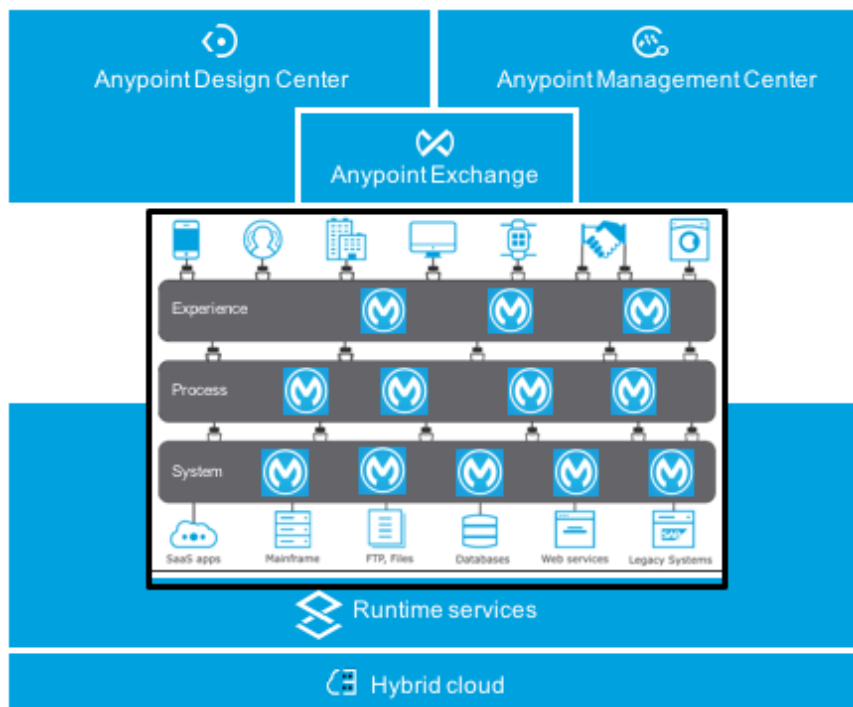


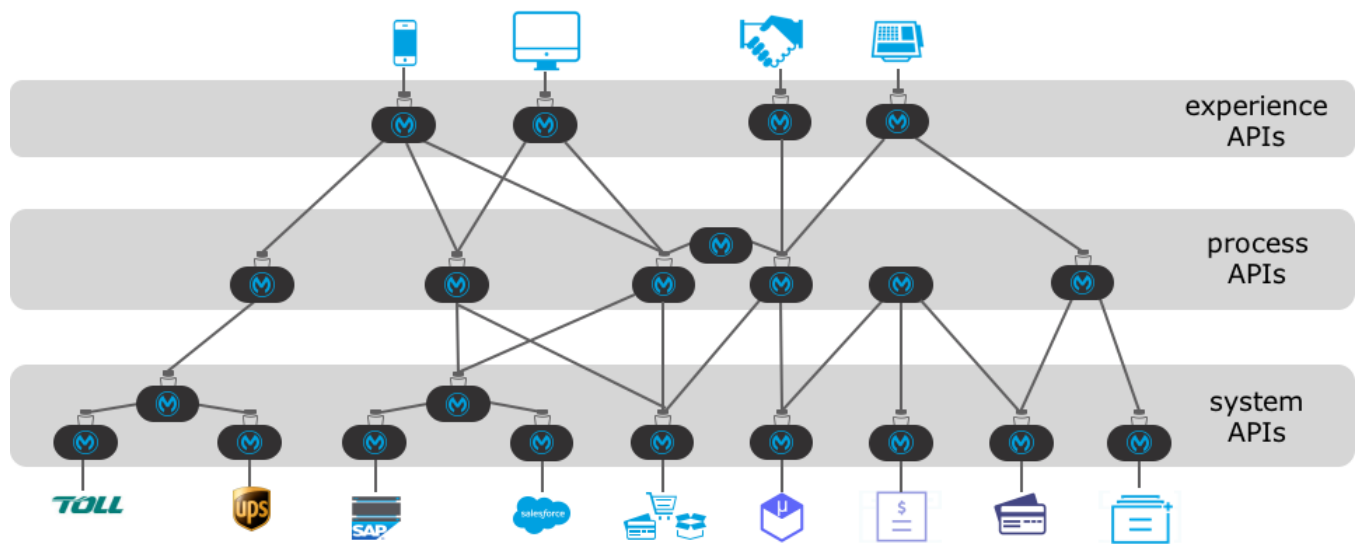
# PART 1: Implementing API-Led Connectivity with Anypoint Platform



## Objectives:

- Describe what API-led connectivity is and its benefits.
- Use Anypoint Platform to take an API through its complete lifecycle.
- Design, build, deploy, manage, and govern an API.

# Module 1: Introducing API-Led Connectivity



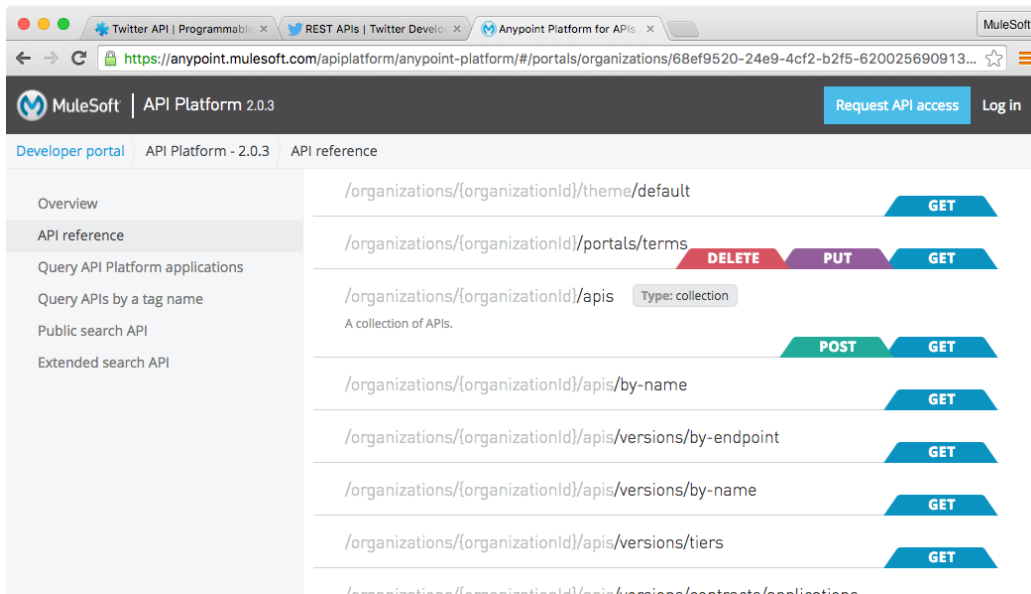
## Objectives:

- Identify the problems faced by IT today.
- Describe what API-led connectivity is and its benefits.
- Explain what web services and APIs are.
- Explore API directories and portals.
- Make calls to secure and unsecured APIs.
- Introduce API-led connectivity with Anypoint Platform.
- Explore Anypoint Platform.

# Walkthrough 1-1: Explore API directories and portals

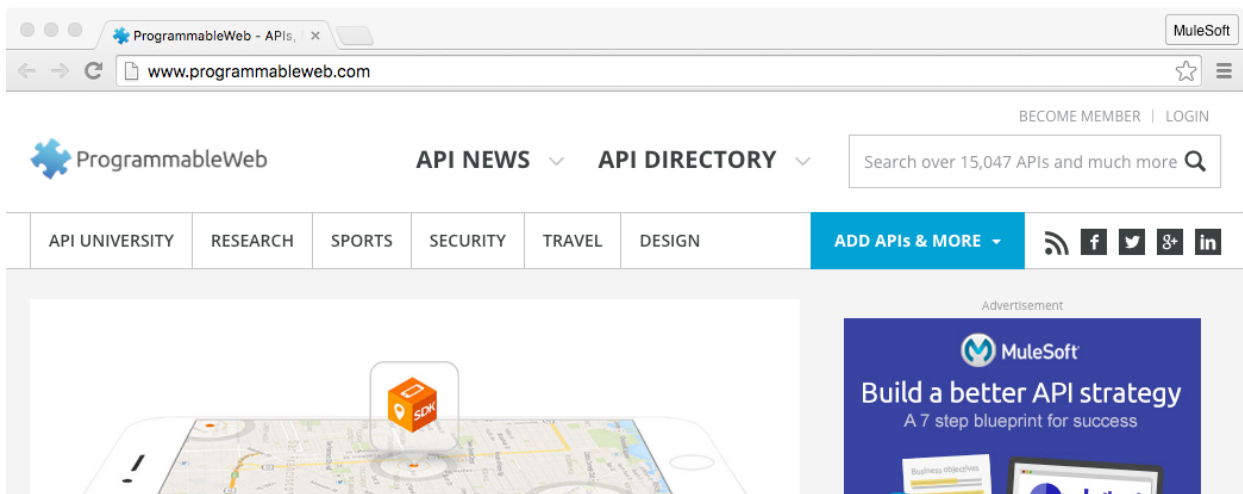
In this walkthrough, you make calls to a RESTful API. You will:

- Browse the ProgrammableWeb API directory.
- Explore the MuleSoft Developer portal for popular APIs.
- View an API definition file.
- Explore the MuleSoft Developer portal for Anypoint Platform.
- Use the API Console in an Anypoint Platform API Portal to make sample calls to an API.



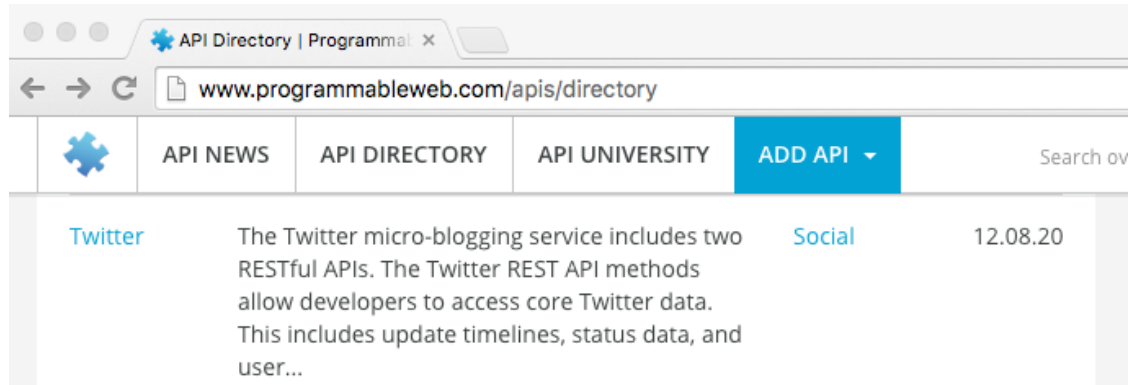
## Explore the ProgrammableWeb API directory

1. In a web browser, navigate to <http://www.programmableweb.com/>.
2. Click the API directory link.



3. Scroll down and click the link for the Twitter API.

*Note: If Twitter is no longer displayed on the main page, search for it.*



4. In the Specs section, click the API Homepage link.

**SPECS**

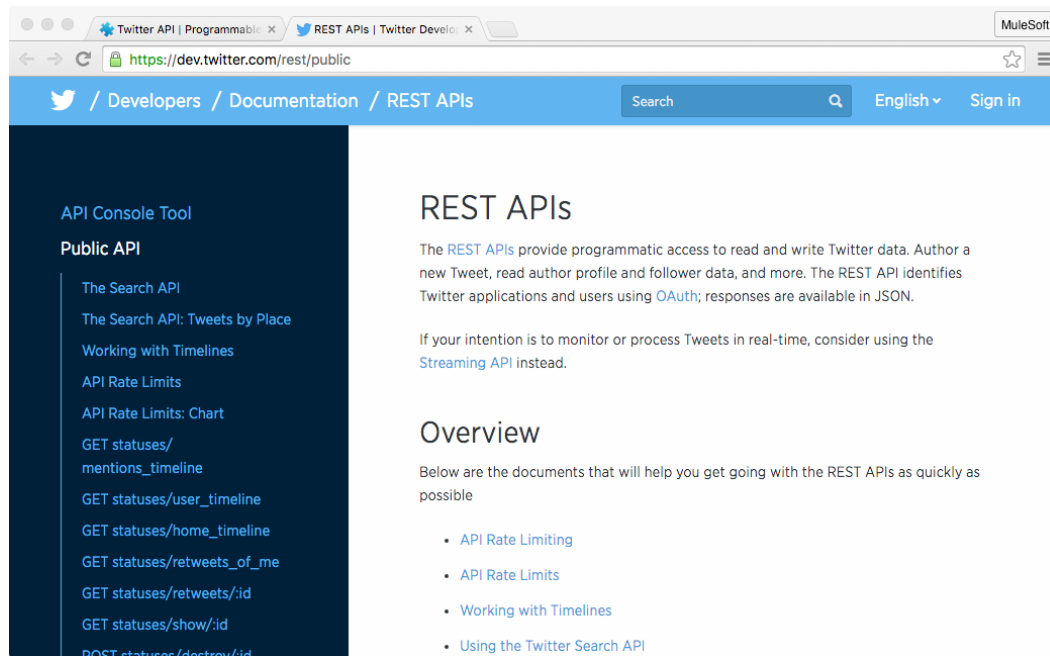
**API Provider**  
<http://twitter.com>

**API Endpoint**  
<http://twitter.com/statuses/>

**API Homepage**  
<https://dev.twitter.com/rest/public>

**Primary Category**

5. Browse the list of requests you can make to the API.



## Explore the MuleSoft Developer portal for popular APIs

- Return to the course snippets.txt file.
- Copy the URL for the MuleSoft developer portal for popular APIs:  
<https://anypoint.mulesoft.com/apiplatform/popular#/portals>.
- In a web browser, navigate to that URL.

The screenshot shows the MuleSoft Developer portal for Popular APIs. The browser address bar displays the URL <https://anypoint.mulesoft.com/apiplatform/popular#/portals>. The page header includes the MuleSoft logo, the text "Popular APIs", and a "Log in" button. Below the header, the page is titled "Developer portal" and "API portals". A search bar is present, followed by a table listing popular APIs. The table has three columns: "API name", "Version", and "Tags".

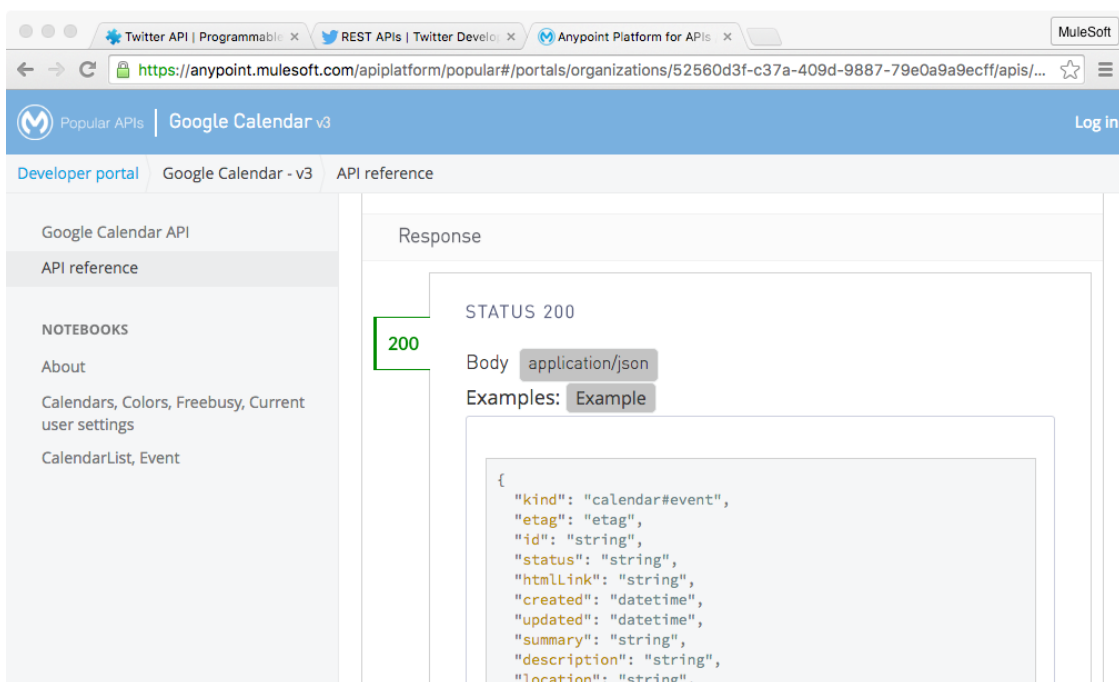
API name	Version	Tags
<a href="#">Blogger</a>	<a href="#">v3</a>	
<a href="#">FlightStats</a>	<a href="#">v1</a>	
<a href="#">Flight Status And Track</a>	<a href="#">v2</a>	
<a href="#">Uber user activity</a>	<a href="#">v1.2</a>	

- Scroll down and locate and click the Google Calendar link.
- In the left-side navigation, click the API reference link.
- Scroll the list of available resources.
- Click the GET tab for the `/calendars/{calendar_id}/events/{event_id}` resource.

The screenshot shows the MuleSoft Developer portal for the Google Calendar v3 API reference. The browser address bar displays the URL <https://anypoint.mulesoft.com/apiplatform/popular#/portals/organizations/52560d3f-c37a-409d-9887-79e0a9a9ecff/apis/8157/versions/8356/...>. The page header includes the MuleSoft logo, the text "Popular APIs", and a "Log in" button. Below the header, the page is titled "Developer portal" and "Google Calendar - v3". The left sidebar shows the "API reference" link selected. The main content area displays a list of API resources with their corresponding HTTP methods.

Resource	Methods
<code>/calendars/{calendar_id}/events</code>	POST, GET
<code>/calendars/{calendar_id}/events/import</code>	POST
<code>/calendars/{calendar_id}/events/{event_id}</code>	DELETE, PATCH, PUT, GET
<code>/calendars/{calendar_id}/events/{event_id}/instances</code>	GET
<code>/calendars/{calendar_id}/events/{event_id}/move</code>	POST

13. Scroll down and look at the sample response.

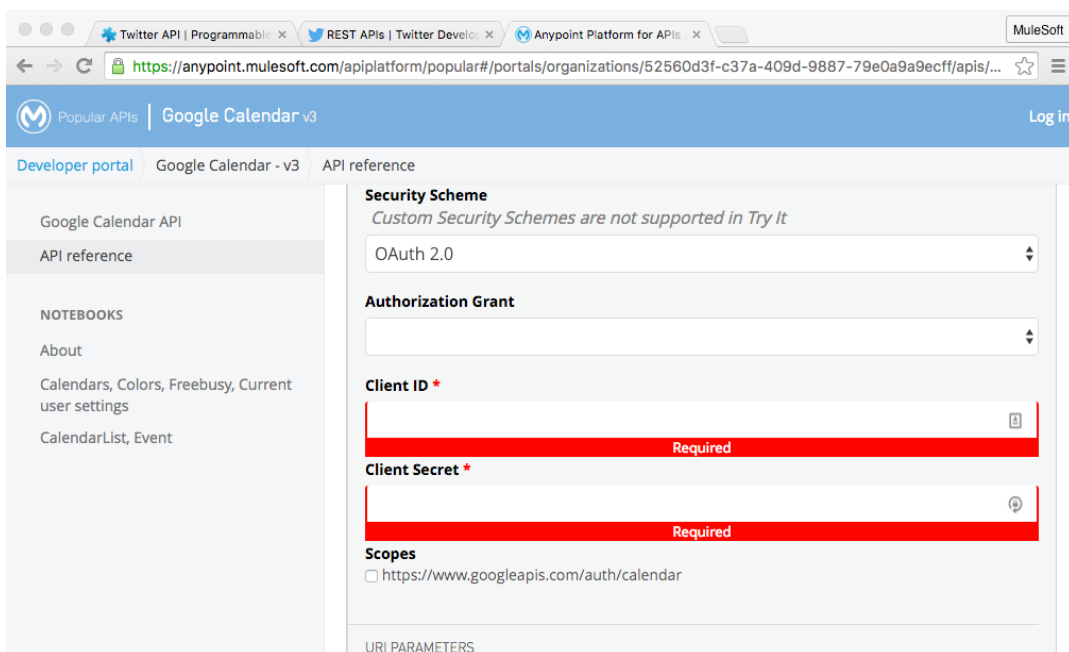


The screenshot shows the MuleSoft AnyPoint Platform for APIs interface. The browser address bar displays the URL: <https://anypoint.mulesoft.com/apiplatform/popular#/portals/organizations/52560d3f-c37a-409d-9887-79e0a9a9ecff/apis/...>. The page title is 'Google Calendar v3'. The left sidebar contains navigation links: 'Developer portal', 'Google Calendar - v3', 'API reference', 'Google Calendar API', 'API reference', 'NOTEBOOKS', 'About', 'Calendars, Colors, Freebusy, Current user settings', and 'CalendarList, Event'. The main content area shows the 'Response' section with a 'STATUS 200' and a 'Body' of 'application/json'. An 'Examples' tab is selected, displaying a JSON object representing a calendar event:

```
{
  "kind": "calendar#event",
  "etag": "etag",
  "id": "string",
  "status": "string",
  "htmlLink": "string",
  "created": "datetime",
  "updated": "datetime",
  "summary": "string",
  "description": "string",
  "location": "string",
}
```

14. Click the Try it button.

15. Scroll down and locate and click the GET button; you should get errors that client id, client secret, event id, and version are required.



The screenshot shows the MuleSoft AnyPoint Platform for APIs interface. The browser address bar displays the URL: <https://anypoint.mulesoft.com/apiplatform/popular#/portals/organizations/52560d3f-c37a-409d-9887-79e0a9a9ecff/apis/...>. The page title is 'Google Calendar v3'. The left sidebar contains navigation links: 'Developer portal', 'Google Calendar - v3', 'API reference', 'Google Calendar API', 'API reference', 'NOTEBOOKS', 'About', 'Calendars, Colors, Freebusy, Current user settings', and 'CalendarList, Event'. The main content area shows the 'Try it' section with the following fields:

- Security Scheme:** Custom Security Schemes are not supported in Try It
- OAuth 2.0:** OAuth 2.0
- Authorization Grant:** Authorization Code
- Client ID:** Required (red error message)
- Client Secret:** Required (red error message)
- Scopes:** ☐ <https://www.googleapis.com/auth/calendar>

The 'URI PARAMETERS' section is visible at the bottom.

16. Scroll up and click the Close button in the upper-right corner.

17. Click the DELETE tab for the /calendars/{calendar\_id}/events/{event\_id} resource.
18. Scroll down and look at the sample response.

The screenshot shows the Anypoint Platform for APIs interface. The browser tabs include 'Twitter API | Programmable', 'REST APIs | Twitter Develo', and 'Anypoint Platform for APIs'. The URL is <https://anypoint.mulesoft.com/apiplatform/popular#/portals/organizations/52560d3f-c37a-409d-9887-79e0a9a9ecff/apis/81...>. The page title is 'Google Calendar v3'. The left sidebar has a 'Developer portal' tab and a 'Google Calendar - v3' sub-tab. The main content area shows the 'API reference' for the Google Calendar API. The 'DELETE' tab is selected for the resource `/calendars/{calendar_id}/events/{event_id}`. The response status is **200**, and the message says 'If successful, this method returns an empty response body.'

19. Scroll up and click the PUT tab for the /calendars/{calendar\_id}/events/{event\_id} resource.
20. Scroll down and look at the example body.
21. Scroll down and look at the sample response.
22. Scroll down to the bottom of the API reference page.
23. Click the Download API definition as a .zip file link.

The screenshot shows the Anypoint Platform for APIs interface. The browser tabs include 'Twitter API | Programmable', 'REST APIs | Twitter Develo', and 'Anypoint Platform for APIs'. The URL is <https://anypoint.mulesoft.com/apiplatform/popular#/portals/organizations/52560d3f-c37a-409d-9887-79e0a9a9ecff/apis/8157/versions/8...>. The page title is 'Google Calendar v3'. The left sidebar has a 'Developer portal' tab and a 'Google Calendar - v3' sub-tab. The main content area shows the 'API reference' for the Google Calendar API. The 'PUT' tab is selected for the resource `/users/me/calendarList/{calendar_id}`. The page shows the ROOT RAML URL: `https://anypoint.mulesoft.com/apiplatform/repository/v2/organizations/52560d...` and a link to 'Download API definition as a .zip file'.

24. In your computer's file browser, navigate to your downloads folder and unzip the API ZIP.
25. Open api.raml in a text editor.

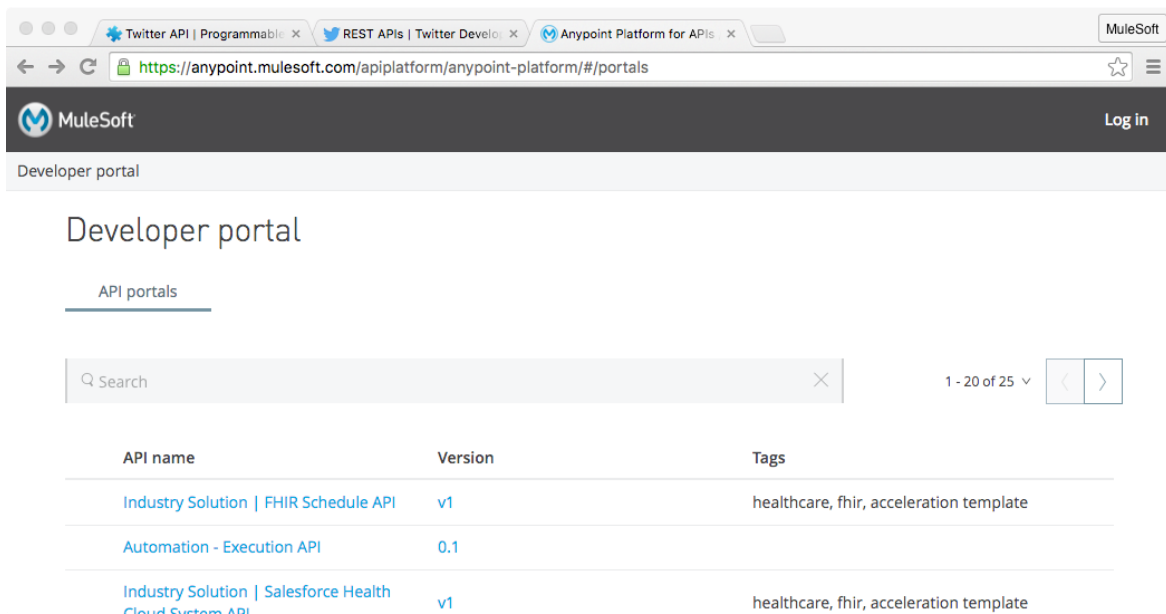
26. Take a quick look at the API definition file and then close it.

```
< | ▶ | api.raml ⚙ |
/{event_id}:
  get:
    is: [ calendarEvent ]
    description: Returns an event.
    queryParameters:
      timeZone:
        description: Time zone used in the response. Optional. The default is the
        example: UTC
    responses:
      200:
        body:
          application/json:
            schema: eventResourceResponse
            example: !include examples/eventResourceResponse-example.json
  put:
    is: [ calendarEvent , sendNotifications ]
    description: Updates an event.
    body:
      application/json:
        schema: createEventResourceRequest
```

## Explore the MuleSoft Developer portal for Anypoint Platform

27. Return to the course snippets.txt file and copy the URL for the MuleSoft developer portal for Anypoint Platform: <https://anypoint.mulesoft.com/apiplatform/anypoint-platform/#/portals>.

28. In a web browser, navigate to that URL.



The screenshot shows a web browser window with the MuleSoft Developer portal. The browser's address bar displays the URL <https://anypoint.mulesoft.com/apiplatform/anypoint-platform/#/portals>. The page header includes the MuleSoft logo and a 'Log in' button. Below the header, the text 'Developer portal' is visible. A section titled 'API portals' contains a search bar and a table of API portals. The table has three columns: 'API name', 'Version', and 'Tags'. The first three rows of the table are visible.

API name	Version	Tags
Industry Solution   FHIR Schedule API	v1	healthcare, fhir, acceleration template
Automation - Execution API	0.1	
Industry Solution   Salesforce Health Cloud System API	v1	healthcare, fhir, acceleration template

29. Scroll down and locate and click the API Platform link.



30. In the left-side navigation, click the API reference link.
31. Scroll the list of available resources.
32. Click the GET tab for the /public/apis resource.

The screenshot shows the MuleSoft API Platform 2.0.3 interface. The left sidebar contains a navigation menu with the following items: Overview, API reference (selected), Query API Platform applications, Query APIs by a tag name, Public search API, and Extended search API. The main content area is titled "API reference" and displays a list of resources. The first resource is "/public", which is expanded to show a sub-resource "/public/apis". The "/public/apis" resource is highlighted with a blue "GET" button. The description for "/public/apis" is "Search through all public APIs within the Anypoint Platform." The second resource is "/organizations", with the description "Organizations are the container entity for all API Portal-related resources."

33. Click the Try it button.
34. Scroll down and locate and click the GET button.
35. Scroll down and look at the response body.

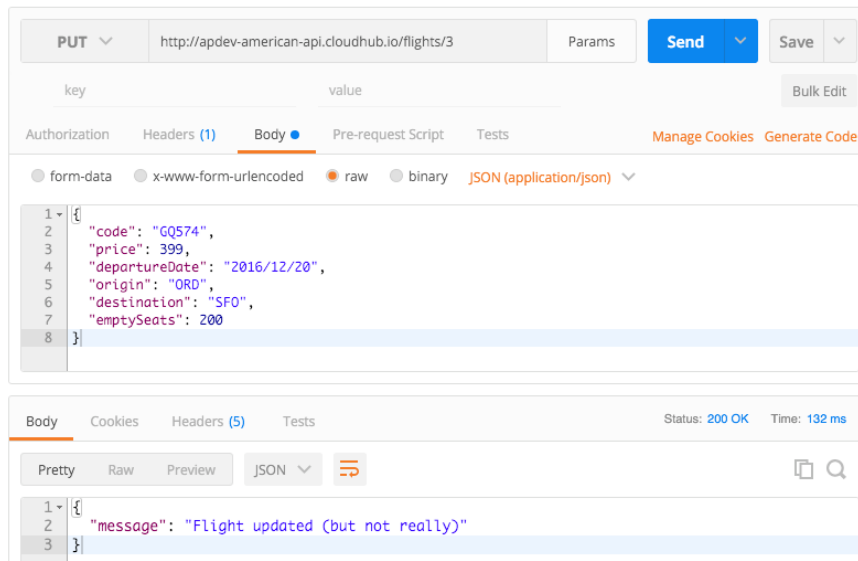
The screenshot shows the MuleSoft API Platform 2.0.3 interface with the "Try it" button clicked. The main content area displays the response body for the GET request to the "/public/apis" resource. The response is a JSON object with the following structure:

```
1 {
2   "total": 5940,
3   "apis": [
4     {
5       "audit": {
6         "created": {
7           "date": "2016-05-11T09:05:07.422Z"
8         },
9       "updated": {}
10    },
11    "masterOrganizationId": "4a2bd049-b822-4ad0-9023-877eb91b4b",
12    "organizationId": "4a2bd049-b822-4ad0-9023-877eb91b4b",
13    "id": 67323,
14    "name": "1.1Development",
15    "versions": [
16      {
17        "audit": {
18          "created": {
19            "date": "2016-05-11T09:05:07.422Z"
20          },
21          "updated": {
22            "date": "2016-05-11T09:07:48.258Z"
23          }
24        }
25      }
26    ]
27  }
28 ]
29 }
```

## Walkthrough 1-2: Make calls to an API

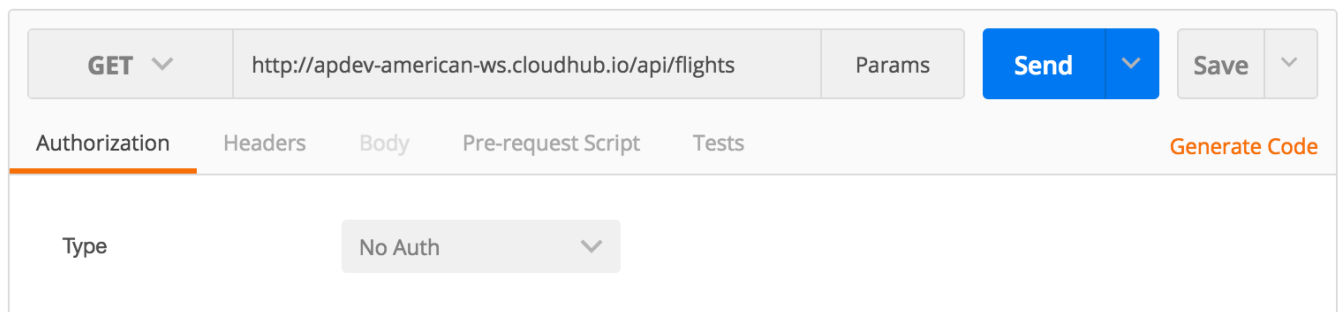
In this walkthrough, you make calls to a RESTful API. You will:

- Use Postman to make calls to an unsecured API.
- Make GET, DELETE, POST, and PUT calls.
- Use Postman to make calls to a secured API.



### Make GET requests to retrieve data

1. Return to or open Postman.
2. Make sure the method is set to GET.
3. Return to the course snippets.txt file.
4. Copy the URL for the American Flights web service:  
<http://apdev-american-ws.cloudhub.io/api/flights>.
5. Return to Postman and paste the URL in the text box that says Enter request URL.



- Click the Send button; you should get a response.
- Locate and click the return HTTP status code of 200.
- Review the response body containing flights to SFO, LAX, and CLE.

GET http://apdev-american-ws.cloudhub.io/api/flights Params Send Save

Body Cookies Headers (5) Tests Status: 200 Time: 1070 ms

Pretty Raw Preview JSON

```
1 {
2   {
3     "ID": 1,
4     "code": "rree0001",
5     "price": 541,
6     "departureDate": "2016-01-20T00:00:00",
7     "origin": "MUA",
8     "destination": "LAX",
9     "emptySeats": 0,
10    "plane": {
11      "type": "Boeing 787",
12      "totalSeats": 200
13    }
14  },
15  {
16    "ID": 2,
17    "code": "eefd0123",
18    "price": 300.
```

- Click the Params button next to the URL.
- In the area that appears, set the key to code and the value to CLE.
- Click the Send button; you should get just flights to CLE returned.

GET http://apdev-american-ws.cloudhub.io/api/flights?code=CLE Params Send Save

code CLE Bulk Edit

key value

Authorization Headers Body Pre-request Script Tests Generate Code

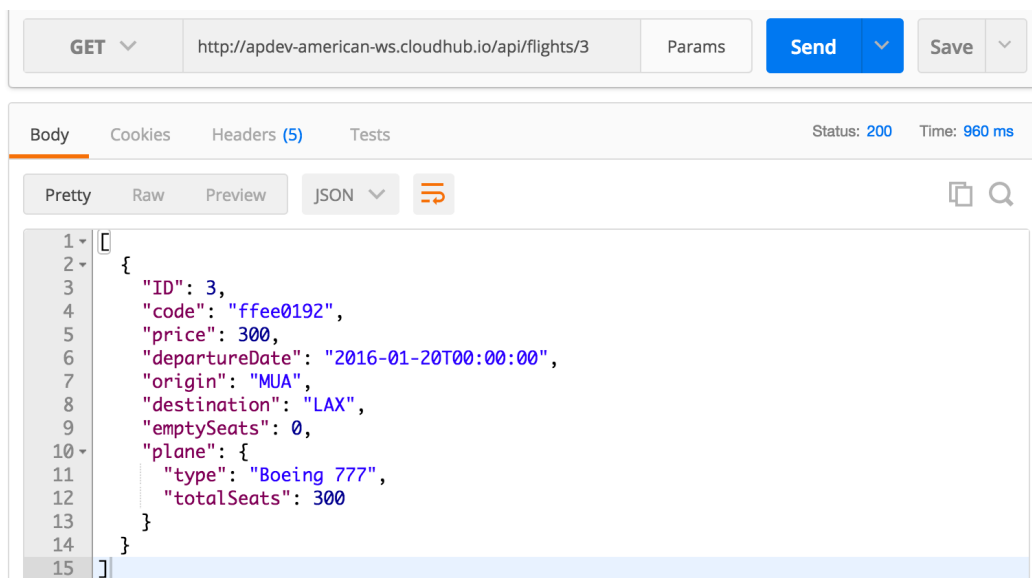
Type No Auth

Body Cookies Headers (5) Tests Status: 200 Time: 1062 ms

Pretty Raw Preview JSON

```
1 {
2   {
3     "ID": 2,
4     "code": "eefd0123",
5     "price": 300,
6     "departureDate": "2016-01-25T00:00:00",
7     "origin": "MUA",
8     "destination": "CLE",
9     "emptySeats": 7.
```

12. Click the X next to the parameter to delete it.
13. Change the request URL to use a uri parameter to retrieve the flight with an ID of 3:  
<http://apdev-american-ws.cloudhub.io/api/flights/3>
14. Click the Send button; you should see only the flight with that ID returned.



GET <http://apdev-american-ws.cloudhub.io/api/flights/3> Params Send Save

Body Cookies Headers (5) Tests Status: 200 Time: 960 ms


Pretty Raw Preview JSON

```
1 {
2   "ID": 3,
3   "code": "ffee0192",
4   "price": 300,
5   "departureDate": "2016-01-20T00:00:00",
6   "origin": "MUA",
7   "destination": "LAX",
8   "emptySeats": 0,
9   "plane": {
10    "type": "Boeing 777",
11    "totalSeats": 300
12  }
13 }
14
15 ]
```

## Make DELETE requests to delete data

15. Change the method to DELETE.
16. Click the Send button; you should see a 200 response with a message that the was Flight deleted (but not really).

*Note: The database is not actually modified so that its data integrity can be retained for class.*



DELETE <http://apdev-american-ws.cloudhub.io/api/flights/3> Params Send Save

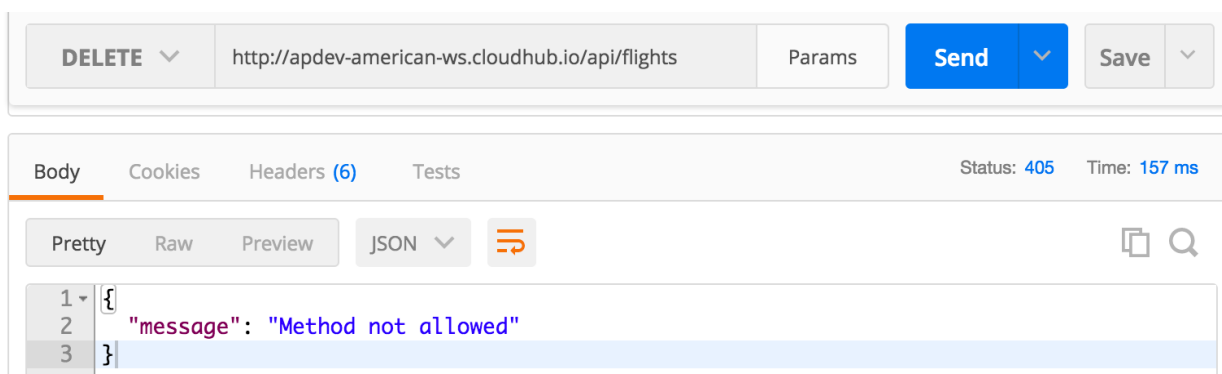
Body Cookies Headers (6) Tests Status: 200 Time: 275 ms

Pretty Raw Preview JSON

```
1 {
2   "message": "Flight deleted (but not really)"
3 }
```

17. Remove the URI parameter from the request: <http://apdev-american-ws.cloudhub.io/api/flights>.

18. Click the Send button; you should get a 405 response with a message of method not allowed.

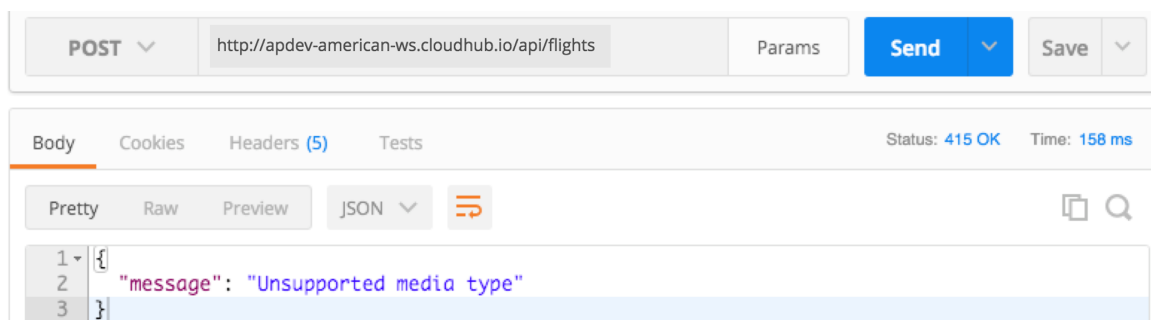


## Make a POST request to add data

19. Change the method to POST.

20. Click the Send button; you should get a 415 response with a message of unsupported media type.

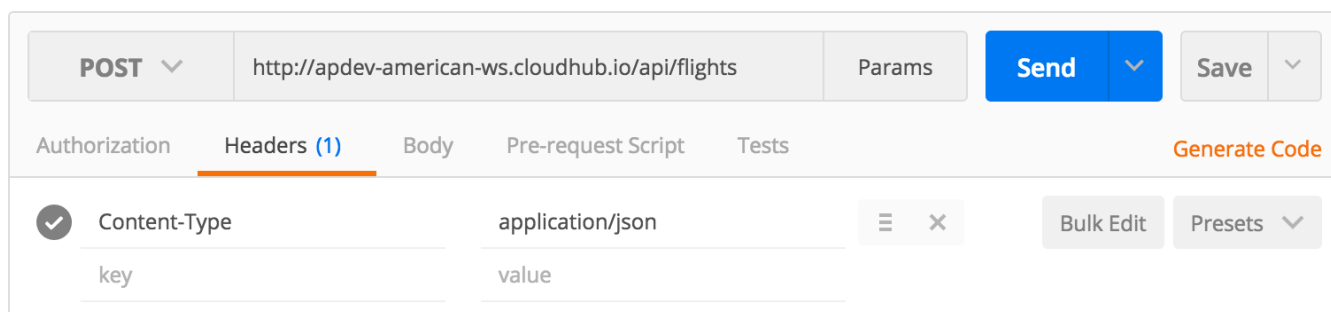
*Note: With the initial release of APIkit in Mule 3.8.0, you may get a different message of flow not found for resource.*



21. Click the Headers link under the request URL.

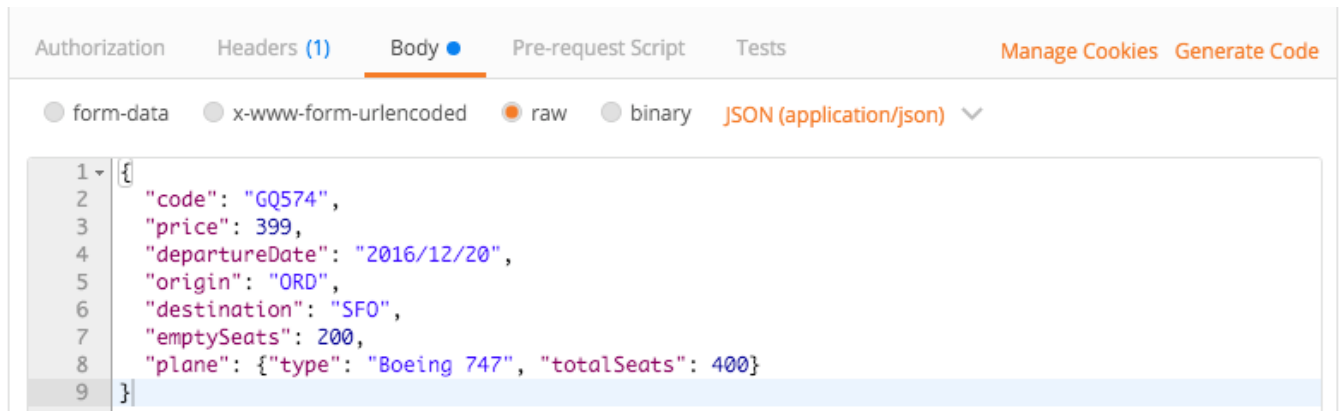
22. Click in the Headers key field, type C, and then select Content-Type.

23. Click in the Value field, type A, and then select application/json.

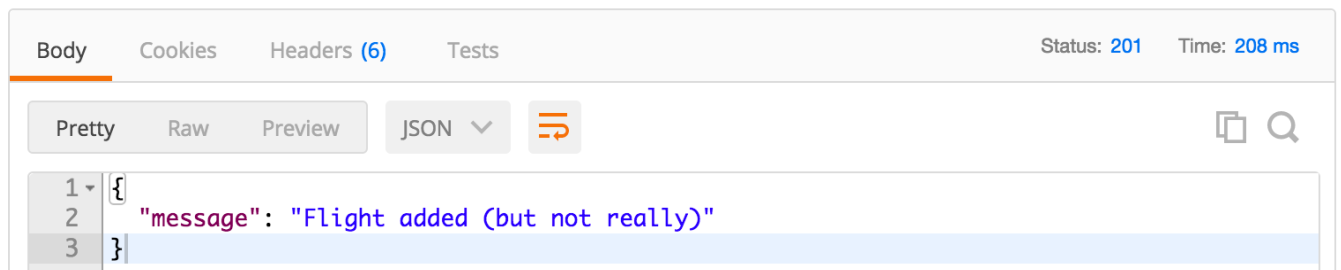


24. Click the Body link under the request URL.

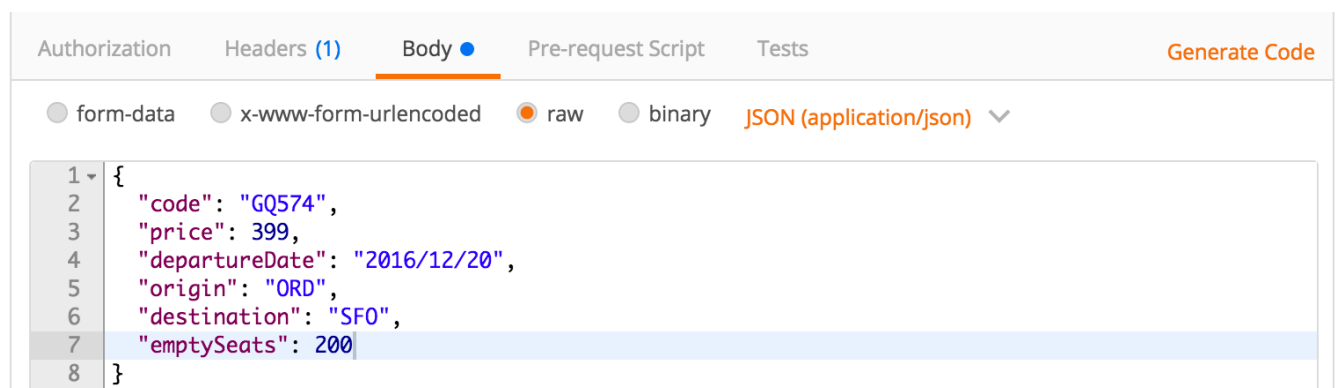
25. Select the raw radio button.
26. Return to the course snippets.txt file and copy the value for American Flights API post body.
27. Return to Postman and paste the code in the body text area.



28. Click the Send button; you should see a 201 response with the message Flight added (but not really).

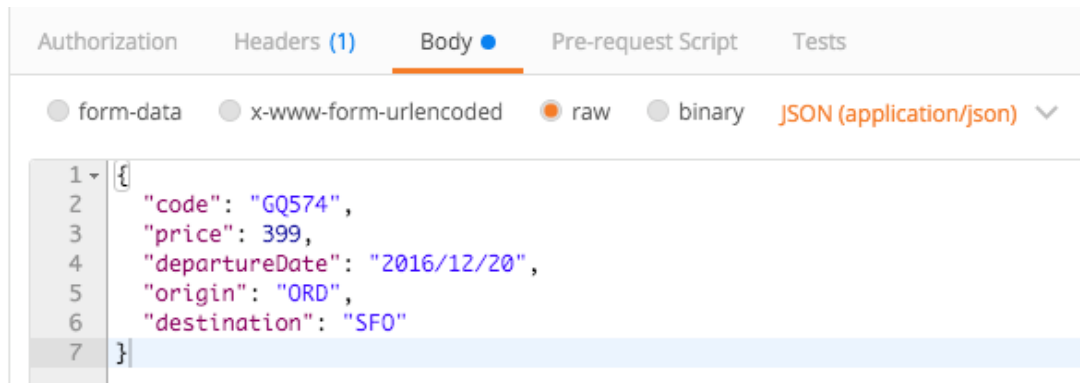


29. Return to the request body and remove the plane field and value from the request body.
30. Remove the comma after the emptySeats key/value pair.

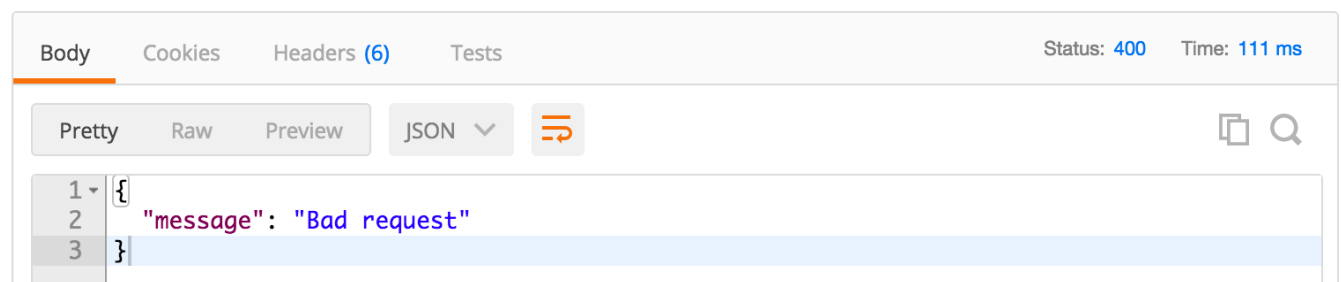


31. Send the request; the message should still post successfully.

32. In the request body, remove the emptySeats key/value pair.
33. Delete the comma after the destination key/value pair.



34. Send the request; you should see a 400 response with the message Bad request.



## Make a PUT request to update data

35. Change the method to PUT.
36. Add a flight ID to the URL to modify a particular flight.
37. Click the Send button; you should get a bad request message.
38. In the request body field, press Cmd+Z or Ctrl+Z so the emptySeats field is added back.

39. Send the request; you should see the response Flight updated (but not really).

The image shows the Postman interface for a PUT request. The URL is `http://apdev-american-ws.cloudhub.io/api/flights/3`. The request body is a JSON object with the following fields: `code` (GQ574), `price` (399), `departureDate` (2016/12/20), `origin` (ORD), `destination` (SFO), and `emptySeats` (200). The response status is 200, and the response body is a JSON object with a `message` field containing the text "Flight updated (but not really)".

```
PUT http://apdev-american-ws.cloudhub.io/api/flights/3
```

```
{
  "code": "GQ574",
  "price": 399,
  "departureDate": "2016/12/20",
  "origin": "ORD",
  "destination": "SFO",
  "emptySeats": 200
}
```

```
{
  "message": "Flight updated (but not really)"
}
```

## Make a request to a secured API

40. Change the method to GET.

41. Change the request URL to `http://apdev-american-api.cloudhub.io/flights/3`.

42. Click the Send button; you should get a message about a missing `client_id`.

The image shows the Postman interface for a GET request. The URL is `http://apdev-american-api.cloudhub.io/flights/3`. The response status is 401, and the response body is the text "Unable to retrieve client\_id from message".

```
GET http://apdev-american-api.cloudhub.io/flights/3
```

```
Unable to retrieve client_id from message
```

43. Return to the course `snippets.txt` file and copy the value for the American Flights API `client_id`.

44. Return to Postman and add a request parameter called `client_id`.

45. Set `client_id` to the value you copied from the `snippets.txt` file.



46. Return to the course snippets.txt file and copy the value for the American Flights API client\_secret.
47. Return to Postman and add a request parameter called client\_secret.
48. Set client\_secret to the value you copied from the snippets.txt file.
49. Click the Send button; you should get data for flight 3 again – or a message that API calls have been exceeded).

*Note: The API service level agreement (SLA) for the application with this client ID and secret has been set to allow one API call per second.*

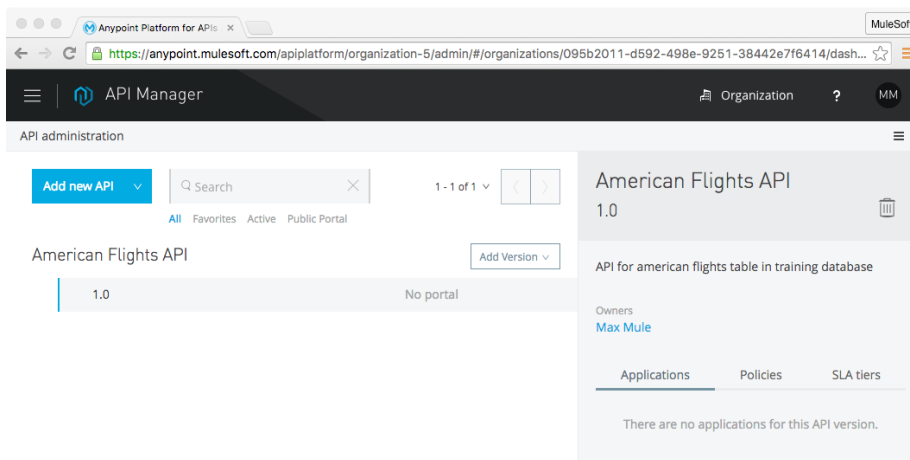
The screenshot shows the Postman interface for a GET request to the American Flights API. The URL is `http://apdev-american-api.cloudhub.io/flights/3?client_id=d1374b15c686`. The Params tab is active, showing two parameters: `client_id` with value `d1374b15c6864c3682ddbed2a247a826` and `client_secret` with value `4a87fe7e2e43488c927372AEF981F066`. The Body tab is also active, showing a JSON response for flight 3. The response is formatted as JSON and includes fields for ID, code, price, departure date, origin, destination, empty seats, and plane details.

```
{
  "ID": 3,
  "code": "ffee0192",
  "price": 300,
  "departureDate": "2016-01-20T00:00:00",
  "origin": "MUA",
  "destination": "LAX",
  "emptySeats": 0,
  "plane": {
    "type": "Boeing 777",
    "totalSeats": 300
  }
}
```

## Walkthrough 1-3: Explore Anypoint Platform

In this walkthrough, you get familiar with the Anypoint Platform web application. You will:

- Explore Anypoint Platform.
- Add an API to Anypoint Platform.



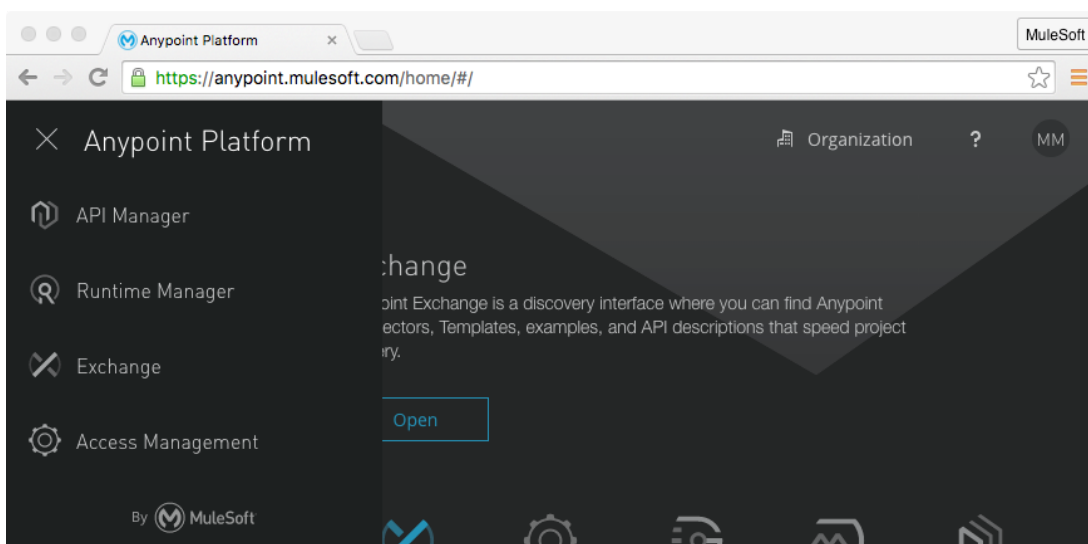
### Return to Anypoint Platform

1. Return to Anypoint Platform in a web browser.

*Note: If you closed the browser window or logged out, return to <https://anypoint.mulesoft.com> and log in.*

2. Click the menu button located in the upper-left in the main menu bar.
3. In the menu that appears, click Anypoint Platform; this will return you to the home page.

*Note: This will be called the main menu from now on.*

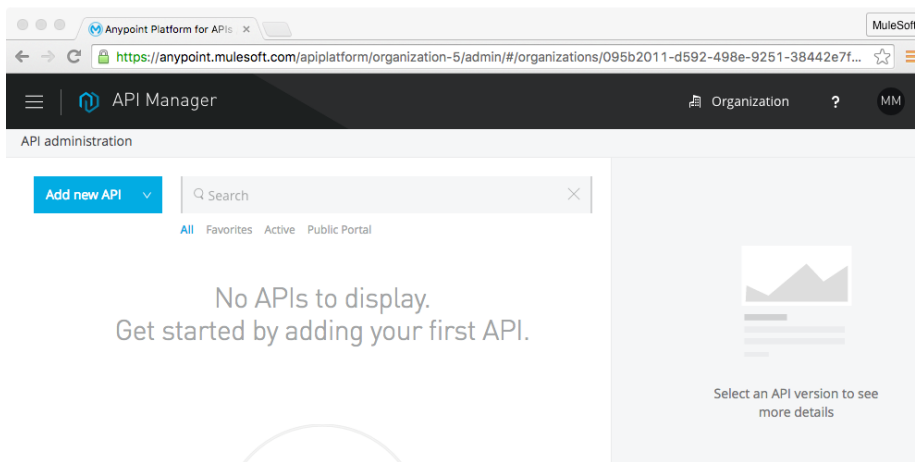


## Explore Anypoint Platform

4. In the main menu, select Access Management.
5. In the main menu, select API Manager.
6. In the main menu, select Exchange.
7. In the main menu, select Runtime Manager.

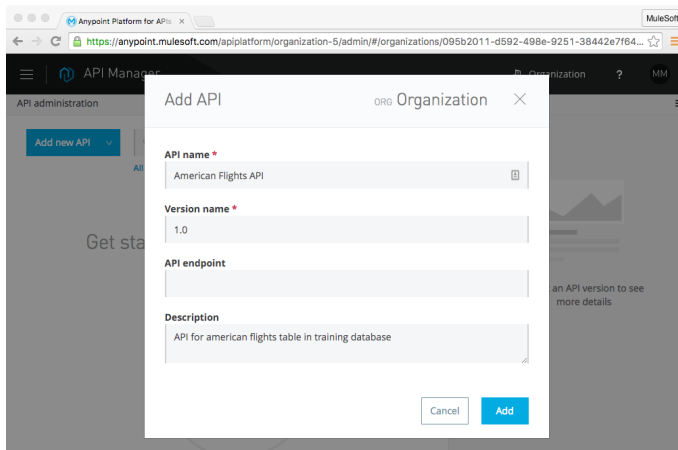
## Add an API to Anypoint Platform

8. In the main menu, select API Manager again.
9. Click the Add new API button.



10. In the Add API dialog box, enter the following information.

- API name: American Flights API
- Version name: 1.0
- API endpoint: *Leave blank*
- Description: API for american flights table in training database



11. Click Add.

12. Look at the different sections and links for the API on the API administration page.

The screenshot shows the 'API Manager' interface for 'American Flights API - 1.0'. The page includes a header with 'API Manager' and 'Organization' links. Below the header, there's a section for 'American Flights API' with a description 'API for american flights table in training database'. A 'ADD A TAG' button is visible. The main content area has three tabs: 'API Definition', 'API Portal', and 'API Status'. The 'API Definition' tab is active, showing a description and a link to 'Define API in API designer'. The 'API Portal' tab shows 'No portal'. The 'API Status' tab shows 'Configure endpoint'. Below these tabs, there's a section for 'Applications' with a sub-header 'In order to manage consumer applications for this API you first need to do two things:'. The steps listed are: '1. Set an API URL and deploy a proxy' and '2. Create & publish an API portal for this API version'. A note states: 'Then application developers can request access to this API from the portal. Requests can be approved from this tab.'

13. Click the API administration link in the main menu; you should see your new API listed.

14. Click the row containing version 1.0 of your API; you should see details for it displayed on the right.

The screenshot shows the 'API Manager' interface for 'American Flights API' with version 1.0 selected. The page includes a header with 'API Manager' and 'Organization' links. Below the header, there's a section for 'American Flights API' with a description 'API for american flights table in training database'. A 'Add new API' button is visible. The main content area has a table with one row for version 1.0, which is selected. The right sidebar shows details for version 1.0, including the description 'API for american flights table in training database', the owner 'Max Mule', and tabs for 'Applications', 'Policies', and 'SLA tiers'. The 'Applications' tab is active, showing 'There are no applications for this API version.'

15. Click the version 1.0 link for the API; you should return to the details page for that API.

The screenshot shows the MuleSoft API Manager web interface. The browser address bar displays the URL: <https://anypoint.mulesoft.com/apiplatform/organization-5/admin/#/organizations/095b2011-d592-498e-9251-38442e7f6414/dash...>. The page header includes the MuleSoft logo and navigation links for 'API Manager', 'Organization', and user profile 'MM'. The main content area is titled 'American Flights API - 1.0' under the 'API administration' tab. It features a 'Set the API URL...' link and a description: 'API for american flights table in training database'. Below this is an 'ADD A TAG' button. Three configuration cards are visible: 'API Definition' (with a link to 'Define API in API designer'), 'API Portal' (with a link to 'Configure endpoint'), and 'API Status' (with a link to 'Configure endpoint').