



Deploy and test an S/4HANA Cloud extension in Kyma

This document demonstrates the steps to deploy and test an S/4HANA Cloud extension in SAP Business Technology Platform, Kyma Runtime.

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THE BEST RUN



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DISCLAIMER

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OBJECTIVE

This document is aimed for cloud developers (beginners or seasoned) and DevOps professionals.

The objective of this exercise is to demonstrate the steps to deploy and test an S/4HANA Cloud extension in SAP Business Technology Platform, Kyma Runtime.

SCENARIO

The S/4HANA Cloud extension is a simple Business Partner Management app, managing exclusively records of category “Person” and using only S/4HANA master data as persistence (nothing stored on the extension side, thus dismissing any database for persistence). It simply leverages the S/4 Business Partner OData service to execute the CRUD operations directly in the S/4 system, so it’s quite simple.

App components:

1. **Frontend UI: SAP Fiori Elements HTML5 app** based on the List Report/Object page templates. No coding on the UI – everything is interpreted from the backend service annotations by the Fiori Elements engine.
2. **Backend service: Cloud Application Programming Model app** with simple a service exposing an OData entity
3. **Create and update operations: Serverless Function** deployed directly in Kyma and invoked either directly or through an event message via event subscription. The event publishing can occur either from inside or outside the cluster (in the second case it uses another serverless function exposed outside the cluster via API Rule). All of this is determined through an environment parameter set upon application deployment.

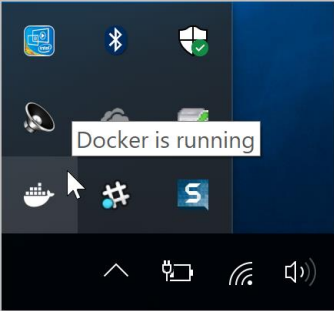
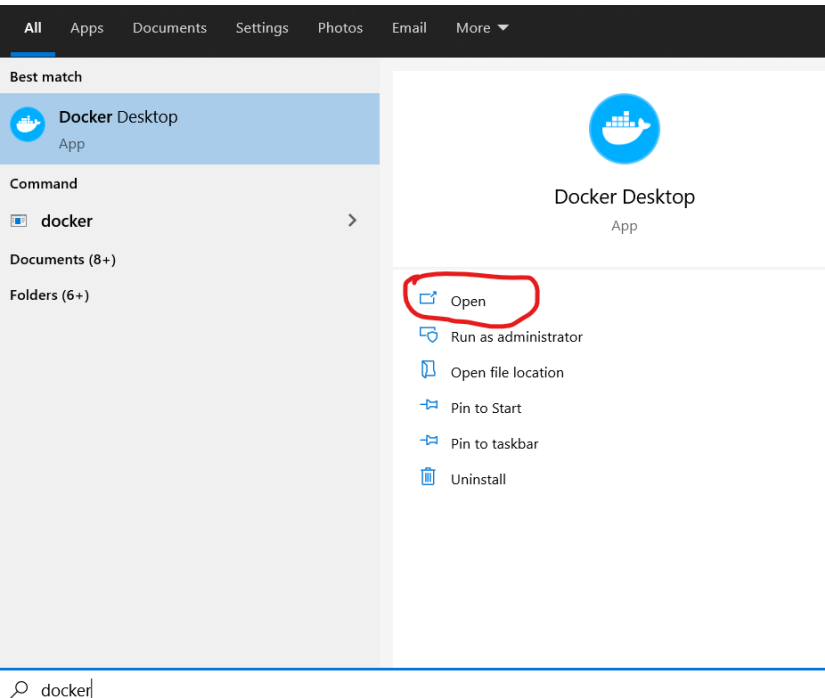
SUGGESTED PRE-READS

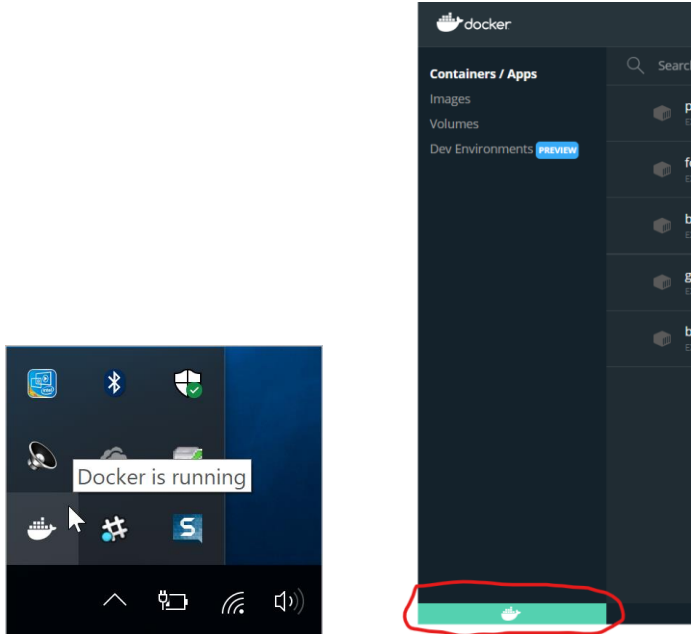
- [Basic Concepts of Kyma Environment](#)
- [Getting Started with the SAP BTP, Kyma runtime](#)

PREREQUISITES

- Have an **S/4HANA Cloud tenant** available with an active **communication user** set for inbound communication in a **communication arrangement** which is based on the communication scenario **SAP_COM_0008** (see: <https://help.sap.com/viewer/0f69f8fb28ac4bf48d2b57b9637e81fa/2108.501/en-US/fab3fd449cf74c6384622b98831e989e.html?q=communication%20arrangement>) – this is required to access the Business Partner OData Service v2.
 - How to get an S/4HANA Cloud trial: <https://www.sap.com/products/s4hana-erp/trial.html>
 - Create an SAP BTP trial account: <https://developers.sap.com/tutorials/hcp-create-trial-account.html>
 - Enable SAP BTP, Kyma Runtime: <https://developers.sap.com/tutorials/cp-kyma-getting-started.html>
 - Set up local development environment using VS Code: <https://developers.sap.com/tutorials/btp-app-set-up-local-development.html>
 - Install kubectl: <https://kubernetes.io/docs/tasks/tools/> (test the kubectl installation)
 - Install Helm Charts: <https://helm.sh/docs/intro/install/>
 - Install Make tool (Windows users):
 - Install Chocolatey: <https://chocolatey.org/install>
 - Run: **choco install make**.
-

- Install Docker Desktop: <https://www.docker.com/products/docker-desktop/>
- Install Docker extension in VS Code: <https://code.visualstudio.com/docs/containers/overview>
- Create an account on Docker Hub: <https://hub.docker.com/>
- Make sure Docker Desktop is running locally successfully.

Explanation	Screenshot
<p>Ensure docker symbol in windows taskbar.</p> <p>If not already running, please follow the steps here below.</p>	
<p>Search docker desktop and click Open</p>	

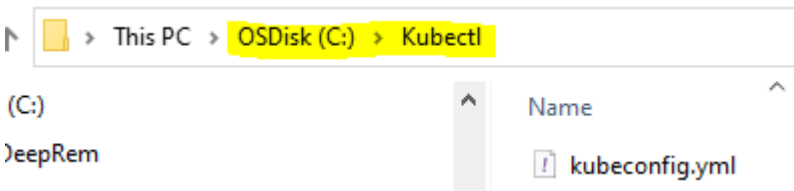
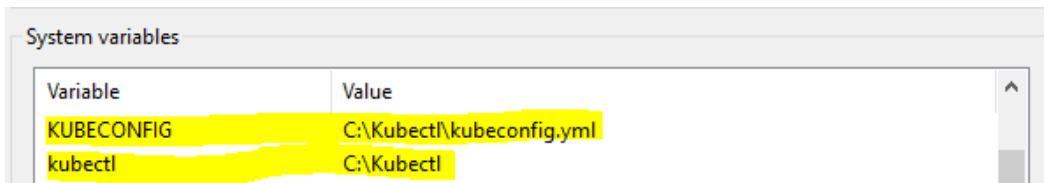
Explanation	Screenshot
Click docker icon and check green status	

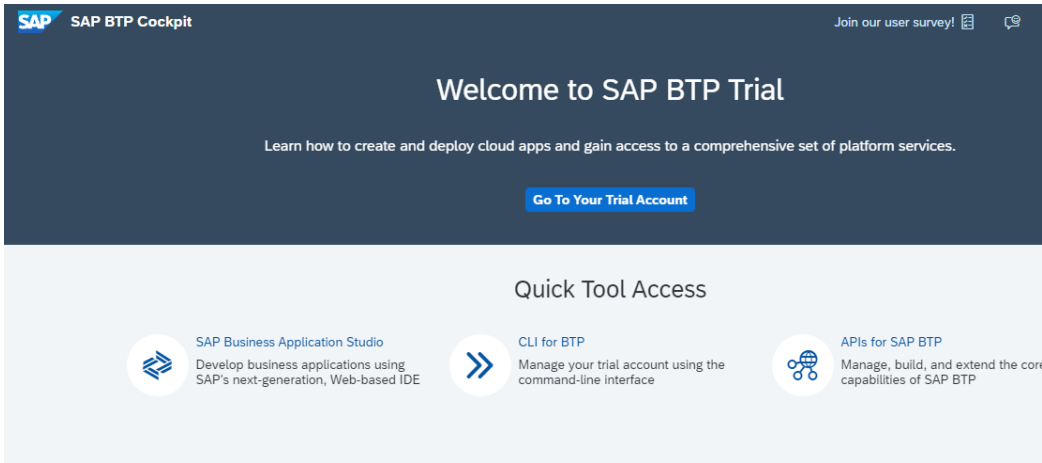
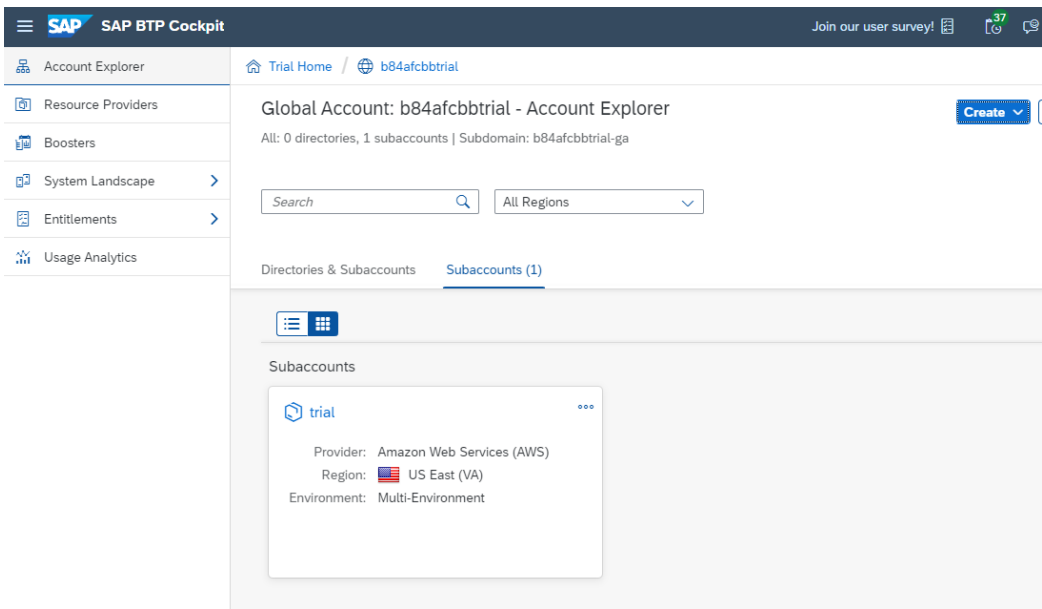
WARNING

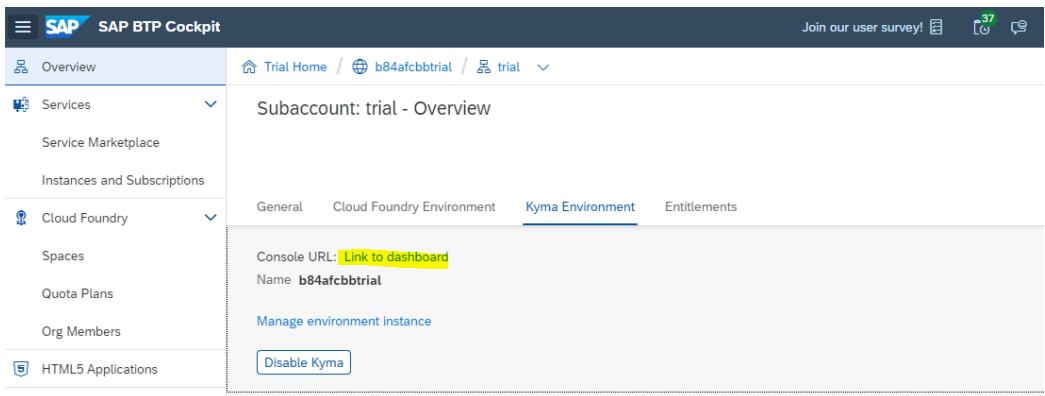
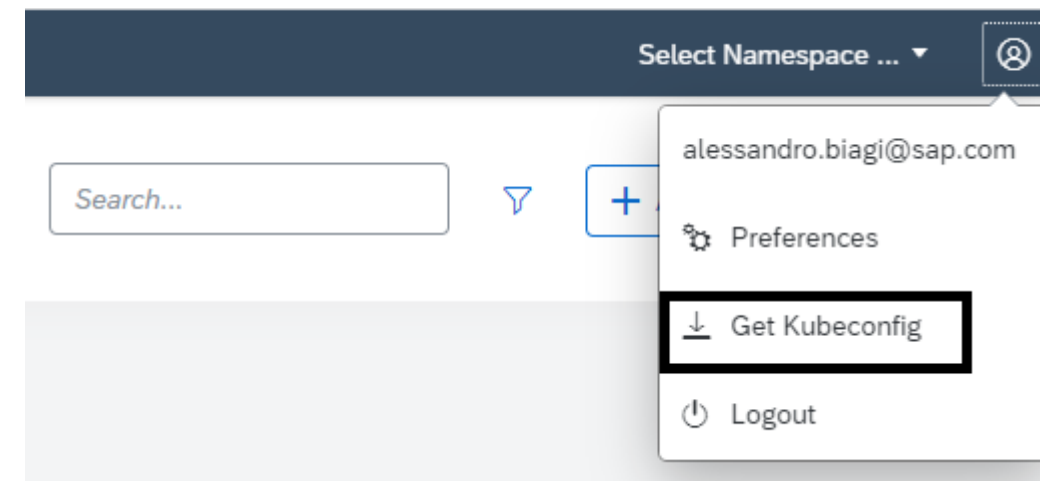
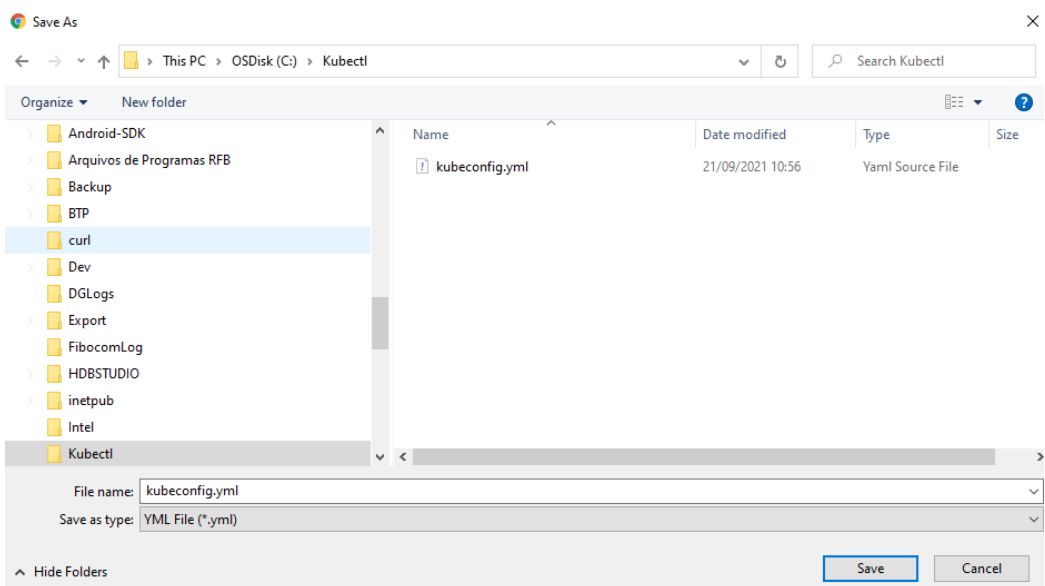
Failing to comply to any of the listed pre-requisites will prevent you from completing the exercise! Therefore, after completing each tutorial/document, make sure that everything you did is working properly!

EXERCISE


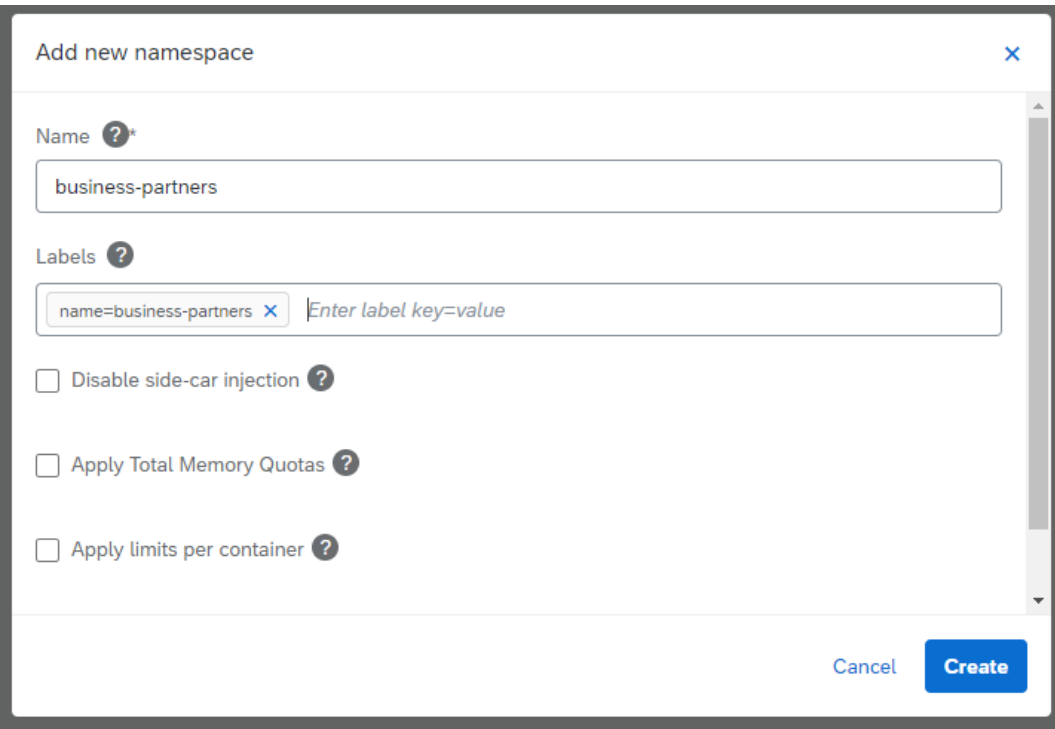
I. Set up Kubernetes context to point to the Kyma cluster

Explanation	Screenshot
Create a folder on your hard-drive to store the kubeconfig.yml file (there's an example of a folder named "C:\Kubectl" in the screenshot).	
Set two system environment variables (examples in the screenshot): <ul style="list-style-type: none"> • kubectl=<your folder path> • KUBECONFIG=<your r folder 	

Explanation	Screenshot
<p><code>path>\kubeconfig.yml</code></p> <p>Note: variable names are case-sensitive!</p>	
<p>Open your BTP trial account cockpit and click Go To Your Trial Account</p>	
<p>Click on your subaccount</p>	

Explanation	Screenshot
<p>Select the Kyma Environment tab and click the link: “Link to dashboard”</p>	
<p>In the Kyma Console UI click on the “little head” icon on the top right corner and select Get Kubeconfig</p>	
<p>Save the kubeconfig.yml file in the folder you created.</p> <p>Note: if the file is already there due to a previous access just overwrite it. Do not change the file name!</p> <p>These two steps to save the config file are required about 12 hours after each access to the cluster as the file token expires after that period..</p>	

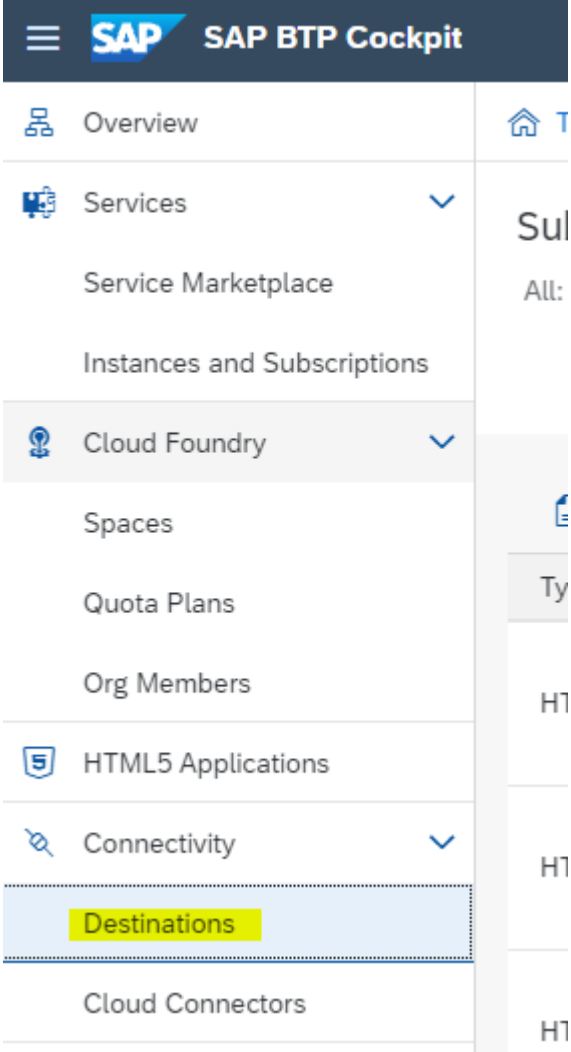
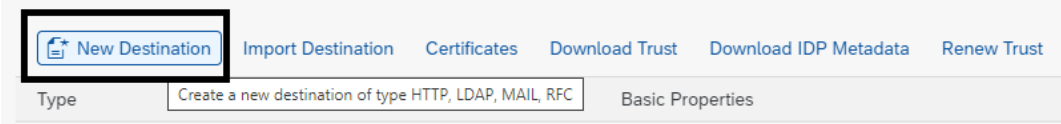
II. Create the application namespace

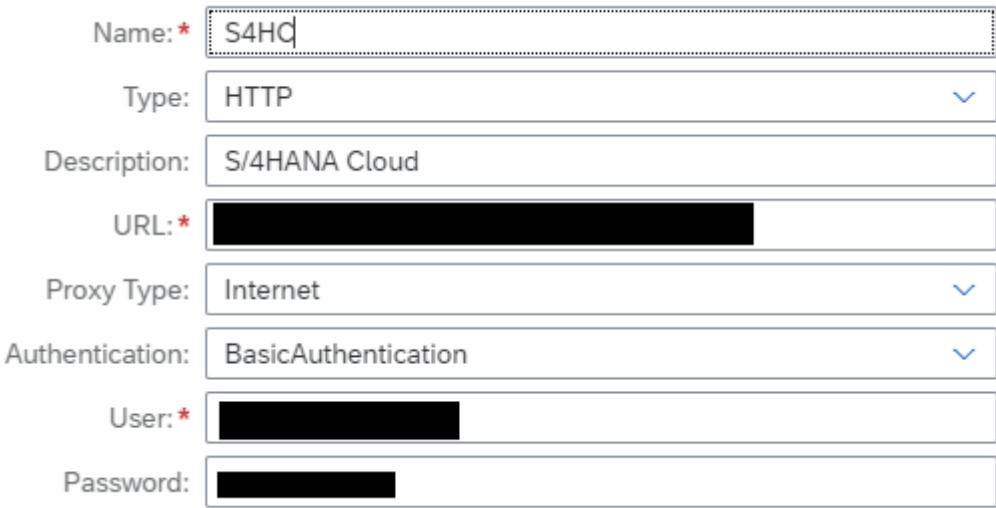
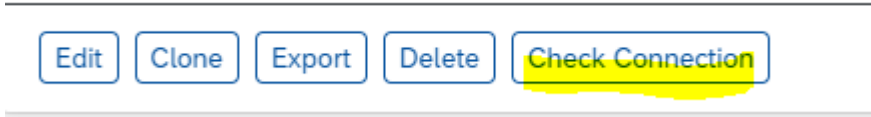
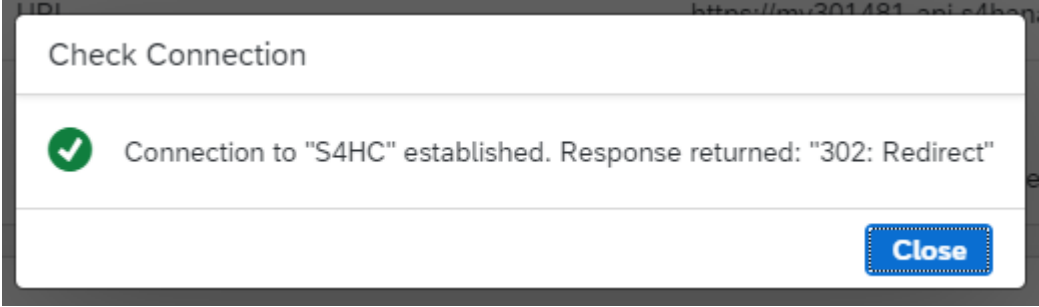
Explanation	Screenshot
In the Kyma Console UI click on Add new namespace in the top right corner	 A screenshot of the Kyma Console UI. It shows a search bar with the placeholder text 'Search...' and a filter icon. To the right of the search bar is a button labeled '+ Add new namespace' which is highlighted with a yellow rectangular box.
In the dialog, set: Name: business-partners Label: name=business-partners Click Create .	 A screenshot of the 'Add new namespace' dialog box. The dialog has a title bar with 'Add new namespace' and a close button. Inside, there is a 'Name' field with a question mark icon and an asterisk, containing the text 'business-partners'. Below it is a 'Labels' field with a question mark icon, containing a label 'name=business-partners' with a close button and a placeholder 'Enter label key=value'. At the bottom, there are three checkboxes: 'Disable side-car injection', 'Apply Total Memory Quotas', and 'Apply limits per container', each with a question mark icon. At the bottom right, there are 'Cancel' and 'Create' buttons.

Explanation	Screenshot
You should see a page like the one in the screenshot.	

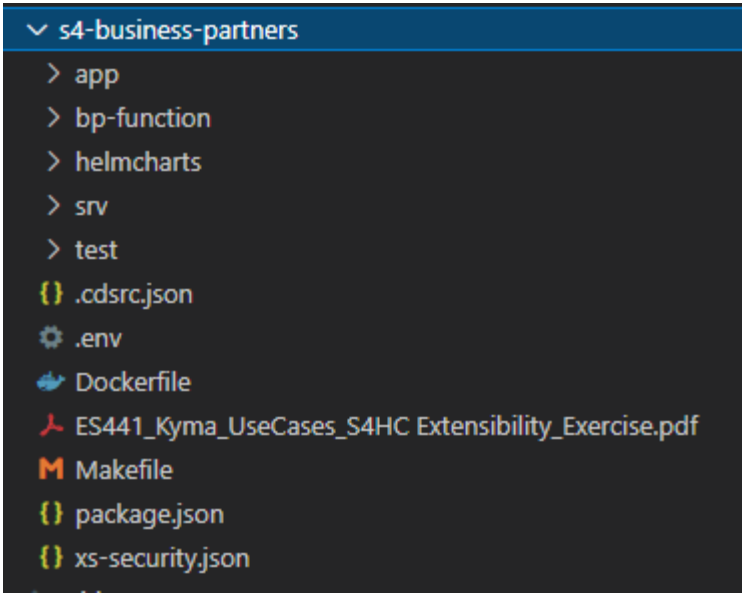
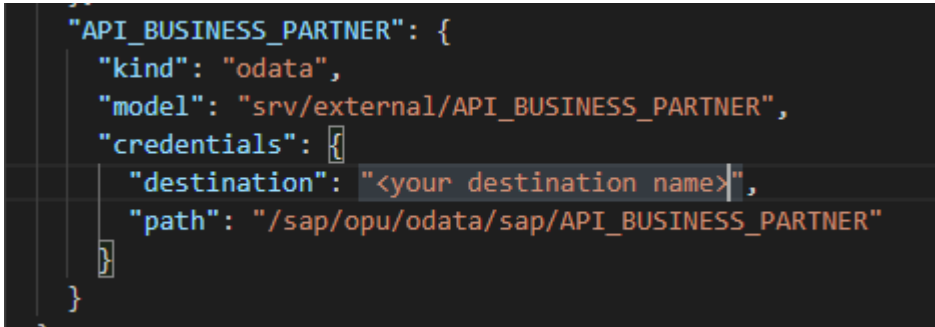
III. Create the destination to S/4HANA Cloud

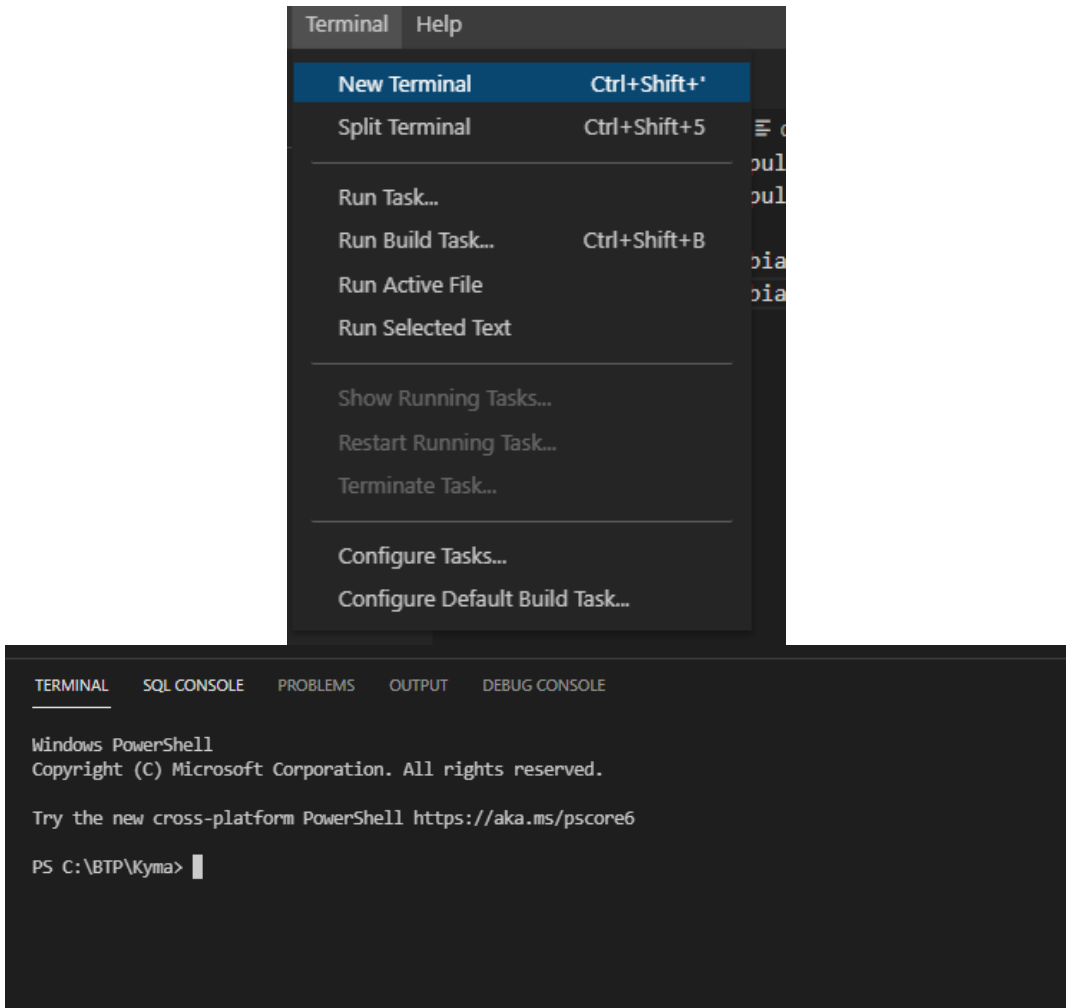
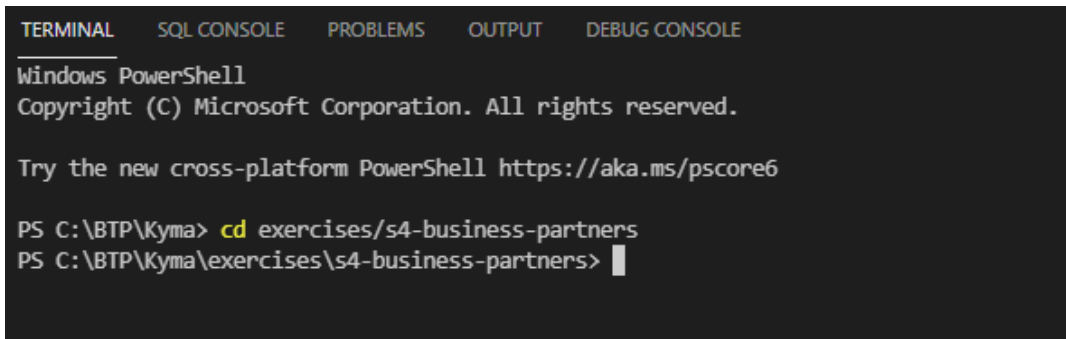
Explanation	Screenshot
Go back to your subaccount cockpit	

Explanation	Screenshot
In the left-hand side menu expand the Connectivity section and click on Destinations .	 <p>The screenshot shows the SAP BTP Cockpit interface. The left-hand menu is expanded to the 'Connectivity' section, which is highlighted with a blue background. Within this section, the 'Destinations' option is highlighted with a yellow box. Other options visible in the menu include Overview, Services, Service Marketplace, Instances and Subscriptions, Cloud Foundry, Spaces, Quota Plans, Org Members, HTML5 Applications, and Cloud Connectors. The right-hand side of the interface shows a list of destinations, with the first one labeled 'Sul' and 'All:'.</p>
Click on New Destination .	 <p>The screenshot shows the 'Subaccount: trial - Destinations' page. The 'New Destination' button is highlighted with a black box. Other buttons visible include 'Import Destination', 'Certificates', 'Download Trust', 'Download IDP Metadata', and 'Renew Trust'. Below the buttons, there is a section for 'Type' with a dropdown menu showing 'Create a new destination of type HTTP, LDAP, MAIL, RFC' and a 'Basic Properties' section.</p>

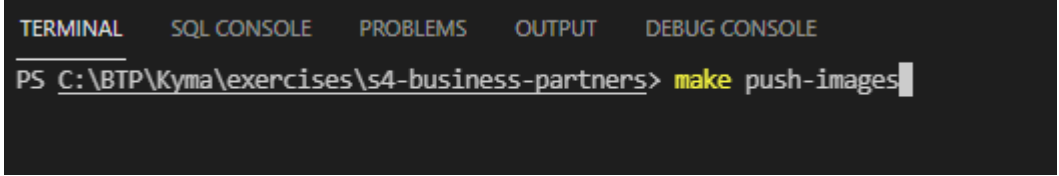
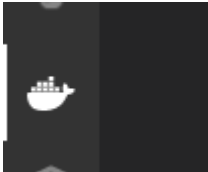
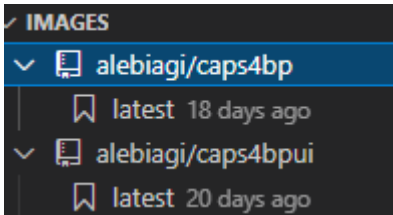
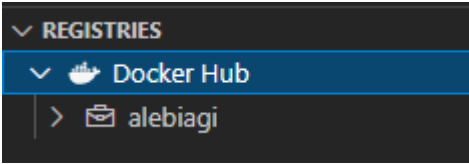
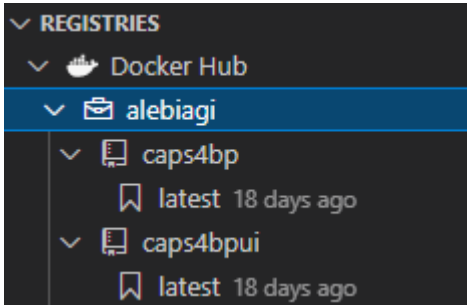
Explanation	Screenshot
<p>Fill-in the destination info accordingly:</p> <p>Name: any name of your choice (i.e. S4HC – just a suggestion) Type: HTTP Description: S/4HANA Cloud URL: URL of your S/4HANA Cloud tenant Proxy Type: Internet Authentication: BasicAuthentication User: username of your communication user Password: password of your communication user</p> <p>Click Save.</p>	
<p>In the bottom bar click Check Connection.</p>	
<p>If successful, you should see a dialog like the one in the screenshot.</p> <p>Just click Close.</p>	

IV. Build and push the Docker images

Explanation	Screenshot
Open the s4-business-partners folder from the cloned Git Repo in your VS Code .	 A screenshot of the VS Code File Explorer sidebar. The 's4-business-partners' folder is expanded, showing a list of files and subfolders: 'app', 'bp-function', 'helmcharts', 'srv', 'test', '.cdsrc.json', '.env', 'Dockerfile', 'ES441_Kyma_UseCases_S4HC Extensibility_Exercise.pdf', 'Makefile', 'package.json', and 'xs-security.json'.
In the File Explorer on the left-hand pane, open the file package.json and replace the place holder <your destination name> with the name of the destination you created at the previous section (i.e. S4HC). Save the file.	 A screenshot of the 'package.json' file in VS Code. The JSON content is as follows: <pre>"API_BUSINESS_PARTNER": { "kind": "odata", "model": "srv/external/API_BUSINESS_PARTNER", "credentials": { "destination": "<your destination name>", "path": "/sap/opu/odata/sap/API_BUSINESS_PARTNER" } }</pre>

Explanation	Screenshot
<p>From the menu Terminal select New Terminal to open the command terminal.</p>	 <p>The screenshot shows the Visual Studio Code interface. At the top, the 'Terminal' menu is open, displaying options: 'New Terminal' (Ctrl+Shift+'), 'Split Terminal' (Ctrl+Shift+5), 'Run Task...', 'Run Build Task...' (Ctrl+Shift+B), 'Run Active File', 'Run Selected Text', 'Show Running Tasks...', 'Restart Running Task...', 'Terminate Task...', 'Configure Tasks...', and 'Configure Default Build Task...'. Below the menu, the terminal window is visible, showing a Windows PowerShell prompt at 'PS C:\BTP\Kyma>'.</p>
<p>CD into the source code folder of the project</p> <p>cd <your cloned root>/s4-business-partners</p>	 <p>The screenshot shows the terminal window with the command 'cd exercises/s4-business-partners' entered and executed. The prompt changes from 'PS C:\BTP\Kyma>' to 'PS C:\BTP\Kyma\exercises\s4-business-partners>'.</p>

Explanation	Screenshot
<p>Build the CAP application with the command:</p> <p>cds build --production</p>	 <pre> TERMINAL SQL CONSOLE PROBLEMS OUTPUT DEBUG CONSOLE Windows PowerShell Copyright (C) Microsoft Corporation. All rights reserved. Try the new cross-platform PowerShell https://aka.ms/pscore6 PS C:\BTP\Kyma> cd exercises/s4-business-partners PS C:\BTP\Kyma\exercises\s4-business-partners> cds build --production </pre>
<p>Check the logs in the console, as well as the file explorer to verify the contents of the folder gen\srv has been properly generated.</p>	 <pre> [cds] - done > wrote output to: gen\srv\.cfignore gen\srv\manifest.yml gen\srv\package.json gen\srv\srv\bp-adm-service.js gen\srv\srv\csn.json gen\srv\srv\external\API_BUSINESS_PARTNER.csn gen\srv\srv\external\API_BUSINESS_PARTNER.edmx gen\srv\srv\helper.js [cds] - build completed in: 477.865ms </pre> <p>File Explorer view of gen\srv:</p> <ul style="list-style-type: none"> > srv .cfignore ! manifest.yml { package.json
<p>In the File Explorer on the left-hand pane, open the Makefile and replace the place holder <your docker account> with the name of the Docker account you must have created as per the 9th prerequisite of this document.</p> <p>Save the file.</p>	 <pre> DOCKER_ACCOUNT=<your docker account> build-capimage: ## Build the container without caching docker build --pull --rm -f Dockerfile -t \$(DOCKER_ACCOUNT)/caps4bp:latest . build-uiimage: docker build --pull --rm -f app/ui.Dockerfile -t \$(DOCKER_ACCOUNT)/caps4bpui:latest ./app push-images: build-capimage build-uiimage docker push \$(DOCKER_ACCOUNT)/caps4bp:latest docker push \$(DOCKER_ACCOUNT)/caps4bpui:latest </pre>

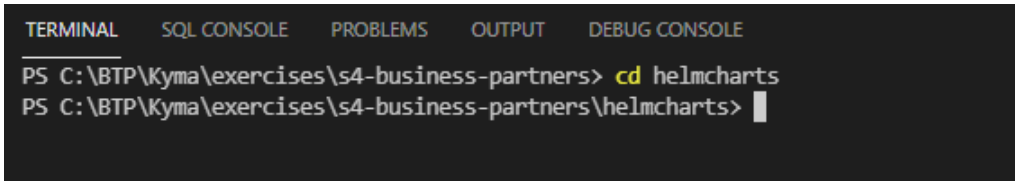
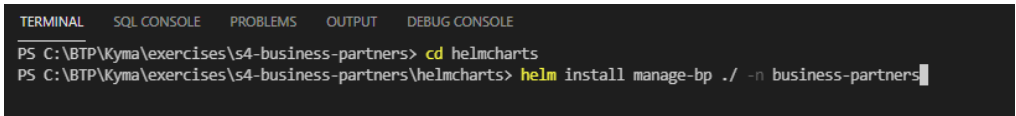
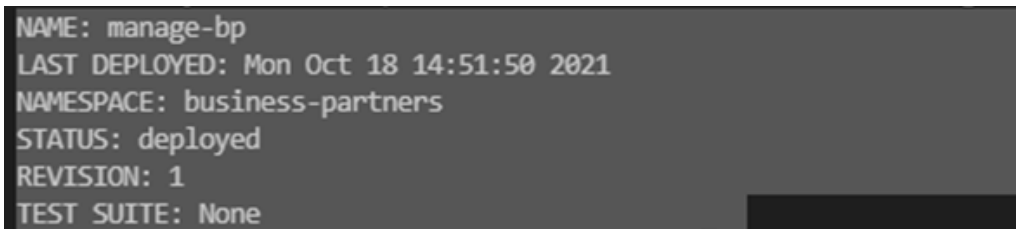
Explanation	Screenshot
Build and push the Docker images with the command: make push-images	 A screenshot of a terminal window with tabs for 'TERMINAL', 'SQL CONSOLE', 'PROBLEMS', 'OUTPUT', and 'DEBUG CONSOLE'. The terminal shows the command 'PS C:\BTP\Kyma\exercises\s4-business-partners> make push-images' with a cursor at the end.
When the process is completed access the VS Code Docker extension the left-hand panel clicking on the icon in the screenshot.	 A small icon of a Docker ship, which is the logo for the Docker extension in VS Code.
Expand the Images node and check whether the two images have been created.	 A screenshot of the Docker extension's 'IMAGES' panel. It shows two images: 'alebiagi/caps4bp' with a 'latest' tag from 18 days ago, and 'alebiagi/caps4bpui' with a 'latest' tag from 20 days ago.
Expand the Registries node and the Docker Hub node. You should see your Docker account listed like in the screenshot.	 A screenshot of the Docker extension's 'REGISTRIES' panel. It shows 'Docker Hub' expanded, with the 'alebiagi' account listed below it.
Expand your Docker account and check whether the two images have been pushed	 A screenshot of the Docker extension's 'REGISTRIES' panel. The 'alebiagi' account is expanded, showing two images: 'caps4bp' with a 'latest' tag from 18 days ago, and 'caps4bpui' with a 'latest' tag from 18 days ago.

V. Adjust the Helm Charts values

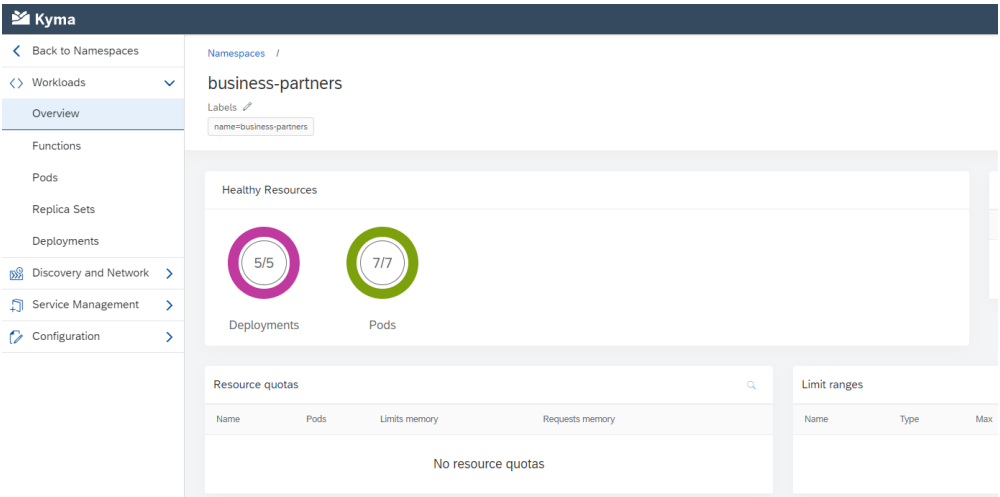
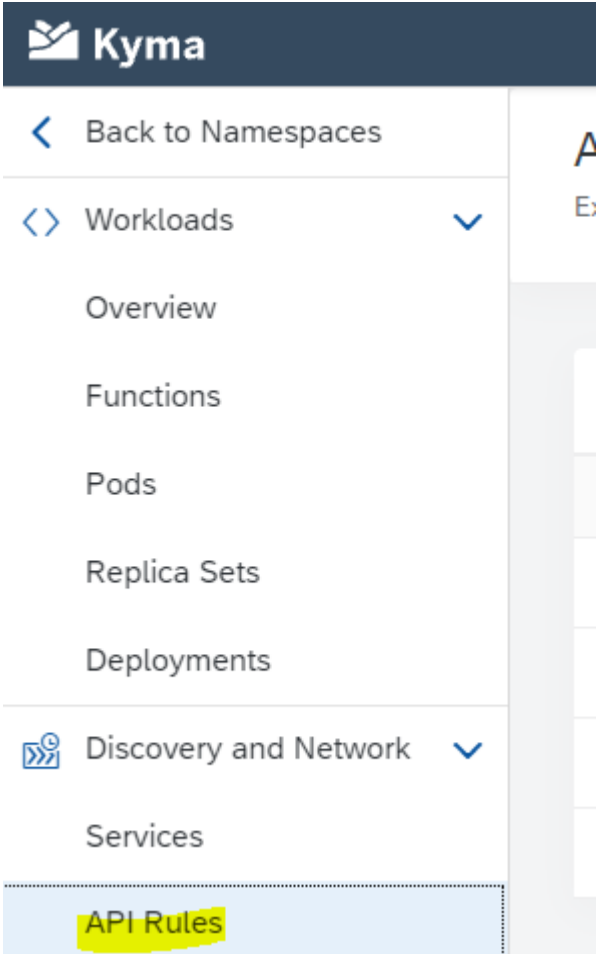
Explanation	Screenshot
Go back to the Kyma Console UI	
Look at the URL in browser and copy the cluster URL (text right after “console.” stopping right before the slash to the clipboard, like demonstrated in the screenshot.	
<p>In the File Explorer on the left-hand pane, expand the helmcharts folder and open the file values.yaml.</p> <p>Replace the place holders accordingly:</p> <p>Over <your docker account> write your account name</p> <p>Over <your cluster url> paste the value copied in the previous step</p> <p>Over <your destination name> write the name of</p>	

Explanation	Screenshot
<p>the destination created at section III (i.e. S4HC).</p> <p>Save the file.</p>	

VI. Install the package

Explanation	Screenshot
<p>In the terminal, CD to the helmcharts folder.</p>	 <pre> TERMINAL SQL CONSOLE PROBLEMS OUTPUT DEBUG CONSOLE PS C:\BTP\Kyma\exercises\s4-business-partners> cd helmcharts PS C:\BTP\Kyma\exercises\s4-business-partners\helmcharts> </pre>
<p>Install the package with the command:</p> <p>helm install manage-bp ./ -n business-partners</p>	 <pre> TERMINAL SQL CONSOLE PROBLEMS OUTPUT DEBUG CONSOLE PS C:\BTP\Kyma\exercises\s4-business-partners> cd helmcharts PS C:\BTP\Kyma\exercises\s4-business-partners\helmcharts> helm install manage-bp ./ -n business-partners </pre>
<p>After some seconds you should see the contents displayed in the screenshot in the logs of your console.</p>	 <pre> NAME: manage-bp LAST DEPLOYED: Mon Oct 18 14:51:50 2021 NAMESPACE: business-partners STATUS: deployed REVISION: 1 TEST SUITE: None </pre>

VII. Test the application

Explanation	Screenshot
<p>It's going to take a couple of minutes until all deployments and pods are running healthy in your Kyma namespace.</p> <p>So, go back to your Kyma Console UI and wait until it shows a status exactly like in the screenshot.</p>	
<p>On the left-hand pane expand Discovery and Network and click on API Rules</p>	

Click on the **URL** next to the **manage-bp-ui-app-router** API Rule, like demonstrated in the screenshot to open the application.

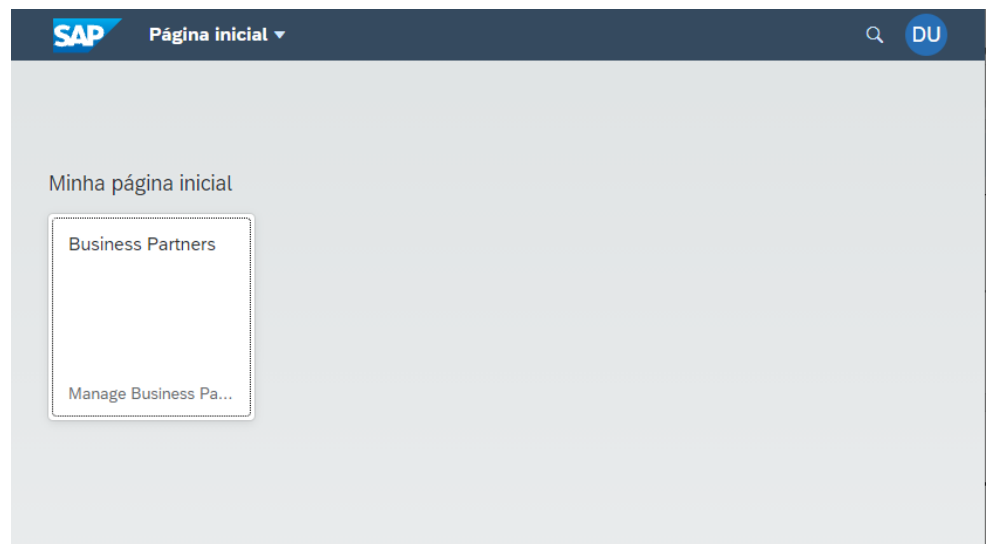
API Rules

Expose Services outside the cluster with API Rules.

Name	Host
manage-bp-updfunc	https://manage-bp-updfunc.b77cd9f.kyma.shoot.live.k8s-hana.ondemand.com
manage-bp-ui-approuter	https://manage-bp-ui-approuter.b77cd9f.kyma.shoot.live.k8s-hana.ondemand.com
manage-bp-caps4bp	https://manage-bp-caps4bp.b77cd9f.kyma.shoot.live.k8s-hana.ondemand.com
manage-bp-eventpub	https://manage-bp-eventpub.b77cd9f.kyma.shoot.live.k8s-hana.ondemand.com

A new tab should be opened in your browser displaying a tile like in the screenshot.

Click on the **Business Partners** tile.

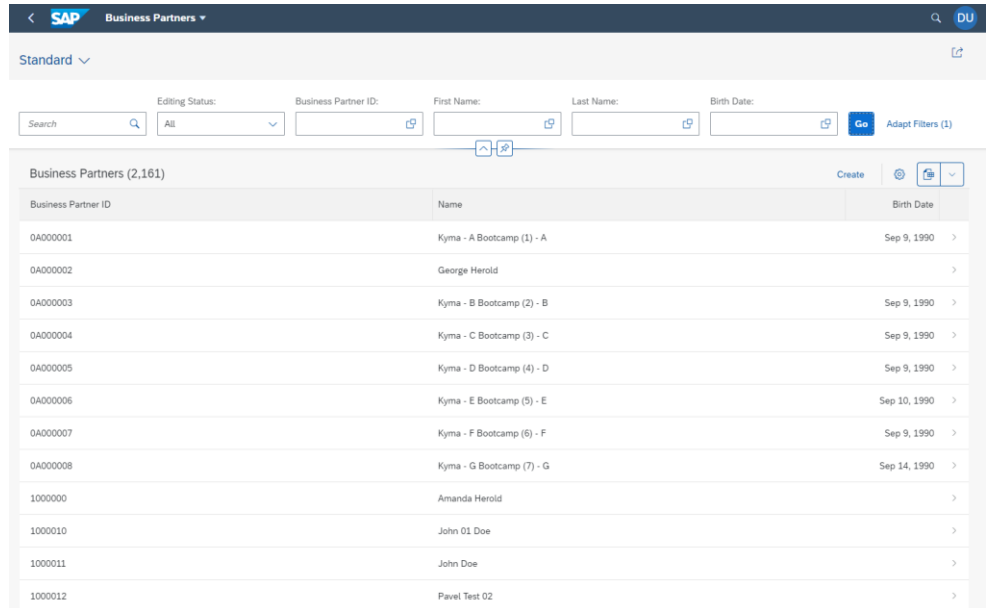


In the next page click on the **Go** button.



In the first click it's going to take a couple of seconds until the Business Partners list is displayed like in the screenshot. This is due to the in-memory table creation and fill-up at first access.

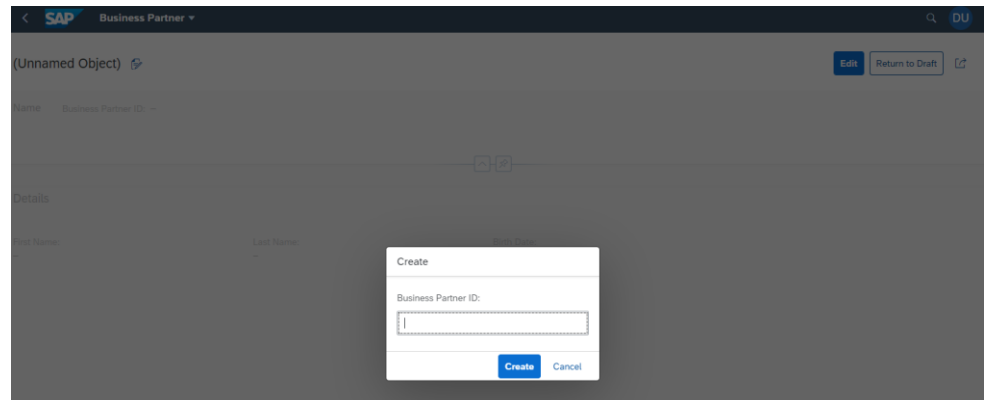
Click on the **Create** button to create a new Business Partner.



The screenshot shows the SAP Business Partners list. At the top, there is a header bar with the SAP logo and 'Business Partners'. Below it, a search bar and filters are visible. The main table lists 12 business partners with columns for ID, Name, and Birth Date. The 'Create' button is highlighted in the top right corner of the table area.

Business Partner ID	Name	Birth Date
0A000001	Kyma - A Bootcamp (1) - A	Sep 9, 1990
0A000002	George Herold	
0A000003	Kyma - B Bootcamp (2) - B	Sep 9, 1990
0A000004	Kyma - C Bootcamp (3) - C	Sep 9, 1990
0A000005	Kyma - D Bootcamp (4) - D	Sep 9, 1990
0A000006	Kyma - E Bootcamp (5) - E	Sep 10, 1990
0A000007	Kyma - F Bootcamp (6) - F	Sep 9, 1990
0A000008	Kyma - G Bootcamp (7) - G	Sep 14, 1990
10000000	Amanda Herold	
10000010	John 01 Doe	
10000011	John Doe	
10000012	Pavel Test 02	

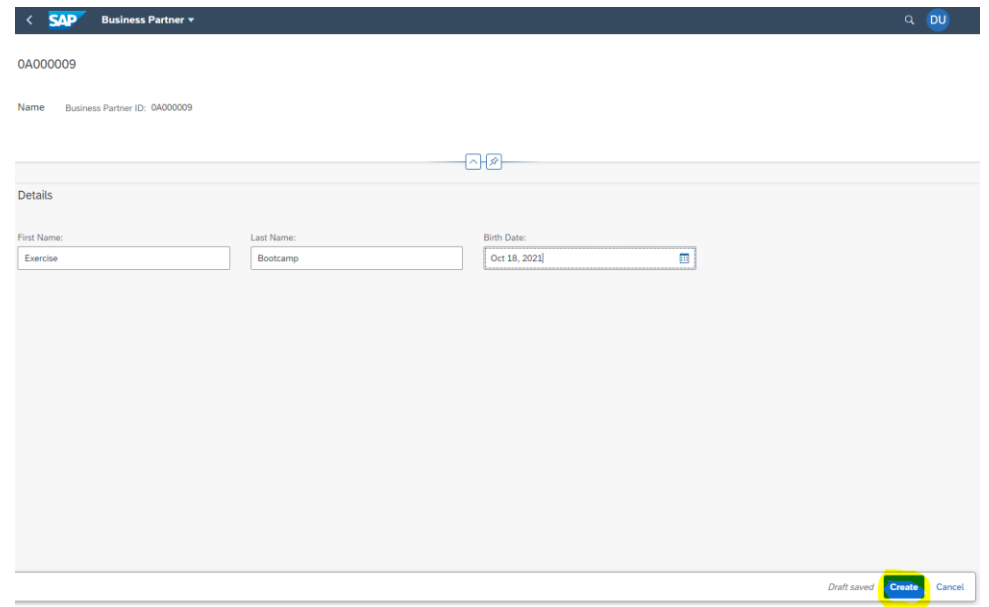
Provide a Business Partner ID that does not exist yet in the S/4 system and click on **Create**.



The screenshot shows the SAP Business Partner creation form. The form is titled '(Unnamed Object)'. It has fields for Name, Business Partner ID, First Name, Last Name, and Birth Date. A 'Create' button is highlighted in the bottom right corner.

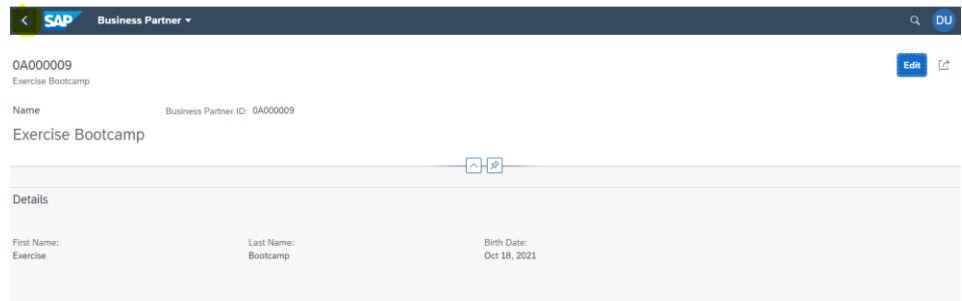
Provide First Name, Last Name and Birth Date.

Click on **Create**.



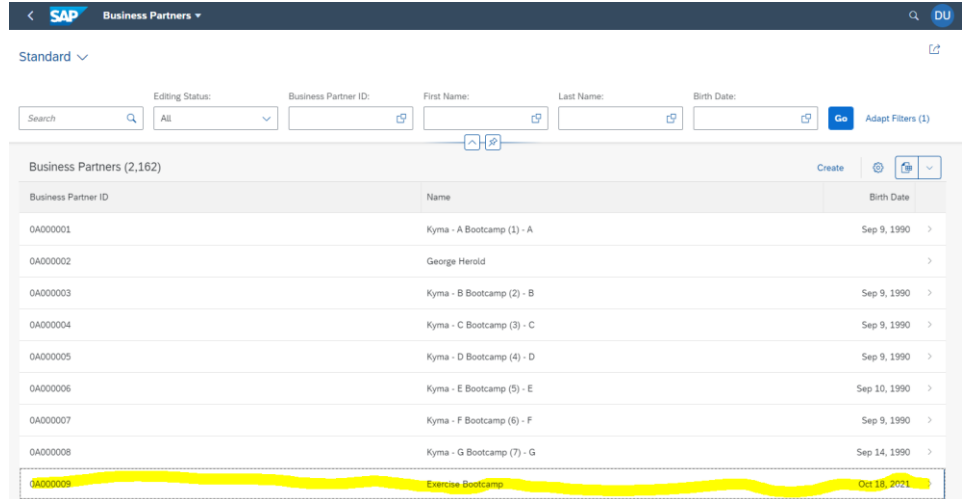
The screenshot shows the SAP Business Partner creation form with data entered. The Business Partner ID is 0A000009. The First Name is 'Exercise', the Last Name is 'Bootcamp', and the Birth Date is 'Oct 18, 2021'. The 'Create' button is highlighted in the bottom right corner.

Check that the Business Partner has been successfully created and click on the arrow at the top left corner to go back to the Business Partners list.



The screenshot shows the SAP Business Partner details for ID OA000009. The name is "Exercise Bootcamp". The details section shows: First Name: Exercise, Last Name: Bootcamp, Birth Date: Oct 18, 2021. An "Edit" button is in the top right corner.

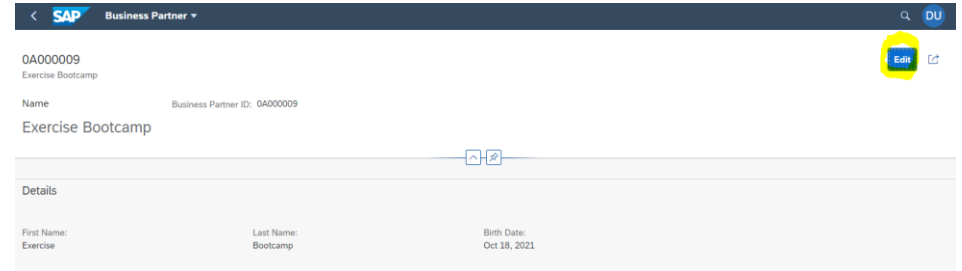
In the list, locate the newly created Business Partner and click on it.



The screenshot shows the SAP Business Partners list. The table has columns: Business Partner ID, Name, and Birth Date. The newly created partner, OA000009, is highlighted in yellow. It is named "Exercise Bootcamp" and has a birth date of "Oct 18, 2021".

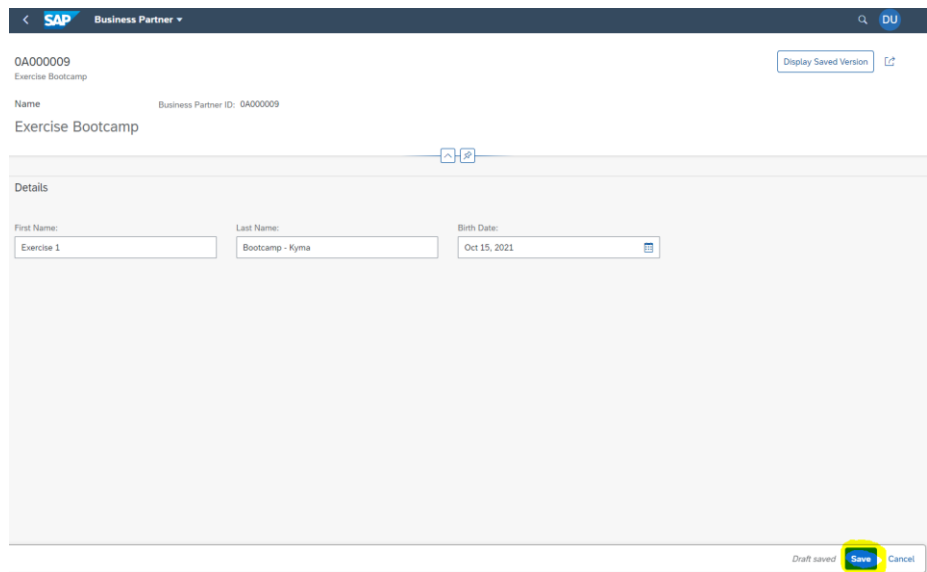
Business Partner ID	Name	Birth Date
OA000001	Kyma - A Bootcamp (1) - A	Sep 9, 1990
OA000002	George Herold	
OA000003	Kyma - B Bootcamp (2) - B	Sep 9, 1990
OA000004	Kyma - C Bootcamp (3) - C	Sep 9, 1990
OA000005	Kyma - D Bootcamp (4) - D	Sep 9, 1990
OA000006	Kyma - E Bootcamp (5) - E	Sep 10, 1990
OA000007	Kyma - F Bootcamp (6) - F	Sep 9, 1990
OA000008	Kyma - G Bootcamp (7) - G	Sep 14, 1990
OA000009	Exercise Bootcamp	Oct 18, 2021

Click on the **Edit** button on the top right corner.



This screenshot is identical to the one above, showing the details for Business Partner OA000009. The "Edit" button in the top right corner is highlighted with a yellow circle, indicating the next step in the process.

Change the information on the fields at your will and click on **Save**.



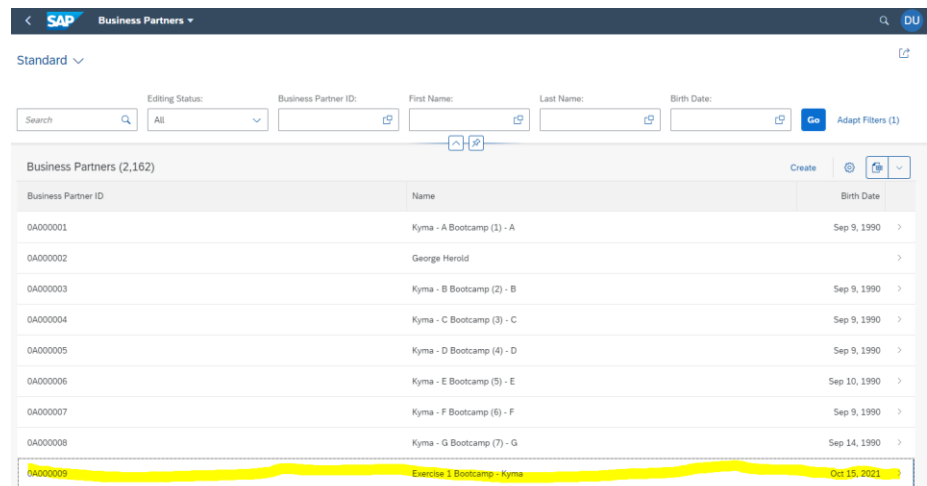
The screenshot shows the SAP Business Partner form for ID 0A000009, named 'Exercise Bootcamp'. The 'Details' section contains three input fields: 'First Name' with 'Exercise 1', 'Last Name' with 'Bootcamp - Kyma', and 'Birth Date' with 'Oct 15, 2021'. At the bottom right, there is a 'Draft saved' status and a yellow 'Save' button next to a 'Cancel' button.

Check that the data has been successfully updated and click on the arrow at the top left corner to go back to the Business Partners list.



The screenshot shows the SAP Business Partner form for ID 0A000009, now named 'Exercise 1 Bootcamp - Kyma'. The 'Details' section shows the updated information: 'First Name' is 'Exercise 1', 'Last Name' is 'Bootcamp - Kyma', and 'Birth Date' is 'Oct 15, 2021'. A blue 'Edit' button is visible at the top right.

In the list, locate the recently updated record.



The screenshot shows the SAP Business Partners list with 2,162 records. The table has columns for Business Partner ID, Name, and Birth Date. The record for ID 0A000009, named 'Exercise 1 Bootcamp - Kyma' with birth date 'Oct 15, 2021', is highlighted in yellow at the bottom of the list.

Business Partner ID	Name	Birth Date
0A000001	Kyma - A Bootcamp (1) - A	Sep 9, 1990
0A000002	George Herold	
0A000003	Kyma - B Bootcamp (2) - B	Sep 9, 1990
0A000004	Kyma - C Bootcamp (3) - C	Sep 9, 1990
0A000005	Kyma - D Bootcamp (4) - D	Sep 9, 1990
0A000006	Kyma - E Bootcamp (5) - E	Sep 10, 1990
0A000007	Kyma - F Bootcamp (6) - F	Sep 9, 1990
0A000008	Kyma - G Bootcamp (7) - G	Sep 14, 1990
0A000009	Exercise 1 Bootcamp - Kyma	Oct 15, 2021

Congratulations!

You have successfully completed the exercise!

To claim your expert badge, just **submit the exact same screenshots** of this topic taken from your own deployment to the corresponding **MS Teams Channel**.



APPENDIX

Stretch and challenge yourself!

Now that you have successfully completed the exercise you can go further and try the application in different modes using the **Kyma eventing feature**.

In the **values.yaml** file of the helm charts, just change the **updatemode** variable to **in-cluster** (to publish the event from inside the cluster) or **out-cluster** (to publish the event from outside the cluster).

Then, to update your deployment, CD to the helmcharts folder and run:

helm upgrade manage-bp ./ -n business-partners

After the command successfully completes, repeat the steps in the last block of the exercise to test the application.

Please note that this is **totally optional** thus **will not be required** for the expert badge request.