

Heritage Bookshop Sales Integration using Mulesoft

Author

Faith Ann Baraclan

1. Solution Overview

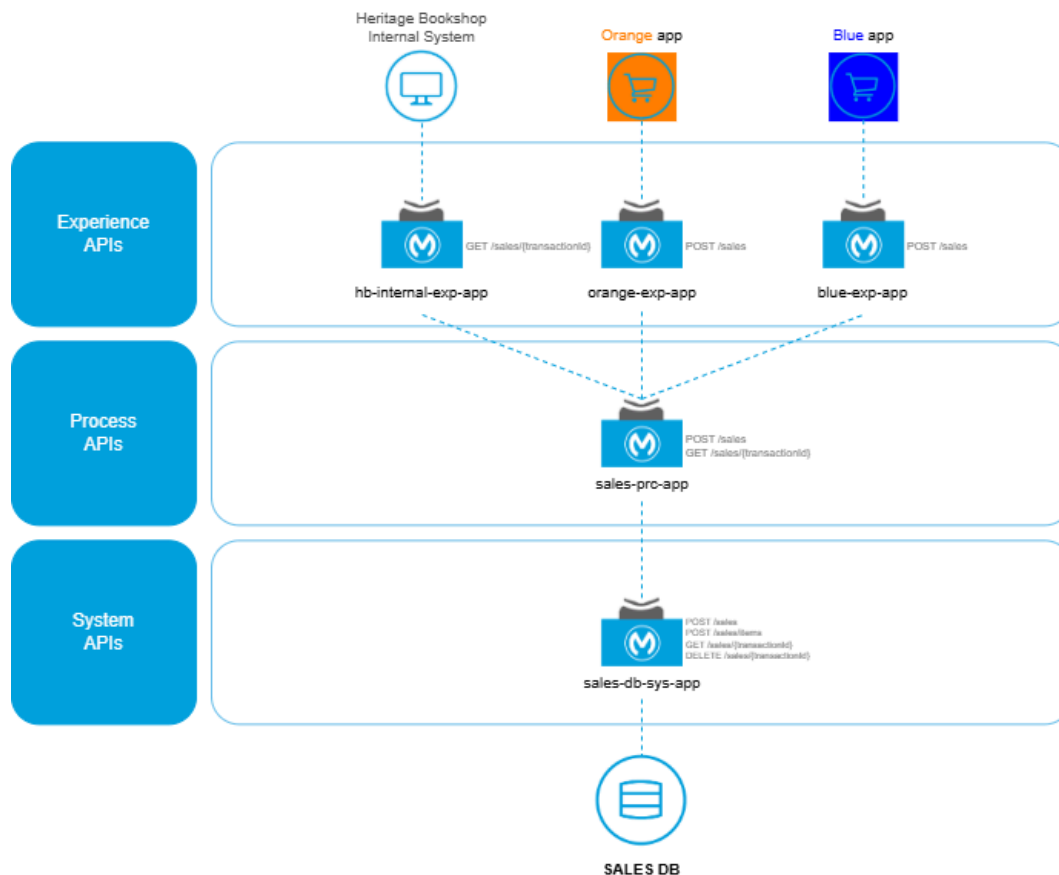
This solution follows Mulesoft's API-Led Connectivity approach, organizing integration logic into three key layers: Experience APIs, Process APIs, and System APIs.

The overall objective is to expose sales-related capabilities from the **Sales Database** to multiple consuming channels, including

- Heritage Bookshop's internal system
- *Orange* app
- *Blue* app

2. Architecture Overview

API-Led Connectivity: Diagram



Created using [draw.io](#)

Experience layer: orange-exp-app, blue-exp-app, hb-internal-exp-app

Process layer: sales-prc-app

System layer: sales-db-sys-app

3. Experience APIs

Experience APIs provide consumer-specific representations of the underlying business data. They tailor the data format, orchestration, and logic to meet the needs of each consuming application.

hb-internal-exp-app

- Consumer: Heritage Bookshop internal system
- Exposes: GET /sales/{transactionId}
- Purpose: Retrieves sales information to support internal business process

orange-exp-app

- Consumer: *Orange* app
- Exposes: POST /sales
- Purpose: Allows *Orange* app to create new sales to Heritage Bookshop's database

blue-exp-app

- Consumer: *Blue* app
- Exposes: GET /sales/{transactionId}
- Purpose: Allows *Blue* app to create new sales to Heritage Bookshop's database

Remarks: Created one experience API for each consumer as each consumer sends different payload formats. By isolating them, in the event of changes for one consumer, the other consumers won't be affected. This follows Mulesoft's API-led best practice wherein Experience APIs must be consumer-specific.

4. Process API

Process APIs centralizes business logic across channels/consumers. It coordinates data flows between the Experience APIs and System APIs.

sales-prc-app

- Exposes:
 - POST /sales
 - GET /sales/{transactionId}
- Responsibilities:
 - Transform experience API payloads into internal or standard data sales structure
 - Validate and route incoming sales data
 - Invoke the system API to interact with the Sales Database

Remarks: This process API ensures consistency across all channels.

5. System API

System APIs provide direct and reusable access to backend systems, i.e. database for this project.

sales-db-sys-app

- Exposes:
 - POST /sales
 - POST /sales/items
 - GET /sales/{transactionId}
 - DELETE /sales/{transactionId}
- Responsibilities:
 - Perform CRUD operations against the **Sales Database**
 - POST /sales - insert new sales transactions into *sales Table*
 - POST /sales/items - insert new sales transactions into *sales_items Table*
 - GET /sales/{transactionId} - retrieves a single sales detail from the **Sales Database**
 - DELETE /sales/{transactionId} - deletes a transaction from the *sales Table*

Remarks: This layer ensures security, reusability, and controlled access to backend systems.

6. Database

6.1 Sales Database Overview

The **Sales Database** serves as the system of record for all sales-related information in the Heritage Bookshop ecosystem.

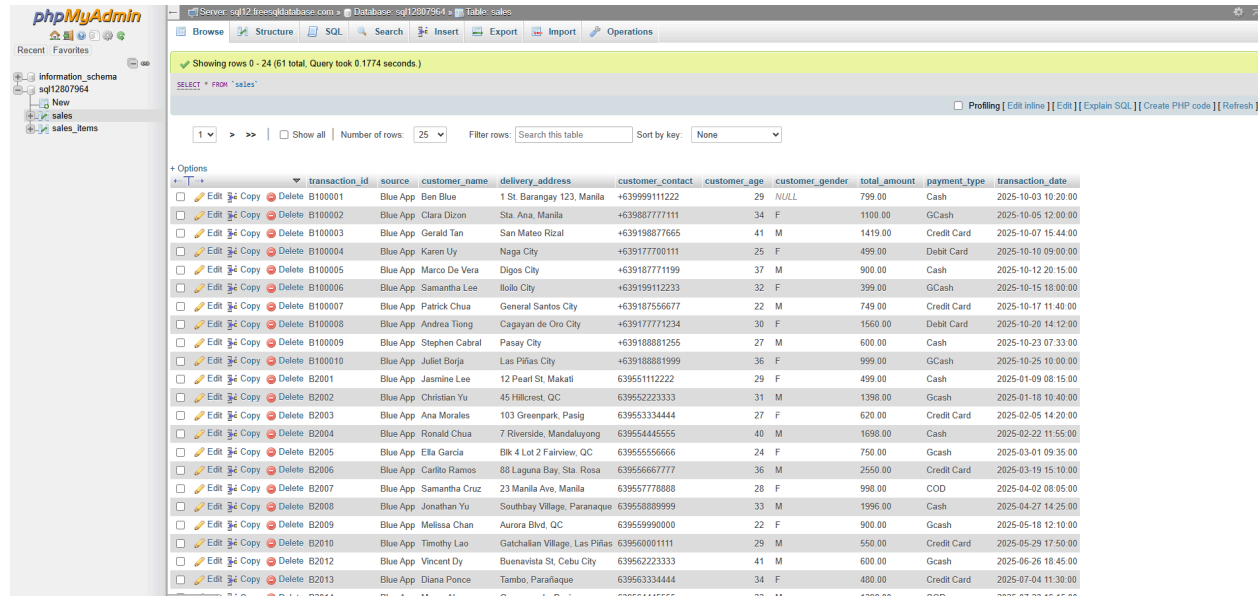
As per requirements, there are 2 tables created:

- Sales Table
- Sales Items Table

6.2 Setup

- Created a free database account here: <https://www.freesqldatabase.com/>
- Created the tables directly in the database using the provided SQL for table creation

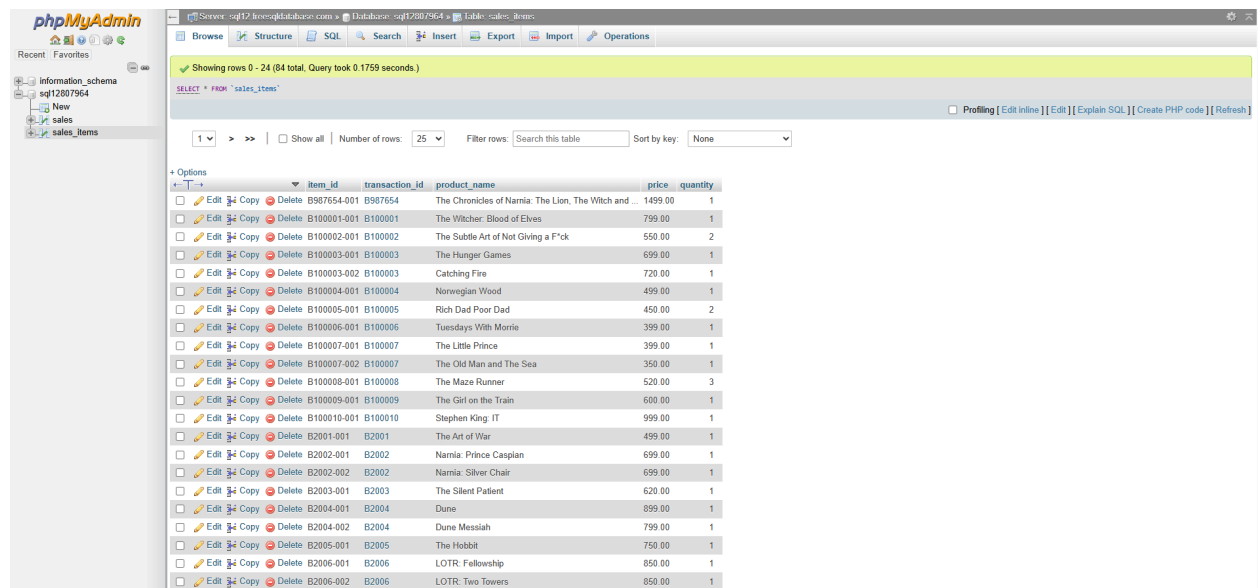
6.3 Sales Table



The screenshot shows the phpMyAdmin interface for the 'sales' table. The table has 10 columns: transaction_id, source, customer_name, delivery_address, customer_contact, customer_age, customer_gender, total_amount, payment_type, and transaction_date. The data is displayed in a table with 24 rows. The first 10 rows are for transactions B100001 to B100010, and the next 14 rows are for transactions B2001 to B20014.

transaction_id	source	customer_name	delivery_address	customer_contact	customer_age	customer_gender	total_amount	payment_type	transaction_date
B100001	Blue App	Ben Blue	1 St. Barangay 123, Manila	+639999111222	29	NULL	799.00	Cash	2025-10-03 10:20:00
B100002	Blue App	Clara Dizon	Sta. Ana, Manila	+639887777111	34	F	1100.00	GCash	2025-10-05 12:00:00
B100003	Blue App	Gerald Tan	San Mateo Rizal	+639198877665	41	M	1419.00	Credit Card	2025-10-07 15:44:00
B100004	Blue App	Karen Uy	Naga City	+639177700111	25	F	499.00	Debit Card	2025-10-10 09:00:00
B100005	Blue App	Marco De Vera	Digos City	+639187771199	37	M	900.00	Cash	2025-10-12 20:15:00
B100006	Blue App	Samantha Lee	Iloilo City	+639199112233	32	F	399.00	GCash	2025-10-15 18:00:00
B100007	Blue App	Patrick Chua	General Santos City	+639187556677	22	M	749.00	Credit Card	2025-10-17 11:40:00
B100008	Blue App	Andrea Tiong	Cagayan de Oro City	+639177771234	30	F	1560.00	Debit Card	2025-10-20 14:12:00
B100009	Blue App	Stephen Cabral	Pasay City	+639188881255	27	M	600.00	Cash	2025-10-23 07:33:00
B100010	Blue App	Juliet Boyja	Las Piñas City	+639188881999	36	F	999.00	GCash	2025-10-25 10:00:00
B2001	Blue App	Jasmine Lee	12 Pearl St, Makati	639551112222	29	F	499.00	Cash	2025-01-09 08:15:00
B2002	Blue App	Christian Yu	45 Hillcrest, QC	639552223333	31	M	1398.00	Gcash	2025-01-18 10:40:00
B2003	Blue App	Ana Morales	103 Greenpark, Pasig	639553334444	27	F	620.00	Credit Card	2025-02-05 12:00:00
B2004	Blue App	Ronald Chua	7 Riverside, Mandaluyong	639554445555	40	M	1698.00	Cash	2025-02-22 11:55:00
B2005	Blue App	Ella Garcia	Blk 4 Lot 2 Fairview, QC	639555556666	24	F	750.00	Gcash	2025-03-01 09:35:00
B2006	Blue App	Carillo Ramos	88 Laguna Bay, Sta. Rosa	639556667777	36	M	2550.00	Credit Card	2025-03-19 15:10:00
B2007	Blue App	Samantha Cruz	23 Manila Ave, Manila	639567778888	28	F	998.00	COD	2025-04-02 08:05:00
B2008	Blue App	Jonathan Yu	Southbay Village, Paranaque	639558889999	33	M	1996.00	Cash	2025-04-27 14:25:00
B2009	Blue App	Melissa Chan	Aurora Blvd, QC	639559990000	22	F	900.00	Gcash	2025-05-18 12:10:00
B2010	Blue App	Timothy Lao	Gatchalian Village, Las Piñas	639560001111	29	M	550.00	Credit Card	2025-05-29 17:50:00
B2012	Blue App	Vincent Dy	Buenavista St, Cebu City	639562223333	41	M	600.00	Gcash	2025-06-26 18:45:00
B2013	Blue App	Diana Ponce	Tambo, Parañaque	639563334444	34	F	480.00	Credit Card	2025-07-04 11:30:00
B2014	Blue App	Marco Alonzo	Greenwoods, Pasig	639564445555	23	M	1398.00	COD	2025-07-23 16:15:00

6.4 Sales Items Table



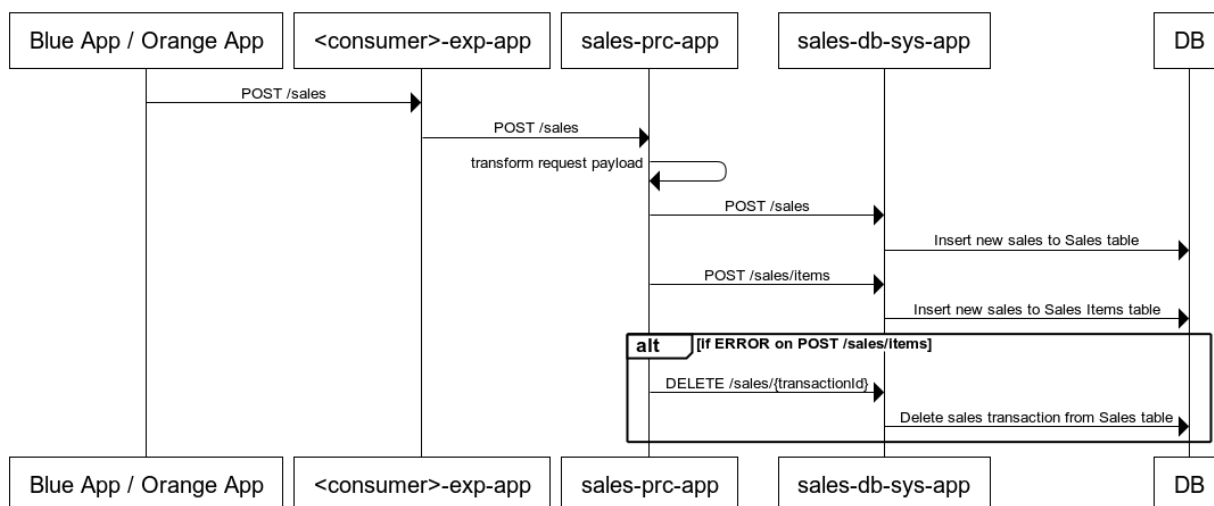
The screenshot shows the phpMyAdmin interface for the 'sales_items' table. The table has 5 columns: item_id, transaction_id, product_name, price, and quantity. The data is displayed in a table with 24 rows. The first 10 rows are for transactions B987654-001 to B100003-001, and the next 14 rows are for transactions B100003-002 to B2006-002.

item_id	transaction_id	product_name	price	quantity
B987654-001	B987654	The Chronicles of Narnia: The Lion, The Witch and ...	1499.00	1
B100001-001	B100001	The Witcher: Blood of Elves	799.00	1
B100002-001	B100002	The Subtle Art of Not Giving a F*ck	550.00	2
B100003-001	B100003	The Hunger Games	699.00	1
B100003-002	B100003	Catching Fire	720.00	1
B100004-001	B100004	Norwegian Wood	499.00	1
B100005-001	B100005	Rich Dad Poor Dad	450.00	2
B100006-001	B100006	Tuesdays With Morrie	399.00	1
B100007-001	B100007	The Little Prince	399.00	1
B100007-002	B100007	The Old Man and The Sea	350.00	1
B100008-001	B100008	The Maze Runner	520.00	3
B100009-001	B100009	The Girl on the Train	600.00	1
B100010-001	B100010	Stephen King: IT	999.00	1
B2001-001	B2001	The Art of War	499.00	1
B2002-001	B2002	Narnia: Prince Caspian	699.00	1
B2002-002	B2002	Narnia: Silver Chair	699.00	1
B2003-001	B2003	The Silent Patient	620.00	1
B2004-001	B2004	Dune	899.00	1
B2004-002	B2004	Dune Messiah	799.00	1
B2005-001	B2005	The Hobbit	750.00	1
B2006-001	B2006	LOTR: Fellowship	850.00	1
B2006-002	B2006	LOTR: Two Towers	850.00	1

7. Sequence Diagrams

7.1 Create New Sales

Heritage Bookshop Create New Sales



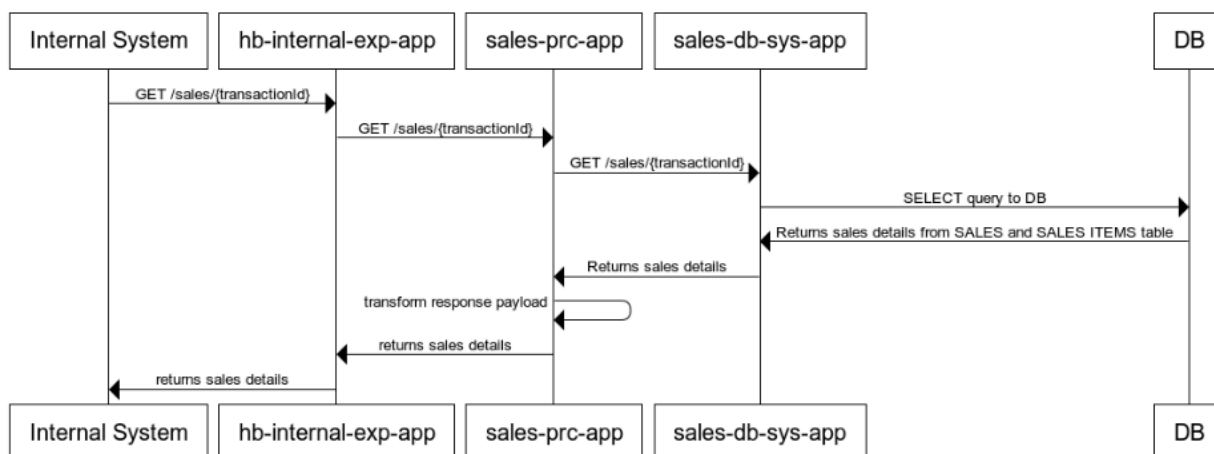
www.websequencediagrams.com

Remarks: Due to time constraints, DELETE operation has been implemented as a short-term solution to prevent “orphan” sales and maintain database consistency.

In the current setup, the Sales record and Sales items record are inserted through separate operations. If the step on inserting sales items fails, the system would create partial or inconsistent data. Since we do not have yet failed-state handling mechanism, DELETE provides a simple and reliable way to clean up incomplete transactions and ensure the database remains consistent.

7.2 Retrieve Sales Details

Heritage Bookshop Retrieve Sales by Transaction ID



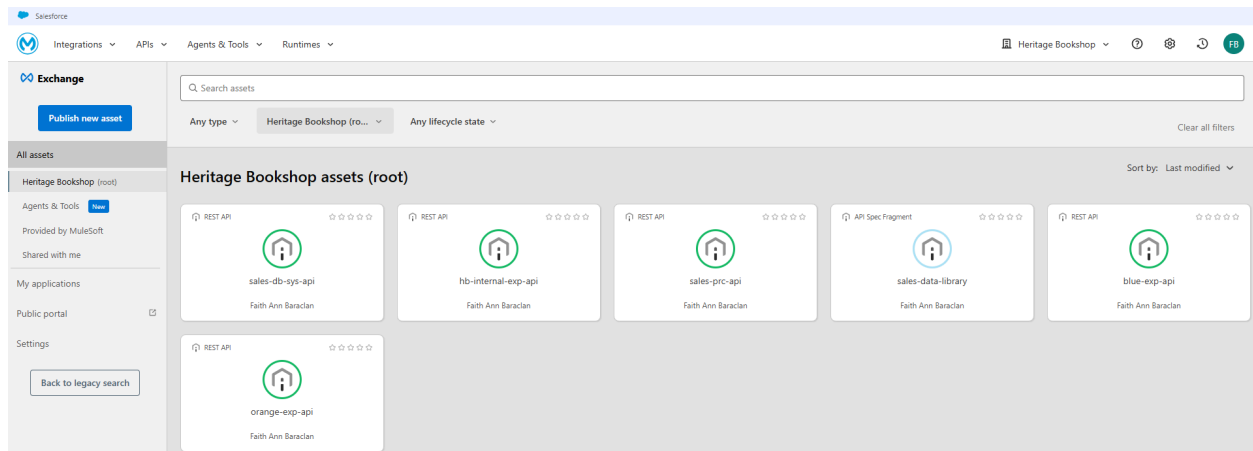
www.websequencediagrams.com

Remarks: This retrieves sales details from both Sales table and Sales Items table returning a single sales details from the database based on the transaction ID.

8. Anypoint Platform

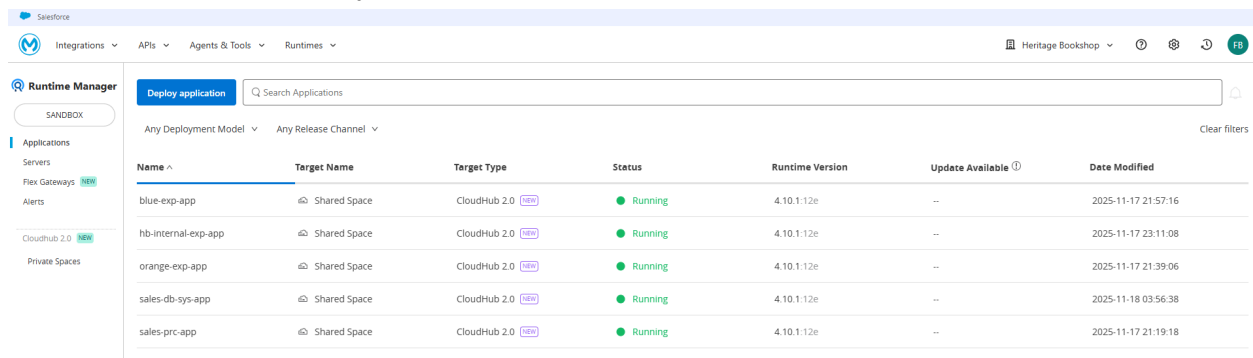
8.1 Anypoint Exchange

Below are the assets published to Anypoint Exchange.



8.2 Runtime Manager

All Mulesoft APIs are deployed in Cloudhub 2.0 with Runtime version 4.10.



sales-db-sys-app - env: SANDBOX

Runtime Manager

SANDBOX

← Applications

Dashboard

Diagnostics NEW

Logs

Object Store

Schedules

Settings

sales-db-sys-app

Stop

Application status: Running

Configuration: ef02a2

Last updated: 2025-11-18 3:56:38AM

Replicas: 1 / 1 started

Public Endpoint: <https://sales-db-sys-app-yac0e5scfy6-2.usa-e2.cloudhub.io>

Target name: Cloudhub-US-East-2

Target type: Shared Space

Configuration ef02a2

Applying changes will create a new configuration for your application

Apply Changes

Application File

sales-db-sys-app.jar

Choose file

Version 1.0.8

Deployment Target

Ingress

Properties

Monitoring

Firewall Rules

Runtime version

Release Channel NEW

Edge

This channel releases a new minor version every four months. It has the latest features and shorter support windows. [Learn more](#)

Runtime Version

4.10.1:12e

Mule Runtime uses semantic versioning. Each version ends with a build number. Versions in the Edge channel are indicated with "e" at the end. [Learn more](#)

Java Version NEW

Using Java 17 may require a different application resource profile. [Learn more](#)

Java 8

Java 17

Runtime properties

Runtime Manager

SANDBOX

← Applications

Dashboard

Diagnostics NEW

Logs

Object Store

Schedules

Settings

sales-db-sys-app

Stop

Application status: Running

Configuration: ef02a2

Last updated: 2025-11-18 3:56:38AM

Replicas: 1 / 1 started

Public Endpoint: <https://sales-db-sys-app-yac0e5scfy6-2.usa-e2.cloudhub.io>

Target name: Cloudhub-US-East-2

Target type: Shared Space

Configuration ef02a2

Applying changes will create a new configuration for your application

Apply Changes

Application File

sales-db-sys-app.jar

Choose file

Version 1.0.8

Deployment Target

Ingress

Properties

Monitoring

Firewall Rules

Table view

Text view

Use properties to change the way your app behaves. [Learn more](#)

anypoint.platform.client.id	c5d5cfc11f44e52a69592c98c5bb94	Protect	...
anypoint.platform.client.secret	47f1417190f348d68a1f202be2cdE68A	Protect	...
env	SANDBOX	Protect	...
key	unprotected value		...

sales-prc-app - env: SANDBOX

Runtime Manager

SANDBOX

← Applications

Dashboard

Diagnostics NEW

Logs

Object Store

Schedules

Settings

sales-prc-app

Stop

Application status: Running

Configuration: e0b179

Last updated: 2025-11-19 1:15:48AM

Replicas: 1 / 1 started

Public Endpoint: <https://sales-prc-app-yacb0e5sc6y6-3.usa-e2.cloudhub.io>

Target name: Cloudhub-US-East-2

Target type: Shared Space

Configuration e0b179

Applying changes will create a new configuration for your application

Apply Changes

Application File

sales-prc-app.jar

Choose file

Version 1.0.6

Deployment Target

Ingress

Properties

Monitoring

Firewall Rules

Table view

Text view

Use properties to change the way your app behaves. [Learn more](#)

anypoint.platform.client_id

c5d5cf6c11f44e52a69592c98cc5bb94

Protect

anypoint.platform.client_secret

47f1417190f348d68A1F202be2cdE68A

Protect

env

SANDBOX

Protect

key

protected value

8.3 API Manager

For demonstration purposes, **sales-db-sys-app** & **sales-prc-app** has API instances, and only **sales-db-sys-app** has policy applied, that is, Client ID Enforcement policy.

API Manager

Sandbox

API Instances

Agent and Tool Instances

API Groups

Automated Policies

Client Applications

You have 3 notifications that need action:

New Flex Gateway capability:
Protect your MCP and Agent servers for secure Agent-to-API and Agent-to-Agent communications.

Effective October 7, 2025, Mule Runtime 4.10 Edge and later will no longer support TLS 1.0 and 1.1. Update all API dependencies to TLS 1.2 or 1.3 before upgrading.

Effective October 31, 2025, Flex Gateway 1.11 and later will no longer support TLS 1.0 and 1.1. Update all API dependencies to TLS 1.2 or 1.3 before upgrading.

Add

Environment

Status: Select

Endpoint type: Select

Search by name, version or label

1 to 2 of 2

⌕ ⏪ ⏩ ⌕

Name	Runtime	Label	Version	Instance	Endpoint Type	Error Rate	Total Requests	Client Applications	Creation Date	Actions
sales-prc-api	Mule 4	-	v1	2060851	raml	24%	79	0	11-19-2025 00:32	
sales-db-sys-api	Mule 4	-	v1	20605700	raml	15%	147	1	11-16-2025 22:38	

sales-db-sys-app - env: SANDBOX

API Instances / sales-db-sys-api

Actions

Type	Asset Version	Implementation URI ⓘ	API Label ⓘ	API Version	✎
RAML/OAS	1.0.3 (Latest)	N/A	-	v1	
API Status	Consumer Endpoint	API Instance ID ⓘ	Mule Version	Java Version ⓘ	
● Active	N/A	20605700	4.10.1	17	
Instance Conformance ⓘ					
Not Validated					
Tags					
Add New Tag +					

Key Metrics

ⓘ If Key Metrics charts are not rendered correctly, make sure that Anypoint Monitoring is enabled. For more information, refer to this article: [Key Metrics charts in API Manager](#)

View more metrics in Anypoint Monitoring dashboard

🔄 Last 24 hours ▾

API Instances / sales-db-sys-api / Policies

Apply policies to manage security, control traffic, and improve adaptability. [Learn more about policies.](#)

Automated policies ⓘ

🚫 No automated policies applied

Instance policies ⓘ

+ Add policy

Client ID Enforcement
Methods: All API methods Resource: All API resources

COMPLIANCE

API Instances / sales-db-sys-api / Contracts

Any Status ▾ 🔍 Search by application name

Api instance contracts (1) Group contracts (0)

🔄 1 to 1 of 1 ▾ ⏪ ⏩ ⏴ ⏵

Application	Current SLA Tier	Requested SLA Tier	Status	Actions
internal-sales-prc-app	-	-	● Approved	Revoke
Owners: Faith Ann Baradan fbaradan@gmail.com				
Client ID: c6c3d17209a047cbfced938a83888c7			Submitted: 2 hours ago	Approved: 2 hours ago
URL: -			Rejected: -	Revoked: -
Redirect URIs: -				

sales-prc-app - env: SANDBOX

The screenshot shows the 'API Manager' console for the 'sales-prc-api' instance. The left sidebar contains navigation links: API Manager, Sandbox, API Instances, API Summary, Contracts, Policies, SLA Tiers, Settings, and Governance Report. The main content area displays the instance details for 'sales-prc-api'.

Type	Asset Version	Implementation URI	API Label	API Version
RAML/OAS	1.0.4 (Latest)	N/A	-	v1

API Status	Consumer Endpoint	API Instance ID	Mule Version	Java Version
Active	N/A	20608851	4.10.1	17

Instance Conformance: Not Validated

Tags: Add New Tag +

Key Metrics section includes a note: 'If Key Metrics charts are not rendered correctly, make sure that Anypoint Monitoring is enabled. For more information, refer to this article: [Key Metrics charts in API Manager](#)'. A link to 'View more metrics in Anypoint Monitoring dashboard' is also present, along with a refresh button and a 'Last 24 hours' filter.

8.24 Design Center

API specifications are created in the Design Center, and then published to Anypoint Exchange.

The screenshot shows the 'Design Center' console. The left sidebar has links for Design Center, API Projects, and Shared with me. The main content area displays a table of API Projects.

Name	Project Type	Updated	Owner
sales-db-sys-api	API specification	November 17th, 2025	hb-fbaraclan
orange-exp-api	API specification	November 17th, 2025	hb-fbaraclan
hb-internal-exp-api	API specification	November 17th, 2025	hb-fbaraclan
sales-prc-api	API specification	November 17th, 2025	hb-fbaraclan
sales-data-library	API fragment	November 17th, 2025	hb-fbaraclan
blue-exp-api	API specification	November 16th, 2025	hb-fbaraclan

The right sidebar shows a 'Details' panel with the text 'Select a project to see details'.

9. Secure Properties Generator

Used secure properties generator to encrypt/decrypt passwords and client credentials.

Link: <https://secure-properties-api.us-e1.cloudhub.io/>

Secure Properties Generator

Use this tool to generate MuleSoft secure configuration properties for your application. The tool currently only supports *.yaml files.
For more details, click [here](#).

String

Operation

Encrypt

Algorithm

AES (default)

State

CBC (default)

☐ Use random IVs

Key

heritage12345678

Value

ptRZCVHZ3P

Generate

Result

x1TF6s1pJG9FF4C1UrzKIA==

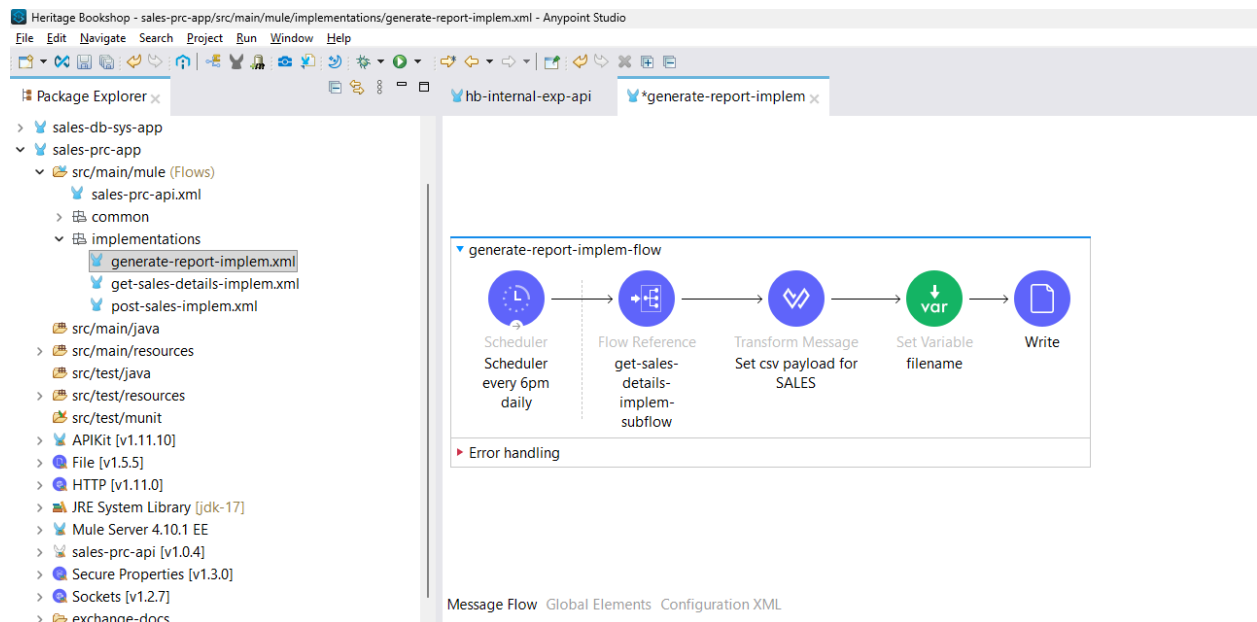
© 2023 MuleSoft

10. End-to-End Flow Summary

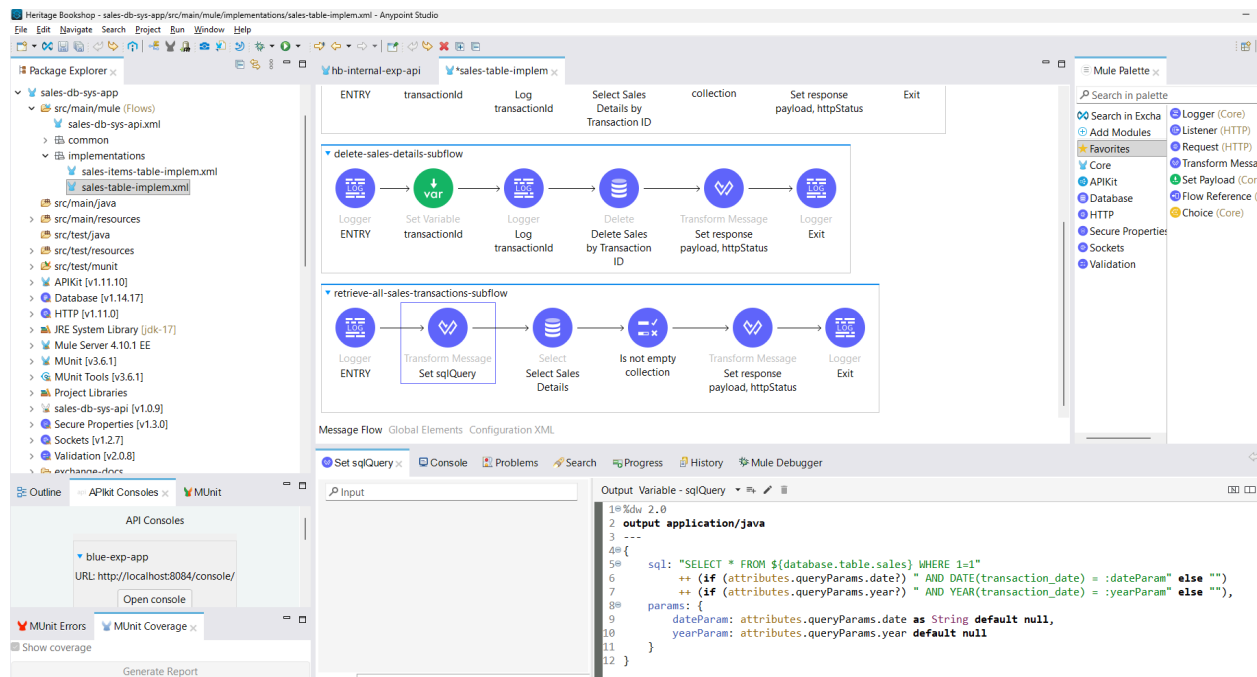
1. A client application (**Orange** app, **Blue** app, or internal system) submits a request to its dedicated **Experience API**.
2. The Experience API validates request format and calls the **sales-pro-app**.
3. The Process API handles business logic, applies transformations, and calls the **sales-db-sys-app**.
4. The System API interacts with the **Sales DB**, returns the result, and propagates it back up through the Process and Experience layers to the client.

11. Data Pipeline

A data pipeline is a series of processes that moves raw data to a destination. The most common or the one I'm familiar with is the ETL (Extract, Transform, Load) model. While I haven't fully deployed a complete solution yet, I have created a flow using Mulesoft that extracts data from the database and writes it as a CSV file to a designated directory.



This flow is designed to run on a scheduler, for example every day at 6PM, to generate daily sales reports from the **Sales** table in Sales Database.

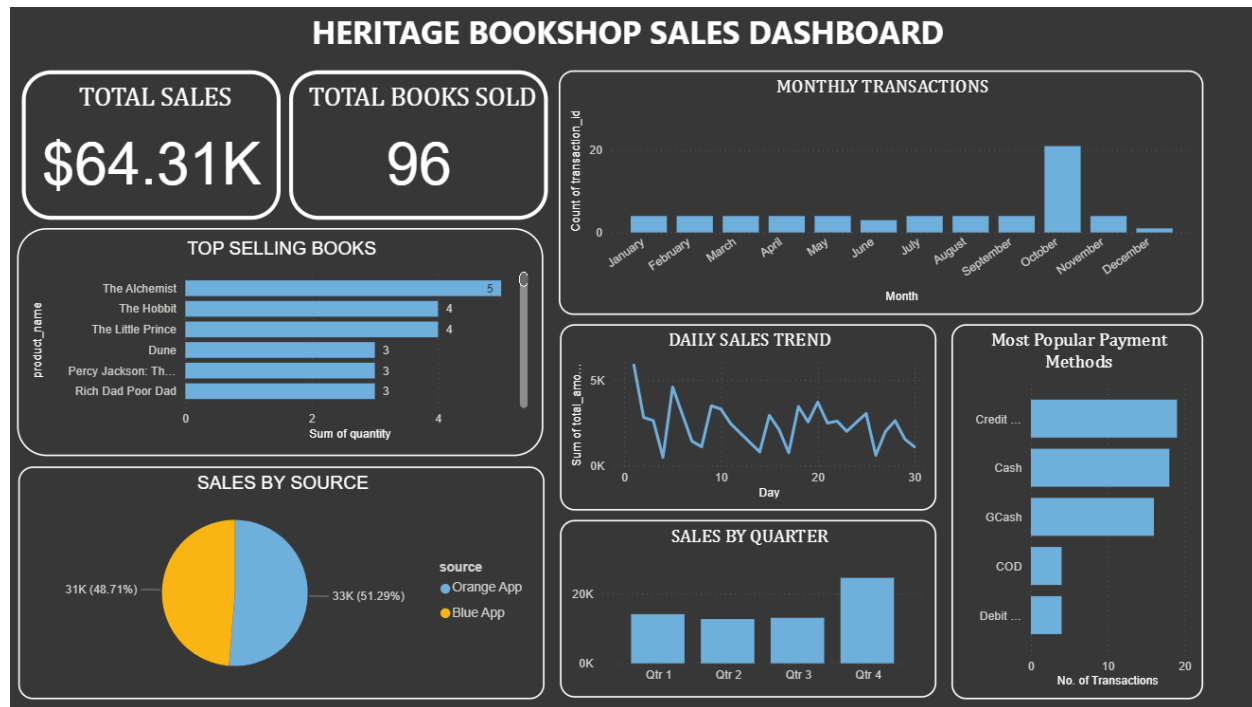


Additionally, I have implemented a partial flow in the sales-db-sys-app to retrieve sales transactions using query parameters such as **date** or **year**. For instance, calling the endpoint `/api/sales?date=2025-11-02`, it is expected to return all sales transactions for that specific date (or year).

Based on my research, there are other different tools available to build data pipelines. I may not be familiar with all of them, but I believe Mulesoft can fulfill the requirements of a data pipeline as per its standard definition.

Currently, no CSV files have been generated, as this is only a partial implementation.

12. Reports



Remarks: The data used for this dashboard comes from the extract of **Sales** table and **Sales items** table of the Sales database. The data was manually exported from the database server.

This dashboard has been created using Power BI. This is my first time working with Power BI, and I was able to use it to visualize sales data and generate insights for reporting. My background in Mathematics has helped me approach the data logically and create visualizations. Given more time to explore the tool, I hope to further enhance the dashboard and utilize other features.

13. Role of AI in the Solution

Artificial intelligence (or AI) played a supporting role in the development of this integration solution and its documentation. AI did not generate or implement the technical system itself;

rather it provided descriptive support to refine communication and structuring the documentation. Specifically, AI support was used in the following areas:

- Documentation Generation
 - assisted in creating documentation from scratch by providing documentation template with heading and subheadings
 - generated clear and professional descriptions
 - Standardized responsibilities of endpoints
- Testing
 - Generated sample payloads used for testing

Future Enhancements

If given the luxury of time, the following enhancements can be done but not limited to:

- Anypoint Exchange Documentation for all API specs created
- Proper logging on all the APIs, masking personally identifiable information (PII) - preferably with JSON logger
- Munit for ALL APIs
- Additional security for the APIs by applying additional policies