# MuleSoft Certified Developer – Integration and API Associate (Mule 3) Certification Exam

## Summary

A *MuleSoft Certified Developer – Integration and API Associate (Mule 3)* should be able to successfully work on basic Mule 3 projects with guidance and supervision. The *MCD – Integration and API Associate (Mule 3)* exam validates that a developer has the required knowledge and skills to design, build, test and debug, deploy, and manage basic APIs and integrations: moving from Anypoint Platform to Anypoint Studio and back. S/he should be able to:

- Use MuleSoft-hosted Anypoint Platform to take a basic API through all the steps of its lifecycle: design, build, deploy, manage, and govern.
- Use Anypoint Studio to build, test, and debug basic integrations and API implementations.
- Connect to a range of resources including databases, files, web services, SaaS applications, and JMS queues.
- Perform basic data transformations using DataWeave.
- Control message flow and handle errors.
- Process batch records.

## Format

- Format: Multiple-choice, closed book, proctored online or in a testing center
- Length: 60 questions
- Duration: 120 minutes (2 hours)
- Pass score: 70%
- Language: English

The exam can be taken a maximum of 5 times, with a 24 hour wait between each attempt.

## Cost

The exam can be purchased with one of the following. Each includes a coupon for one free retake.

- $250
- 1 Flexible Training Credit (FTC)
- A voucher obtained by attending the instructor-led *Anypoint Platform Development: Fundamentals (Mule 3)* course

Additional retakes (attempts 3 to 5) are $125 or 0.5 FTC off and do not come with a free retake.

## Validity

The certification expires two years from the date of passing.

## Preparation

The best preparation for the exam is to take the instructor-led *Anypoint Platform Development: Fundamentals (Mule 3)* course and to complete the accompanying Do-It-Yourself (DIY) exercises. **Candidates should be familiar with all of the content in the course and be able to apply the concepts in actual projects.**

The following resources are available to assist in a candidate's preparation:

- **Instructor-led training: Anypoint Platform Development: Fundamentals (Mule 3)**
  - Recommended as the most effective and efficient method of preparation
  - 5-day class
  - Private and public classes available
  - Onsite and online classes available
  - Includes a certification voucher for this exam
- **Self-study training: MuleSoft.U Development Fundamentals (Mule 3)**
  - 30+ hours of video-based training with 60+ exercises to teach you the basics
  - All content available instantly to be completed at any time and pace
  - Supported by the peer-to-peer MuleSoft training forum
  - Does NOT include a voucher for this exam
- **Self-assessment quiz**
  - 5+ multiple-choice questions for each course module
  - Identifies strengths and weaknesses
  - Comparable difficulty to the proctored exam
- **Do-it-yourself exercises**
  - 10+ DIY exercises to get experience with and apply the knowledge gained in class
  - Starting code and solutions provided
  - Can be completed in any order

## Topics

The exam validates that the candidate can perform the following tasks.

*Note: DEV:FUN3 is the acronym for the instructor-led or self-study version of the Anypoint Platform Development: Fundamentals (Mule 3) course. DEV:DIY3 is the acronym for the Development Fundamentals (Mule 3) Self-Assessment Quiz & DIY Exercises materials.*

| **Explaining Application Network Basics** | Resources |
|---|---|
| • Explain MuleSoft's proposal for closing the IT delivery gap<br>• Describe the role and characteristics of the "modern API"<br>• Describe the purpose and roles of a C4E<br>• Define and describe the benefits of API-led connectivity and application networks<br>• Define and correctly use the terms API, API implementation, API interface, API consumer, and API invocation<br>• Describe the basics of the HTTP protocol and characteristics of requests and responses<br>• Describe the capabilities and high-level components of Anypoint Platform for the API lifecycle | • DEV:FUN3 Module 1<br>• DEV:FUN3 Module 2 |
| **Designing and Consuming APIs** | |
| • Describe the lifecycle of the "modern API"<br>• Use RAML to define API resources, nested resources, and methods<br>• Identify when and how to define query parameters vs URI parameters<br>• Use RAML to define API parameters, requests, and responses<br>• Use RAML to define reusable data types and format independent examples<br>• Read a RAML spec and formulate RESTful requests with query parameters and/or headers as appropriate | • DEV:FUN3 Module 3<br>• DEV:DIY3 Exercise 3-1 and 4-1 |
| **Accessing and Modifying Mule Messages** | |
| • Describe the Mule message data structure<br>• Use transformers to set message payloads, message properties, and flow variables<br>• Write MEL expressions to access and modify message payloads, message properties, and flow variables<br>• Enrich Mule messages using the Message Enricher | • DEV:FUN3 Module 6<br>• DEV:DIY3 Exercise 6-1 |

| Structuring Mule Applications | |
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| • Parameterize an application using property placeholders<br>• Define and reuse global configurations in an application<br>• Break an application into multiple flows using private flows, subflows, and the Flow Reference component<br>• Specify what data (payload, message properties, flow variables) is persisted between flows when a Flow Reference is used<br>• Specify what data (payload, message properties, flow variables) is persisted between flows when a Mule message crosses a transport boundary<br>• Specify what data (payload, message properties, flow variables) exists in a flow before and after a call in the middle of a flow to an external resource | • DEV:FUN3 Module 7<br>• DEV:DIY3 Exercise 7-1 and 7-2 |
| **Building API Implementation Interfaces** | |
| • Manually create a RESTful interface for a Mule application<br>• Describe the features and benefits of APIkit<br>• Use APIkit to create implementation flows from a RAML file<br>• Describe how requests are routed through flows generated by APIkit | • DEV:FUN3 Module 4<br>• DEV:DIY3 Exercise 4-1 |
| **Routing Messages** | |
| • Use the Choice router to route messages based on conditional logic<br>• Use the Scatter-Gather router to multicast messages<br>• Use Filters to filter Mule messages<br>• Validate data using the Validation module | • DEV:FUN3 Module 10<br>• DEV:DIY3 Exercise 10-1 and 10-2 |
| **Handling Errors** | |
| • Describe the default exception strategy in a Mule application<br>• Define a custom global default exception strategy for an application and identify in what situations it will be used<br>• Define exception strategies for flows<br>• Combine multiple catch exception strategies in a choice exception strategy | • DEV:FUN3 Module 9<br>• DEV:DIY3 Exercise 9-1 and 9-2 |

| Transforming Data with DataWeave | |
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| • Write DataWeave scripts to convert JSON, XML, and Java data structures to different data structures and data types<br>• Use DataWeave operators<br>• Define and use custom data types<br>• Apply correct DataWeave syntax to coerce data types<br>• Apply correct DataWeave syntax to format strings, numbers, and dates<br>• Call Mule flows from a DataWeave script<br>• Call global MEL functions from a DataWeave script | • DEV:FUN3 Module 11<br>• DEV:DIY3 Exercise 11-1 |
| **Using Connectors** | |
| • Retrieve data from a Database using the Database connector<br>• Retrieve data from a REST service using HTTP Request<br>• Use a Web Service Consumer connector to consume SOAP web services<br>• Use the Transform Message component to pass arguments to a SOAP web service<br>• List, read, and write local files using the File connector<br>• List, read, and write remote files using the FTP connector<br>• Use the JMS connector to publish and listen for JMS messages | • DEV:FUN3 Module 4<br>• DEV:FUN3 Module 8<br>• DEV:FUN3 Module 12<br>• DEV:DIY3 Exercise 4-1, 8-1, 12-1, and 12-2 |
| **Processing Records** | |
| • List and compare and contrast the methods for processing individual records in a collection<br>• Explain how Mule messages are processed by the Foreach scope<br>• Use the Foreach scope to process records<br>• Explain how Mule messages are processed in a Batch job<br>• Use a Batch element with Batch Steps, Batch Filters, and a Batch Commit to process records<br>• Use the Poll component to trigger a flow<br>• Describe the features, benefits, and process to use watermarking<br>• Configure watermarks in the Poll scope<br>• Persist data between flow executions using the Object Store | • DEV:FUN3 Module 12<br>• DEV:FUN3 Module 13<br>• DEV:DIY3 Exercise 13-1 |

| Debugging and Troubleshooting Mule Applications | |
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| • Use breakpoints to inspect a Mule message during runtime<br>• Install missing dependencies and drivers to a Mule project<br>• Read and decipher Mule log error messages | • DEV:FUN3 Module 6<br>• DEV:FUN3 all WTs<br>• DEV:DIY3 Exercise 6-1<br>• DEV:DIY3 all exercises |
| **Deploying and Managing APIs and Integrations** | |
| • Package Mule applications for deployment<br>• Deploy applications to CloudHub<br>• Use CloudHub properties to ensure deployment success<br>• Create and deploy API proxies<br>• Connect an API implementation to API Manager using autodiscovery<br>• Use policies, including client ID enforcement, to secure an API<br>• Create SLA tiers and apply SLA based policies | • DEV:FUN3 Module 5<br>• DEV:DIY3 Exercise 5-1 and 5-2<br>• Configuring API Autodiscovery in a Mule 3 Application |

## Delivery methods

The exam is administered via the Kryterion Webassessor testing platform. The exam can be taken in-person at a testing center or online using a web camera.

In-person at a Kryterion Testing Center:

- Over 1000 locations worldwide
- Onsite instructions
- Test-taker guide

Online using the Kryterion Webassessor testing platform:

- Requires a webcam - a laptop webcam can be used, an external camera is not required
- Requires internet connectivity with 1 Mbps upload, 1 Mbps download, jitter <50ms, ping <200ms
- Check internet speed and reliability
    - Note: Some candidates are expelled from the exam for an unstable connection even after checking reliability with the tool. If you think your connection could potentially be unreliable, we **strongly** recommend scheduling your exam at a test center.
- Online instructions
- Test-taker guide

## Registration

To register for the exam:

- Go to https://training.mulesoft.com/webassessor.
- Create a user profile.
- Log in.
- Select Register for an Exam.
- Select the ***MuleSoft Certified Developer – Integration and API Associate (Mule 3.9)*** exam.
- Select either the Online Proctoring Option or the Kryterion Test Center option.
- On the payment screen, select to pay by credit card or enter a voucher/coupon code.

  *Note: A fee applies if an exam is cancelled or rescheduled within 72 hours of its scheduled time, even if the exam was purchased with a voucher.*

## More information

For more information, visit http://help.learn.mulesoft.com.