Requirements

Kyma(*kee-ma*) is a platform to develop and deploy applications with serverless functions and microservices. We use SAP BTP, Kyma Runtime, to extend DME Next Number generation functionality by implementing In-App Extensions.

This document guides through the steps needed to execute to implement a serverless function in SAP BTP, Kyma Runtime to extend standard batch number generation DME functionality based on requirements:

- Periodic resetting of batch number ranges based on configuration rules defined in Environment Variables - Yearly, Monthly, Daily, and Never
- Define replaceable parameters for next number Pattern in Environment Variables.
- MongoDB usage in SAP BTP, Kyma Runtime development to store the sequence number
- Usage of extension parameters passed from DME next numbering micro-service business logic to extension service

The Kyma serverless function should have flexible behavior that can be configured at runtime without massive re-implementations; for this purpose, the environment variables described below were added. They can be considered as "runtime configuration rules".

1. PATTERN environment variable - defines custom numbering pattern, it should support the following replaceable parameters:

- PLANT - current plant where batch number generation was triggered
- DD - two-digit numeric representation for the Day (from 01 to 31)
- MM - two-digit numeric representation for the Month (from 01 to 12)
- YYYY - four-digit representation for the current Year
- YY - the last two digits of the current year
- LL - work center name
- NNNNN generated sequence in base-10 (decimal) or base-16 (hexadecimal) format. The generated sequence should be completed with leading zeros to have five numbers in total. For example, 5 will be converted to 00005.

The default pattern value is PLANTYYYYDDMMLLNNNNN.

It can be a combination of replaceable parameters in any order, for example, MMLLYYYYNNNNN, PLANTDDMMYYYYYNNNNN. Or even can include literal string, for example, SAP-YYNNNNN.

2. NUMBER_BASE environment variable is a number base for generated sequence.

Should support the base-10 or base-16 number system. Default is base-10 format for the sequence number.

Supported values: 10 and 16.

3. RESET_MODE environment variable - controls when sequence value can be reset back to initial value based on reset mode settings - Yearly, Monthly, Daily, and Never

Default value – Never.

Supported values: NONE, DAY, MONTH, YEAR

Warning: when using reset mode DAY, MONTH, YEAR, ensure appropriate replaceable parameters are included to avoid duplicates.

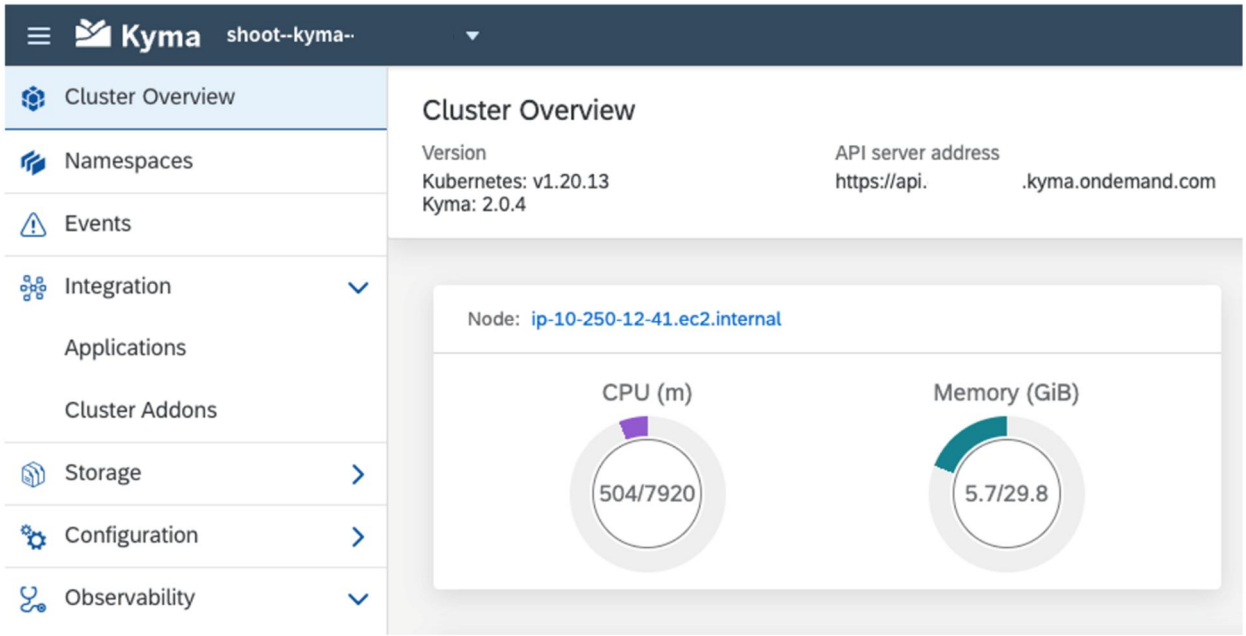
Prerequisites

If you want to follow the steps and deploy the project by yourself, you have to do some preparations:

1. SAP BTP, Kyma runtime environment should be enabled.

   Follow the steps from this tutorial: https://developers.sap.com/tutorials/cp-kyma-getting-started.html

2. Verify that you can access the Kyma Runtime console to manage deployments, traceability, scalability, etc.



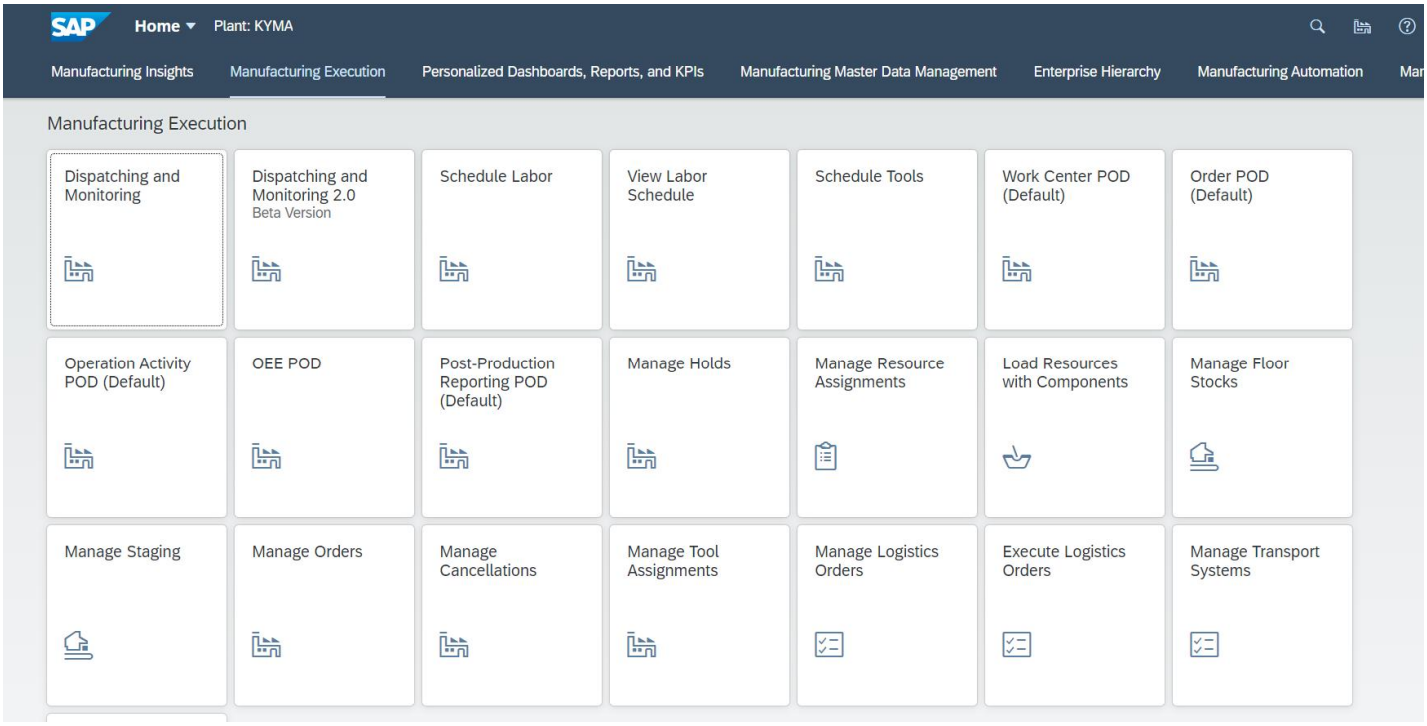
3. Install the Kubernetes Command Line Tool, which allows access to the SAP BTP, Kyma runtime via the command line.

   Follow the steps from this tutorial: https://developers.sap.com/tutorials/cp-kyma-download-cli.html

4. Create a Kyma service account

   Follow the steps from this tutorial: https://developers.sap.com/tutorials/kyma-create-service-account.html

5. Request access to DME and applications, such as:
   - Manage Service Registry
   - Manage Next Number
   - Order POD



6. Clone the Git repository

In your browser, go to https://github.com/SAP-samples/digital-manufacturing-extension-samples.

Choose the Code button and choose one of the options to download the code locally or simply run the following command within your CLI at your desired folder location:

git clone https://github.com/SAP-samples/digital-manufacturing-extension-samples

7. Open the DMC_NextNumber_InAppExtensions/batch-nn-mongo-db directory in your desired editor, it contains two folders: documentation for technical tutorials and code_solution for the implementation part.

Installation Steps

1. Test the kubectl command-line tool to make sure it is installed correctly by running the following command in your CLI: kubectl version --client

   This should return a list of version properties, for example:

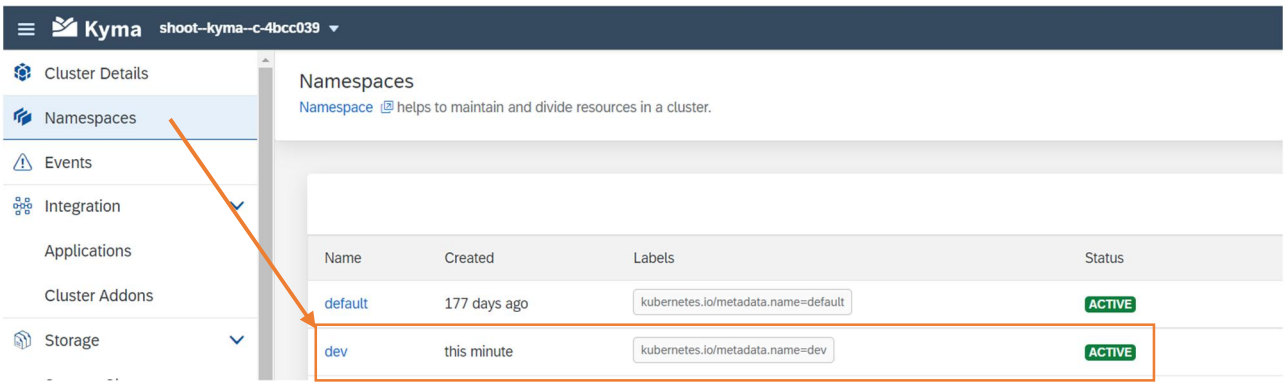
   Client Version: version.Info{Major:"1", Minor:"22", GitVersion:"v1.22.1", GitCommit:"632ed300f2c34f6d6d15ca4cef3d3c7073412212", GitTreeState:"clean", BuildDate:"2021-08-19T15:45:37Z", GoVersion:"go1.16.7", Compiler:"gc", Platform:"windows/amd64"}

2. Run the following commands from the DMC_NextNumber_InAppExtensions/batch-nn-mongo-db/code_solution directory using CLI.

   · Create the dev Namespace if it doesn't already exist: kubectl create namespace dev

   The command should return: namespace/dev created

   Verify that Namespace was created in Kyma Runtime Console UI



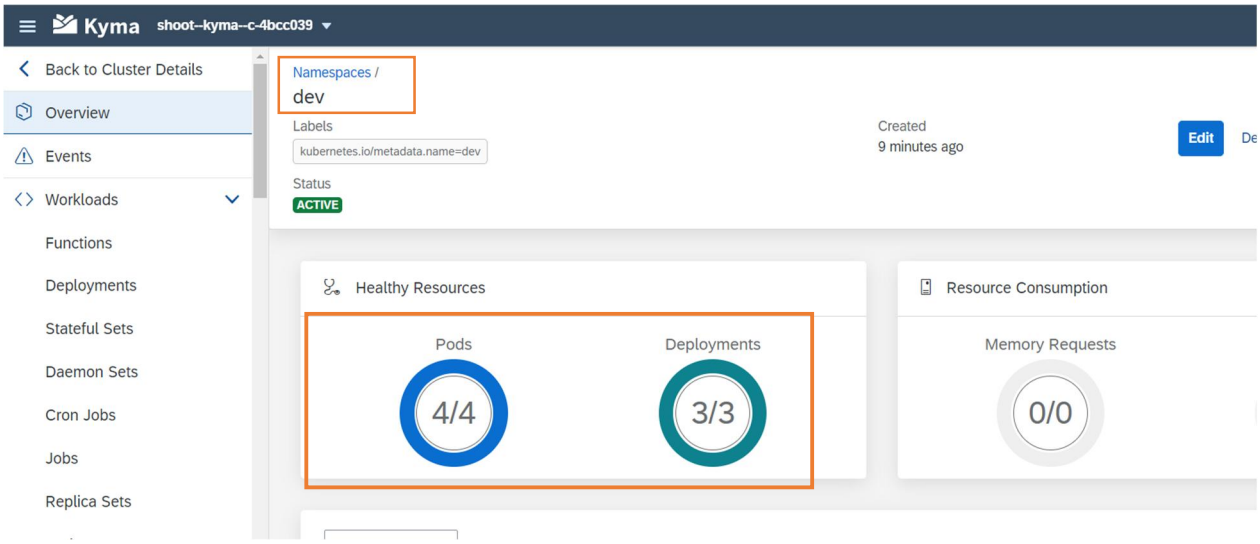
   · Deploy MongoDB and nn-seqgen function to dev Namespace: kubectl apply -f . -n dev

   The command should return:

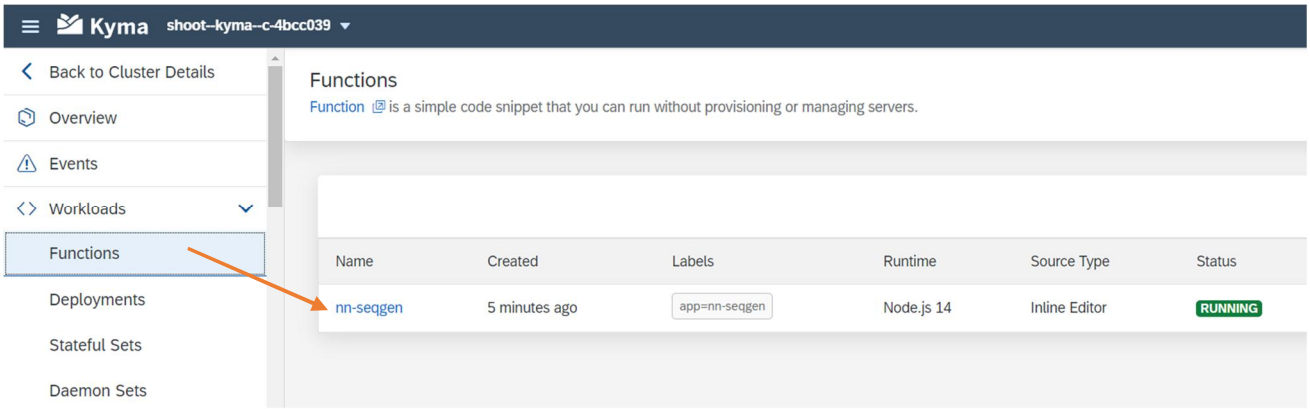
   deployment.apps/mongo-client created
   deployment.apps/mongo created
   service/mongo-nodeport-svc created
   persistentvolumeclaim/mongo-data created
   secret/mongo-creds created
   secret/nn-seqgen-user-creds created
   apirule.gateway.kyma-project.io/nn-seqgen-api created
   configmap/nn-seqgen created
   function.serverless.kyma-project.io/nn-seqgen created

Wait few minutes, so all deployments are finalized inside Kyma!

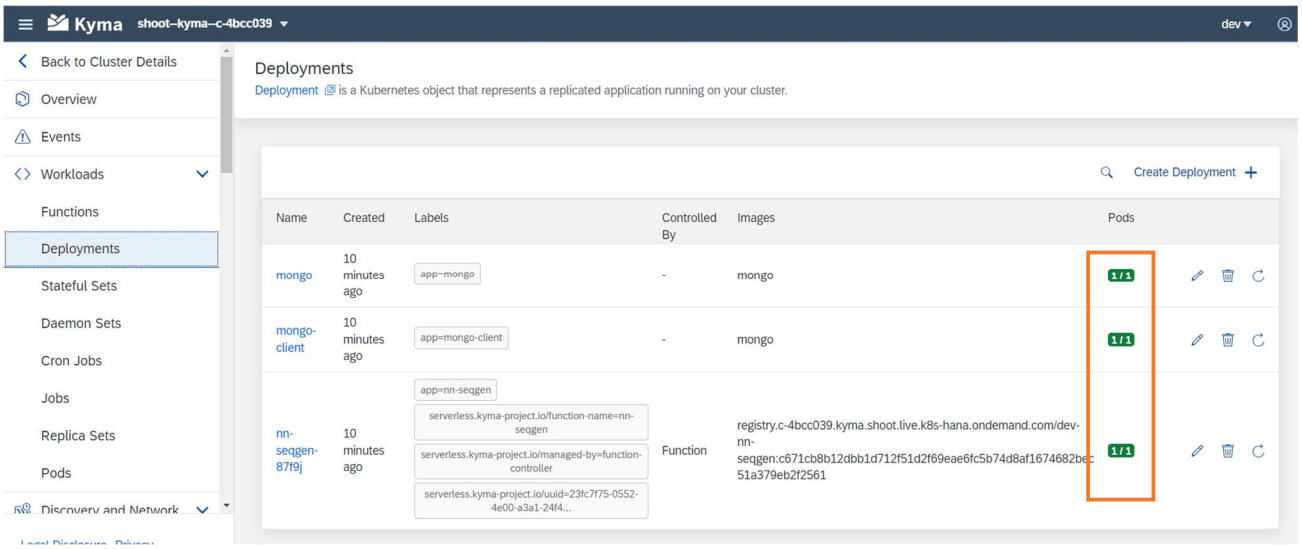
Verify deployments were successful in Kyma Console UI, navigate to “dev” Namespace.



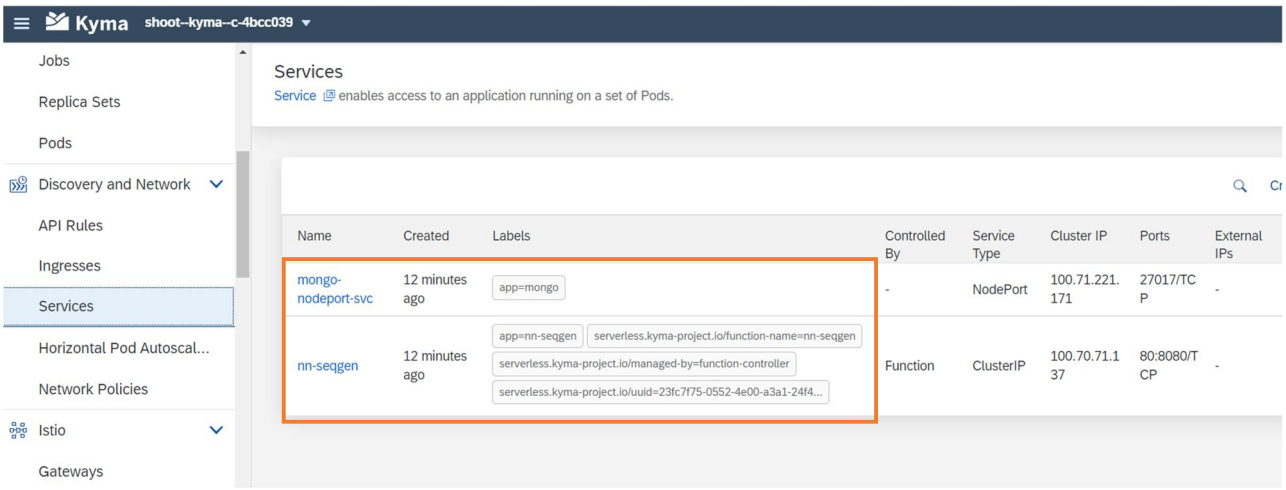
- Navigate to Workload à Functions to verify that nn-seqgen function in Running status



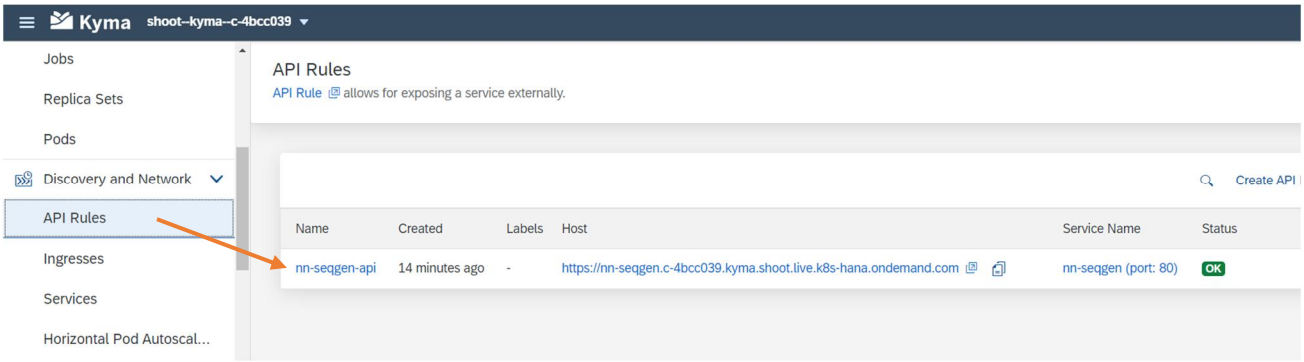
- Navigate to Workload à Deployments to verify that mongo and mongo-client has green Pods status



- Navigate to Discovery and Network à Services to check deployed Services



- Navigate to Discovery and Network à API Rules to find nn-seqgen-api rule in OK status



3. Run the following commands to access MongoDB and create user with password that is required for nn-seqgen serverless function execution.

· Use kubectl exec to open a bash command shell where you can execute commands:
kubectl exec -n dev deployment/mongo-client -it -- /bin/bash

The command should return similar to that: root@mongo-client-69bfd49fdd-f65tj:/#

· Login into the MongoDB shell:
mongosh --host mongo-nodeport-svc --port 27017 -u adminuser -p password123

The command should return:

```
Current Mongosh Log ID: 61cb050e3834a953a14edc4a
Connecting to:          mongodb://mongo-nodeport-svc:27017/?directConnection=true
Using MongoDB:          5.0.5
Using Mongosh:          1.1.6
test>
```

· Use target database indent-db, execute the command: use ident-db

Command returns: switched to db ident-db

```
test> use ident-db
switched to db ident-db
ident-db>
```

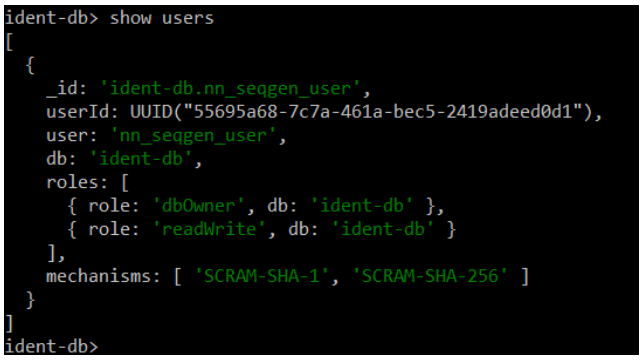
- Create user at the ident-db database. Execute the following command:

```
db.createUser(
 {
  user: "nn_seqgen_user",
  pwd: "password123456789@",
  roles: [ { role: "readWrite", db: "ident-db" } , { role: 'dbOwner', db: 'ident-db' }]
 }
)
```

Command returns: { ok: 1 }

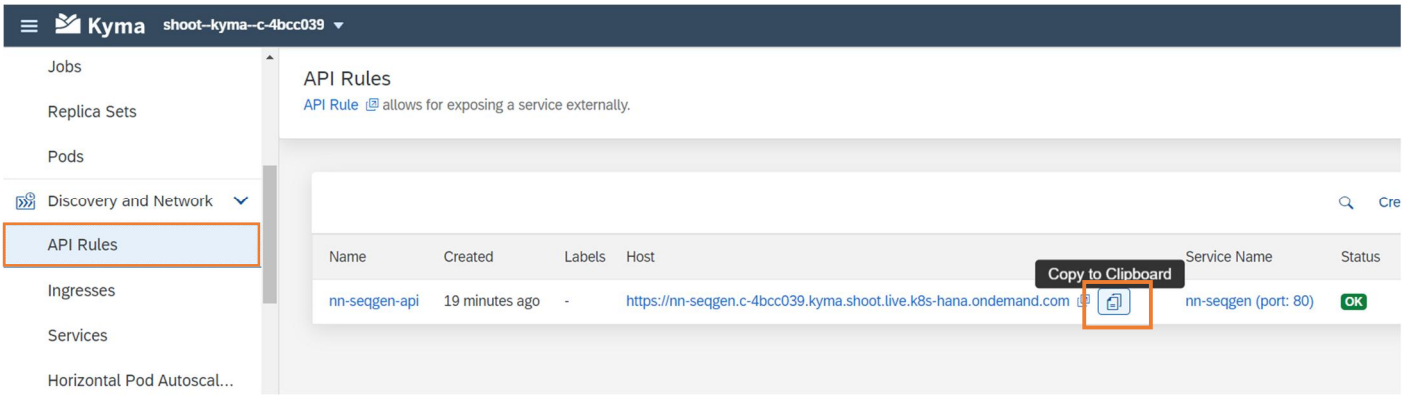
- Execute the command: show users

Command returns created user nn_seqgen_user, verify that it was created at ident-db.

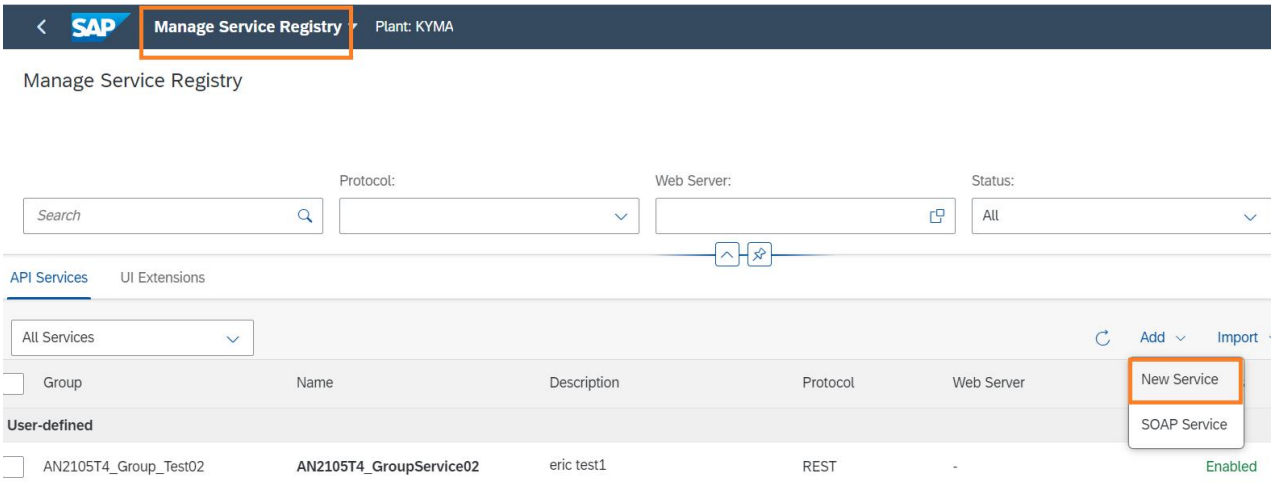


Configuration Steps

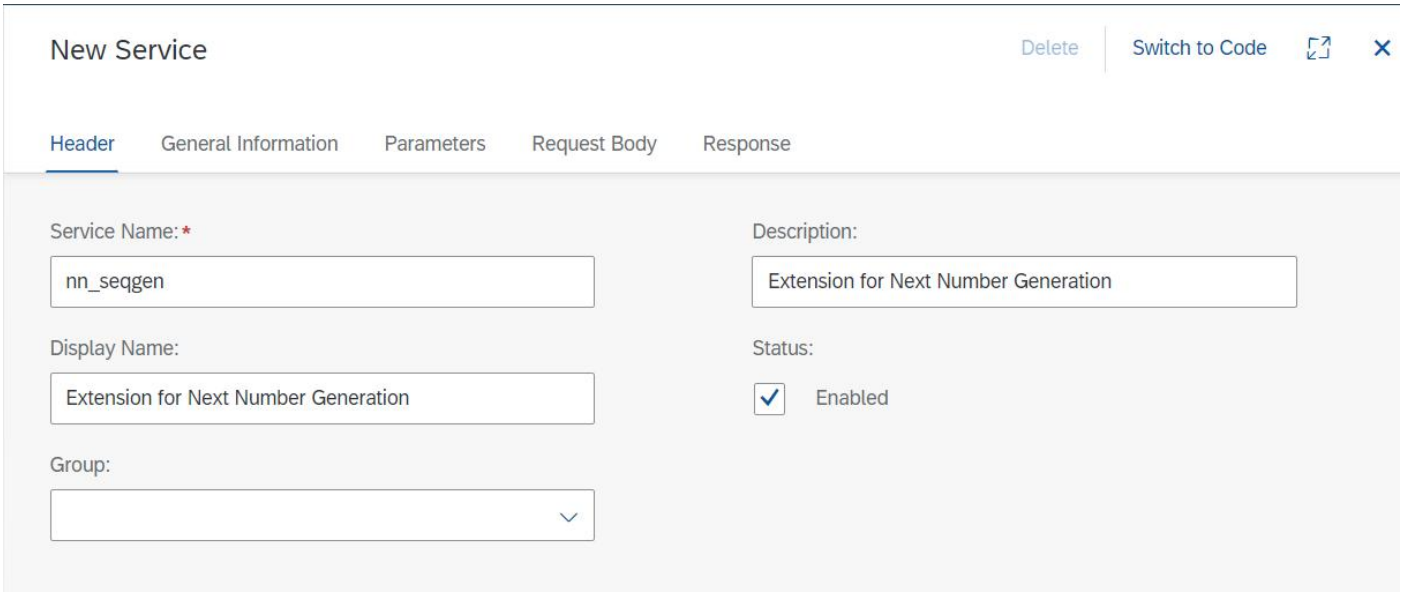
1. Open Kyma Runtime console UI
2. Go to dev Namespace
3. Navigate to Workloads à API Rules
4. Copy to clipboard API Rule URL for nn-seqgen-api name



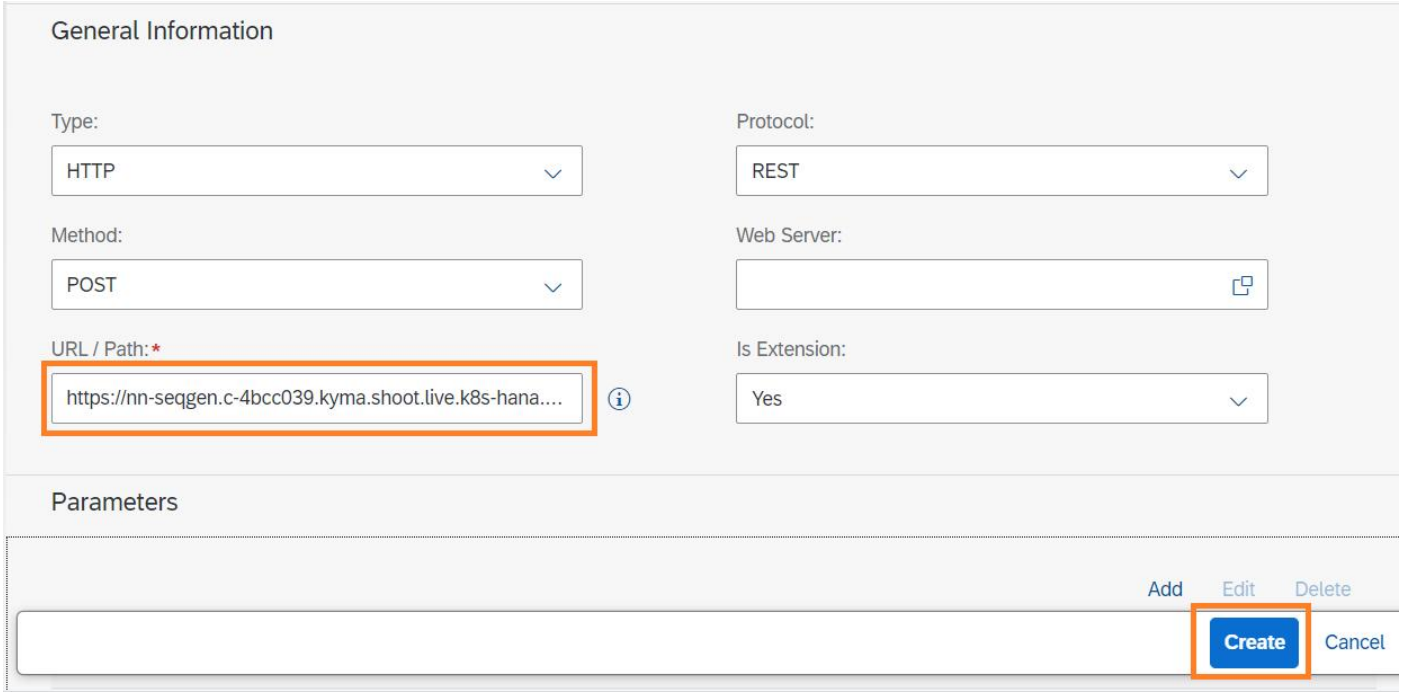
5. Login to DMC and open the Manage Service Registry application
6. Click on Add button and choose New Service option from the menu



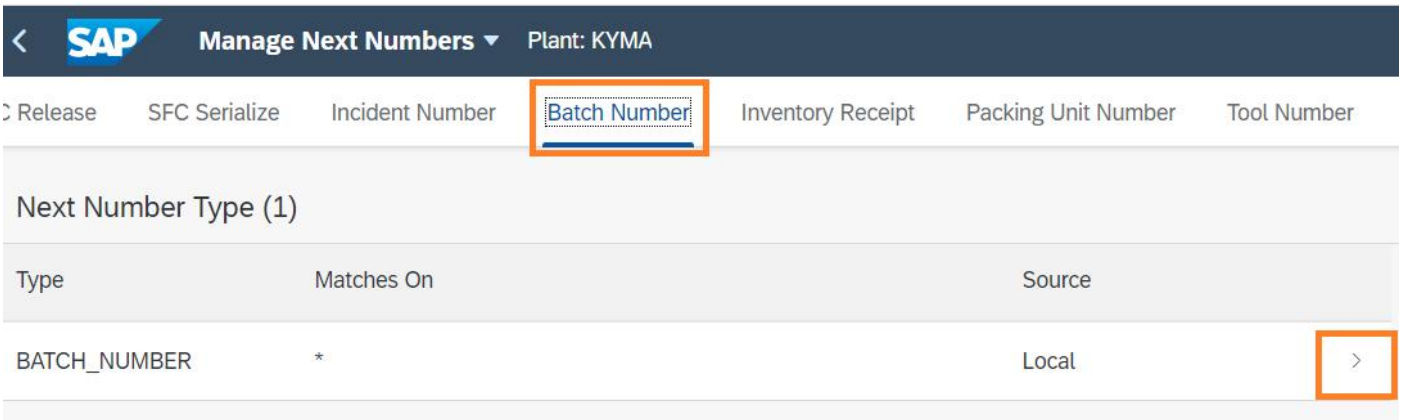
7. Define new service with the following settings below



Use API Rule URL from clipboard and then click Create button.

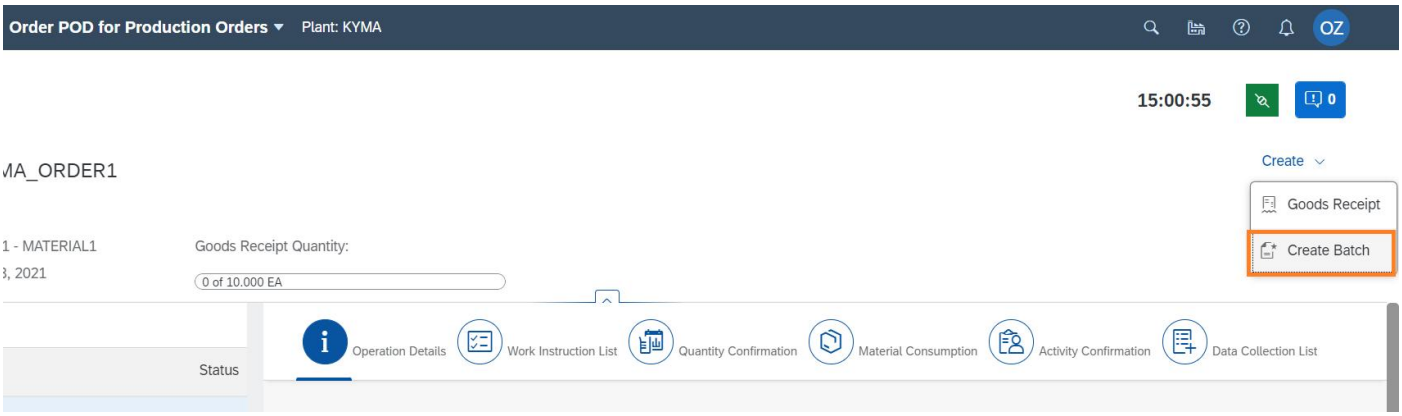


8. Open Manage Next Numbers application
9. Choose Batch Number type and choose Details

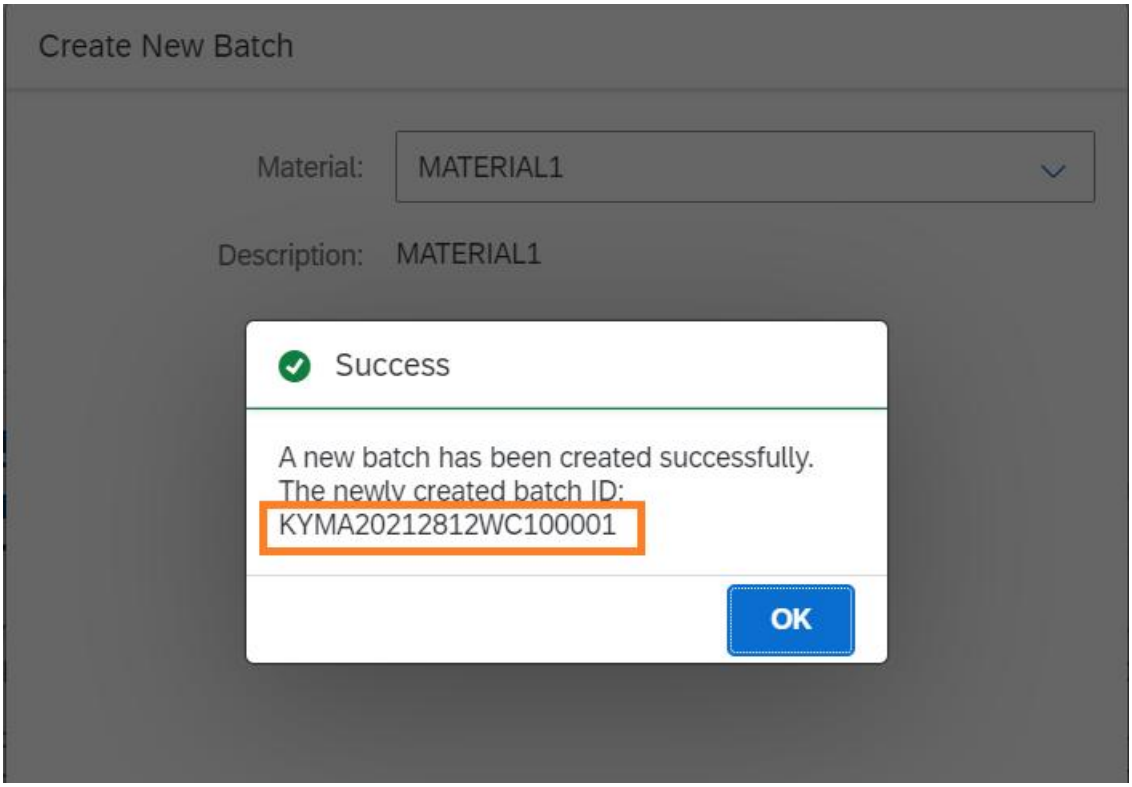


10. Define nn_seqgen for the Extension field and click the Save button

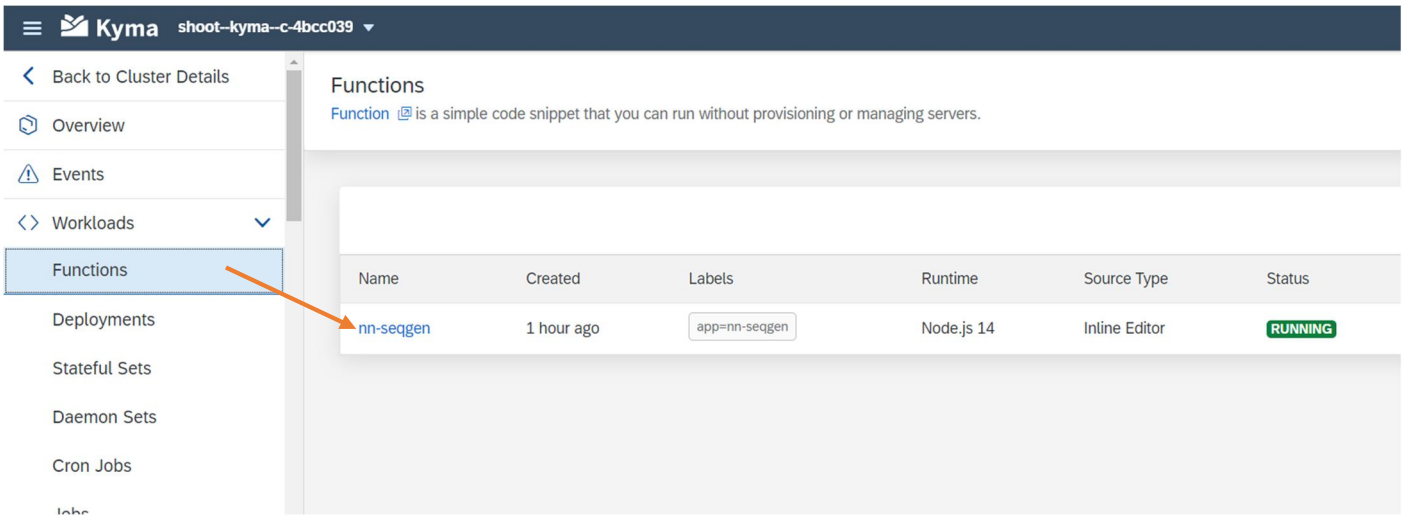
11. Open Order POD. Choose order.
12. Chose Create Batch option from Create



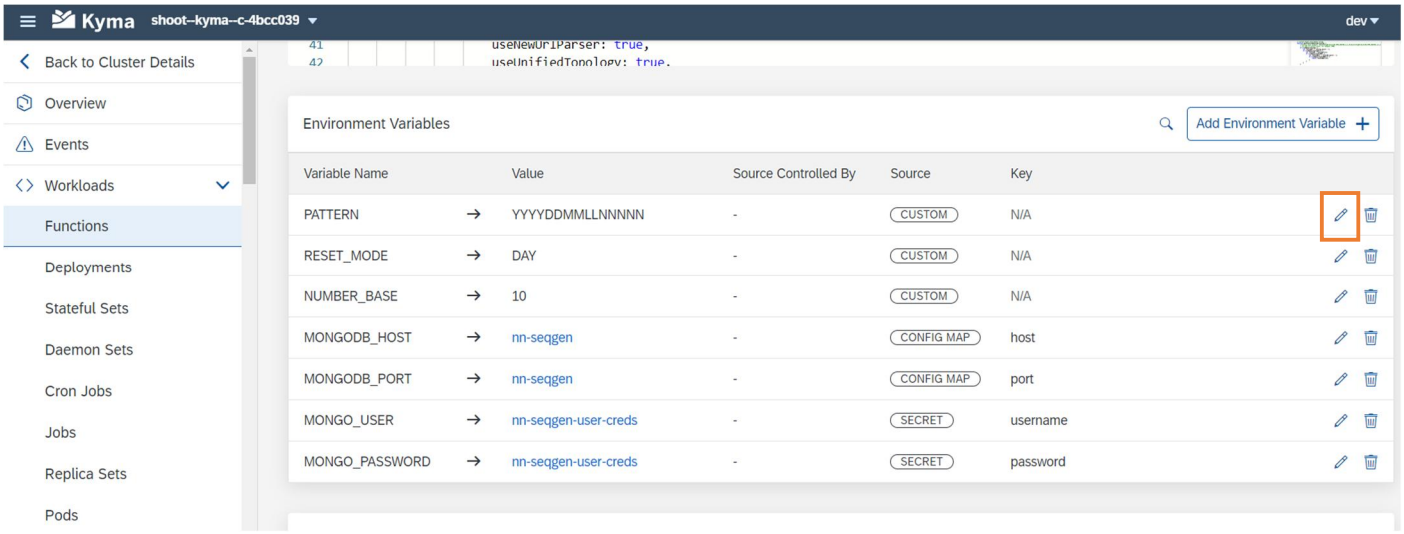
The new batch number was successfully generated in Kyma Runtime serverless function. The generated number is displayed to the user at Create New Batch screen.



13. Open and login to SAP BTP, Kyma Runtime console UI
14. Open dev Namespace
15. Navigate to Workload à Functions and click on “nn-seqgen” function name

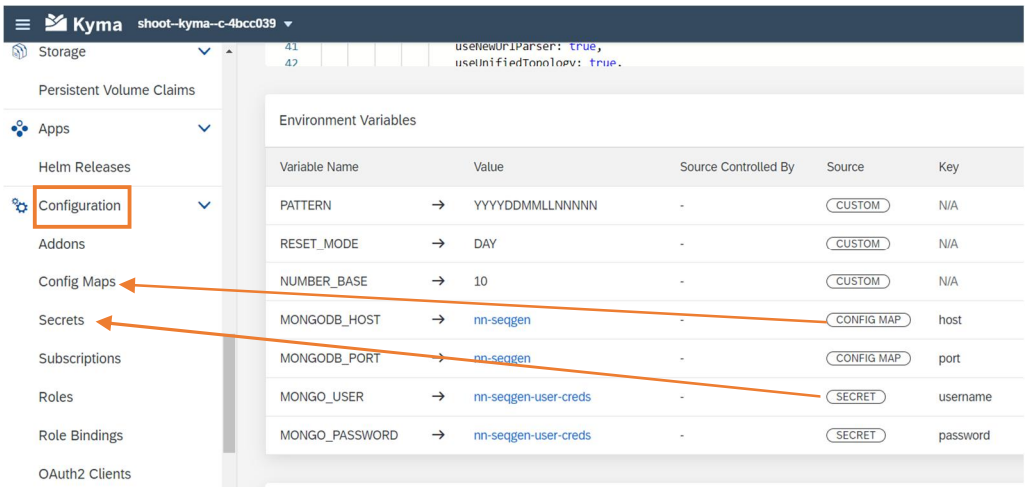


16. Click on Edit Environment Variable icon if you need to change PATTERN, RESET_MODE, or NUMBER_BASE runtime configuration rules. Save changes.



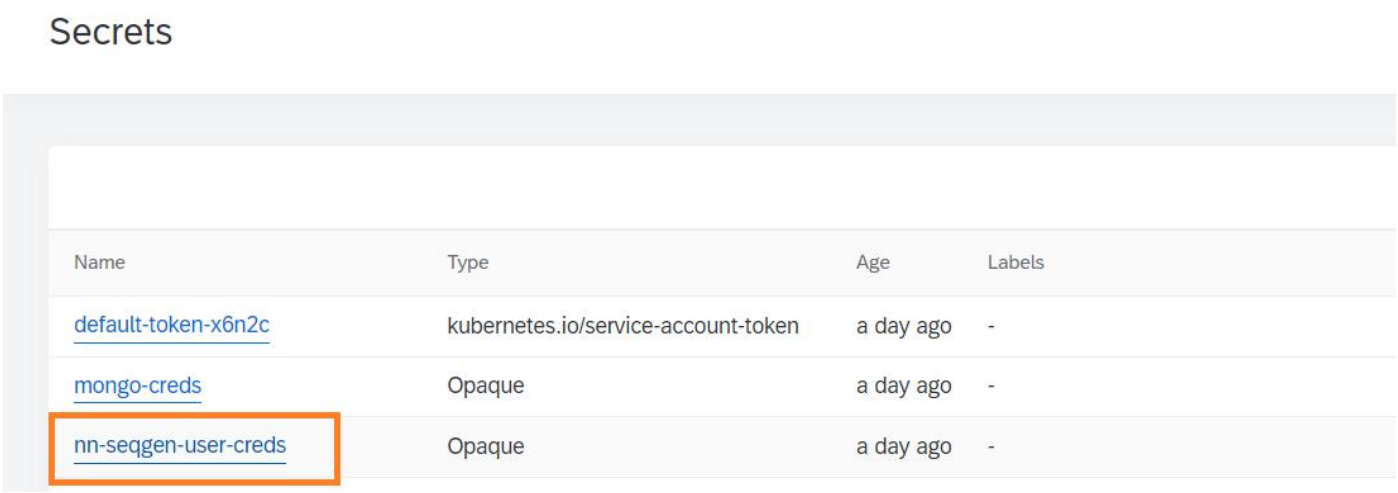
CONFIG MAP source is used to store non-confidential data in key-value pairs, such as host and port for Mongo DB.

SECRET source stores confidential data in key-value pairs, such as user name and password.



Secrets

Secret “nn-seqgen-user-creds” stores confidential data in key-value pairs, such as mongo database user name and password.



Config Maps

ConfigMap “nn-seqgen” is used to store non-confidential data in key-value pairs, such as mongo database host and port.