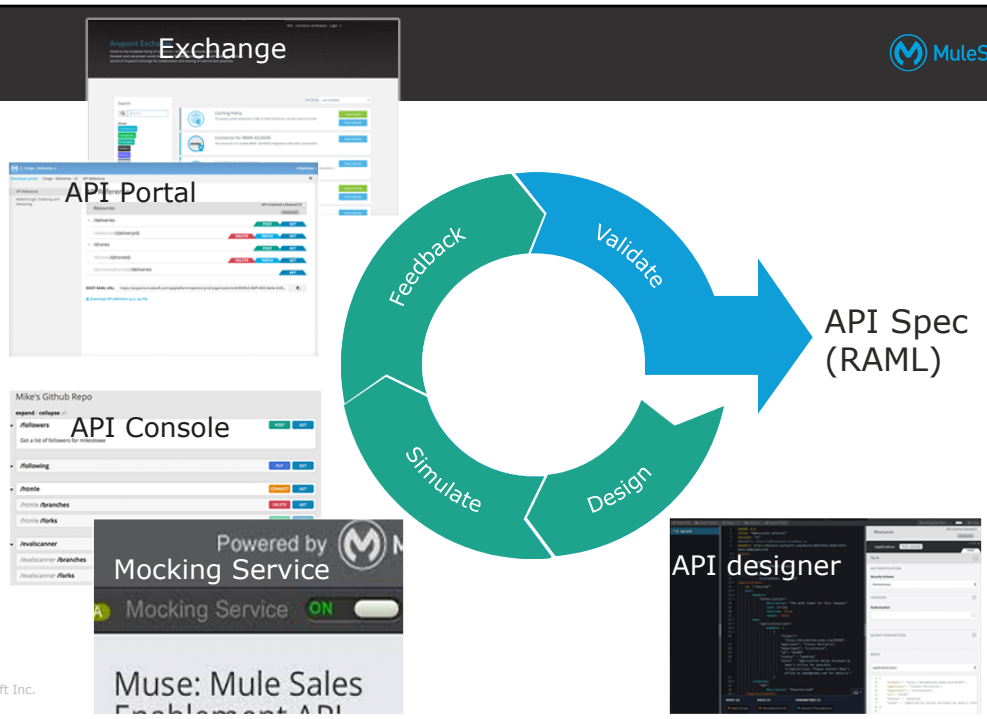
Spec driven development

- We discussed in the last modules about the benefits of designing an API first before actually building it
- This is often referred to as spec driven development
  - A development process where your application is built in two distinct phases
    - The creation of a spec (the design phase)
    - Development of code to match the spec (the development phase)
- In this module, we'll
  - Create this API specification using a standardized API description language (RAML)
  - Then learn to test it with users without writing any code

Goal



At the end of this module, you should be able to

- Define APIs with RAML, the Restful API Modeling Language
- Mock APIs to test their design before they are built
- Make APIs discoverable by adding them to the private Anypoint Exchange
- Create public API portals for external developers

Reviewing the options for defining APIs

Approaches to API design

MuleSoft

Hand coding

API Blueprint

apiary

OpenAPI Spec

OPEN {API} INITIATIVE

RAML

RAML

Introducing RAML

RAML: RESTful API Modeling Language

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- **A simple, structured, and succinct way of describing RESTful APIs**
- A non-proprietary, vendor-neutral open spec
- Developed to help out the current API ecosystem
  - Encourages reuse, enables discovery and pattern-sharing, and aims for merit-based emergence of best practices
- RAML files can be used to auto-generate documentation, mocked endpoints, interfaces for API implementations, and more!

RAML

http://raml.org

RAML syntax

- RAML is based on broadly-used standards such as YAML and JSON
- Uses a human-readable data serialization format where **data structure hierarchy is specified by indentation**
  - Not additional markup characters

```
1  #%RAML 1.0
2  version: v1
3  title: American Flights API
4
5  /flights:
6    get:
7    post:
8
9    /{ID}:
10     get:
11     delete:
12     put:
13       responses:
14         200:
15           body:
16             application/json:
```

Notice the indentation used to specify to what each line applies

Defining resources and methods

- Resources are the objects identified by the web service URL that you want to act upon using the HTTP method used for the request
- All resources begin with a slash
- Any methods and parameters nested under a resource belong to and act upon that resource
- Nested resources are used for a subset of a resource to narrow it
  - URI parameter are enclosed in {}

```
1  #%RAML 1.0
2  version: v1
3  title: American Flights API
4
5  /flights:
6    get:
7    post:
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11     delete:
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13       responses:
14         200:
15           body:
16             application/json:
```
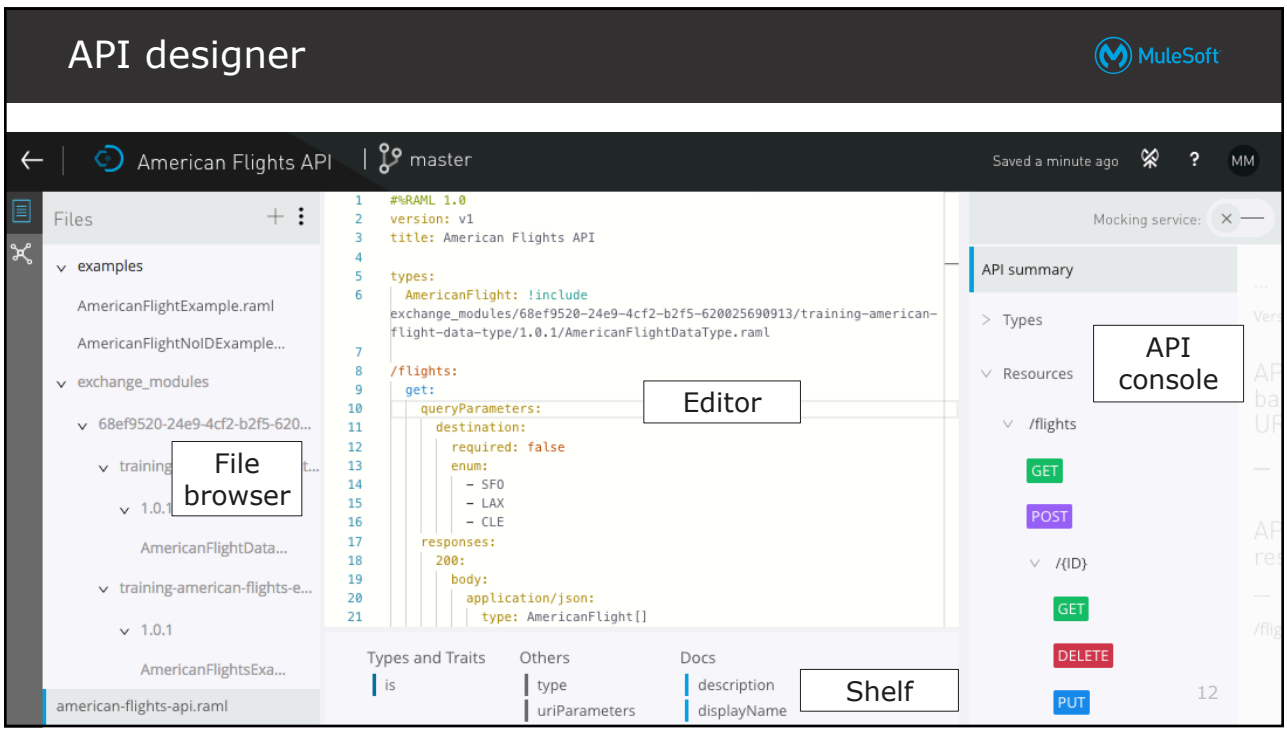

Using API designer to define APIs with RAML

API designer



Walkthrough 3-1: Use API designer to define an API with RAML

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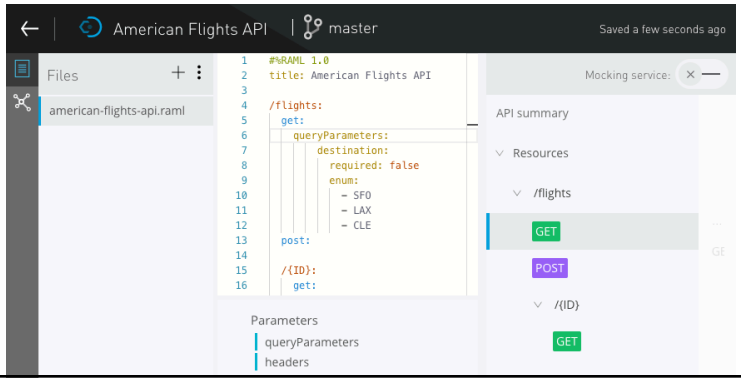
- Define resources and nested resources
- Define get and post methods
- Specify query parameters
- Interact with an API using the API console



Testing API design without writing code

Simulating an API

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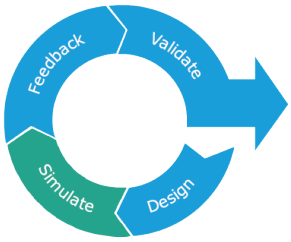
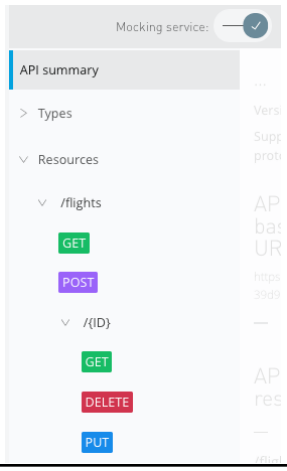
- You can mock an API to test it before it is implemented
  - Useful to get early feedback from developers
- Use the **API console** and the **mocking service** to run a live simulation
  - Returns sample API responses defined in the API definition
- The API console is available in
  - **API designer** – so the API designer can test it
  - **API portals in Exchange** – so users/developers can test it

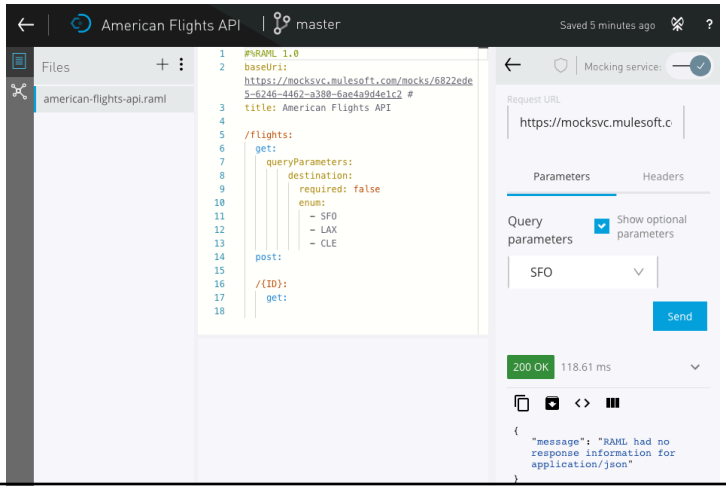




Walkthrough 3-2: Use the mocking service to test an API

MuleSoft

- Turn on the mocking service
- Use the API console to make calls to a mocked API



Using RAML to define specifications for requests and responses

Defining method response details with RAML

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- Responses must be a map of one or more HTTP status codes
- For each response, specify possible return data types along with descriptions and examples

```
/flights:
  get:
    responses:
      200:
        body:
          application/json:
            example:
                ID: 1
                code: GQ574
                price: 399
                departureDate: 2016/12/20
                origin: ORD
                destination: SFO
                emptySeats: 200
                plane:
                  type: Boeing 747
                  totalSeats: 400
```

Defining method request details with RAML

- For a request, similarly specify the possible request data types along with data types, descriptions, and examples

```
/flights:
  get: ⋯
  post:
    displayName: Add a flight
    body:
      application/json:
        example:
            code: GQ574
            price: 399
            departureDate: 2016/12/20
            origin: ORD
            destination: SFO
            emptySeats: 200
            plane:
              type: Boeing 747
              totalSeats: 400
```


Modularizing APIs

- Instead of including all code in one RAML file, you can modularize it and compose it of reusable fragments
  - **Data types**, **examples**, traits, resource types, overlays, extensions, security schemes, documentation, annotations, and libraries
- Fragments can be stored
  - In different files and folders within a project
  - In a separate API fragment project in Design Center
  - In a separate RAML fragment in Exchange

Walkthrough 3-3: Add request and response details

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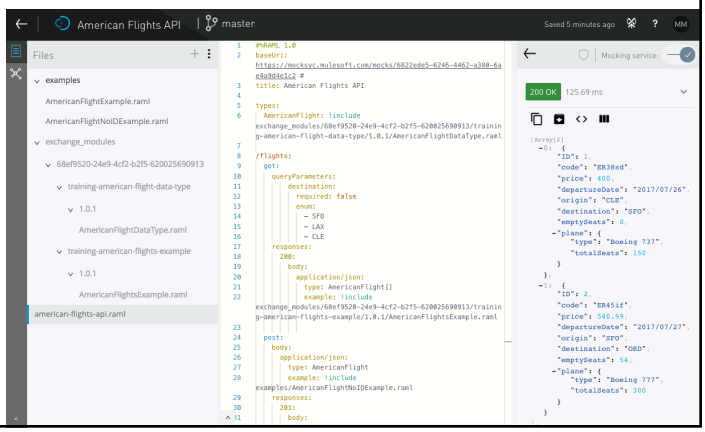
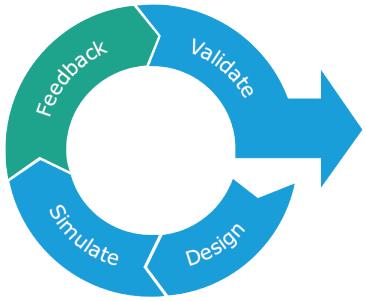
- Use API fragments from Exchange in an API
- Add a data type to be used by resources in an API
- Specify data types for GET and POST method requests and responses
- Add example JSON requests and responses
- Create new files and folders in a project and import a file
- Test an API and get example responses



Engaging with users

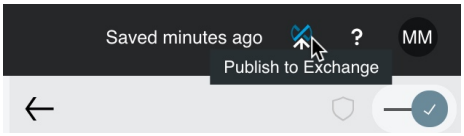
Engaging users during the API design phase

- To build a successful API, you should define it iteratively
  - Get feedback from developers on usability and functionality along the way
- To do this, you need to provide ways for developers to discover and play with the API
- Anypoint Platform makes this easy with **API portals in Exchange**
  - In **private Exchange** for internal developers
  - In a **public portal** for external developers



Publishing RAML APIs to Anypoint Exchange

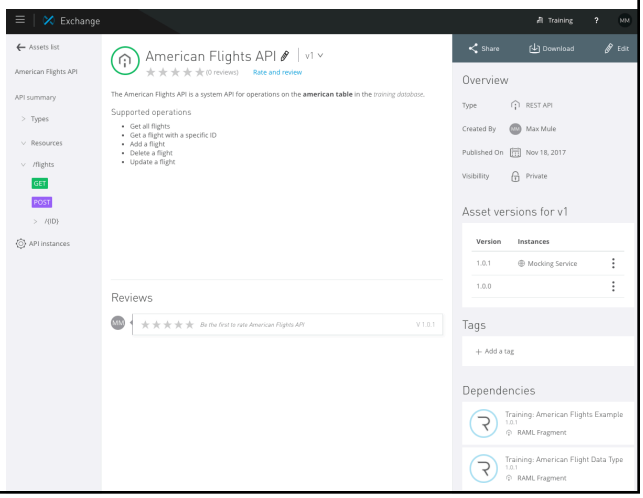
- You publish RAML API Specifications and RAML fragments to the Exchange **from API designer**
  - Not from Exchange itself



- **API portals** are automatically created for REST APIs added to Exchange
  - An **API console** for consuming and testing APIs
  - An **automatically generated API endpoint** that uses a **mocking service** to allow the API to be tested without having to implement it
- API portals can be shared with both internal and external users

Walkthrough 3-4: Add an API to the Anypoint Exchange

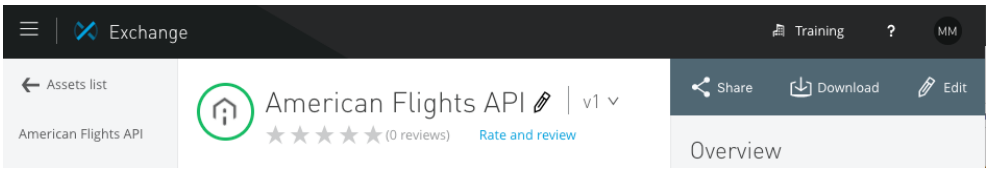
- Publish an API to Exchange from API designer
- Review an auto-generated API portal in Exchange and test the API
- Add information about an API to its API portal
- Create and publish a new API version to Exchange



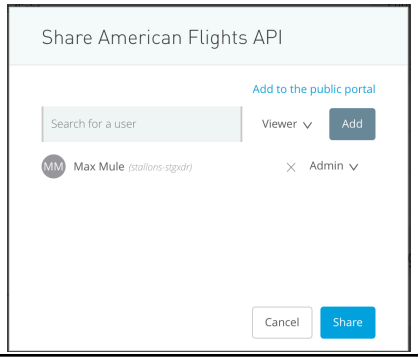
Sharing APIs

Sharing APIs

- You can share an API in Exchange with other internal or external users

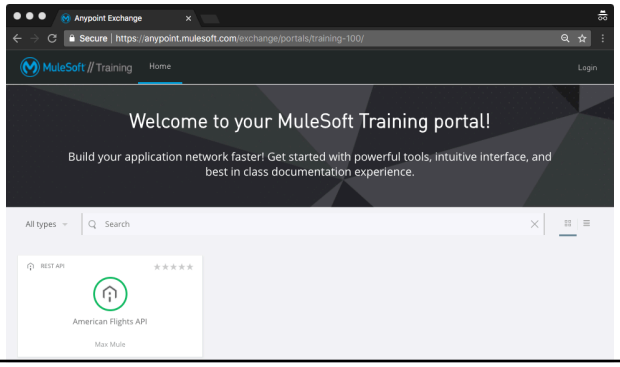


- Share an API within an org through the **private Exchange**
- Share an API with external users in a **public portal** that you create from Exchange



Walkthrough 3-5: Share an API

- Share an API within an organization using the private Exchange
- Create a public API portal
- Customize a public portal
- Explore a public portal as an external developer



Summary

Summary

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- **RAML** is a non-proprietary, standards-based API description language spec that is simple, succinct, and intuitive to use
  - Data structure hierarchy is specified by indentation, not markup characters
- Use **API designer** to write API specifications with RAML
- Documentation is auto-generated from a RAML file and displayed in an **API console**
- A **mocking service** can be used in API console to test an API and return the example data specified in RAML

Summary

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- Make an **API discoverable** by adding it to your **private Exchange**
- **API portals** are automatically created for the APIs with
  - Auto-generated **API documentation**
  - An **API console** that provides a way to consume and test an API
  - An **automatically generated API endpoint** that uses a **mocking service** to allow the API to be tested without having to implement it
- API portals can be shared with both internal and external users
  - Selectively share APIs in your org's **private Exchange** with other internal developers
  - Share APIs with external developers by creating and customizing a **public portal** from Exchange and specifying what APIs you would like to include in it

RAML resources

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- RAML definitions can be a lot more complex and sophisticated then what we built here
- Training: training.mulesoft.com
  - *Anypoint Platform: API Design* (2 days)

- Website: raml.org
  - Documentation
  - Tutorials
  - Full spec
  - Resources