# Lab Center – Hands-On Lab

Session 4415

## Extending IBM DataPower API Gateway with User Policies




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# 1 Deploying Basic User Defined Policies using API Connect

User Defined Policies are one of the. API Connect provides various methods to extend Gateway Policies beyond those provided allowing the full capabilities of the underlying DataPower Gateway to be taken advantage of. One method is the User Defined Policy. User Defined Policies give the capability of adding new assembly actions that can be deployed into the assembly flows.

In this lab you will discover how to work with the API Designer and the DataPower Gateway to deploy a User Defined Policy. Using the API Designer allows you to create and test API's locally on a laptop.

## 1.1 Preparing the environment

1. Log into Linux image with username/password: *ibmuser/ibmuser*
2. Clone the GitHub repository at https://github.com/ibm-apiconnect/Labs and extract all files.
3. Open a terminal window
4. Set your path with the *PATH=$PATH:$HOME*
5. Start the API Connect LTE using the `apic-lte start` command

```
$ apic-lte start
INFO[0001] Creating docker resources
INFO[0016] Waiting for services to start
INFO[0231] Configuring backend
- Platform API url: https://localhost:2000
- Admin user: username=admin, password=7iron-hide
- 'localtest' org owner: username=shavon, password=7iron-hide
- 'localtest' org sandbox test app credentials client id: 36e2da0e888ffcb6a9160200e40c5a15 , client secret
- Datapower API Gateway API base url: https://localhost:9444/localtest/sandbox/
INFO[0264] Ready. The current version of the Local Test Environment is a beta release. See documentation a
```

Note: If you stop the LTE (ie `apic-lte stop`), it will destroy all your containers and you will need to re-deploy your APIs. Furthermore, the sample org sandbox test app credentials will also change, so you will need to use new values when testing. You can use `apic-lte status` to view information about your environment.

## 1.2 Deploy API using API Connect LTE

In this section, you will use the API Designer to deploy a set of APIs and gain familiarity with the local development environment.

1. Open the API Designer and navigate to the `openapi` folder. Click *OK* in upper right corner (If you do not have IBM ID please create one).

2. In the Connect to Cloud page, enter the URL `https://localhost:2000`. This endpoint is the API Manager running locally (ie Platform API url that is displayed when you start the LTE).
3. Login to the API manager using the credentials `shavon` and password `7iron-hide`.
4. Click on **Develop APIs and Products** and select `sports-api-1.0.0`. If you don't have that API in your repository, you can upload it from the `openapi` directory.
5. Click the **Assemble** tab at the top.


6. Publishing APIs does not require you to explicitly define a product. You can quickly test APIs using the default subscription which implicitly creates an API product. In the top right-hand corner, select the Offline toggle icon to publish the Sports API. Once complete the toggle will switch to **Online**.


7. Once the API is published, you can easily test it using any tool. For simplicity, you can use the following curl command (replacing the client id and secret with your own values. These can be found with the *apic-lte status* command):

   *curl -k -X GET 'https://localhost:9444/localtest/sandbox/sports/teams?league=nba' -H 'x-ibm-client-id: <ClientID>' -H 'x-ibm-client-secret: <ClientSecret>'*

## 1.3 Creating User Defined Policies (UDP)

The basic UDP allows you to package one or more API assemblies into a single policy for reusability. For example, you can create a single logging policy that consists of multiple API Assembly policies such as GatewayScript and Set-Variable.

1. Expand the `udp-basic` directory (in File Manager), you will notice two files:

   - udp-basic-policy.cfg
   - udp-basic-gws.js

2. Open the `udp-basic-policy.cfg` file. You will notice that it consists of DataPower CLI commands. You won't need to understand each command if you stick to the script and modify specific commands. The first command is the `Set Variable` policy which creates a set of context variables that are used in the API Assembly. The value `$(local.parameter.credential)` is a special variable that is obtained from user input during API assembly development. This is similar to any API assembly policy that asks for input (ie

Public Key to validate a JSON Web Token), so this parameter should reflect a user input field that is dynamically handled at runtime.

```
assembly-setvar udp-basic_1.0.0_set-variable_0
    reset
    title "set-variable"
    correlation-path "$.x-ibm-configuration.assembly.execute[0]"
    variable
        action set
        name "param1"
        type string
        value "$(local.parameter.credential)"
    exit
    variable
        action set
        name "message.headers.content-type"
        type string
        value "text/xml"
    exit
exit
```

In general, you can reuse these commands when creating a new policy. Just replace `udp-basic` with your policy name. If you have additional variables, copy/paste the variable section following the same format.

3. The next command is the GatewayScript policy. The `gatewayscript-location` path is important since its references a filename at the desired location. When you deploy the UDP it will place this file at the root of the gateway extension folder.

```
assembly-gatewayscript udp-basic_1.0.0_gatewayscript_1
    reset
    title "gatewayscript"
    correlation-path "$.x-ibm-configuration.assembly.execute[1]"
    gatewayscript-location temporary:///filestores/extensions/gateway-extension/udp-basic/udp-basic-gws.js
exit
```

4. The next set of commands build the internal DataPower configuration for the UDP. If you have multiple policies, they will be reflected in this command.

```
api-rule udp-basic_1.0.0_main
    reset
    action udp-basic_1.0.0_set-variable_0
    action udp-basic_1.0.0_gatewayscript_1
exit

assembly udp-basic_1.0.0
    reset
    rule udp-basic_1.0.0_main
exit
```

5. This last snippet creates the UDP policy, including the information that is displayed in the UI. Remember that the parameter name `credential` needs to match the last part of the variable used in the Set Variable policy ie (`$(local.parameter.credential)` )

```
assembly-function "udp-basic_1.0.0"
    summary "udp-basic-policy_1.0.0"
    title "Basic UDP"
    parameter
        name "credential"
        description "Parameter name"
        value-type string
    exit
    assembly udp-basic_1.0.0
exit
```

6. Optionally, you can deploy the UDP policy with the following snippet or manually add them to the DataPower configuration. In this tutorial, you will manually add the UDP since you will need to restart the API Gateway service in the same step; however, for a production (managed deployment), you should include this snippet, so the rollout is automated.

```
apic-gw-service
    user-defined-policies udp-basic_1.0.0
exit
```

7. Open the `udp-basic-gws.js` file and examine its content. The sample code shows how to access the context variable from the `Set-Variable` policy created in the `udp-basic-policy.cfg`. The JavaScript code simply creates a new JSON object with the contents of the parameter and the result of the Invoke policy.

```
var param1 = context.get('param1');
console.info ("param1 %s", param1);

if (param1 == null || param1 == '') {
    context.reject('Invalid Parameter', 'The paramater param1 you provided is invalid');
    context.message.statusCode = '401 Unauthorized';
}

var jsonBody = {
    "param1" : param1,
    "body" : apim.getvariable('message.body')
}
```

# 2 Packaging and Publishing UDP using Gateway Extensions

In this section, you will package the UDP policy into a Gateway extension and deploy it to the DataPower Gateway. The API Manager includes a CLI which provides the ability to perform managed deployments into the gateway cluster.

- A single Gateway extension is deployed to a Gateway cluster. Artifacts are packaged into a ZIP file containing .cfg files, together with any dependent files that are referenced from the CFG file.
- All files must be at the root of the ZIP file. The CFG files are processed in alphanumeric order by file name.
- ZIP files are uploaded to the file system: `temporary:///filestores/extensions/gateway-extension/` so any file references must be adjusted accordingly.

1 ZIP the file so that no folders are packaged into the ZIP file. Make sure you are in the *apiconnect-policies-master* directory when you perform the command. Optionally, you can add the commands to the `zip-gw-extension.sh` file.

```
zip gw-extension.zip udp-basic/*.cfg udp-basic/*.js
```

2 Login to API manager using the `apic` cli (Answer yes to any questions)

```
apic login --server localhost:2000 --username admin --password 7iron-hide --
realm admin/default-idp-1
```

3 Upload extension using the `apic` command-line tool parameter.

```
apic gateway-extensions:create gw-extension.zip --scope org --org admin --
gateway-service datapower-api-gateway --availability-zone availability-zone-
default --server localhost:2000
```

Response

```
gateway-extension   https://localhost:2000/api/orgs/53463679-3f9f-44d3-8c98-
0ae242757eb1/availability-zones/09b41905-d076-425f-81a1-060369e125a0/gateway-
services/ee46f2eb-3560-48af-a403-38fd804e183c/gateway-extension
```

4 Confirm extension has been added

```
apic gateway-extensions:get --scope org -o admin --gateway-service datapower-
api-gateway --availability-zone availability-zone-default --server
localhost:2000 --output -
```

```
type: gateway_extension
api_version: 2.0.0
name: gateway-extension
gateway_service_url: >-
https://127.0.0.1:2000/api/orgs/53463679-3f9f-44d3-8c98-0ae242757eb1/availability-zones/09b41905-d076-425f
scope: org
created_at: '2019-08-13T22:01:11.538Z'
updated_at: '2019-08-13T22:01:11.538Z'
org_url: 'https://127.0.0.1:2000/api/orgs/53463679-3f9f-44d3-8c98-0ae242757eb1'
url: >-
https://127.0.0.1:2000/api/orgs/53463679-3f9f-44d3-8c98-0ae242757eb1/availability-zones/09b41905-d076-425f
```

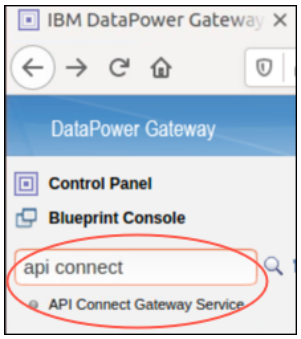
**Important**: If you need to re-deploy then delete the gateway extension with the following command:

```
apic gateway-extensions:delete --scope org --org admin --gateway-service
datapower-api-gateway --availability-zone availability-zone-default --server
localhost:2000
```

In the next step, you will manually trigger the API Manager to send the UDP to the API Gateway.

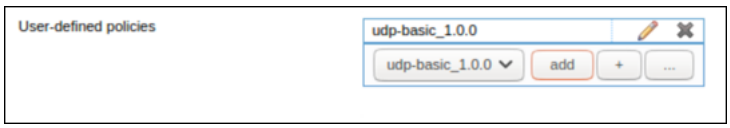
7. Login to the DataPower UI with Firefox at https://localhost:9091 (Accept Security Warning)
   - Username `admin`
   - Password `admin`
   - Domain: apiconnect
   - Graphical UI drop-down: `WebGUI`

8. Trigger the API Manager to push the Gateway extension to the Gateway.
   - Go to the API Connect Gateway service. Use the Search box and type *api connect* to find and select

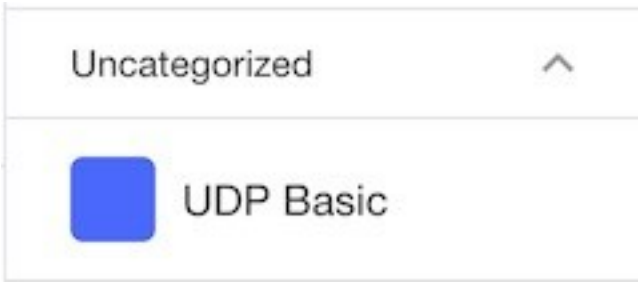



   - Restart the API Connect Gateway service by toggling the administrative state
     1. Modify the **Administrate State** to **disabled** and click **Apply**.
     2. Change the state back to **Enabled** and click **Apply**.

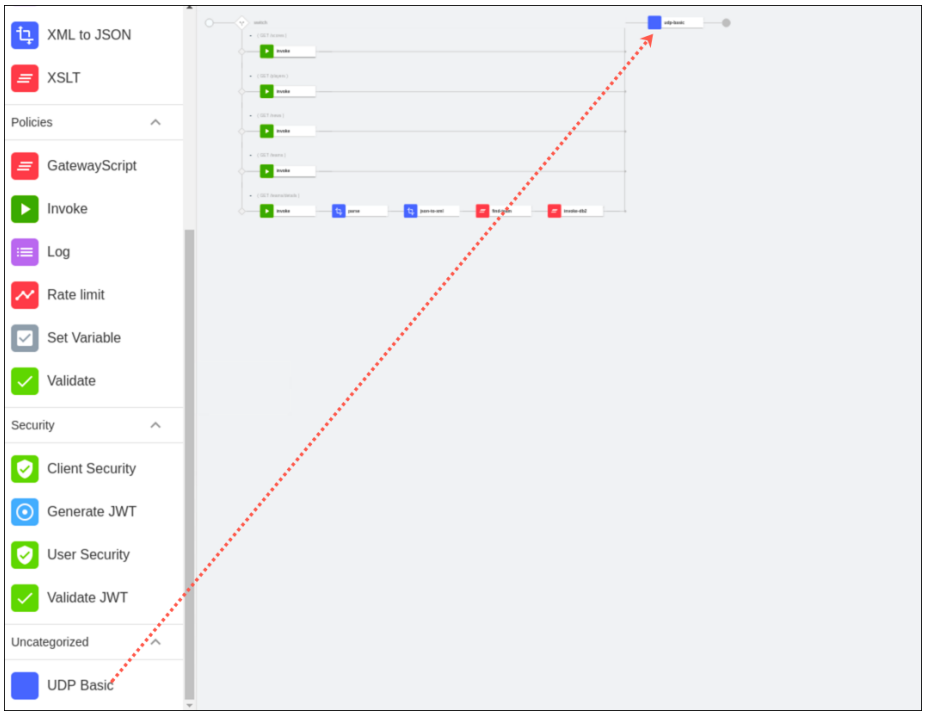
9. You may need to wait a minute for the Gateway Extension to copy over
    - refresh the browser
    - scroll down to the User-defined Policy, select the `UDP Basic` policy in the drop-down and click **add**.
    - Click **Apply** to save the configuration.



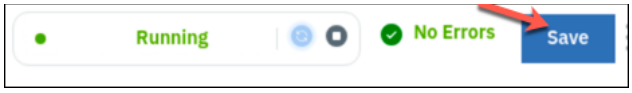

10. Switch to the API Designer and click the existing **sports-api-1.0.0** API. Click the **Assemble** tab (If you were previously on the Assembly this will refresh the view). You should see the `UDP Basic` policy.



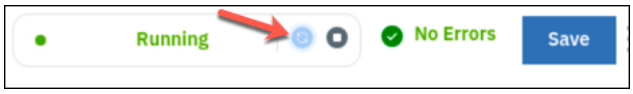

11. Drag and drop the UDP-Basic policy at the end of the Assembly. Click the Policy and enter any credential value say `ozairs`.



12. Save the policy




13. Switch to the Design view and Republish the API. In the top right-hand corner beside **Running**, click the Play icon or the wheel icon to republish the API.




14. Test the API again using curl, you should get a JSON response, with the parameter value and the JSON body

*curl -k -X GET 'https://localhost:9444/localtest/sandbox/sports/teams?league=nba' -H 'x-ibm-client-id: <ClientID>' -H 'x-ibm-client-secret: <ClientSecret>'*

Response:

```
    {
    "param1": "ozairs",
    "body": null
    }
```

```
**Bonus**
Notice that the body field is `null`. This is not a bug in the policy. The previous
Invoke action returns a JSON response which the GatewayScript copies directly into a
variable. The API Assembly needs to know the message type from the Invoke policy.
Add a `Parse` assembly policy between the Invoke and the `UDP Basic` policy. Test
again and should now see the response returned.
```

## 2.1 Summary

In this tutorial, you learned how to deploy a User-defined policy (UDP) consisting of multiple API Assembly policies, Set-Variable and GatewayScript. The UDP was packaged as a Gateway Extension and deployed to the API Gateway. You validated that the API designer displayed the UDP in its palette and configured as part of an API deployment.