configuration part, select **Endpoint with Proxy.**
4. Fill the Implementation URI field.
5. Under Advanced Options, set the scheme to HTTP.
6. Save.

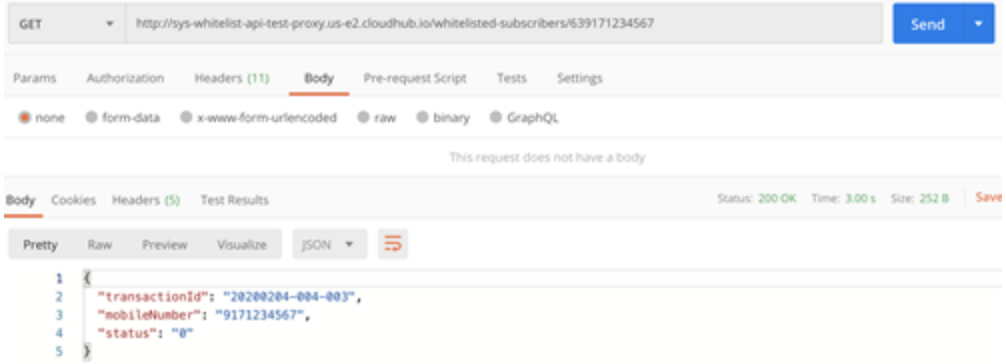


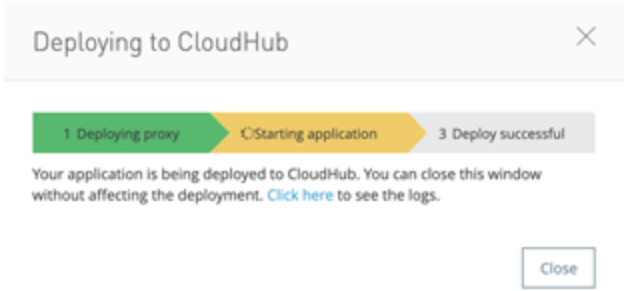


HTTP Proxy in CloudHub

7. Under the Deployment Configuration, specify the **Runtime Version** and the **Proxy Application Name**, then **Deploy/Redeploy.**
8. Wait for the proxy to be deployed.
9. Test if the proxy is reachable.







References:

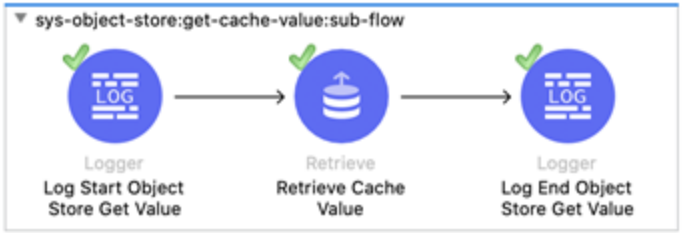
- https://docs.mulesoft.com/api-manager/2.x/proxy-deploy-cloudhub-latest-task

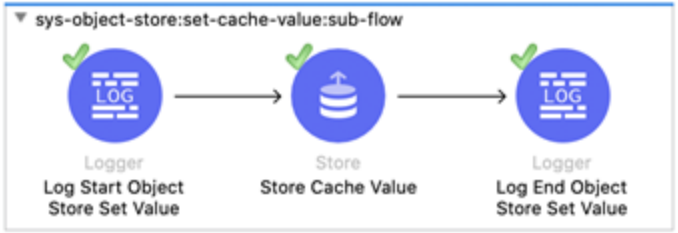
ADVANCED TOPICS

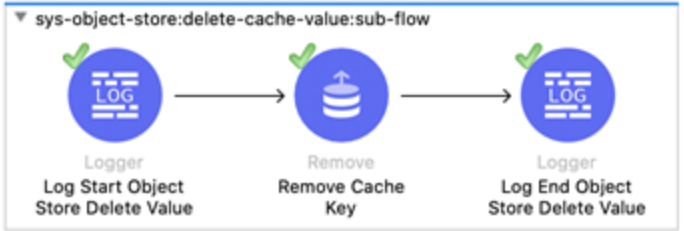
OBJECT STORE INSTEAD OF REDIS

Object Store Instead of Redis

- things to note:
  - Unlike Redis, Object Store is not capable of automatically expiring the cache key. You will need to revise the implementation for the expiration (i.e. including expiryDate in the cache value, checking if the expiryDate is expired or not)







END