Requirements

This document guides through the steps needed to execute to implement REST service deployed to SAP BTP Cloud Foundry 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 the next number pattern by using environment variables
- PostgreSQL usage to store the sequence number to custom NN_SEQUENCE table
- Usage of extension parameters passed from DME next numbering micro-service business logic to the extension service
- Usage of SAP Business Application Studio for Cloud Foundry deployment

Custom REST service should have flexible behavior that can be configured at runtime without massive re-implementations and without re-deploys. For this purpose, we added the User-Provided Variables described below. These variables 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.

SAP Business Application Studio is used as a development environment for implementing a REST service with Node.js and Express.

For setting up SAP Business Application Studio in an Enterprise Account refer to Getting Started topic of the SAP Business Application Studio Administrator Guide.

PostgreSQL database is used to store generated new sequence data to custom NN_SEQUENCE table.

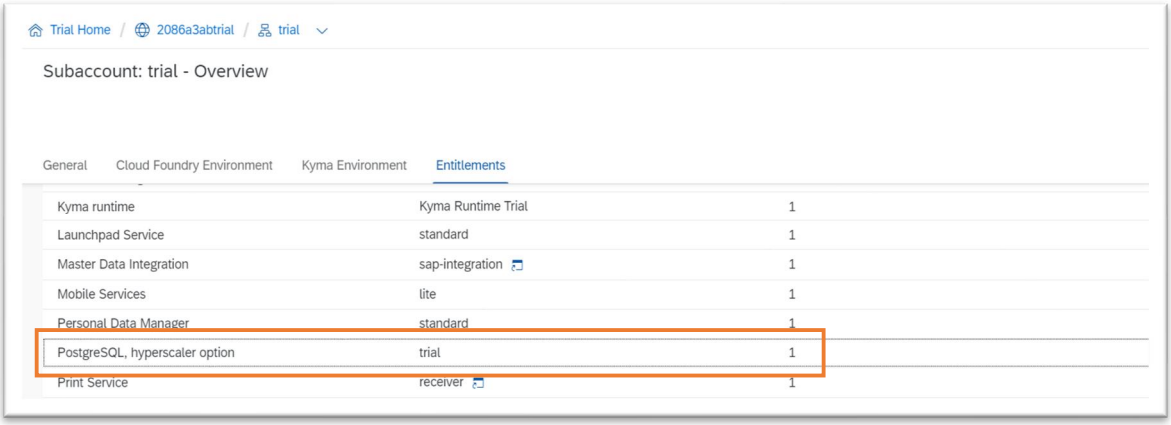
Cloud Foundry application with REST service is deployed to SAP BTP Cloud Foundry.

Prerequisites

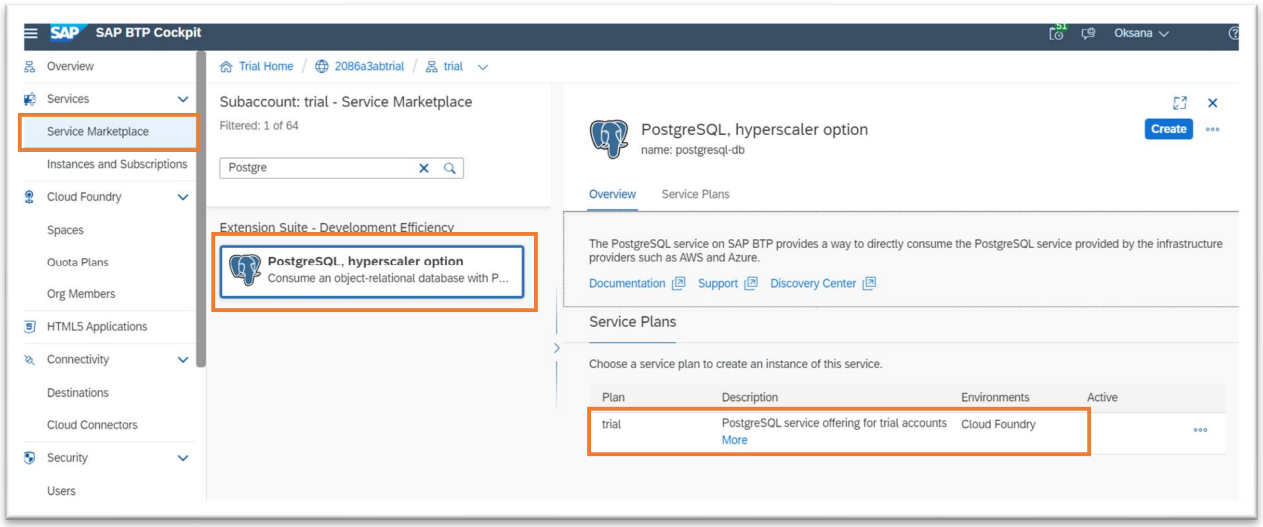
If you plan to follow the installation and configuration steps and deploy the project by yourself, you have to do some preparations:

1. Get a free account on SAP BTP Trial
   Follow the steps from this tutorial: https://developers.sap.com/tutorials/hcp-create-trial-account.html

2. Ensure, that the *PostgreSQL, hyperscaler option* is in the list of entitlements of your trial account. If not, then you need to add the service manually.



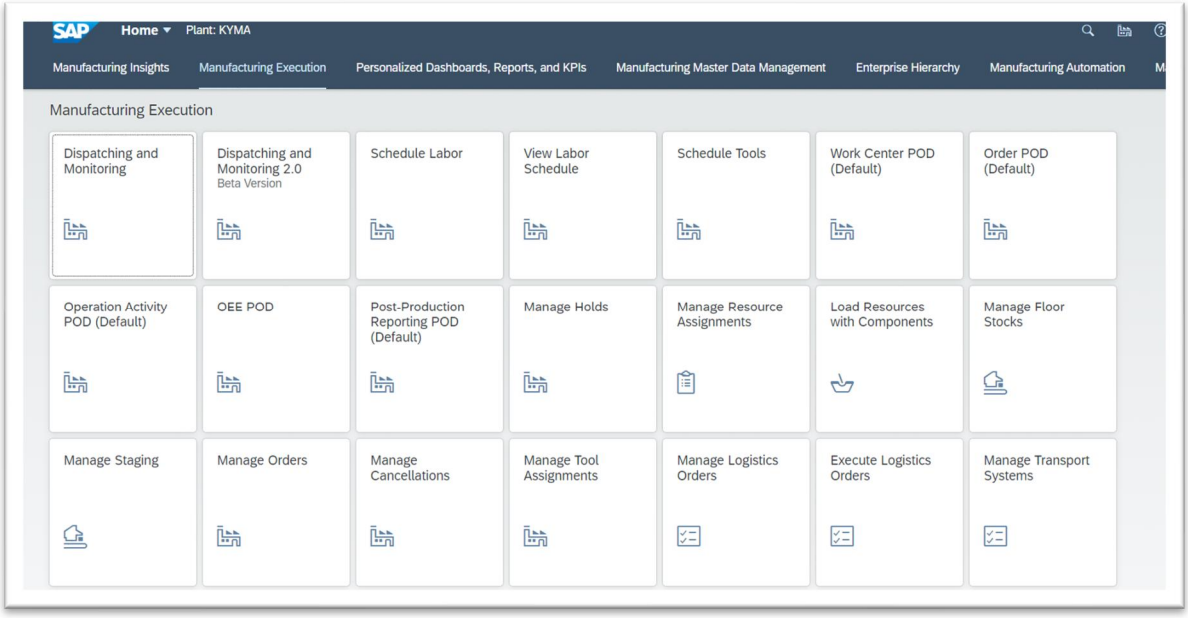
3. Ensure, that you have *PostgreSQL, hyperscaler* option in Service Marketplace.
   Please NOTE: “trial” service plan will be used for the current example.



4. Set up SAP Business Application Studio for development

   Follow steps from this tutorial: https://developers.sap.com/tutorials/appstudio-onboarding.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.

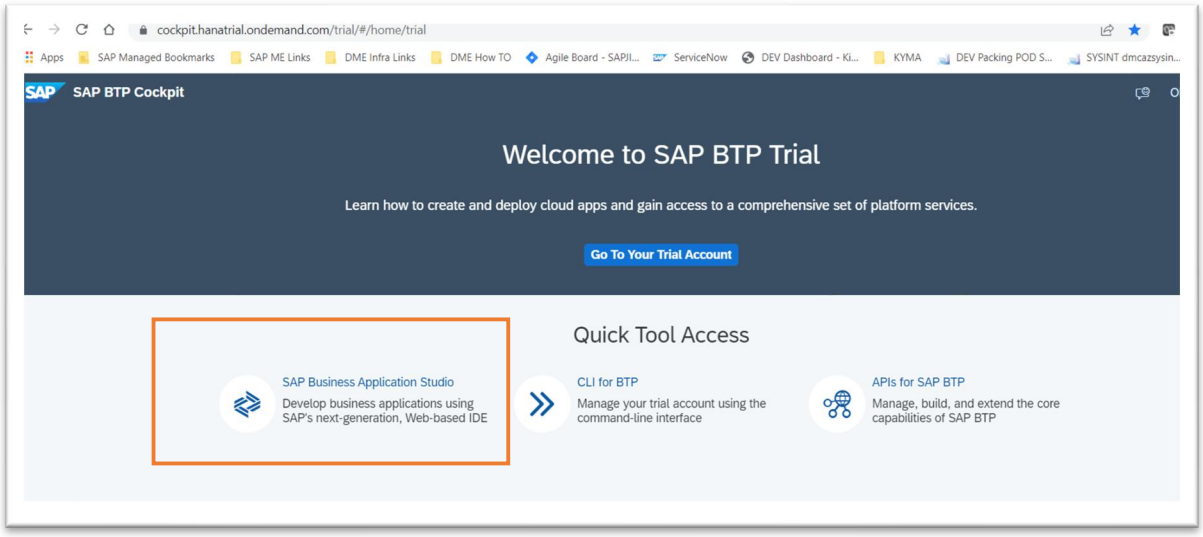
Choose the Code button and choose one of the options to download the code locally or simply run the following command within your CLI at your desired folder location:

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

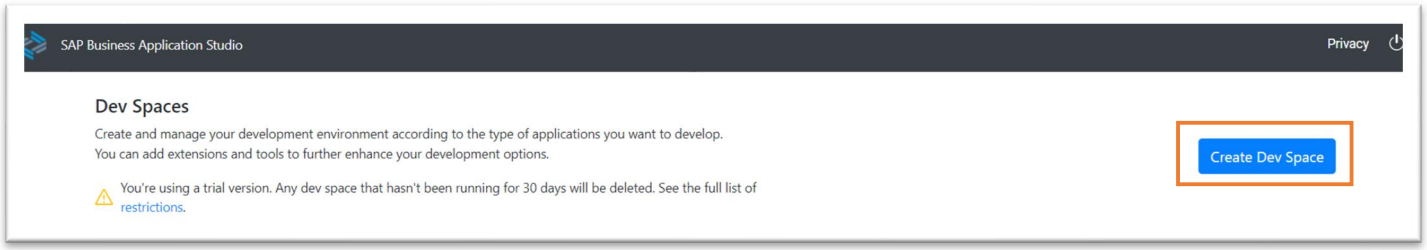
7. Open the DMC_NextNumber_InAppExtensions/batch-nn-postgresql directory in your desired editor, it contains two folders: documentation for technical tutorials and code_solution for the implementation part.

Installation Steps

1. Open SAP Business Application Studio.



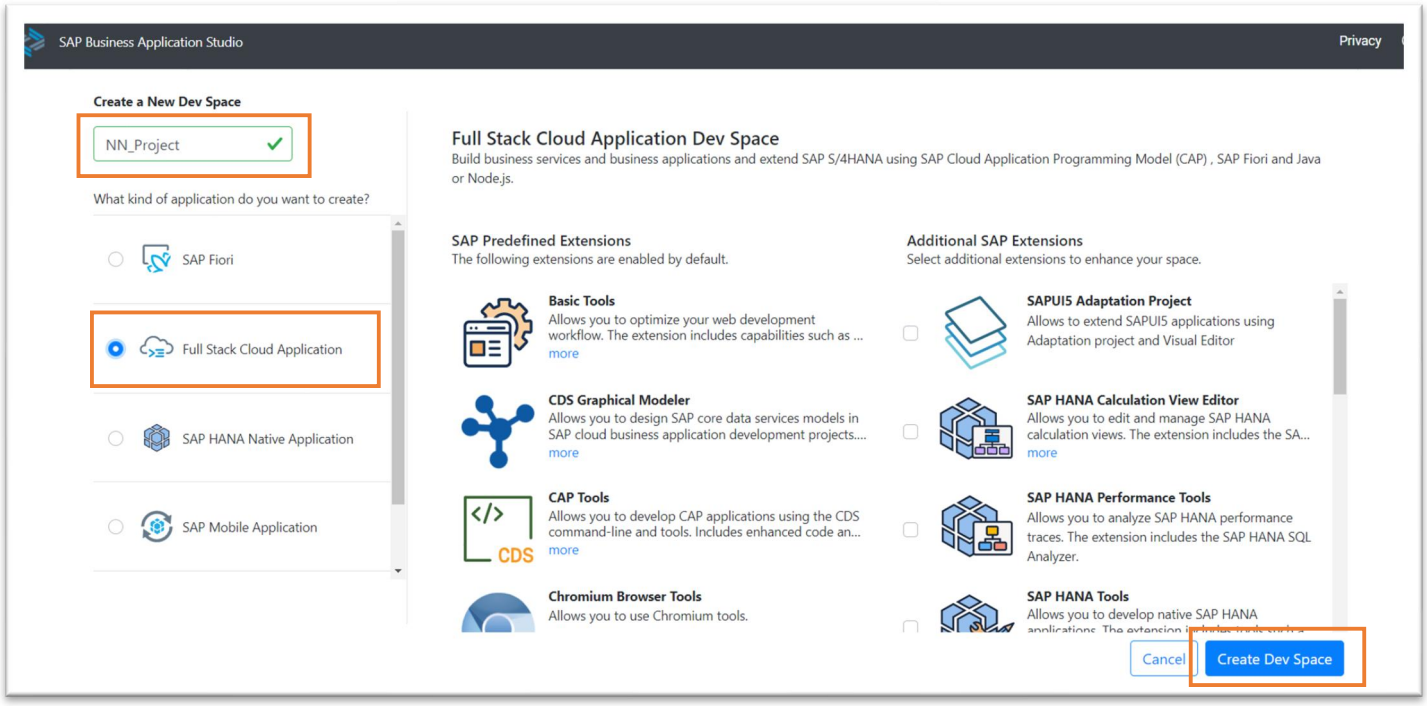
2. Choose Create Dev Space.



3. At the “Create New Dev Space” screen execute the following steps:
   - Enter the NN_Project name for your dev space.
   - Choose Full Stack Cloud Application as the application type.

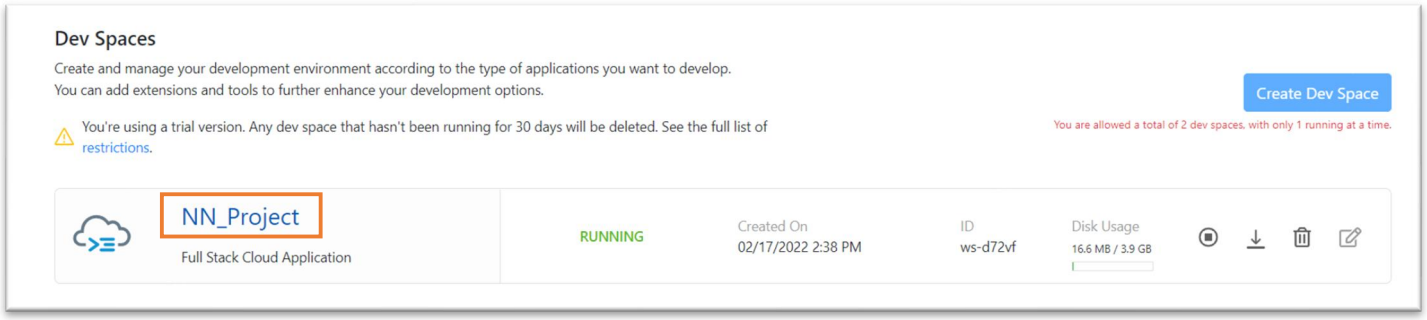
   By selecting Full Stack Cloud Application your dev space comes with several extensions out-of-the-box that you need to develop applications.
   - Choose Create Dev Space.

   The Dev Space will then begin starting and the process will take a minute or so as your cloud environment is being created. You see that the status for your dev space will change from STARTING to RUNNING.

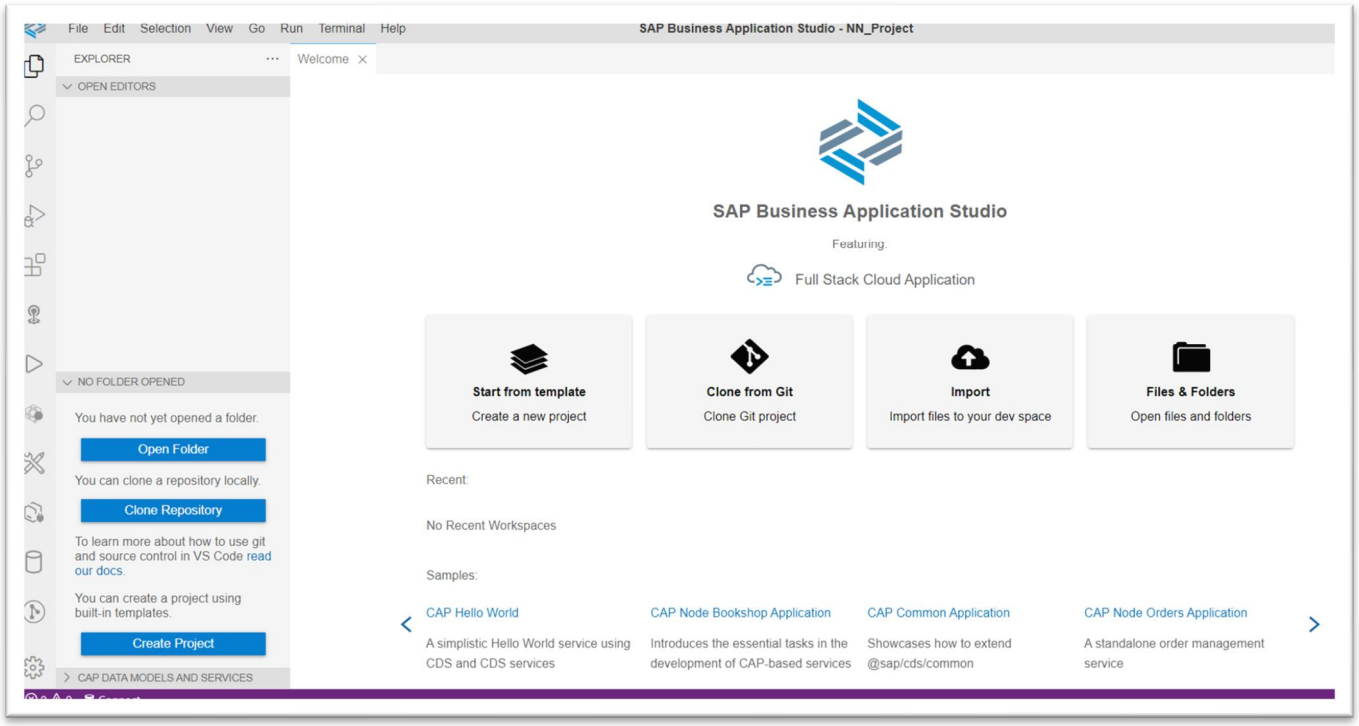


Please NOTE: In the SAP BTP trial you are limited to only two Dev Spaces and only one can be active at a time.

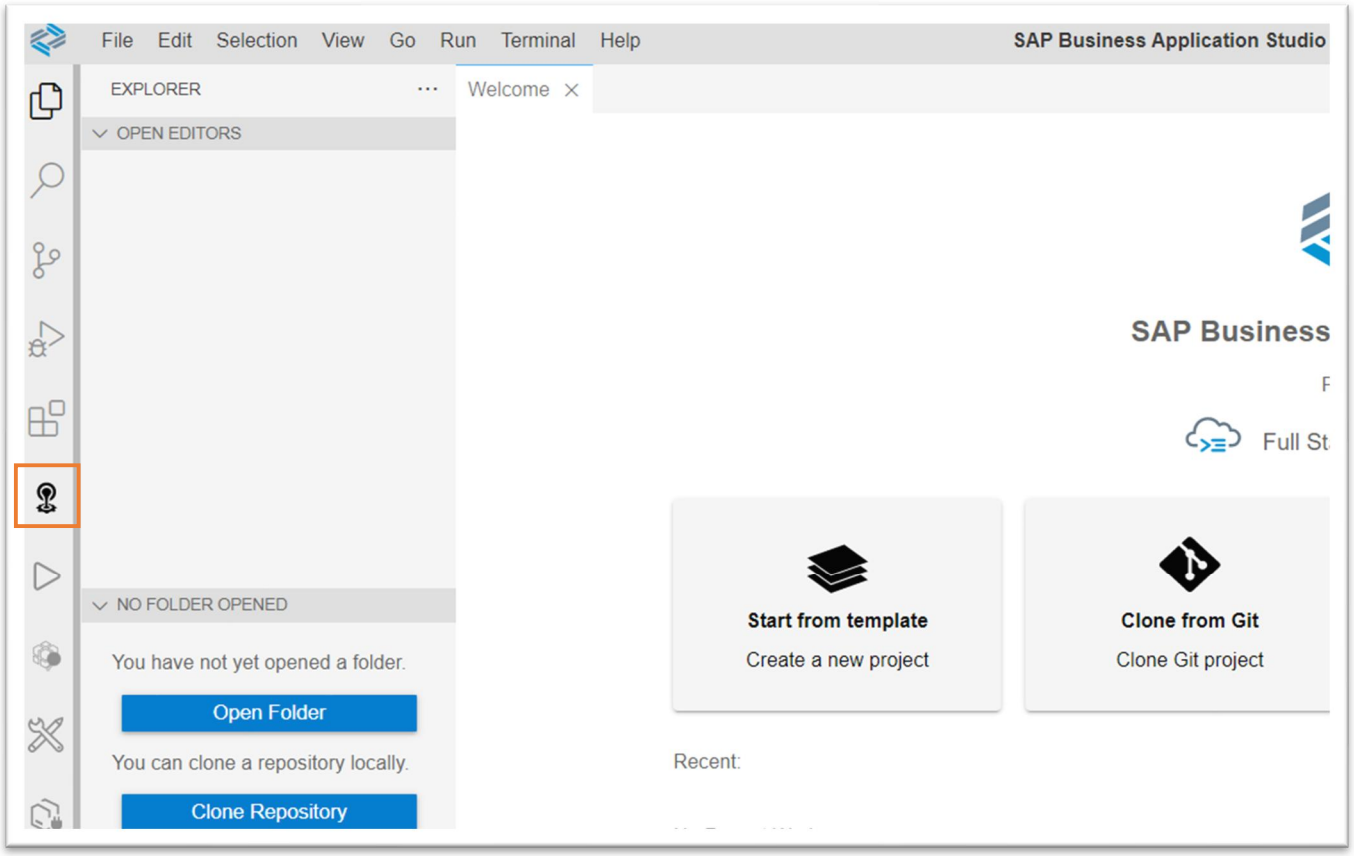
4. Once the Dev Space reaches the green status of RUNNING, you can click on the name of the Dev Space and it will load into the editor within your browser.



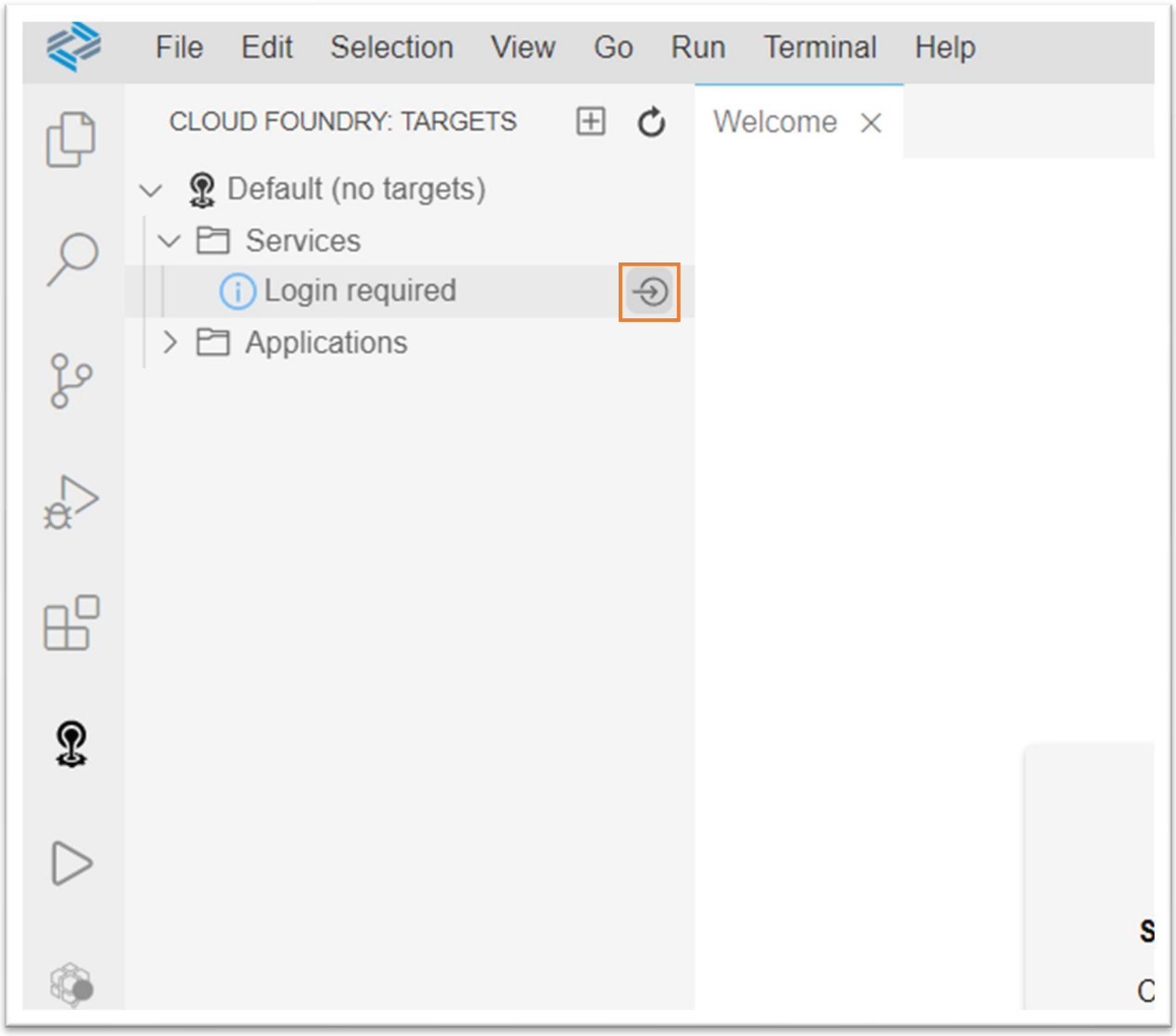
5. You'll be redirected to your newly created SAP Business Application Studio Dev Space. Recommend you bookmark this URL so it's easier for you to access this dev space of your SAP Business Application Studio in the future.



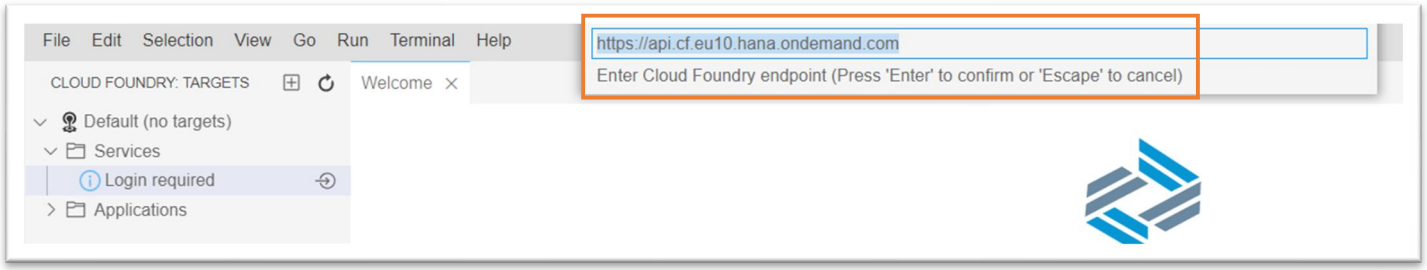
6. On the left side of the Business Application Studio click on the Cloud Foundry targets icon



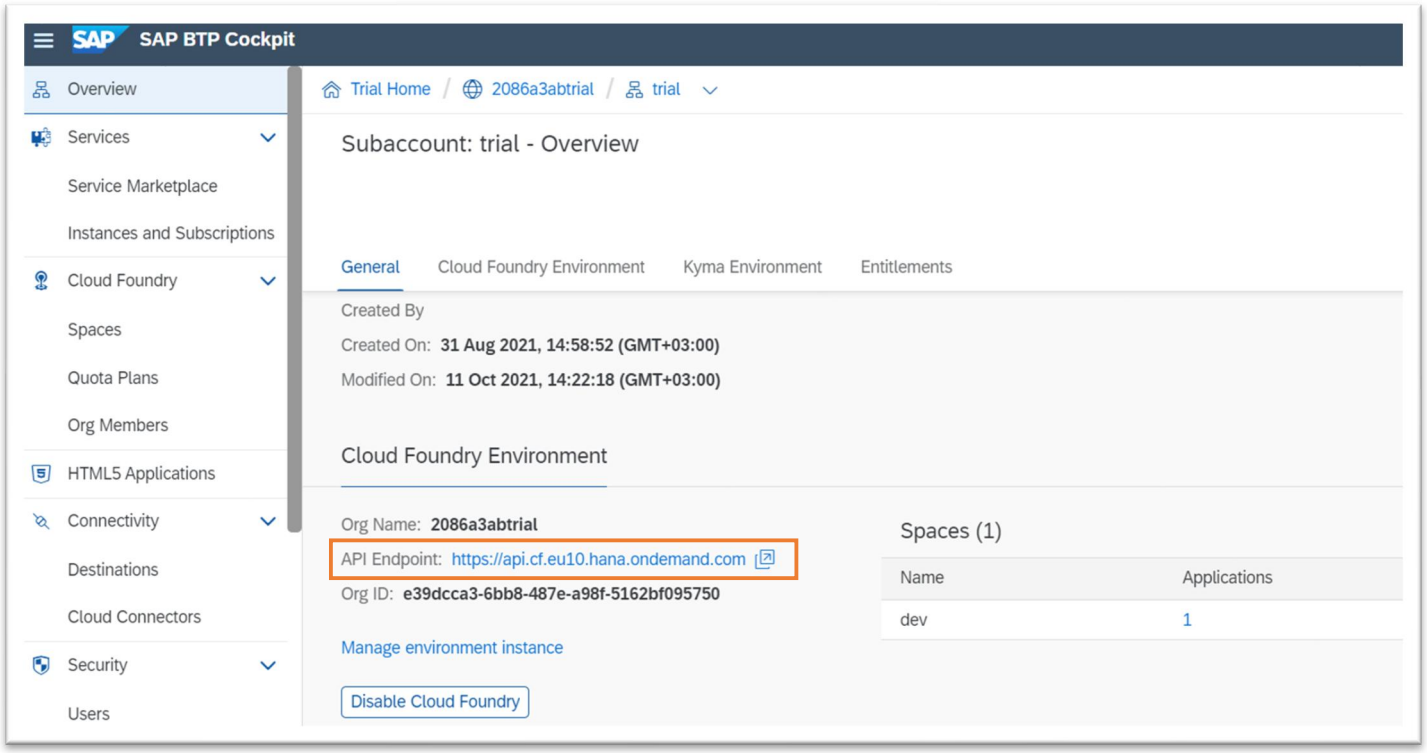
7. In the Cloud Foundry Targets window, you can expand either Service or Applications and then click on the Logon icon to continue the configuration process



8. The command window will then open at the top of the SAP Business Application Studio. The first input will prompt you for the Cloud Foundry endpoint

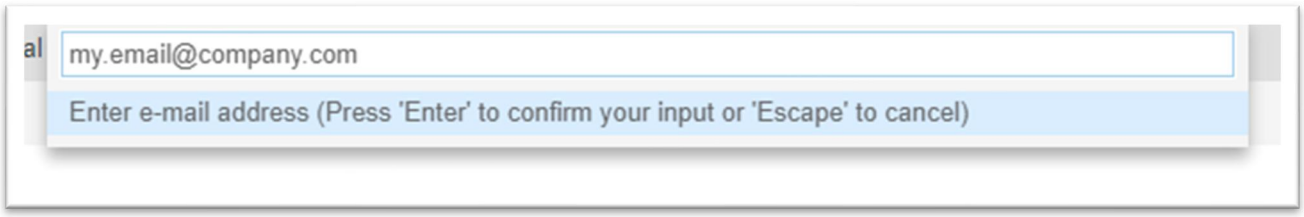


The default value proposed is likely the correct value, but if you need to confirm; the value can be found in the SAP BTP cockpit at the Subaccount level.

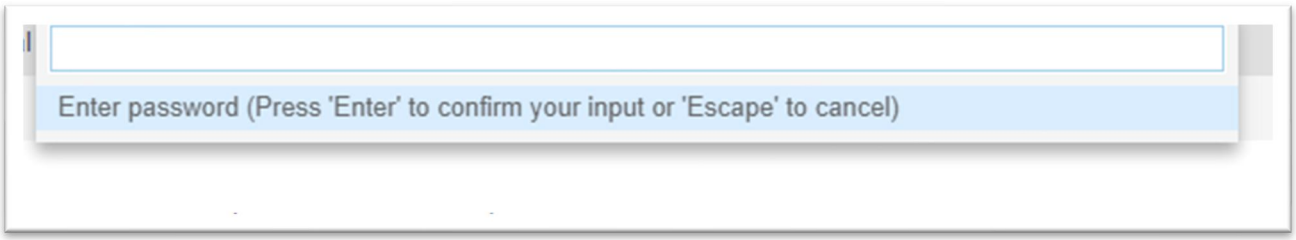


Press Enter to confirm your input of the Cloud Foundry endpoint.

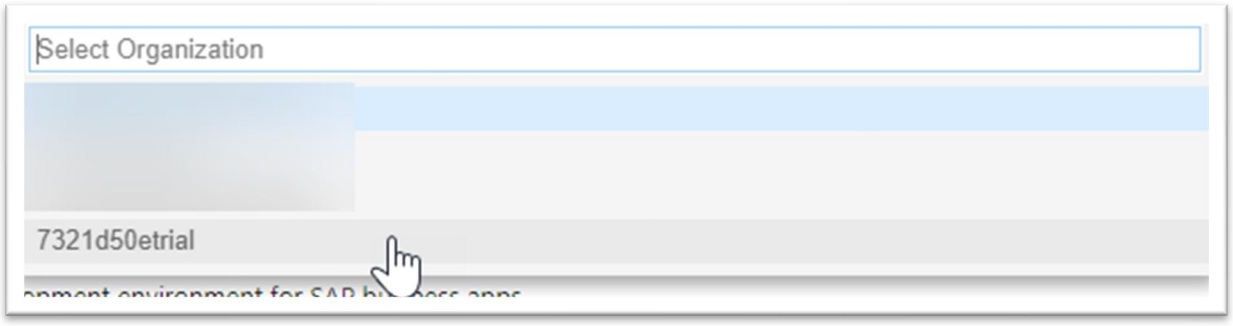
9. The next input field will ask you for the email address you used to create your SAP BTP trial account



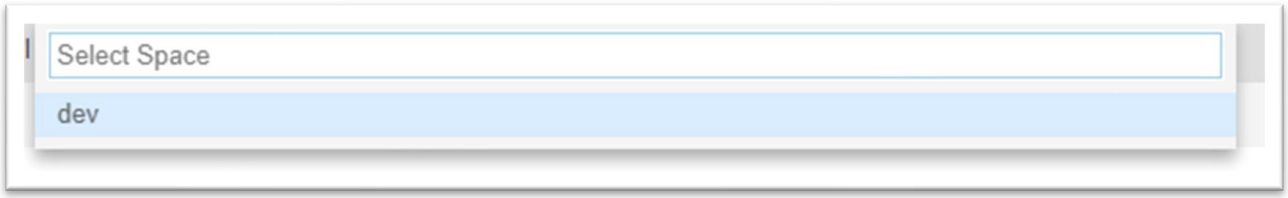
10. The next input will ask you for your SAP BTP trial account password



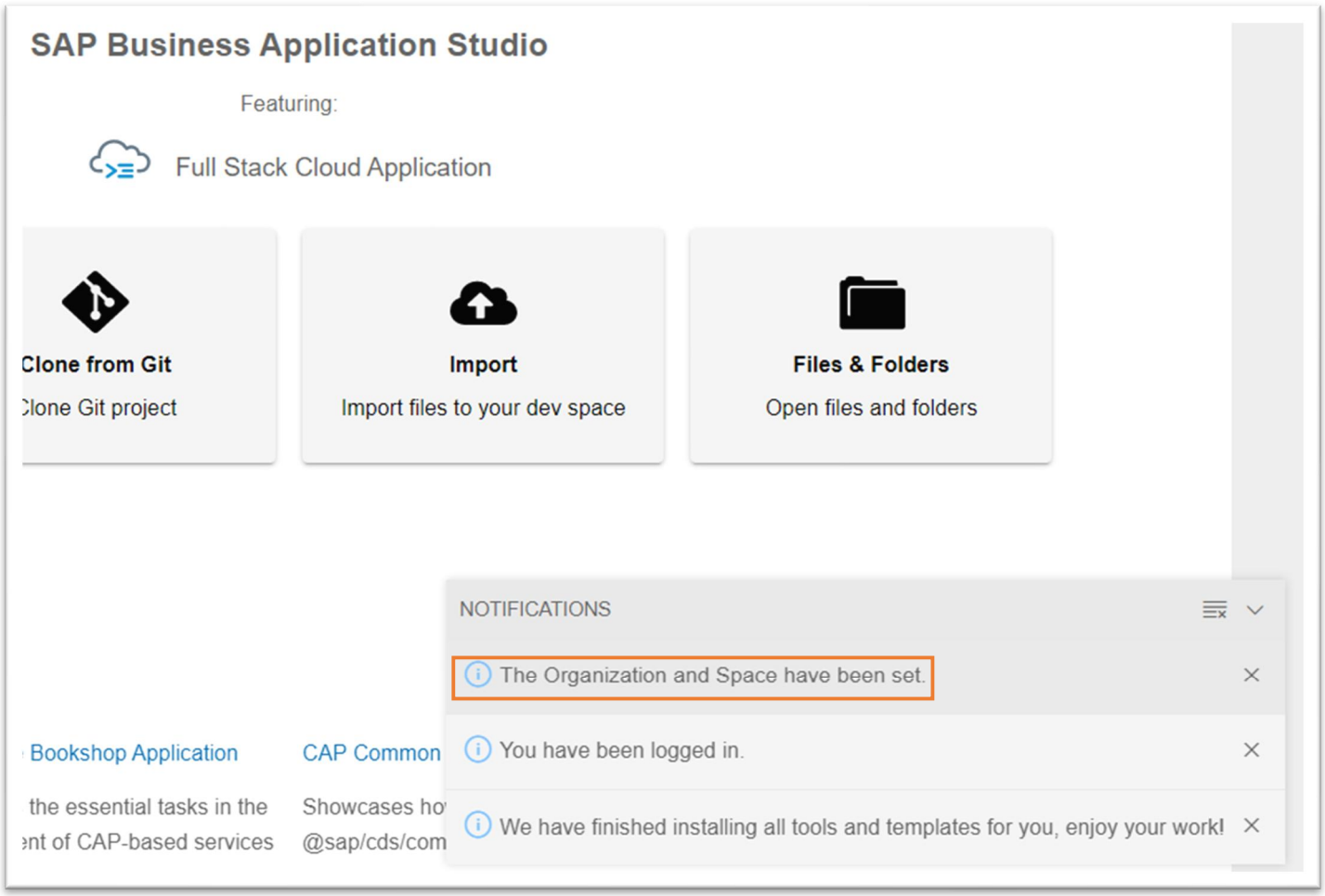
11. The next input will ask you for your Organization. In most situations, you will have a single choice. But like the API endpoint earlier, if you need to confirm the correct value it will be displayed in the top navigation of the SAP BTP cockpit



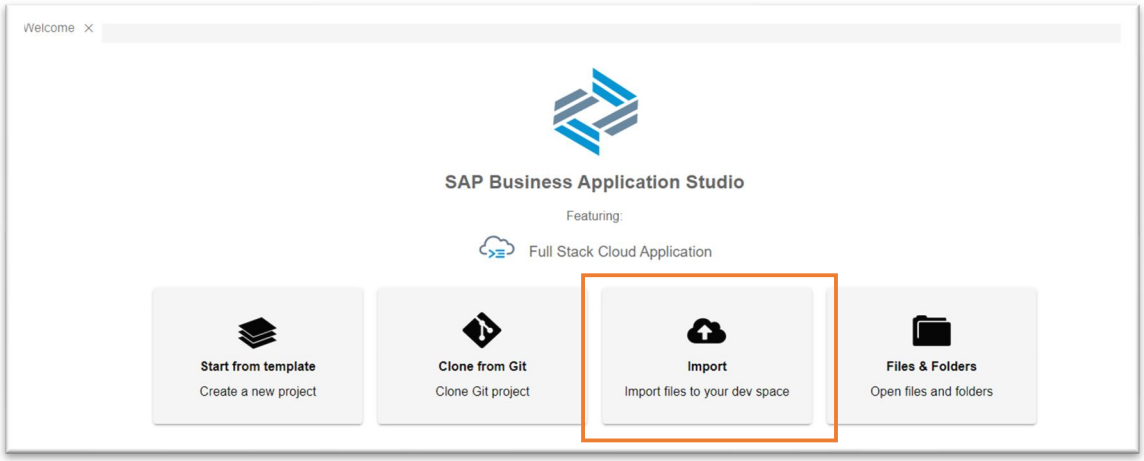
12. The final input will ask you for your Space. If you choose the endpoint API and Organization correctly, then you should have a single option of dev



13. Upon completion of all the inputs, you should see that the Organization and Space have been set.

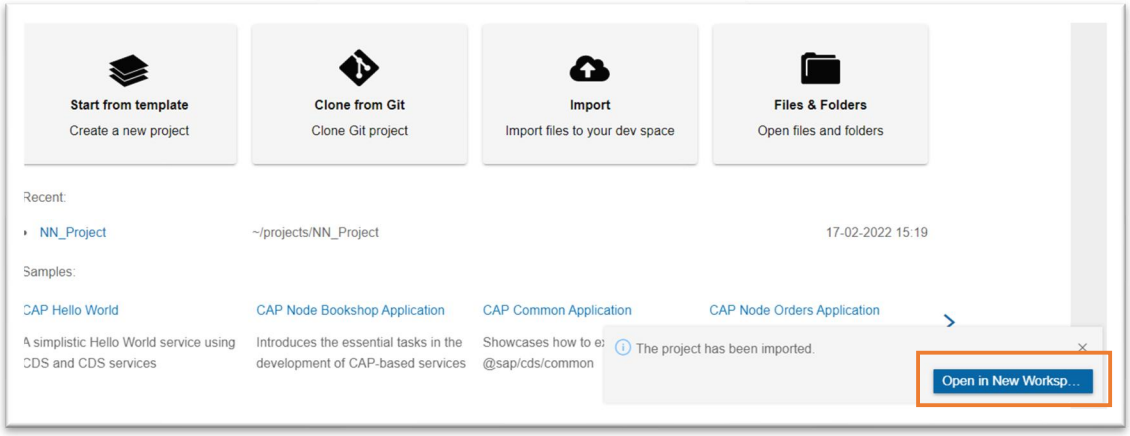


14. The next step is to add project with an example to workspace. From the SAP Business Application Studio Welcome page, click Import

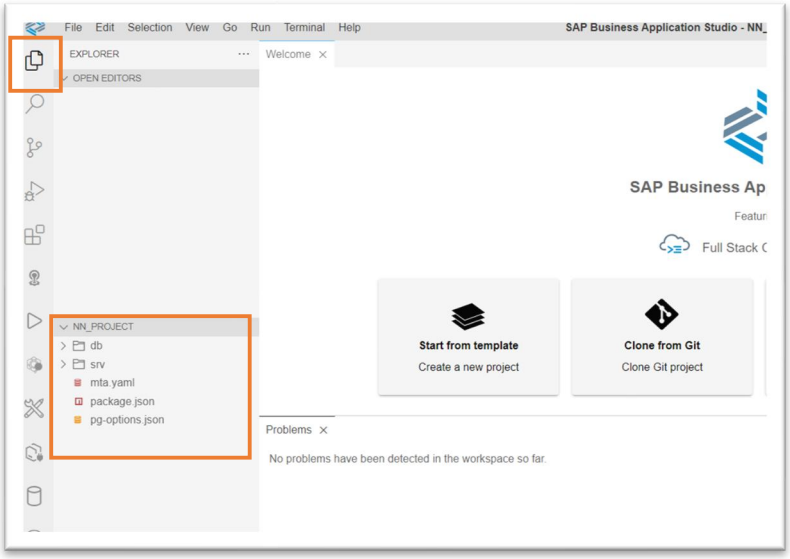


15. Choose NN_Project.zip archive from DMC_NextNumber_InAppExtensions/batch-nn-postgresql/code_solution directory

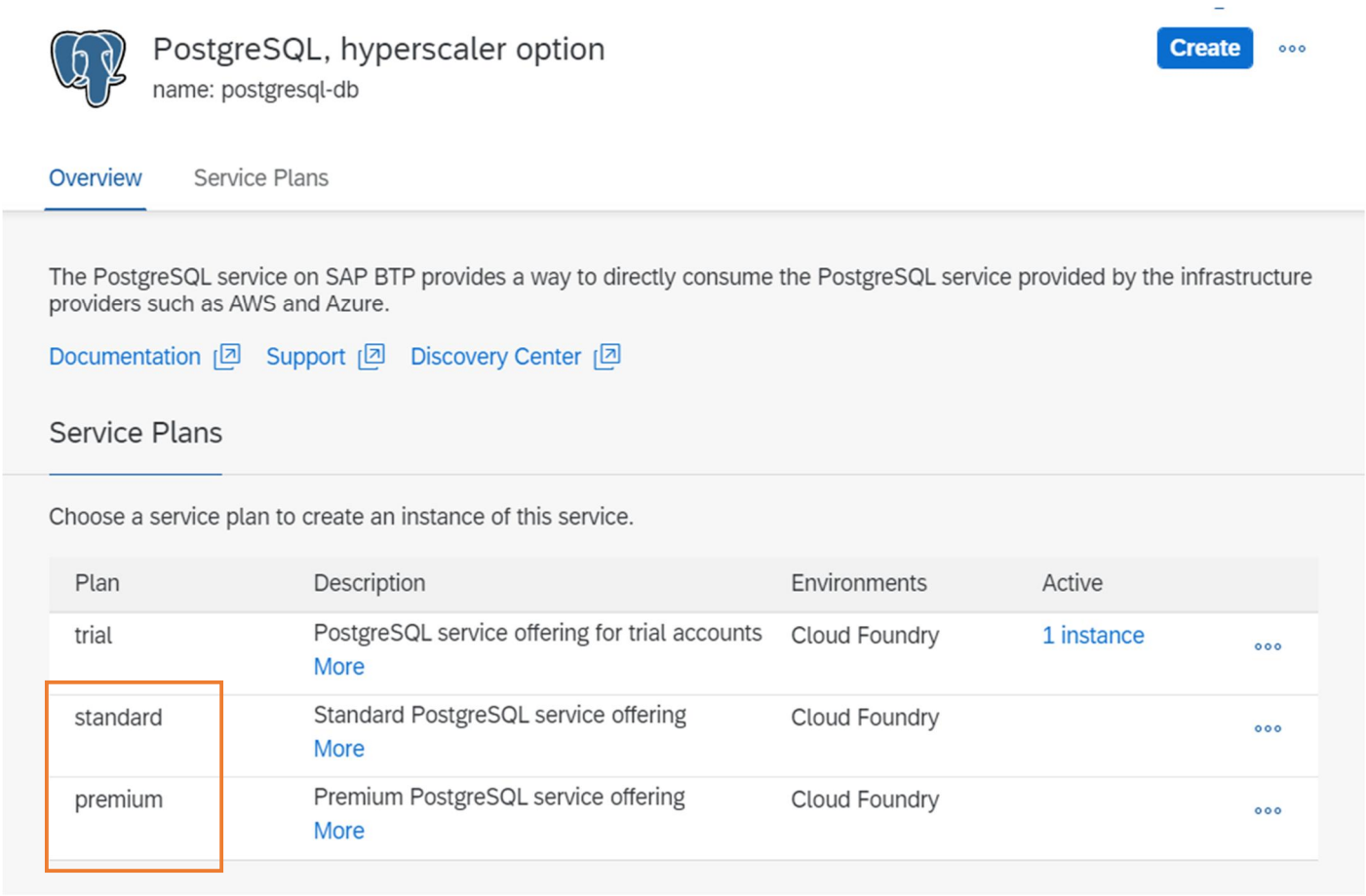
Expected result that project is imported successfully and you should choose Open in New Worksp...



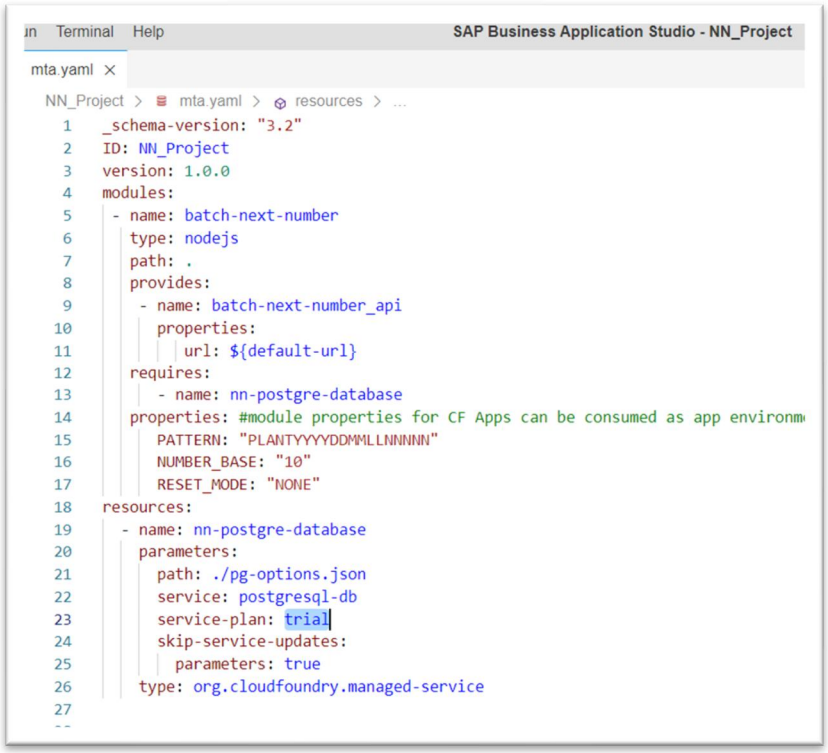
Explorer view shows NN_Project with content as below



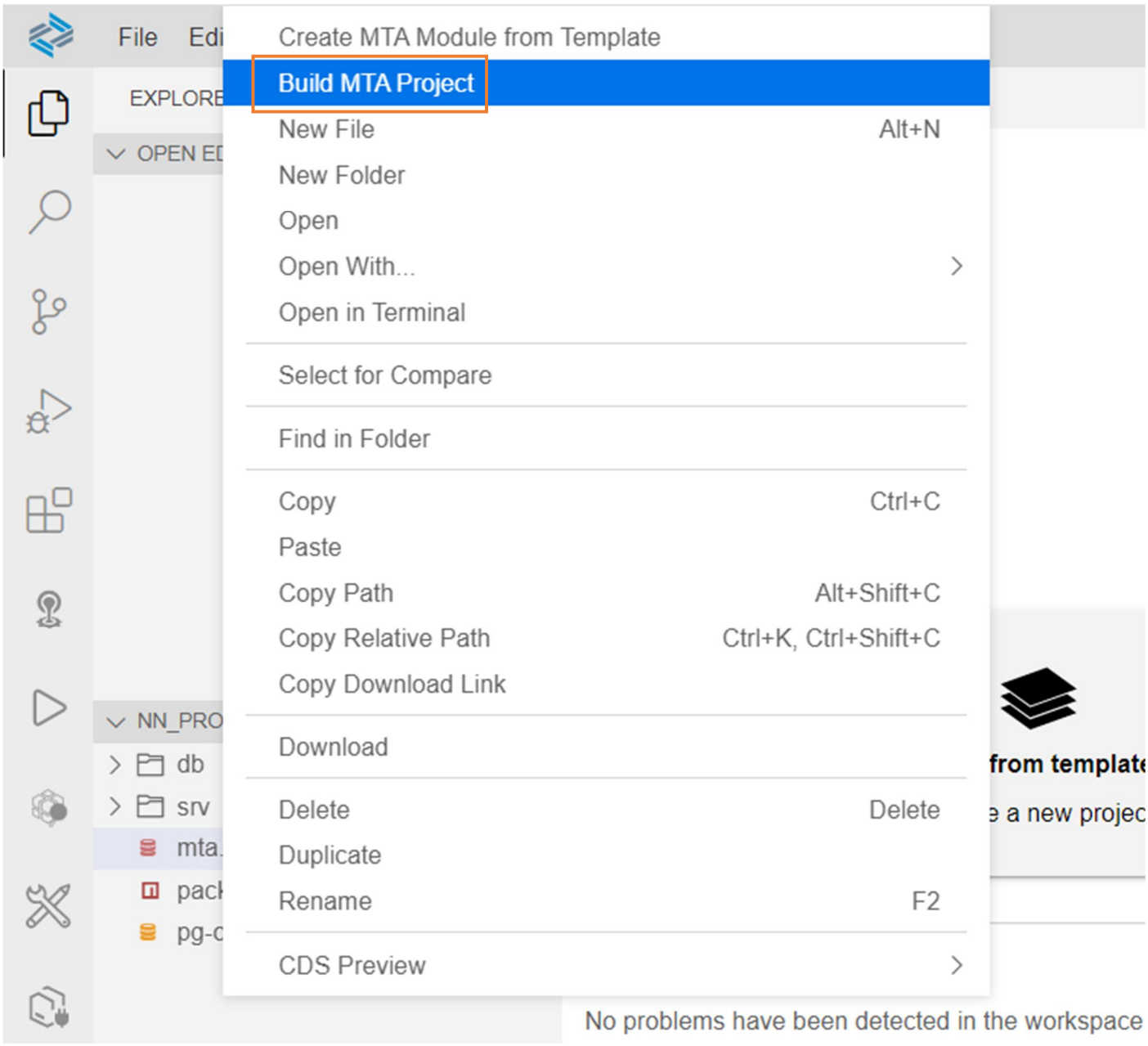
Please NOTE: If you use a “standard” or “premium” service plan for PostgreSQL then mta.yaml development descriptor should be adjusted accordingly.



Open mta.yaml file and change service-plan from “trial” to “standard” or “premium”.

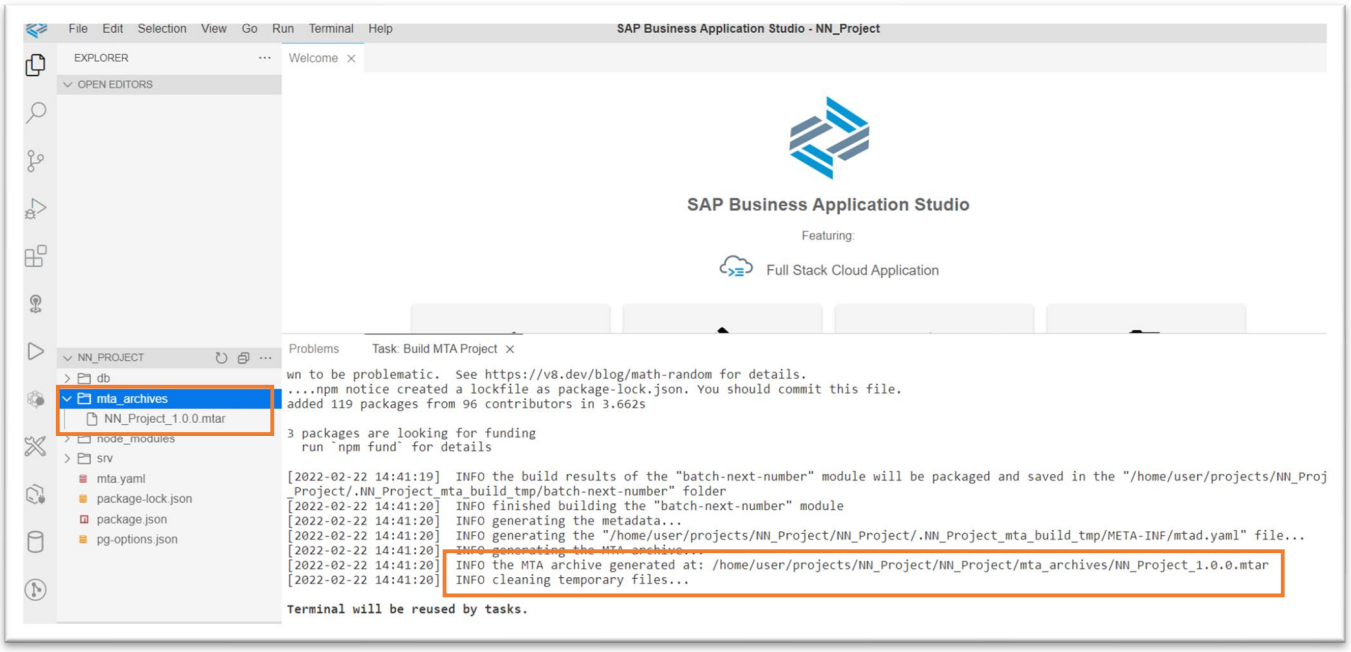


16. Right-click the mta.yaml file and choose Build MTA Project.

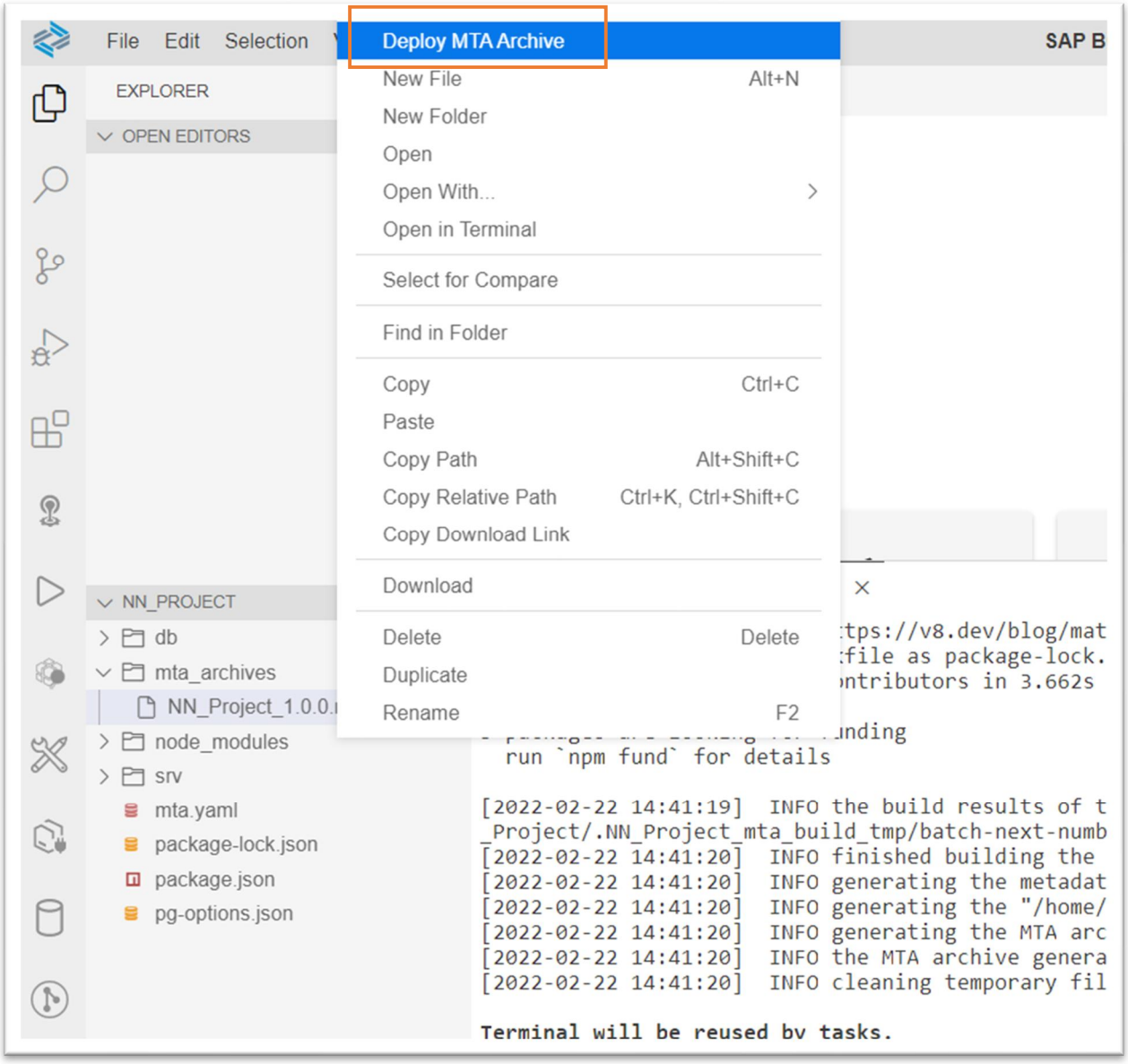


As a result of this step two new folders are created:

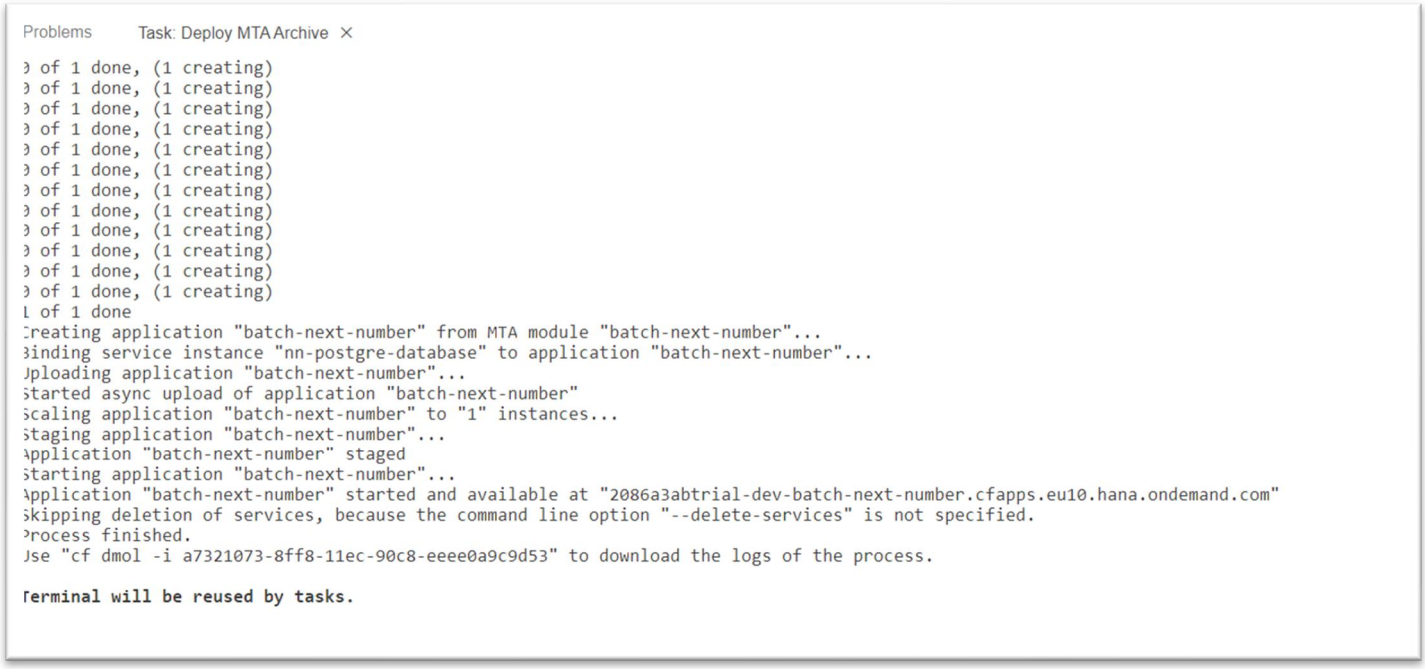
- mta_archives folder is created containing the new generated NN_Project_1.0.0.0.mtar file
- node_modules folder is created with all required dependencies defined in package.json file.



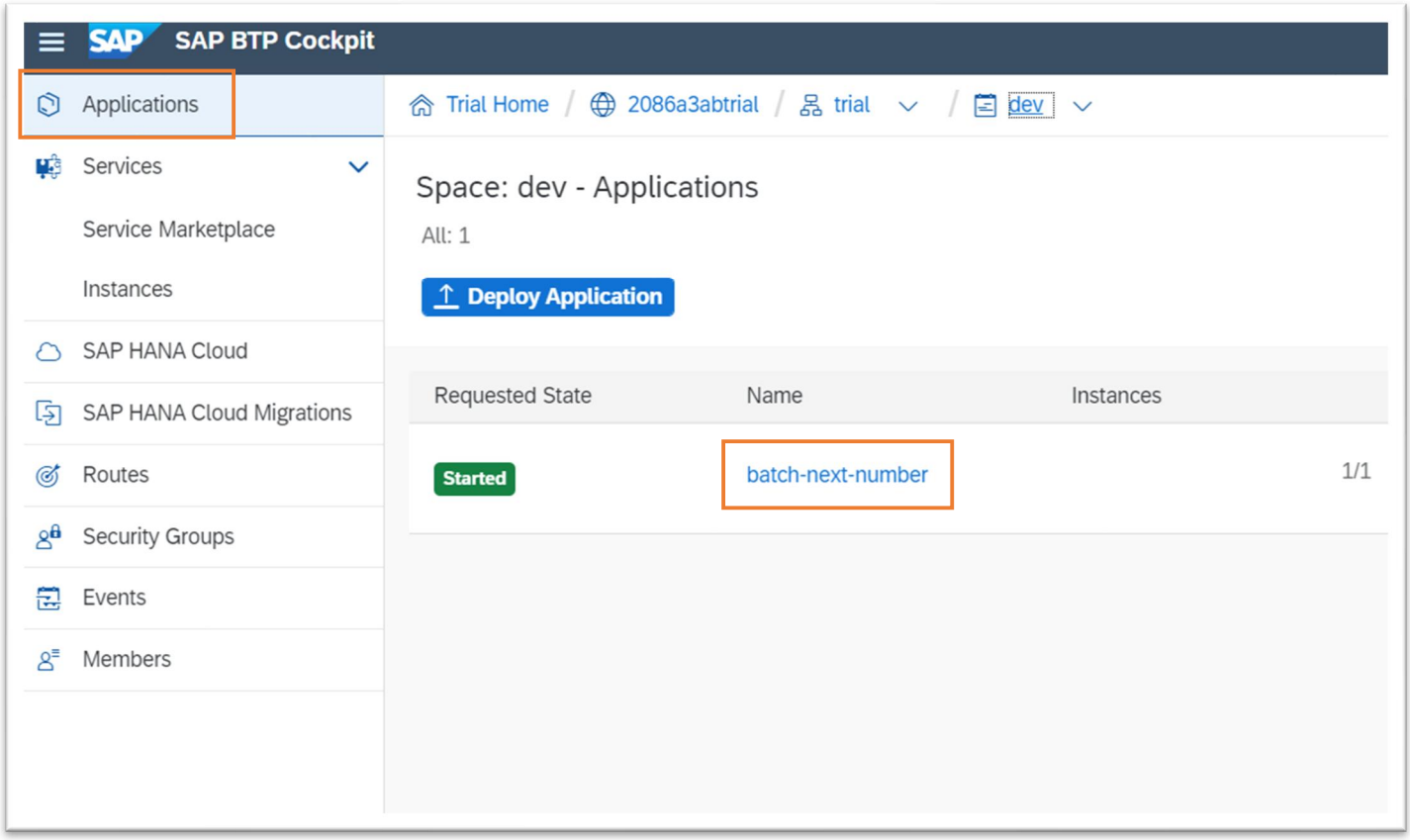
17. Right-click on the generated NN_Project_1.0.0.0.mtar file and choose Deploy MTA Archive.



Please NOTE: The first deployment will take time as new service for postgresql-db will be created and binding to your application. The next deployments should be faster!

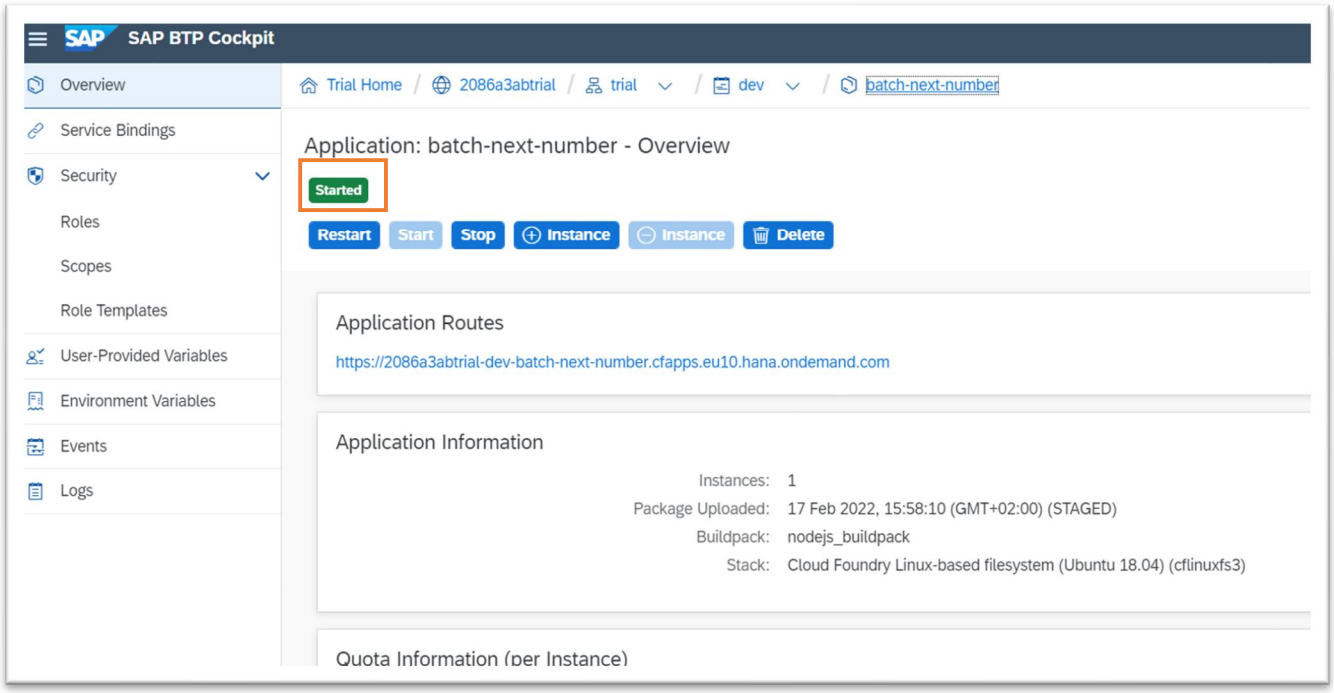


After deployment is done, your application should be available in your Cloud Foundry space. To access your application, go to your space in the SAP Cloud Platform cockpit and select Applications from the side menu.

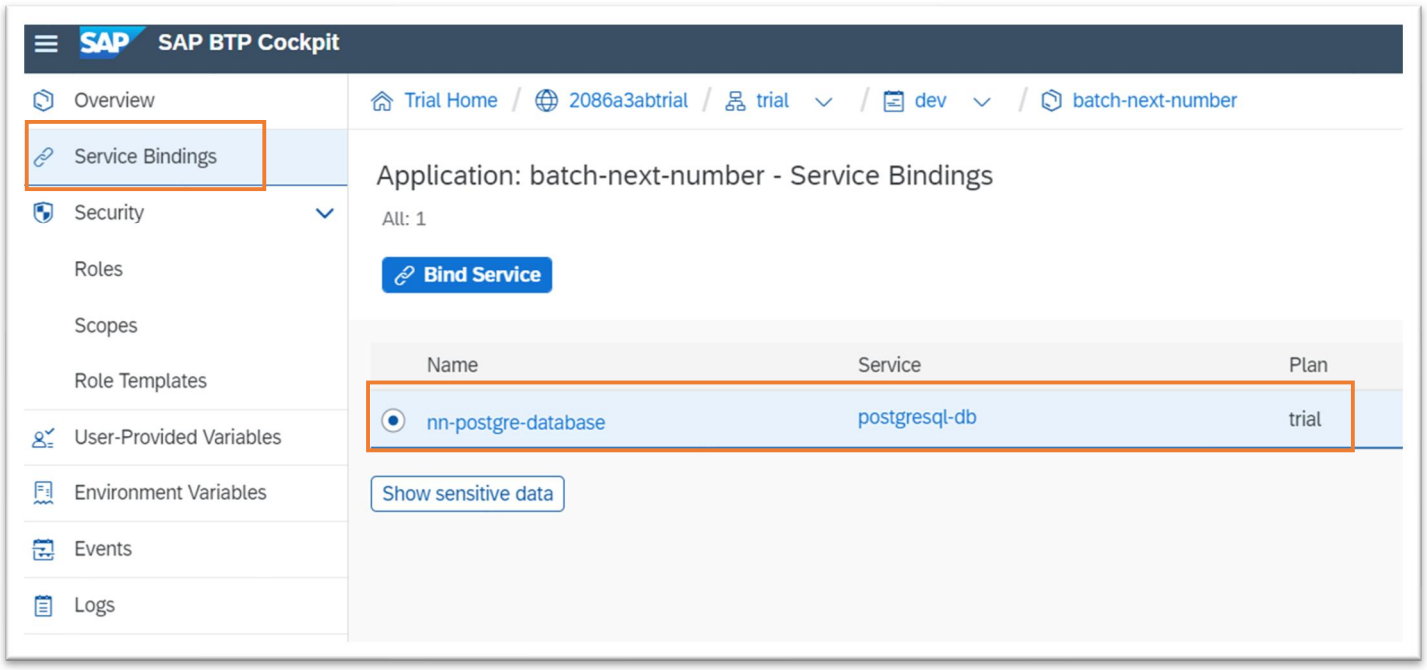


18. Choose a batch-next-number application to see details and status.

The application should have Started status.



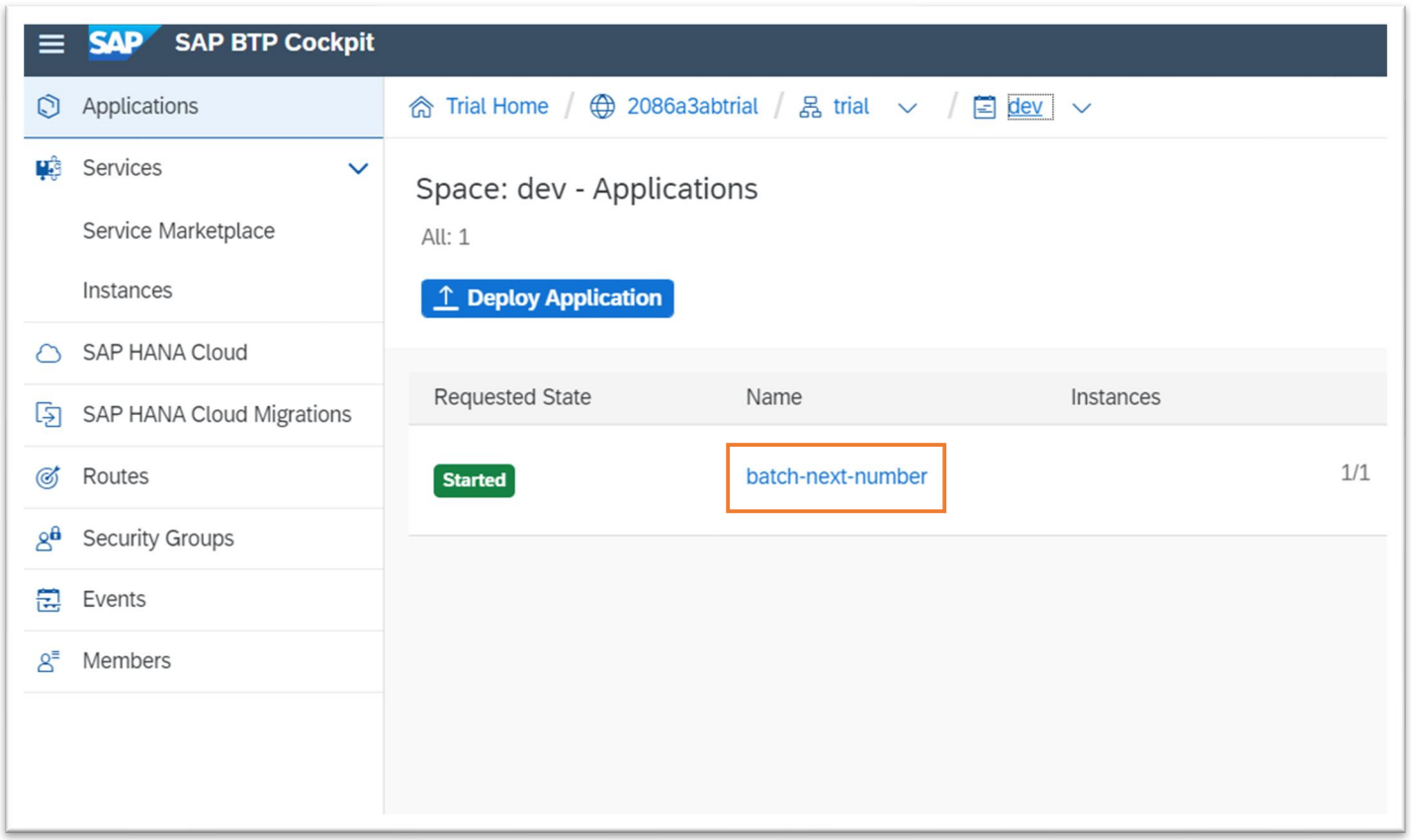
Choose Service Bindings from the side menu to verify that the posgersql-db service was created.



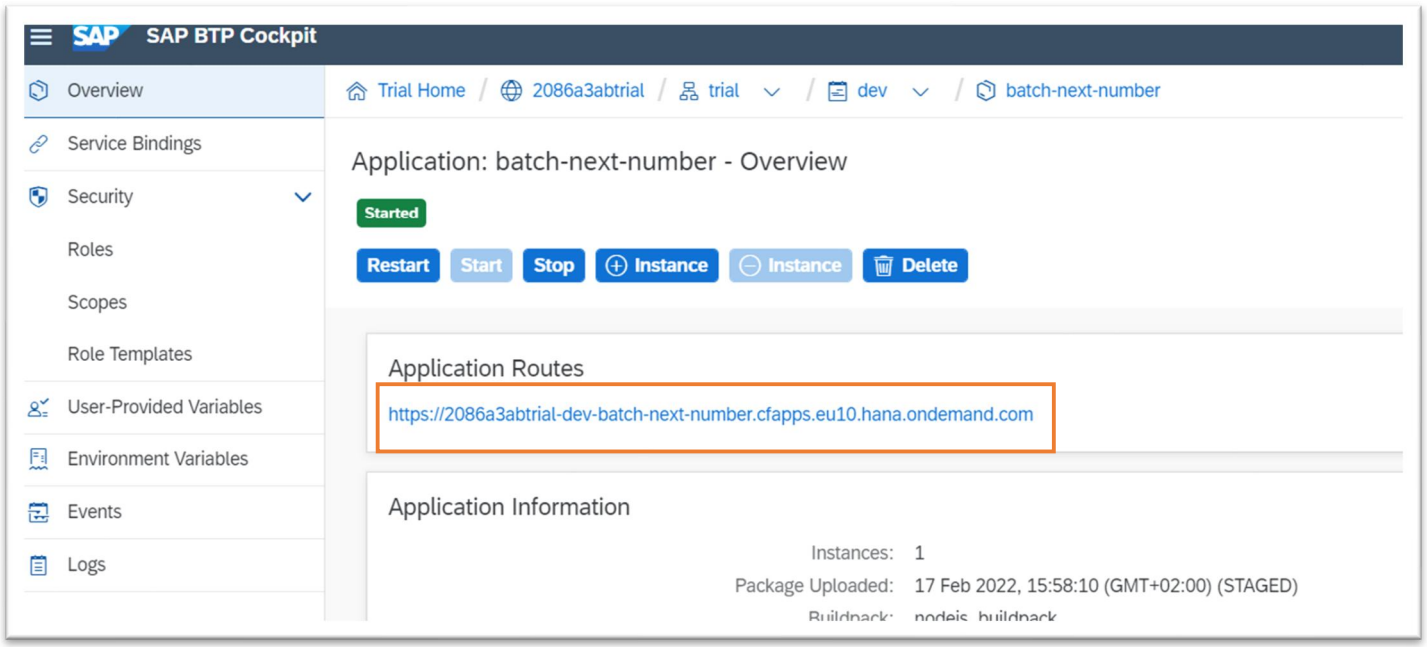
Installation steps are completed! Go to the Configuration Steps section!

Configuration Steps

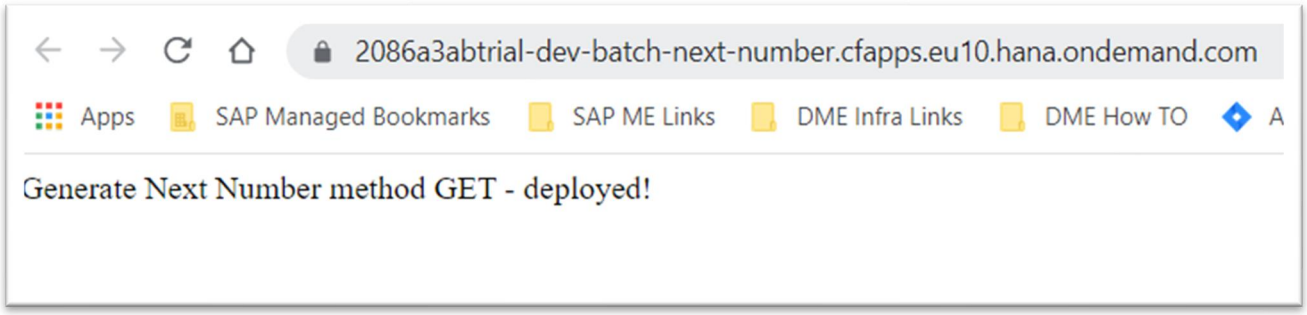
1. Go to your space in the SAP Cloud Platform cockpit and select Applications from the side menu
2. Choose the batch-next-number application



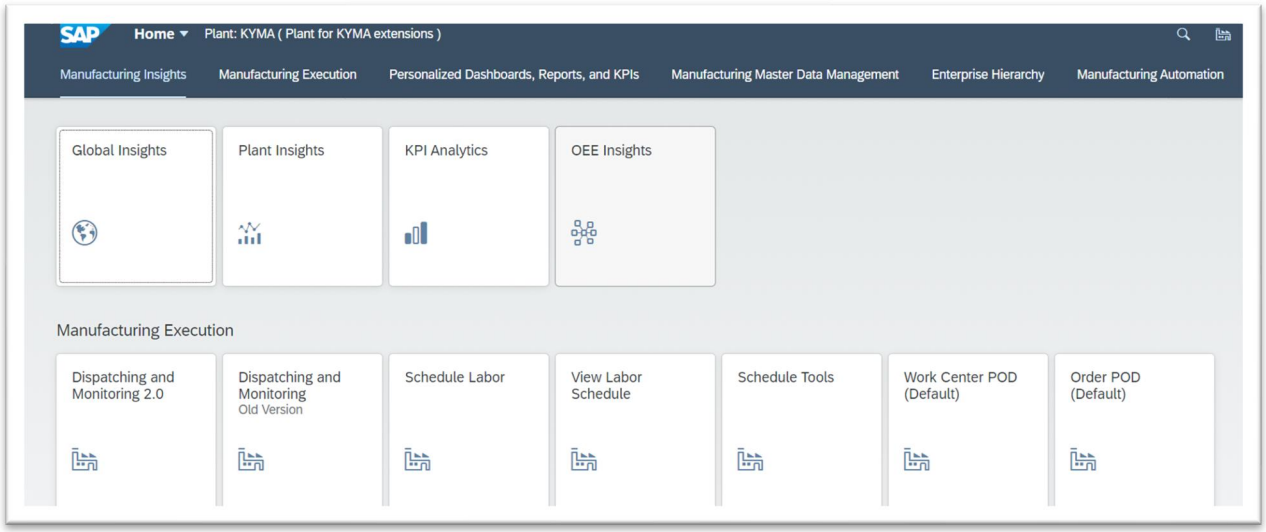
3. Click on Application Routes URL to verify that the service was deployed



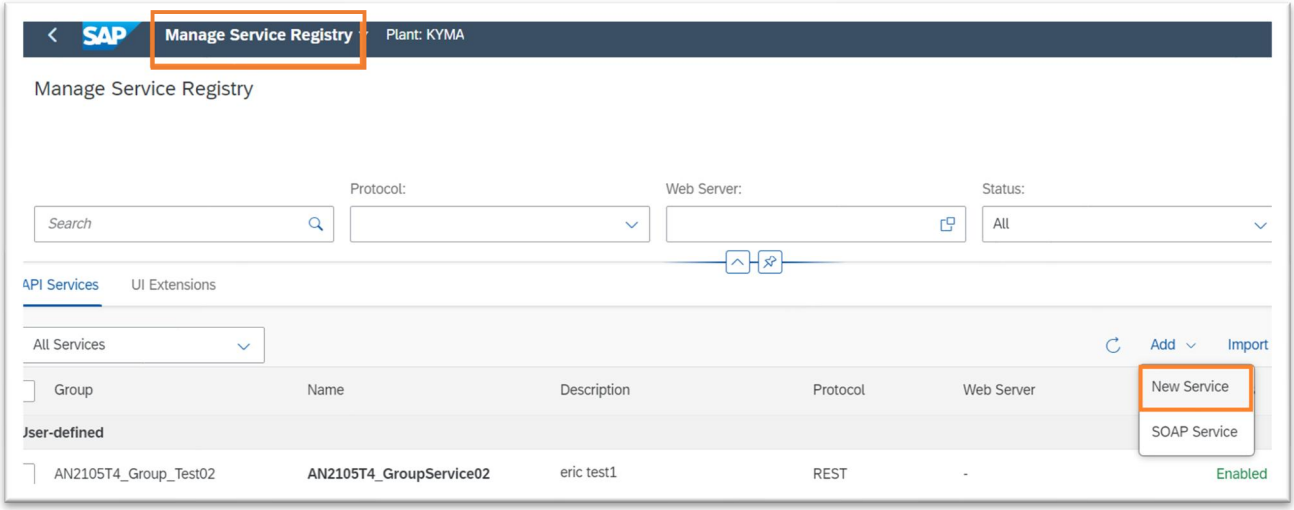
Here is the result of successful deployment to Cloud Foundry.



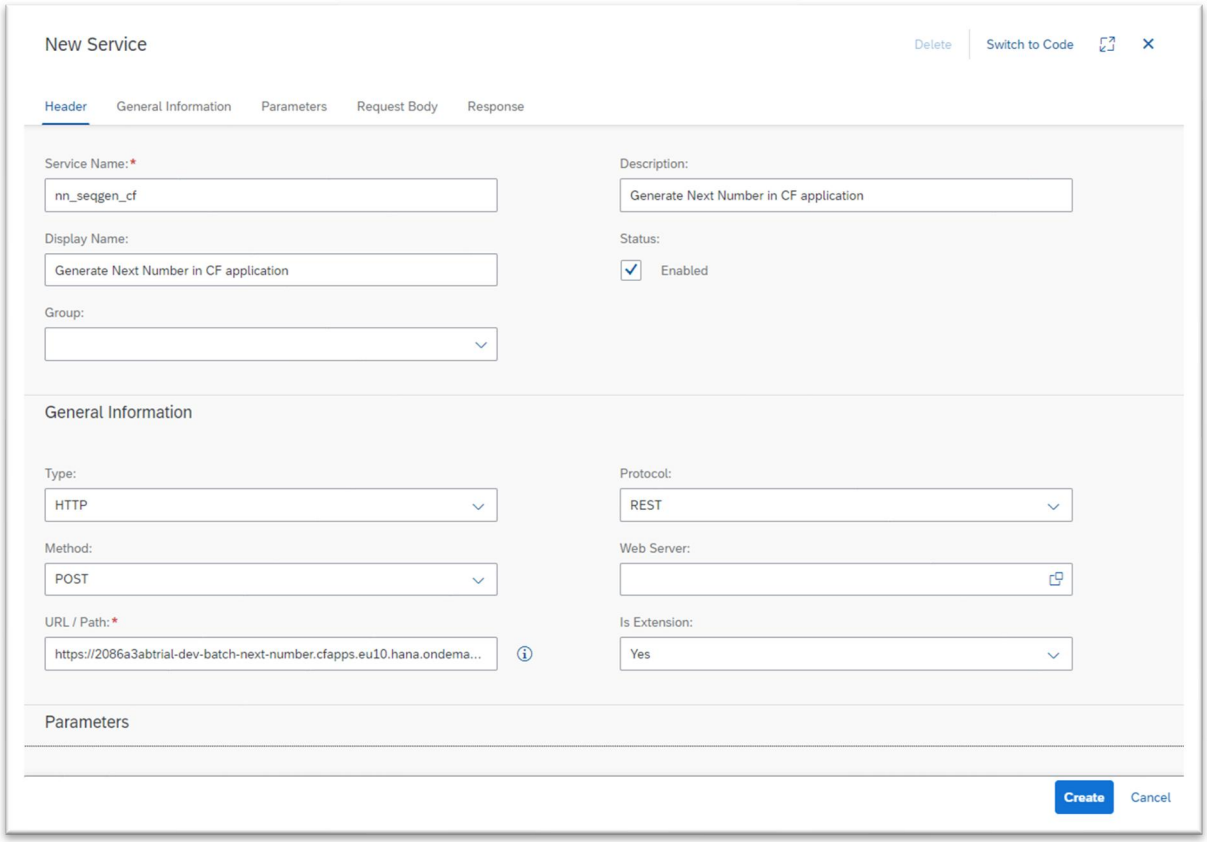
4. Copy application route URL as it will be used in Manage Service Registry application in next steps
5. Login to DMC



6. Open the Manage Service Registry application
7. Click on Add button and choose New Service option from the menu



8. Define new service with the following settings below

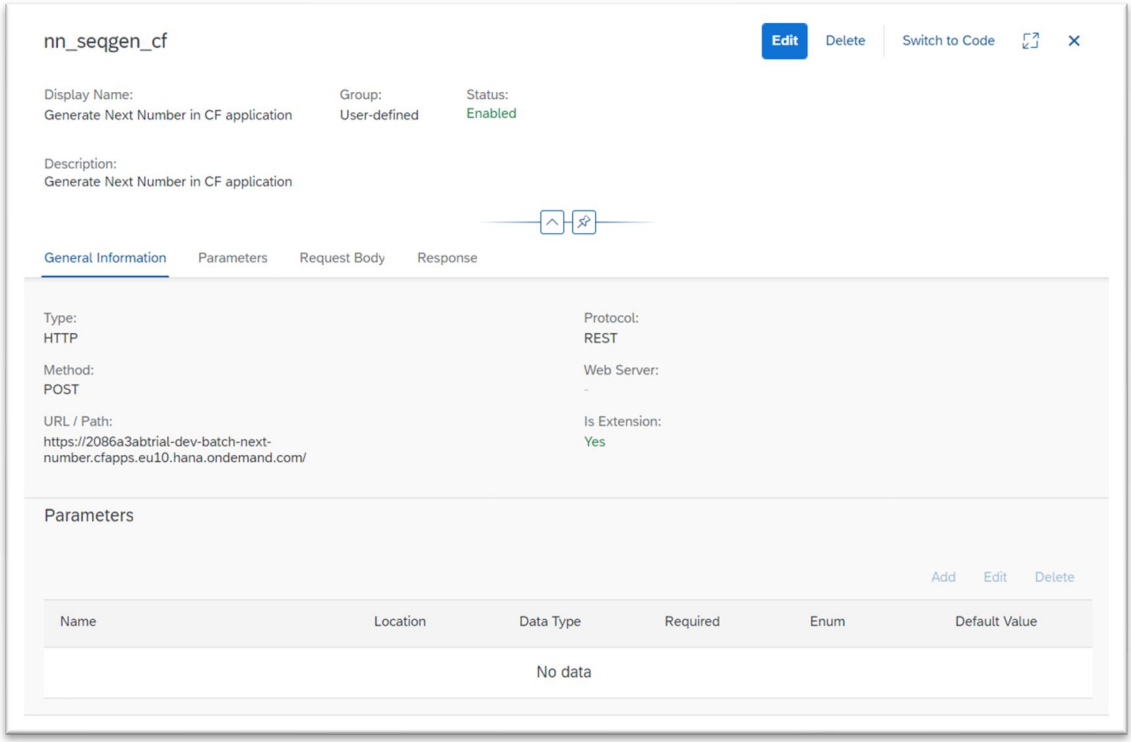


For URL/Path field use application route URL from clipboard.

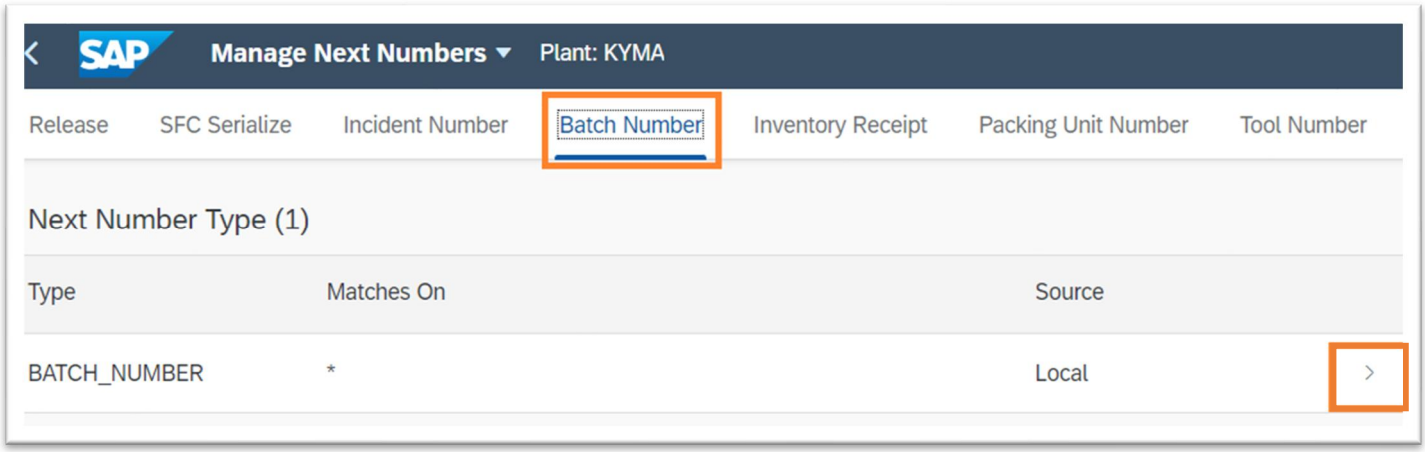
9. Choose Create and verify that the service was created with correct settings

Please NOTE:

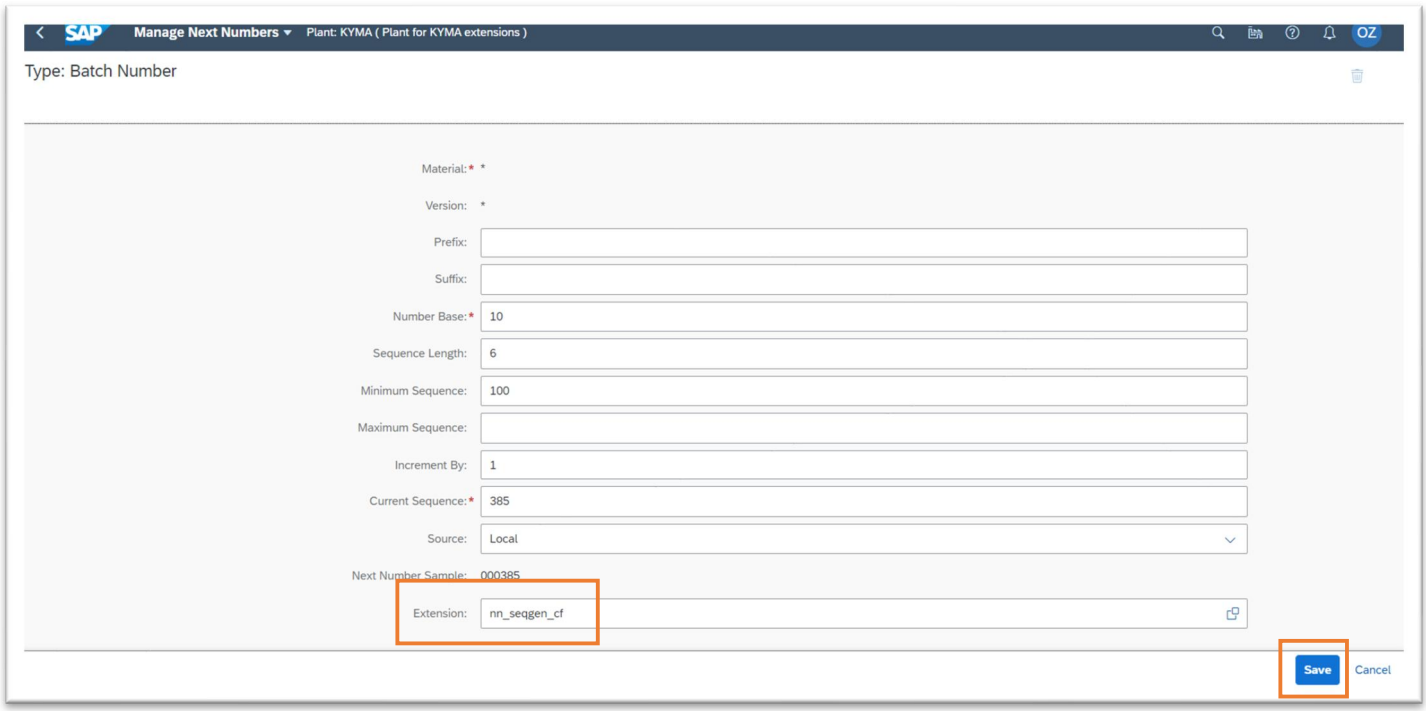
- Protocol -> REST
- Is Extension -> Yes
- Method -> POST
- URL/Path should finish with "/"



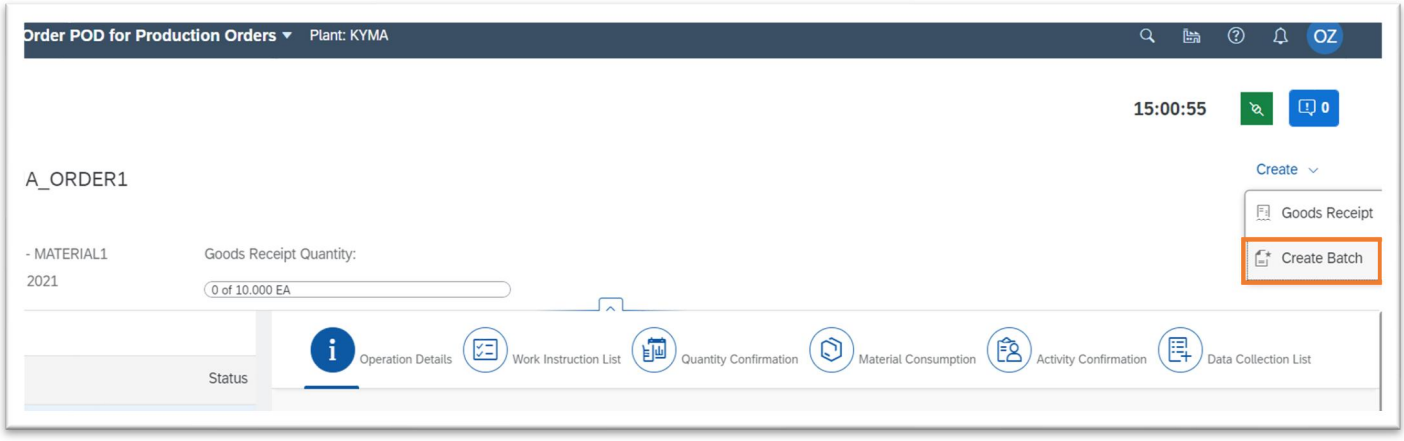
10. Open Manage Next Numbers application
11. Choose Batch Number type and choose Details



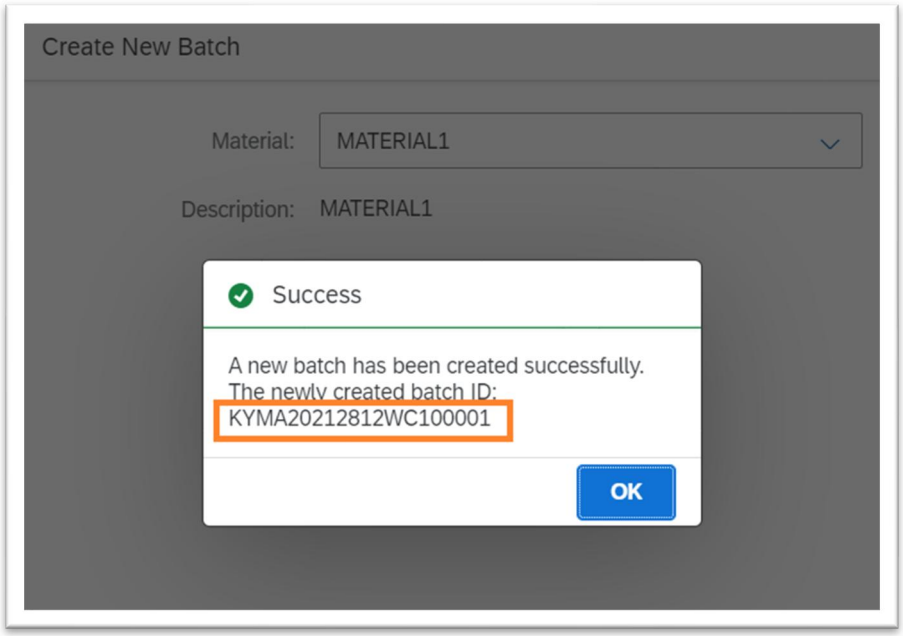
12. Define nn_seqgen_cf for the Extension field and click the Save button



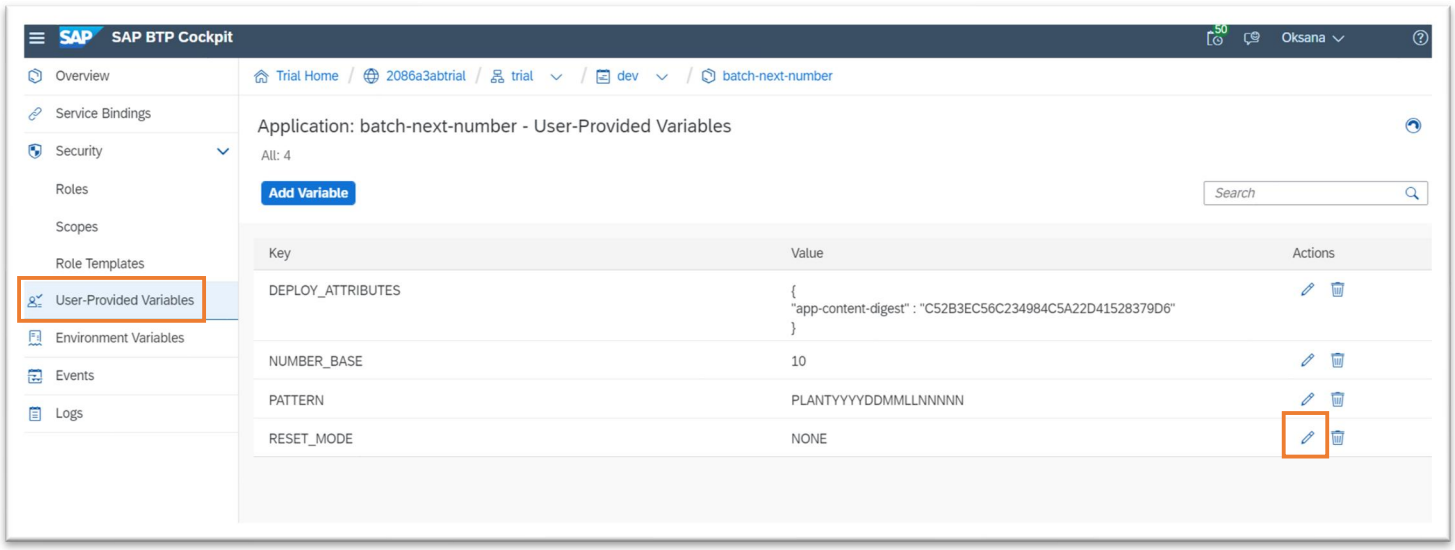
13. Open Order POD. Choose order.
14. Chose Create Batch menu option from Create



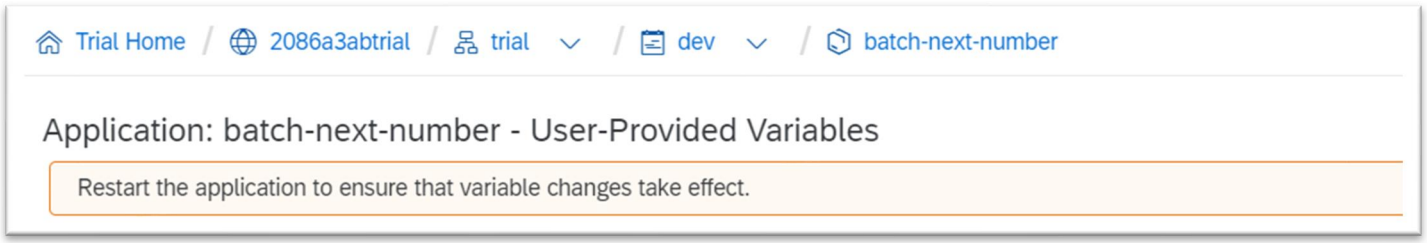
The new batch number was successfully generated in the REST service deployed to Cloud Foundry. The generated number is displayed to the user at Create New Batch screen.

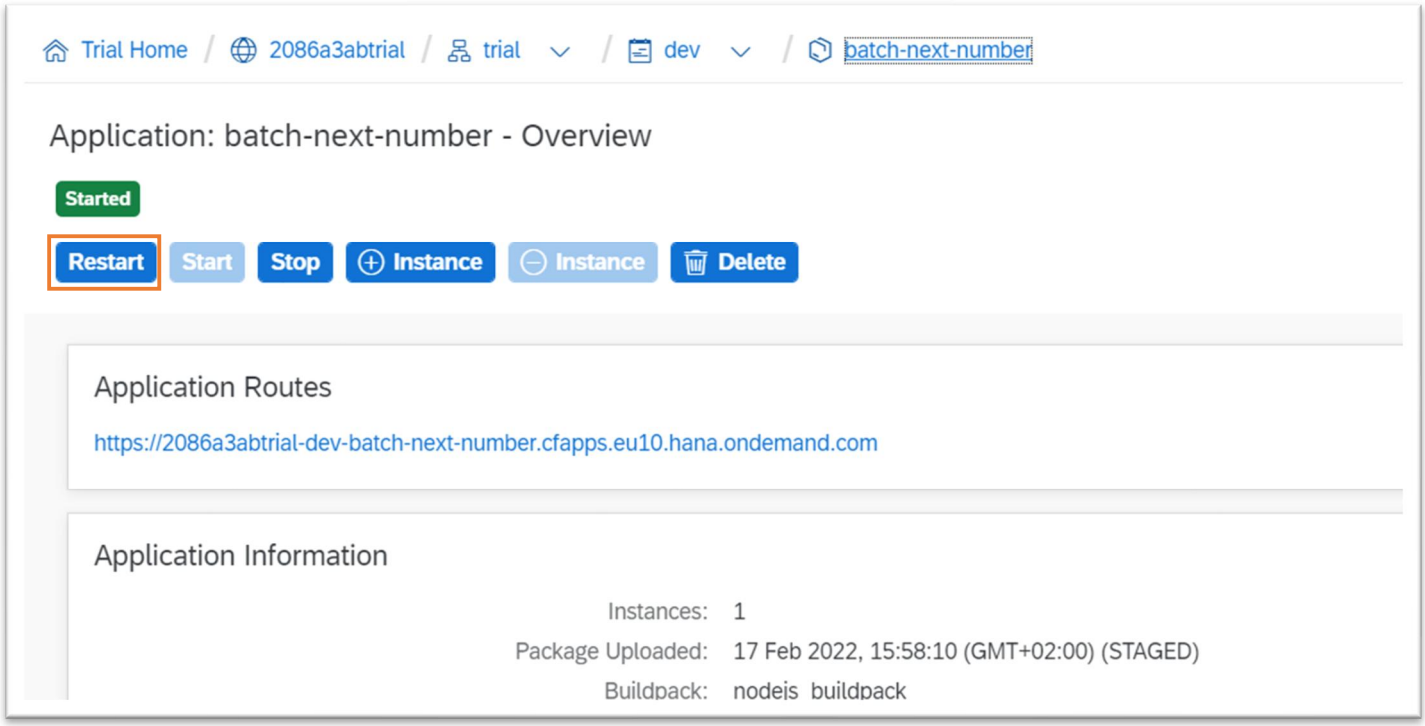


User-Provided Variables for batch-next-number application: PATTERN, RESET_MODE, or NUMBER_BASE can be used to change generate batch number service behavior.



Please NOTE: any value changes will require a batch-next-number application restart.





Restart should take just a few seconds. After restart service will use new values defined in user-provided variables.

Configuration Steps are completed!