

PUBLIC

# **Data Integration and Data Flow Modeling with SAP Data Warehouse Cloud ANA365**

Exercises  
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Thank you for participating in this hands-on session about Data Integration and Data Flow Modeling with SAP Data Warehouse Cloud! The session is divided into three main parts:

1. Space creation and connection setup
2. Data loading and modeling
3. Data visualization

## SYSTEMS

For working your way through the hands-on materials you need access to a SAP Data Warehouse Cloud tenant. Depending on whether you join the live session or watch the session on demand or replay the materials at a later point in time, different systems and credentials can be used.

### Participating live

In case you are reading this manual while participating in the live session during the SAP TechEd 2020 program, you can use any of the following three tenants for participating in this hands-on session:

- EMEA region: <https://dwc-teched2020.eu10.hcs.cloud.sap/>
- APJ region: <https://dwc-teched2020.ap10.hcs.cloud.sap/>
- NA region: <https://dwc-teched2020.us10.hcs.cloud.sap/>

To receive login credentials please send an e-mail to [jascha.kanngiesser@sap.com](mailto:jascha.kanngiesser@sap.com) mentioning the session ID and the tenant you would like to log in to.

### On Demand

In case you are working on this hands-on material after the live session you cannot use any of the three tenants listed above. Instead, you need to get yourself a SAP Data Warehouse Cloud trial tenant here:  
<https://saphanajourney.com/data-warehouse-cloud/trial/>

You need to set up all the required connectivity yourself, including the Data Provisioning Agent, uploading certificates, creating the data sets in the remote sources (or uploading the data sets to SAP Data Warehouse Cloud).

Please note that the exercise below is written for attending the live session. Therefore, for example the user credentials and tenant information might not match in case you are following the materials later on demand. In this case please substitute any live session-specific information with the individual information available to you in your trial tenant.

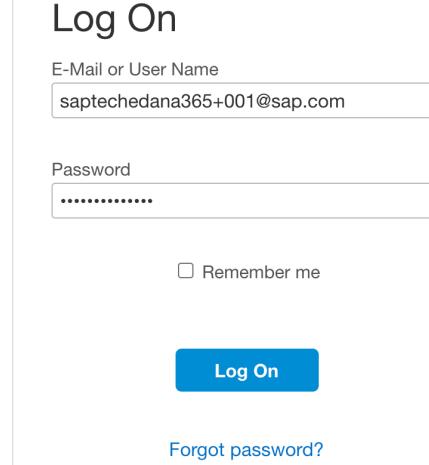
During the session we are using different source systems in the cloud and on-premise. However, you can reply the whole session by uploading the required data sets using the File Upload option to your SAP Data Warehouse Cloud tenant, too.

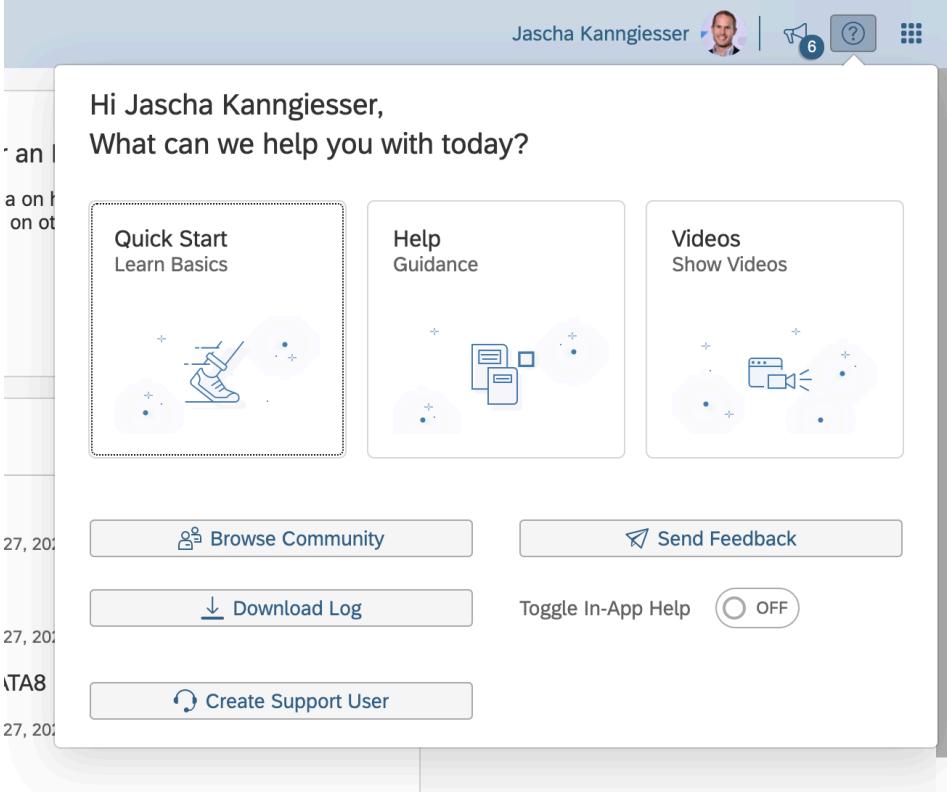
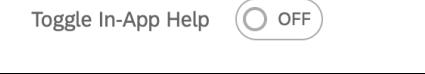
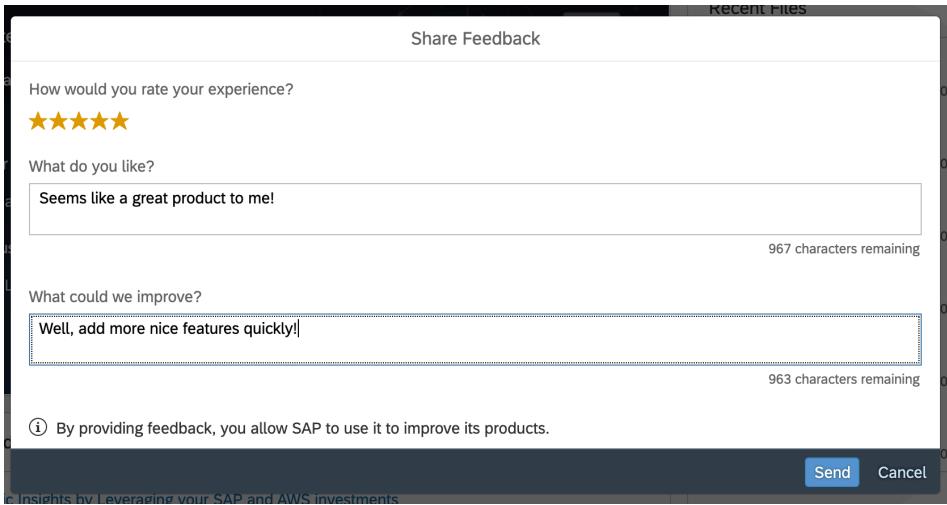
## THINGS YOU WILL LEARN IN THIS SESSION

- How to create federated and replicated connections to SAP & non-SAP, cloud and on-premises data sources.
- How to load data into SAP Data Warehouse Cloud using external SQL clients.
- How to upload CSV files.
- How to model ETL processes to extract data from external sources into SAP Data Warehouse Cloud.
- How to consume & visualize data models using the SAP Analytics Cloud story builder and external SQL clients.

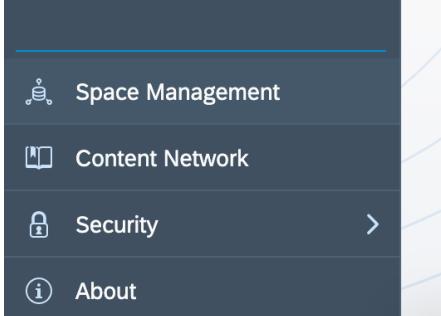
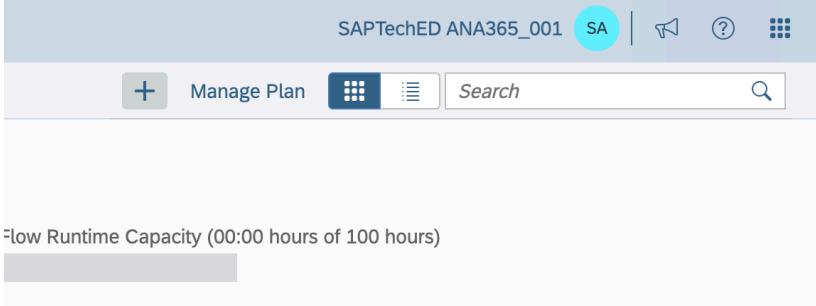
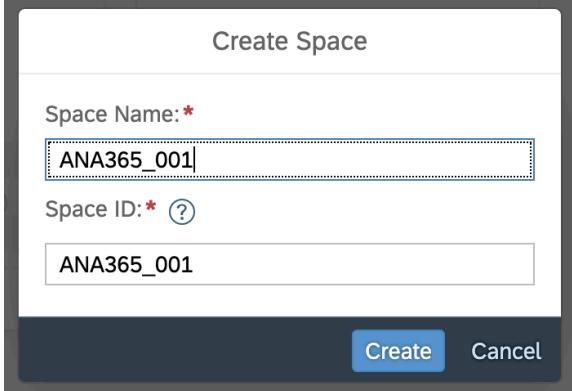
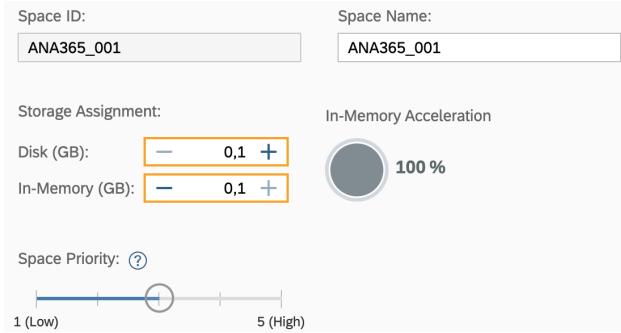
Last but not least, check out this site for all information on TechEd and upcoming sessions:

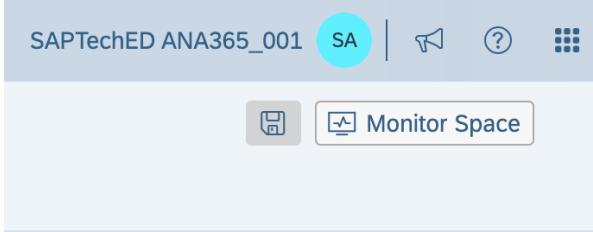
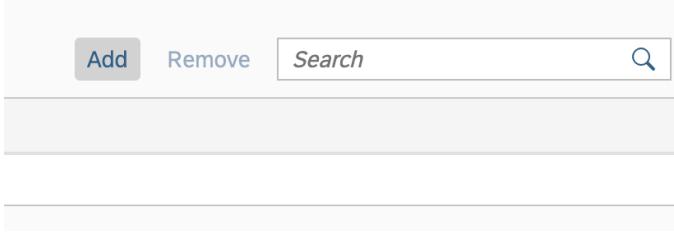
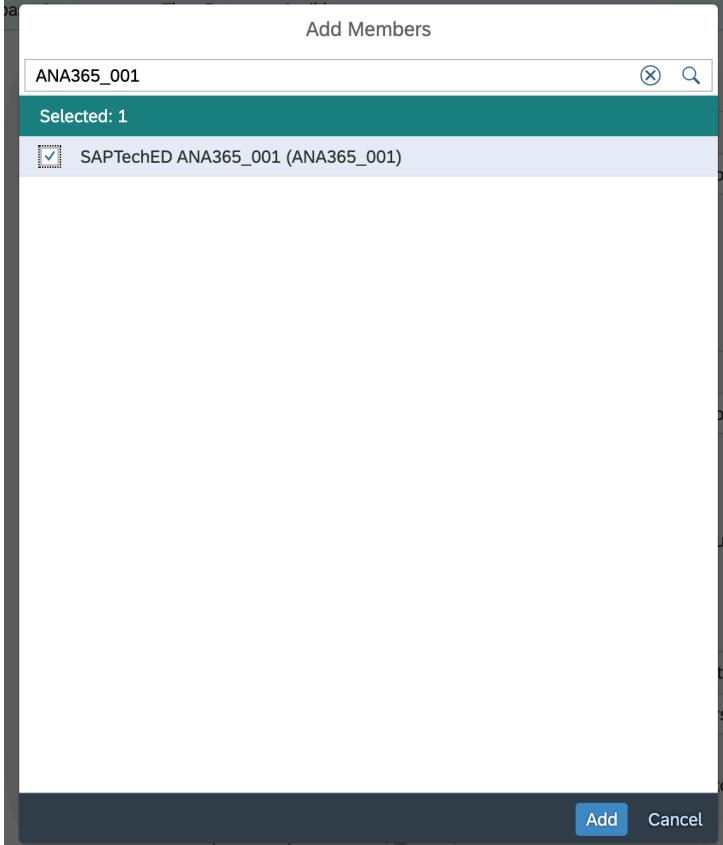
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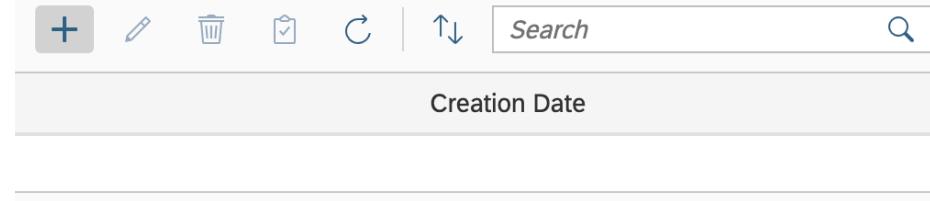
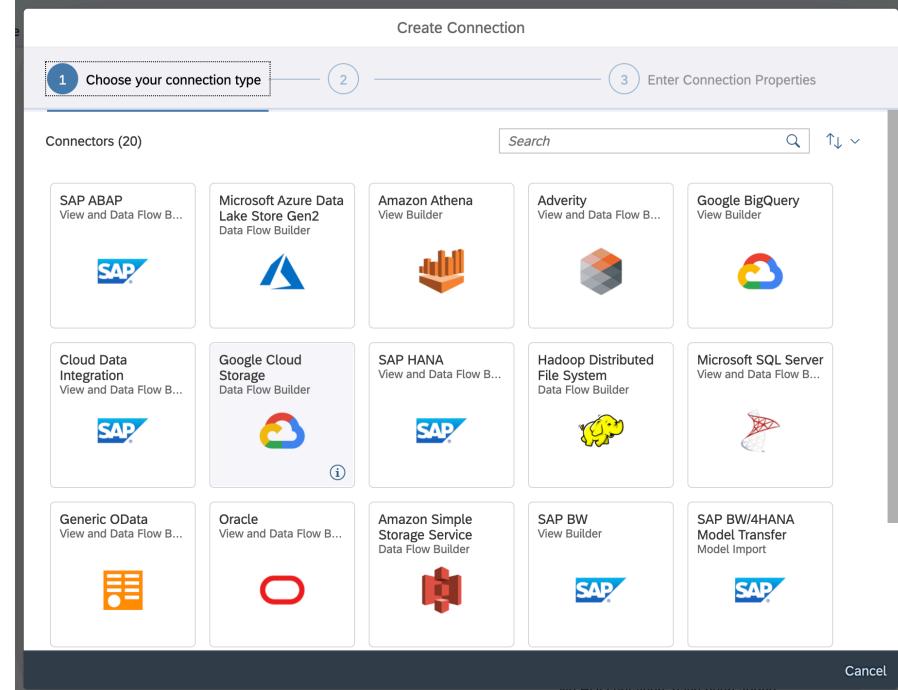
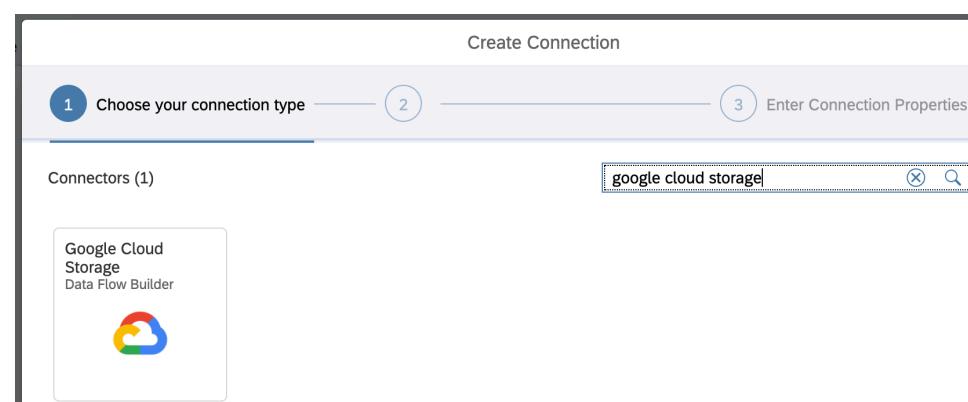
Explanation	Screenshot
<p>1. Make sure you have the login credentials available to you. You should have received a username like <b>saptechedana365+xyz</b>@sap.com and a password. Replace the value <b>xyz</b> with the number assigned to you.</p>	 <p>The screenshot shows the SAP HANA Cloud Services log-on page. It features a header "Log On" and two input fields: "E-Mail or User Name" containing "saptechedana365+001@sap.com" and "Password" containing a series of dots. Below the fields are "Remember me" and "Log On" buttons, and a "Forgot password?" link.</p>
<p>2. Let's get going – first part!</p>	<p>As mentioned above, this session consists of three main areas: Creating your space and required connections, load the data and build your data models and visualizing the results. Let's get started with creating your space and setting up the required connectivity.</p>
<p>3. First things first – providing feedback.</p>	<p>While working your way through this hands-on you probably want to provide some feedback on things that go well and things that don't go that well. No matter what, please don't hesitate to use the feedback functionality in the tool to provide any kind of feedback that comes to your mind! Let us briefly check out how you can provide feedback. You don't need to do that now of course, but just that you know the process in case you want to provide feedback later.</p>

Explanation	Screenshot
<p>4. To provide feedback, click on the question mark icon in the top right corner.</p>	 <p>A screenshot of the SAP Data Warehouse Cloud interface. At the top, there's a navigation bar with a user profile picture of Jascha Kanngiesser, a notification badge with the number '6', and a help icon. Below the navigation bar, a modal window is open. The modal has a greeting 'Hi Jascha Kanngiesser,' and a question 'What can we help you with today?'. It contains three cards: 'Quick Start Learn Basics' (with an icon of a person running), 'Help Guidance' (with an icon of two overlapping documents), and 'Videos Show Videos' (with an icon of a video camera). At the bottom of the modal, there are several buttons: 'Browse Community', 'Send Feedback' (which is highlighted in blue), 'Download Log', 'Toggle In-App Help' (with a switch set to 'OFF'), and 'Create Support User'.</p>
<p>5. Hit the Send Feedback button in the bottom right corner.</p>	 <p>A screenshot of the SAP Data Warehouse Cloud interface. It shows the same modal window from the previous step. The 'Send Feedback' button is highlighted in blue. Below it is the 'Toggle In-App Help' switch, which is set to 'OFF'.</p>
<p>6. Provide your feedback and hit the Send button.</p>	 <p>A screenshot of the SAP Data Warehouse Cloud 'Share Feedback' dialog box. The dialog has a title 'Share Feedback' and a sub-section 'Recent Files'. It contains three text input fields: 'How would you rate your experience?' with a 5-star rating, 'What do you like?' with the text 'Seems like a great product to me!', and 'What could we improve?' with the text 'Well, add more nice features quickly!'. There are character count indicators: '967 characters remaining' for the likes section and '963 characters remaining' for the improvements section. At the bottom, there's a note: '(i) By providing feedback, you allow SAP to use it to improve its products.' and a footer with 'Send' and 'Cancel' buttons.</p>

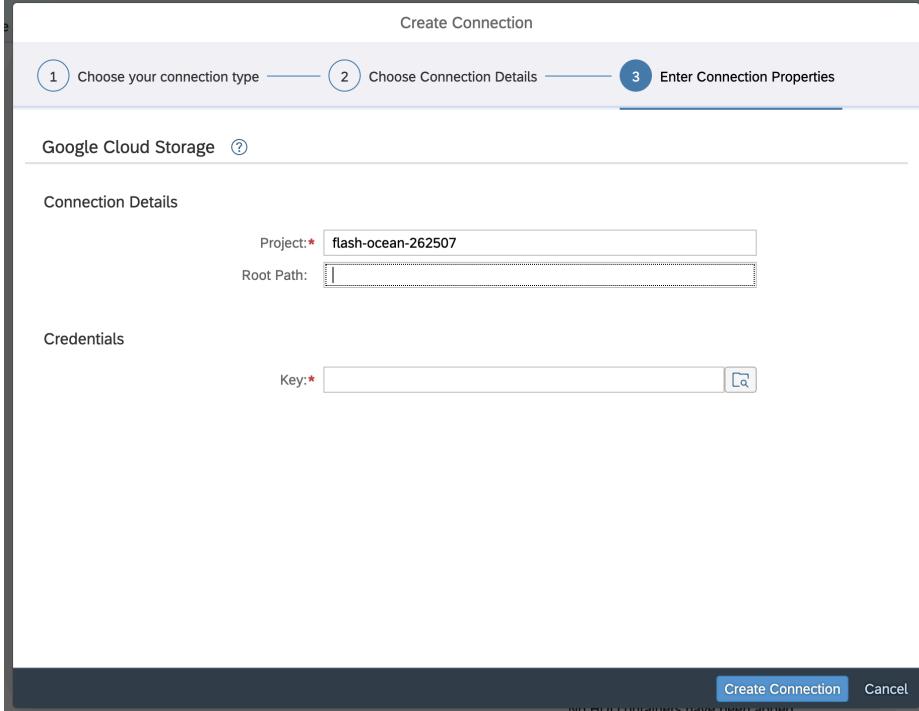
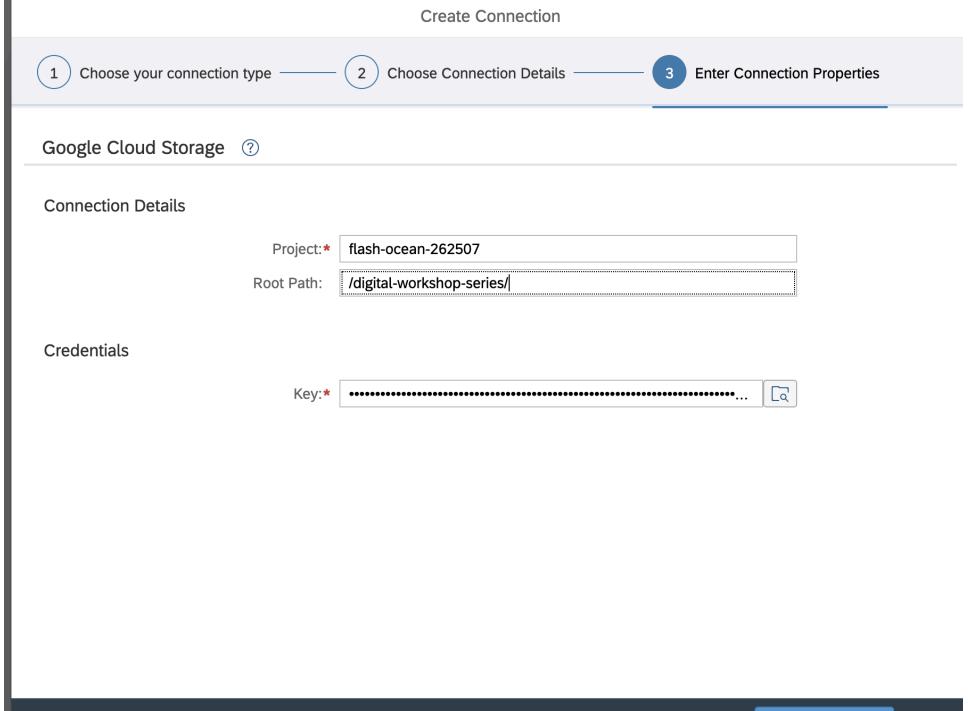
Explanation	Screenshot
7. When this toast message is shown, we received your feedback!	A screenshot of a toast message box. The message reads "Your feedback has been sent." in white text on a dark blue background. The background of the slide shows a blurred SAP Home interface with various icons.
8. Alright ...	... now you know how to provide feedback. Let's get started with the real stuff!
9. Click on the menu bar to expand the navigation menu.	A screenshot of the SAP Home interface. The top navigation bar is visible with the SAP logo and "Home" text. A vertical navigation menu is open on the left side, displaying several icons: home, search, user, dashboard, data, process, and settings. The background features a light gray grid pattern.

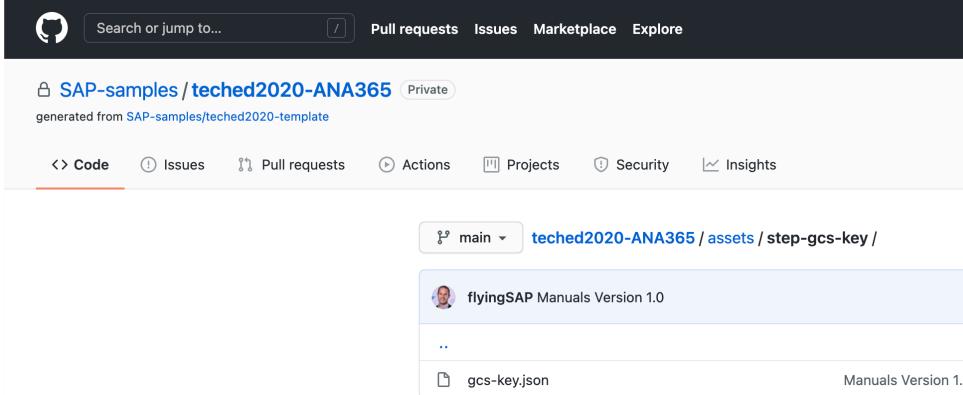
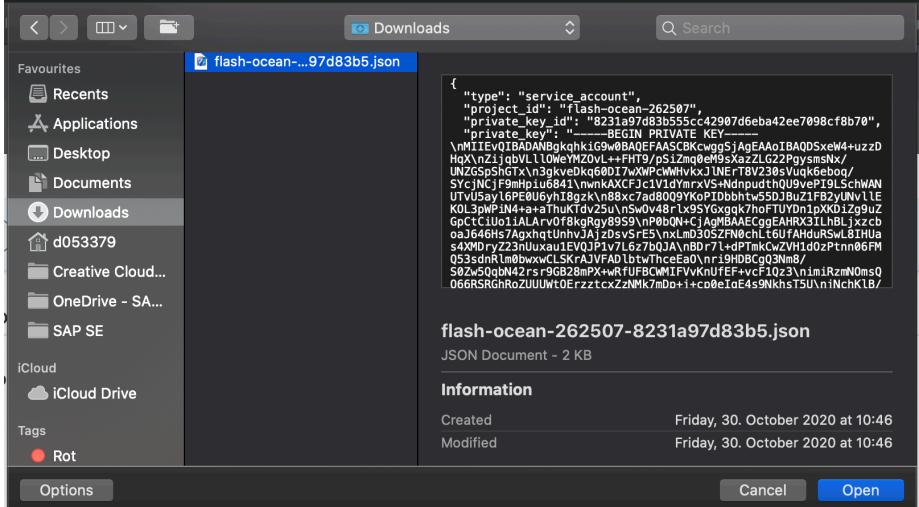
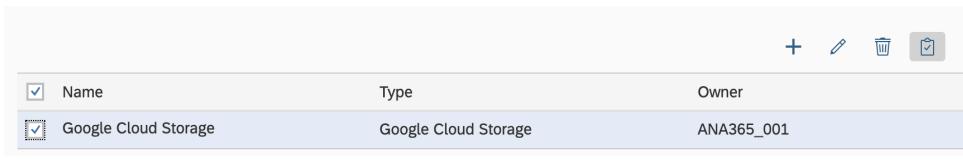
Explanation	Screenshot
10. Select Space Management in the bottom left corner.	
11. Hit the Create Space + button in the top right corner to create a new space.	
12. Enter a Space Name and Space ID. Make sure that at least the Space ID follows the syntax ANA365_<your three-digit number>. Then hit Create to create your space.	
13. Reduce the space size in the Overview section at the top. Make sure to specify both the Disk (GB) and In-Memory (GB) storage assignment as 0,1 (GB).	

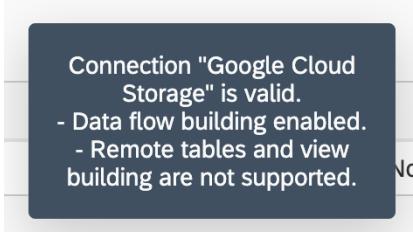
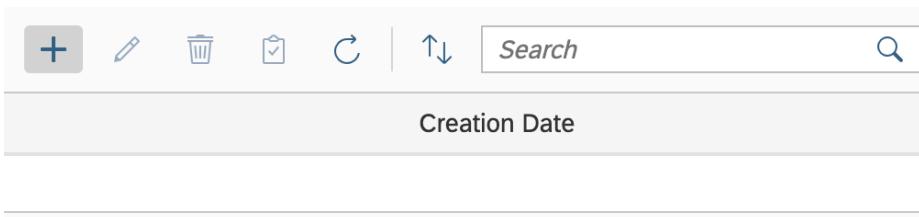
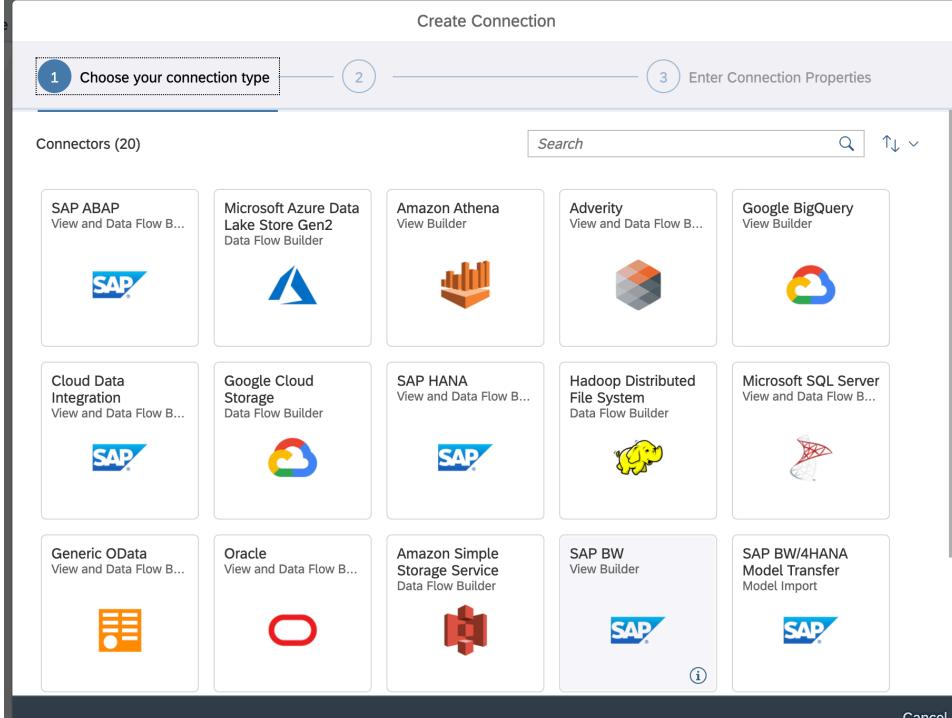
Explanation	Screenshot
<p>14. Hit Save in the top right corner to save your changes.</p>	
<p>15. Head on to the Members section and hit the Add button on the right to add yourself to your space.</p>	
<p>16. Search for your user ANA365_&lt;your three digit number&gt; in the dialog, select your user and hit Add to close the dialog. <b>Make sure that it is really your ANA365 user!</b></p>	

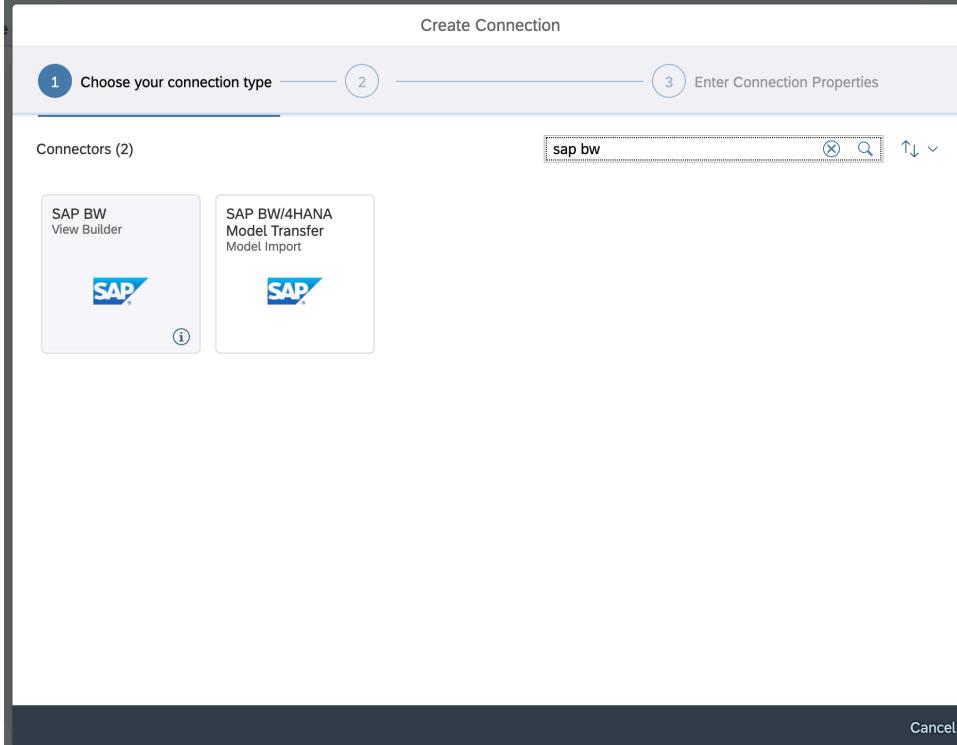
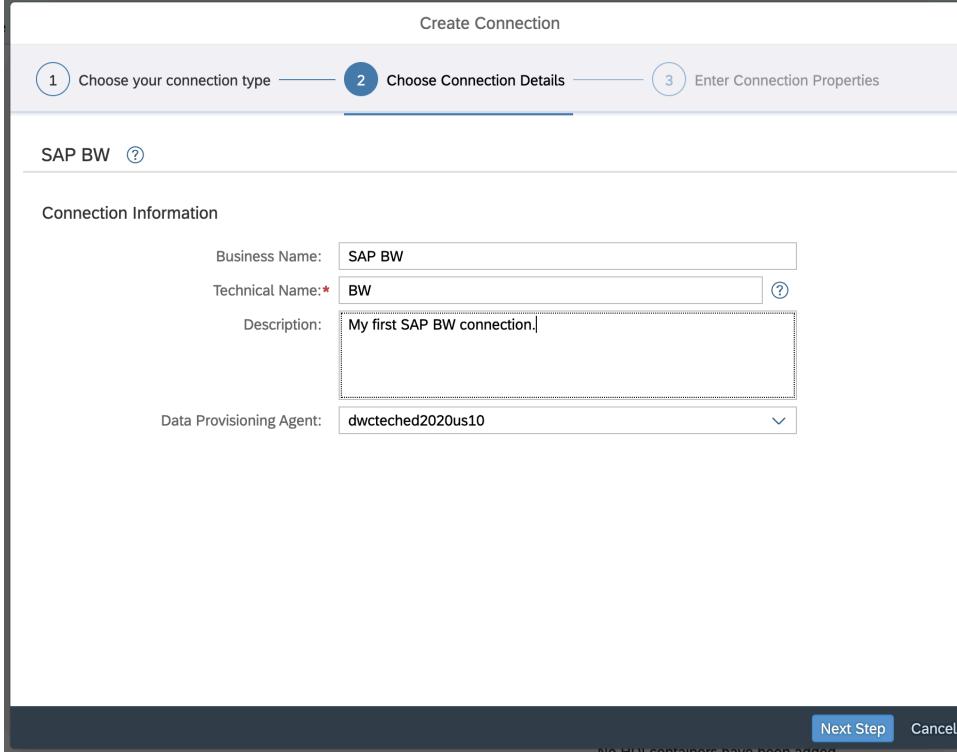
Explanation	Screenshot
17. Head on to the Connections (Local Connections) section and hit the + - button to create a new connection.	
18. Select the Google Cloud Storage tile.	
19. Or use the filter and search for Google Cloud storage in case you cannot find it in the list of connections.	

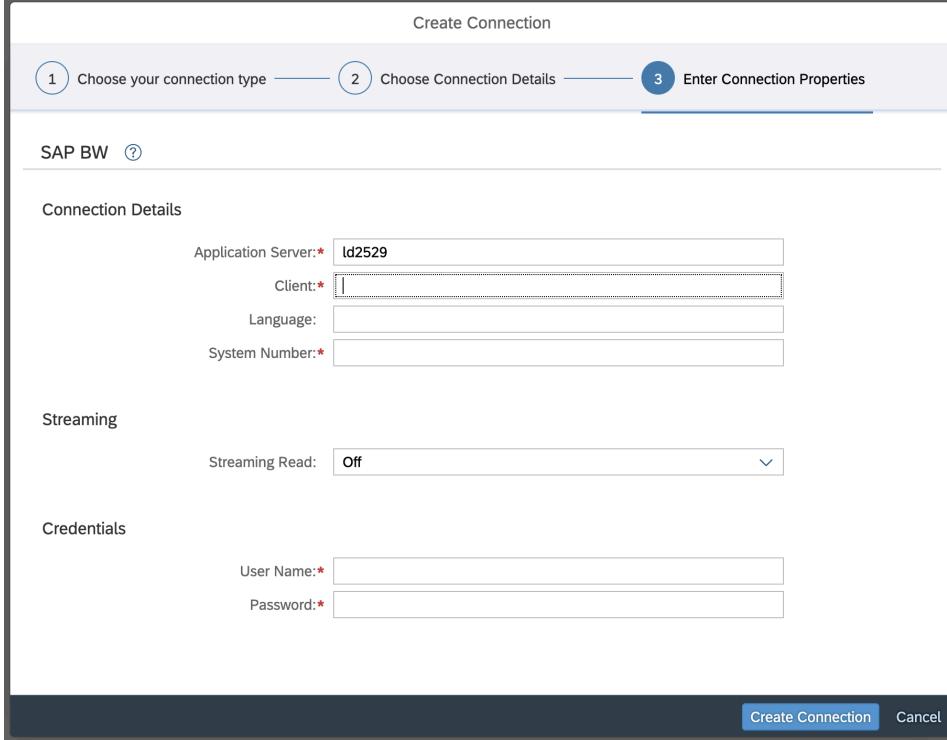
Explanation	Screenshot
<p>20. Enter a meaningful business name and technical name as well as a useful description.</p>	<p>The screenshot shows the 'Create Connection' interface. Step 2, 'Choose Connection Details', is active. The 'Business Name' field contains 'Google Cloud Storage'. The 'Technical Name' field contains 'GCS'. The 'Description' field contains 'My first Google Cloud Storage connection.' A progress bar at the top indicates three steps: 1. Choose your connection type, 2. Choose Connection Details (which is selected), and 3. Enter Connection Properties. At the bottom, there are 'Next Step' and 'Cancel' buttons.</p>
<p>21. Hit Next Step to navigate to the next screen.</p>	<p>The screenshot shows the 'Create Connection' interface. Step 3, 'Enter Connection Properties', is active. Under 'Connection Details', the 'Project' field is empty and has an asterisk indicating it's required. The 'Root Path' field is also empty. Under 'Credentials', the 'Key' field is empty and has an asterisk indicating it's required. A progress bar at the top indicates three steps: 1. Choose your connection type, 2. Choose Connection Details, and 3. Enter Connection Properties (which is selected). At the bottom, there are 'Create Connection' and 'Cancel' buttons.</p>

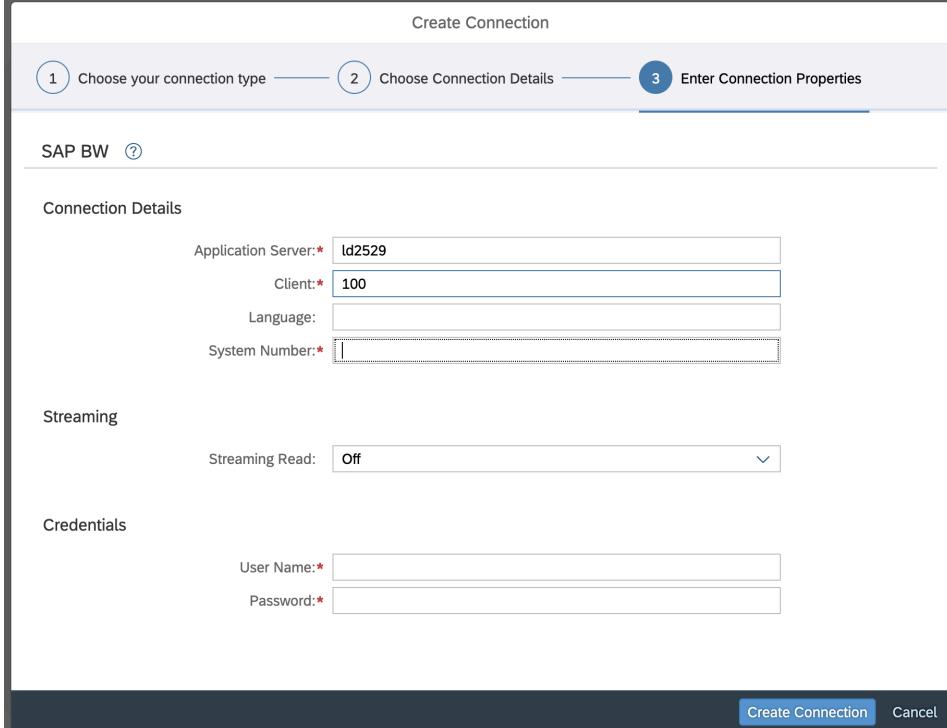
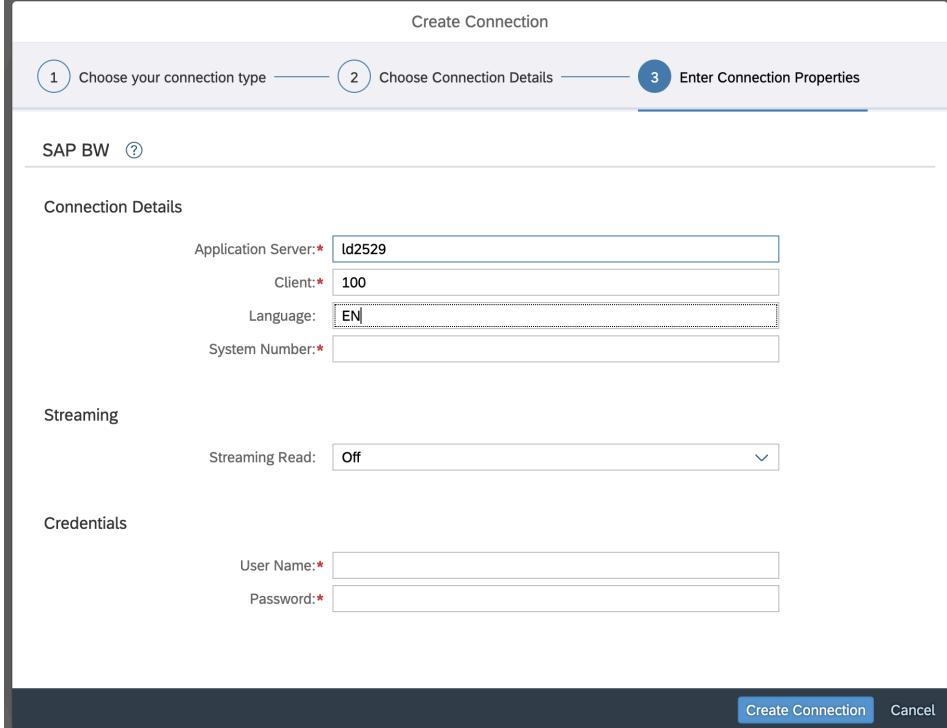
Explanation	Screenshot
<p>22. Enter the Project as flash-ocean-262507</p>	 <p>The screenshot shows the 'Create Connection' dialog for Google Cloud Storage. It is divided into three steps: 1. Choose your connection type (done), 2. Choose Connection Details (done), and 3. Enter Connection Properties (selected). The 'Connection Details' section shows a 'Project:' field containing 'flash-ocean-262507' and a 'Root Path:' field containing '/'. The 'Credentials' section has a 'Key:' field with a placeholder value. At the bottom, there are 'Create Connection' and 'Cancel' buttons.</p>
<p>23. Enter the root path as /digital-workshop-series/</p>	 <p>The screenshot shows the 'Create Connection' dialog for Google Cloud Storage, identical to the previous one but with a different root path. The 'Root Path:' field now contains '/digital-workshop-series/'. The rest of the interface, including the 'Project:' field and the 'Create Connection' button, remains the same.</p>

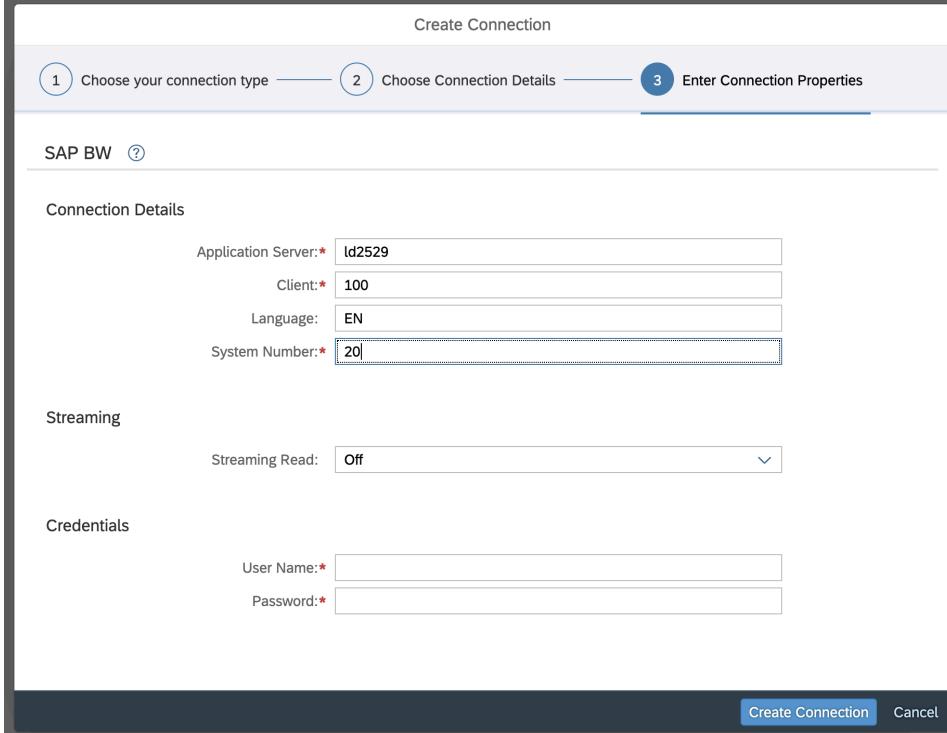
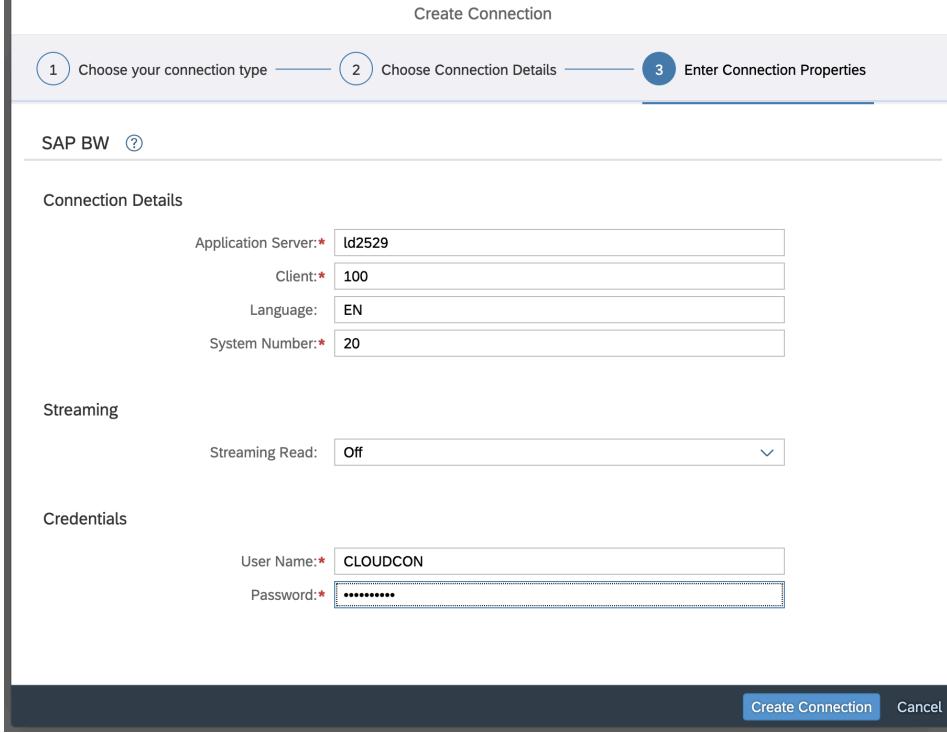
Explanation	Screenshot
<p>24. Download the key <code>gcs-key.json</code> from the assets folder in the Github repository here: <a href="https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-gcs-key">https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-gcs-key</a></p>	
<p>25. Hit the Browse button next to the Key entry field and select the downloaded file.</p>	
<p>26. Hit Create Connection to finish the dialog.</p>	
<p>27. Select the created connection from the list of connections and hit the Validate Connection button on the right.</p>	

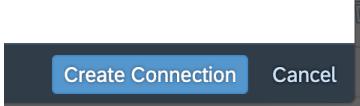
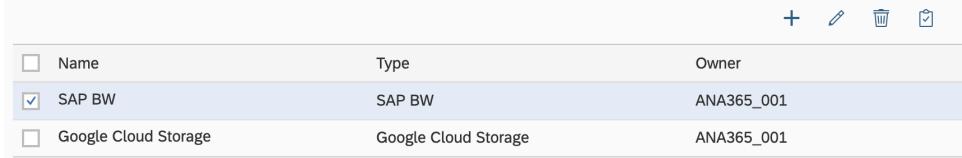
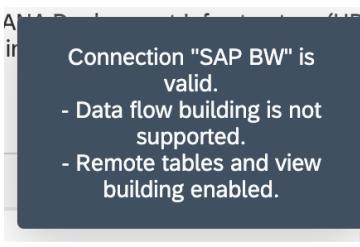
Explanation	Screenshot
28. Make sure that the connection is valid for data flow building in the toast message show non the bottom of the screen.	 <p>Connection "Google Cloud Storage" is valid.      - Data flow building enabled.      - Remote tables and view building are not supported.</p>
29. Hit the + button again to create another connection.	 <p>+    Search</p> <p>Creation Date</p>
30. This time select the SAP BW connection.	 <p>Create Connection</p> <p>1 Choose your connection type    2    3 Enter Connection Properties</p> <p>Connectors (20)</p> <ul style="list-style-type: none"> <li>SAP ABAP View and Data Flow B... </li> <li>Microsoft Azure Data Lake Store Gen2 Data Flow Builder </li> <li>Amazon Athena View Builder </li> <li>Adverity View and Data Flow B... </li> <li>Google BigQuery View Builder </li> <li>Cloud Data Integration View and Data Flow B... </li> <li>Google Cloud Storage Data Flow Builder </li> <li>SAP HANA View and Data Flow B... </li> <li>Hadoop Distributed File System Data Flow Builder </li> <li>Microsoft SQL Server View and Data Flow B... </li> <li>Generic OData View and Data Flow B... </li> <li>Oracle View and Data Flow B... </li> <li>Amazon Simple Storage Service Data Flow Builder </li> <li>SAP BW View Builder </li> <li>SAP BW/4HANA Model Transfer Model Import </li> </ul> <p>No HUI containers have been added.</p> <p>Cancel</p>

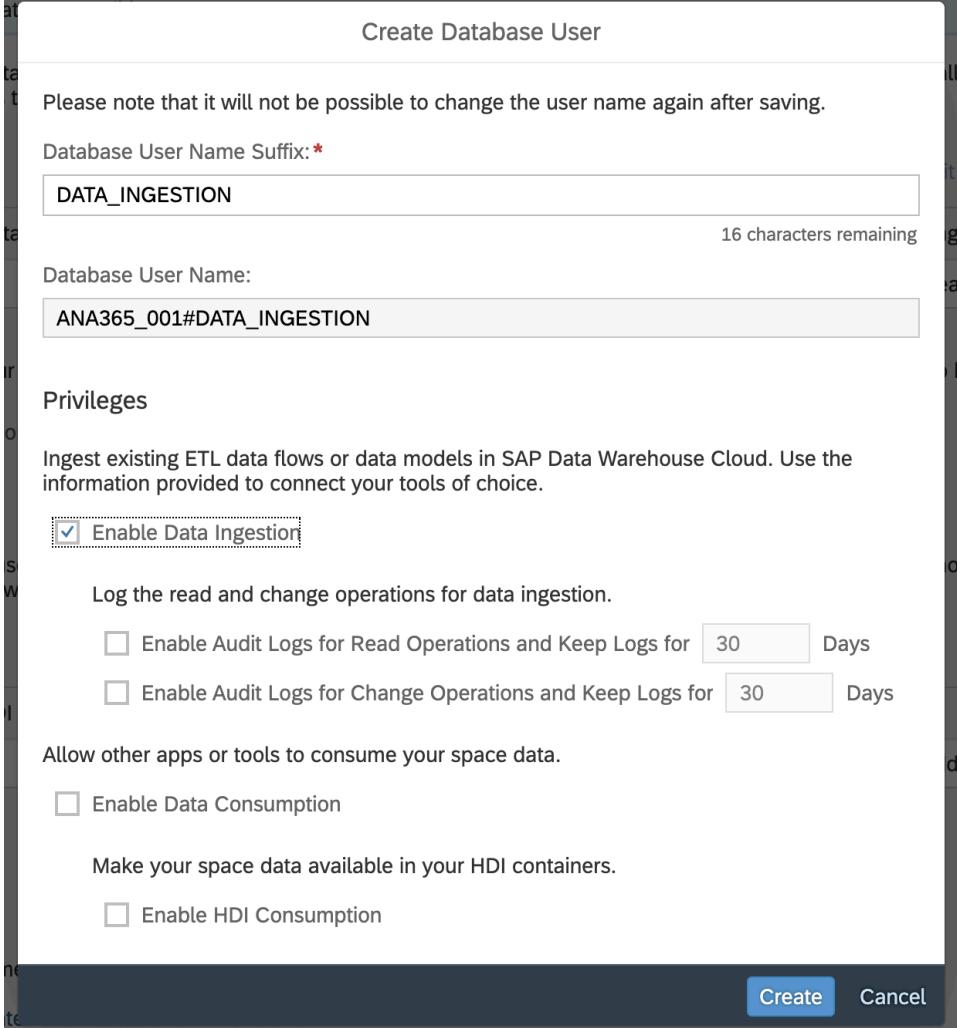
Explanation	Screenshot
<p>31. In case you cannot find it, search for SAP BW in the filter bar.</p>	
<p>32. Enter a meaningful business name and technical name as well as a descriptive description.</p>	

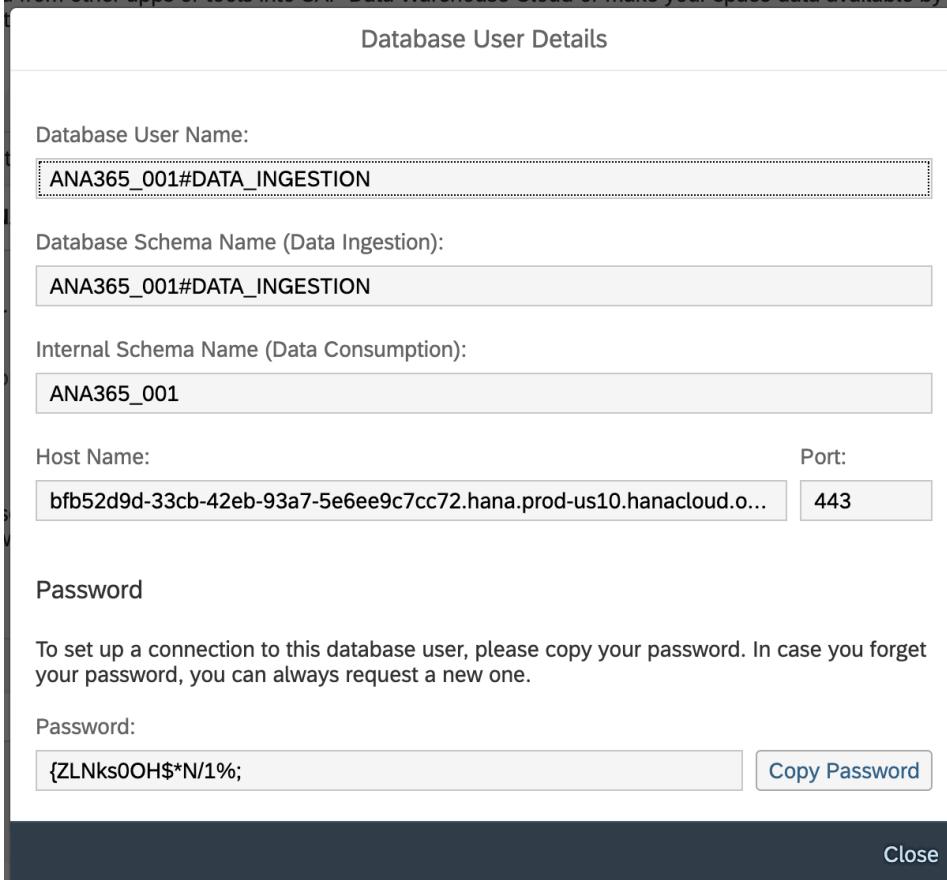
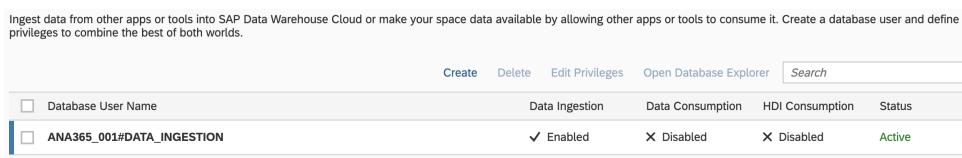
Explanation	Screenshot
<p>33. Make sure that the right Data Provisioning Agent is selected. The ending (in this case us10) should match the tenant you are logged in to.</p>	<p>Data Provisioning Agent:</p> 
<p>34. Hit Next Step.</p>	
<p>35. Fill out the Connection Details. Use Id2529 as the Application Server.</p>	

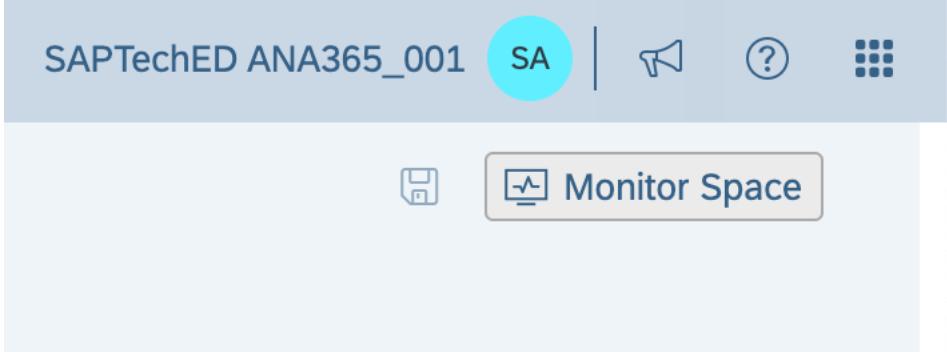
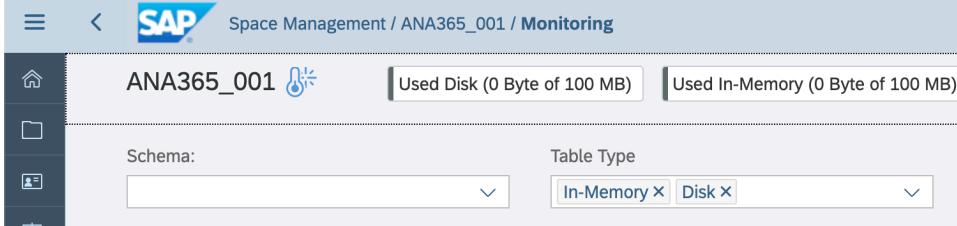
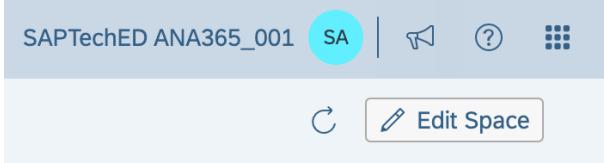
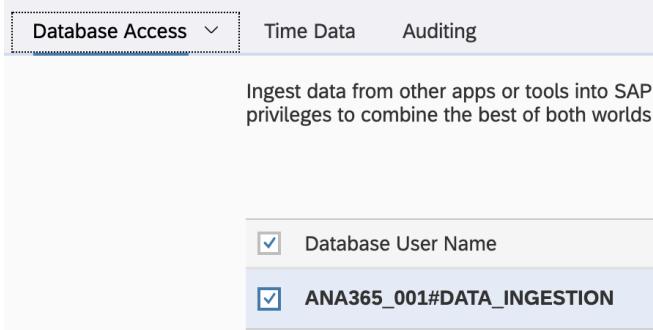
Explanation	Screenshot
36. Enter Client 100.	 <p>SAP BW <a href="#">?</a></p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="id2529"/> Client: * <input type="text" value="100"/> Language: <input type="text"/> System Number: * <input type="text"/></p> <p>Streaming</p> <p>Streaming Read: <input type="button" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text"/> Password: * <input type="text"/></p> <p><a href="#">Create Connection</a> <a href="#">Cancel</a></p>
37. Optionally enter the language as EN (is the default anyway).	 <p>SAP BW <a href="#">?</a></p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="id2529"/> Client: * <input type="text" value="100"/> Language: <input type="text" value="EN"/> System Number: * <input type="text"/></p> <p>Streaming</p> <p>Streaming Read: <input type="button" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text"/> Password: * <input type="text"/></p> <p><a href="#">Create Connection</a> <a href="#">Cancel</a></p>

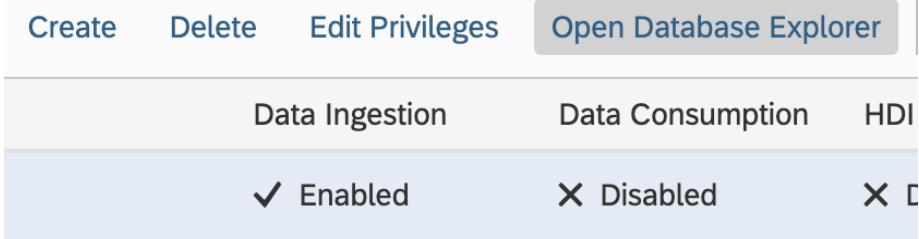
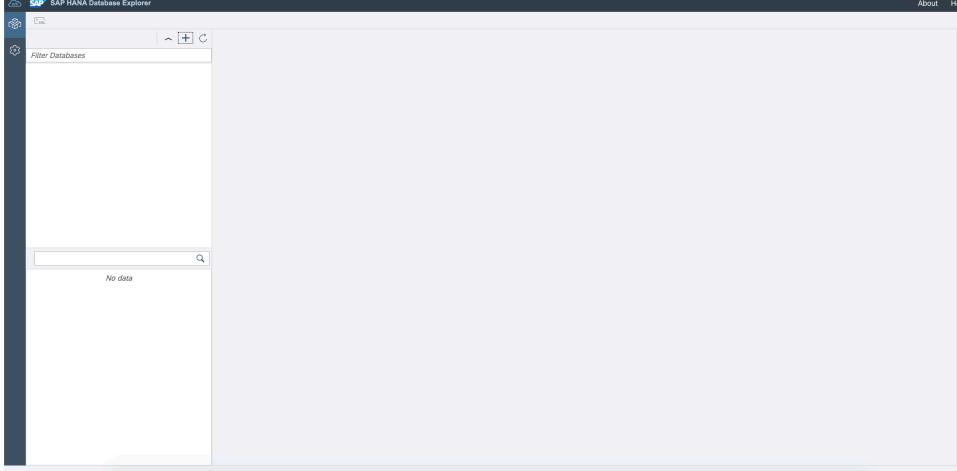
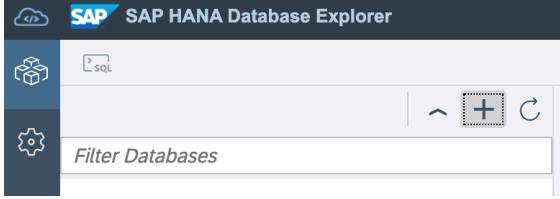
Explanation	Screenshot
<p>38. Enter System Number 20.</p>	 <p>Create Connection</p> <p>1 Choose your connection type — 2 Choose Connection Details — 3 Enter Connection Properties</p> <p>SAP BW ?</p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="ld2529"/> Client: * <input type="text" value="100"/> Language: <input type="text" value="EN"/> System Number: * <input type="text" value="20"/></p> <p>Streaming</p> <p>Streaming Read: <input type="text" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text"/> Password: * <input type="password"/></p> <p><b>Create Connection</b> Cancel</p>
<p>39. Leave the Streamind Read option as Off. Enter user CLOUDCON with password Teched2020</p>	 <p>Create Connection</p> <p>1 Choose your connection type — 2 Choose Connection Details — 3 Enter Connection Properties</p> <p>SAP BW ?</p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="ld2529"/> Client: * <input type="text" value="100"/> Language: <input type="text" value="EN"/> System Number: * <input type="text" value="20"/></p> <p>Streaming</p> <p>Streaming Read: <input type="text" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text" value="CLOUDCON"/> Password: * <input type="password" value="Teched2020"/></p> <p><b>Create Connection</b> Cancel</p>

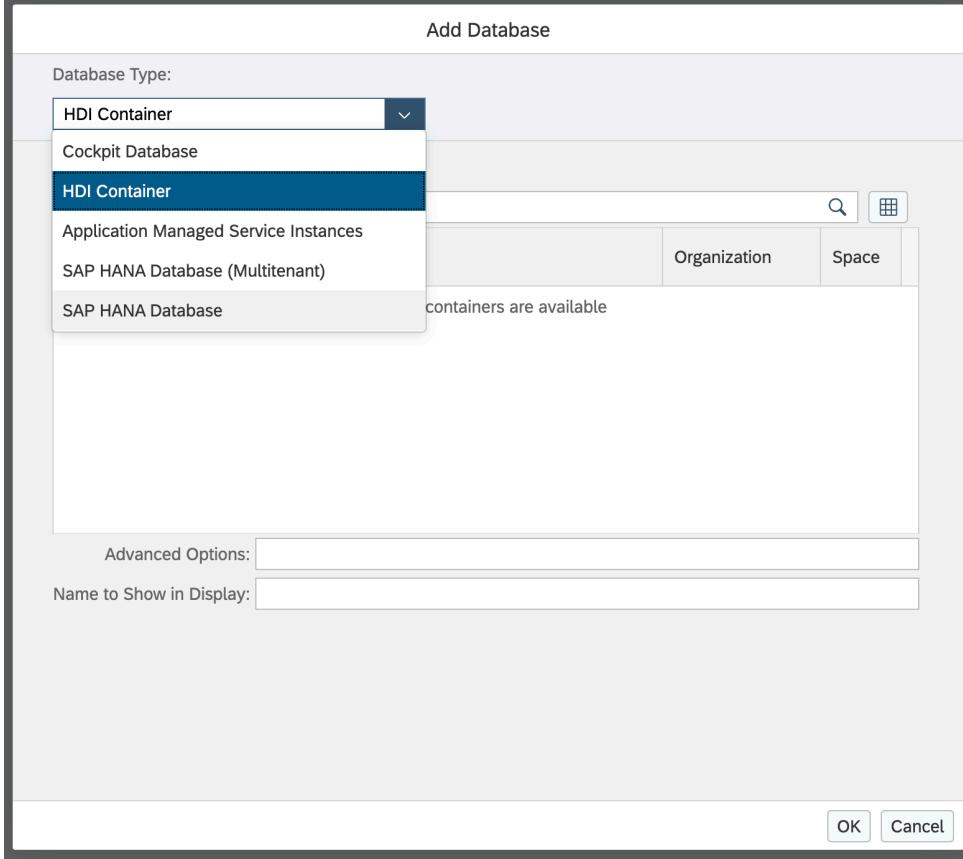
Explanation	Screenshot									
40. Hit Create Connection to finish the dialog.										
41. Select the newly created SAP BW connection and again hit the Validate Connection button on the right.	 <table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Owner</th> </tr> </thead> <tbody> <tr> <td>SAP BW</td> <td>SAP BW</td> <td>ANA365_001</td> </tr> <tr> <td>Google Cloud Storage</td> <td>Google Cloud Storage</td> <td>ANA365_001</td> </tr> </tbody> </table>	Name	Type	Owner	SAP BW	SAP BW	ANA365_001	Google Cloud Storage	Google Cloud Storage	ANA365_001
Name	Type	Owner								
SAP BW	SAP BW	ANA365_001								
Google Cloud Storage	Google Cloud Storage	ANA365_001								
42. Make sure that the toast message on the bottom of the screen mentions that the connection can be used in the view builder.										
43. Head on to the Database Access (Database Users) section. Hit the Create button to create a new database user.	 <table border="1"> <thead> <tr> <th>Database User Name</th> <th>Data Ingestion</th> <th>Data C...</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>No database users have been created.</p>	Database User Name	Data Ingestion	Data C...						
Database User Name	Data Ingestion	Data C...								

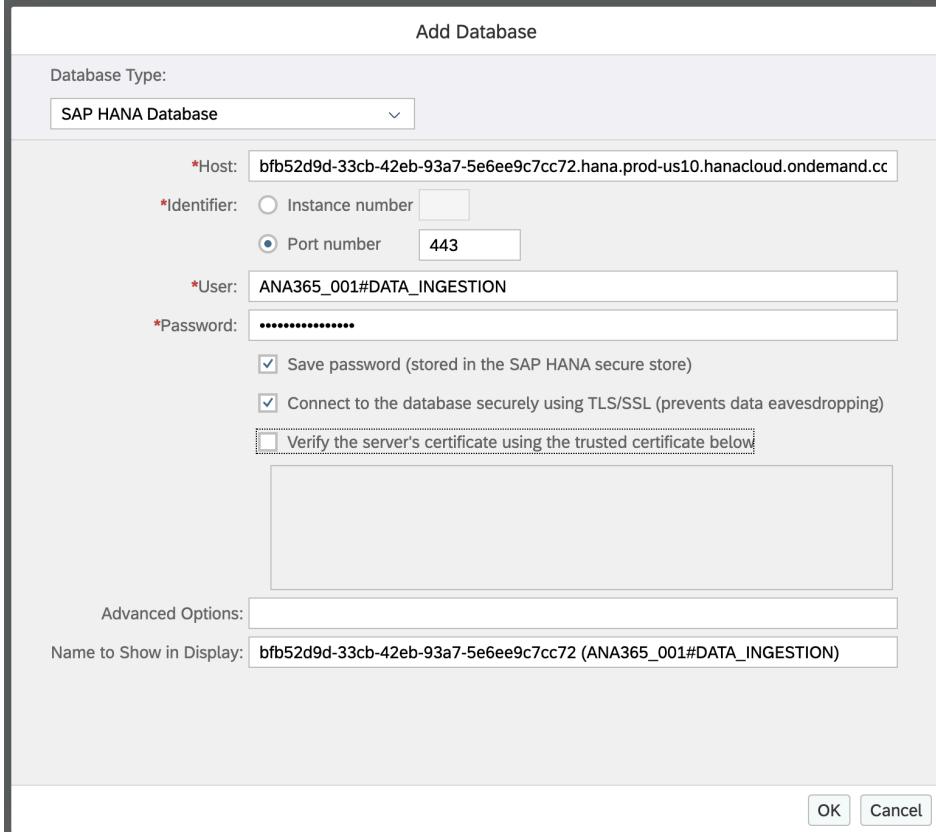
Explanation	Screenshot
<p>44. Enter a meaningful Database User Name suffix and make sure to select the Enable Data Ingestion checkbox in the Privileges section. Then hit Create to close the dialog.</p>	 <p>Create Database User</p> <p>Please note that it will not be possible to change the user name again after saving.</p> <p>Database User Name Suffix: *</p> <input type="text" value="DATA_INGESTION"/> <p>16 characters remaining</p> <p>Database User Name:</p> <input type="text" value="ANA365_001#DATA_INGESTION"/> <p><b>Privileges</b></p> <p>Ingest existing ETL data flows or data models in SAP Data Warehouse Cloud. Use the information provided to connect your tools of choice.</p> <p><input checked="" type="checkbox"/> Enable Data Ingestion</p> <p>Log the read and change operations for data ingestion.</p> <p><input type="checkbox"/> Enable Audit Logs for Read Operations and Keep Logs for <input type="text" value="30"/> Days</p> <p><input type="checkbox"/> Enable Audit Logs for Change Operations and Keep Logs for <input type="text" value="30"/> Days</p> <p>Allow other apps or tools to consume your space data.</p> <p><input type="checkbox"/> Enable Data Consumption</p> <p>Make your space data available in your HDI containers.</p> <p><input type="checkbox"/> Enable HDI Consumption</p> <p><b>Create</b> <b>Cancel</b></p>

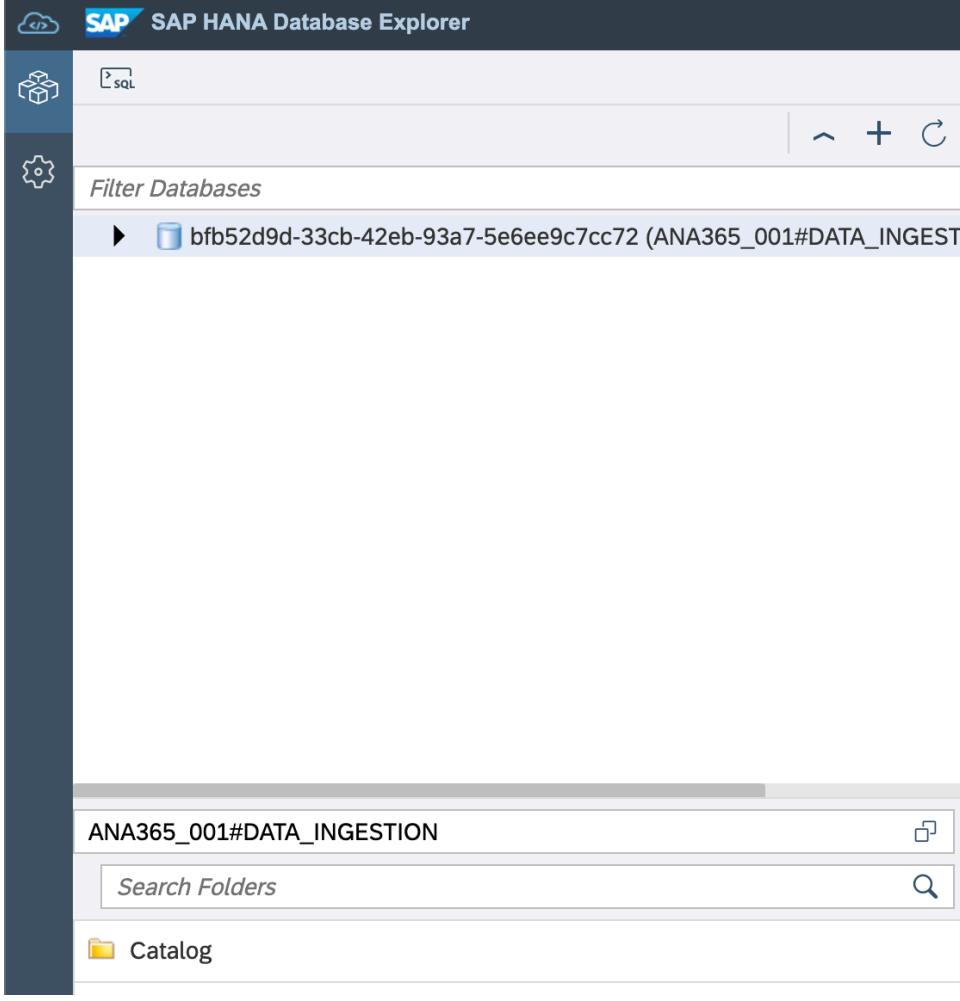
Explanation	Screenshot										
45. Make sure to copy the Host Name, Port, Database User Name and Password to a safe place, for example your local notes on Mac or Notepad on Windows. Then hit Close to finish the user creation.	 <p>Database User Details</p> <p>Database User Name: ANA365_001#DATA_INGESTION</p> <p>Database Schema Name (Data Ingestion): ANA365_001#DATA_INGESTION</p> <p>Internal Schema Name (Data Consumption): ANA365_001</p> <p>Host Name: bf... Port: 443</p> <p>Password {ZLNks0OH\$*N/1%;} <input type="button" value="Copy Password"/></p> <p><input type="button" value="Close"/></p>										
46. The created database user should be shown with status <b>Active</b> .	 <p>Ingest data from other apps or tools into SAP Data Warehouse Cloud or make your space data available by allowing other apps or tools to consume it. Create a database user and define privileges to combine the best of both worlds.</p> <table border="1"> <thead> <tr> <th data-bbox="518 1332 567 1353"><input type="checkbox"/> Database User Name</th> <th data-bbox="1041 1332 1122 1353">Data Ingestion</th> <th data-bbox="1144 1332 1258 1353">Data Consumption</th> <th data-bbox="1263 1332 1377 1353">HDI Consumption</th> <th data-bbox="1382 1332 1398 1353">Status</th> </tr> </thead> <tbody> <tr> <td data-bbox="518 1374 567 1396"><input checked="" type="checkbox"/> ANA365_001#DATA_INGESTION</td> <td data-bbox="1041 1374 1090 1396">✓ Enabled</td> <td data-bbox="1144 1374 1192 1396">✗ Disabled</td> <td data-bbox="1263 1374 1312 1396">✗ Disabled</td> <td data-bbox="1382 1374 1431 1396">Active</td> </tr> </tbody> </table>	<input type="checkbox"/> Database User Name	Data Ingestion	Data Consumption	HDI Consumption	Status	<input checked="" type="checkbox"/> ANA365_001#DATA_INGESTION	✓ Enabled	✗ Disabled	✗ Disabled	Active
<input type="checkbox"/> Database User Name	Data Ingestion	Data Consumption	HDI Consumption	Status							
<input checked="" type="checkbox"/> ANA365_001#DATA_INGESTION	✓ Enabled	✗ Disabled	✗ Disabled	Active							
47. Congratulations!	You successfully created your space and created connections to a non-SAP source, Google Big Query! Also you integrated a SAP BW system and enabled your space to get connected to external SQL clients! Before we continue with the second parts, let's quickly make sure that the space is still empty.										

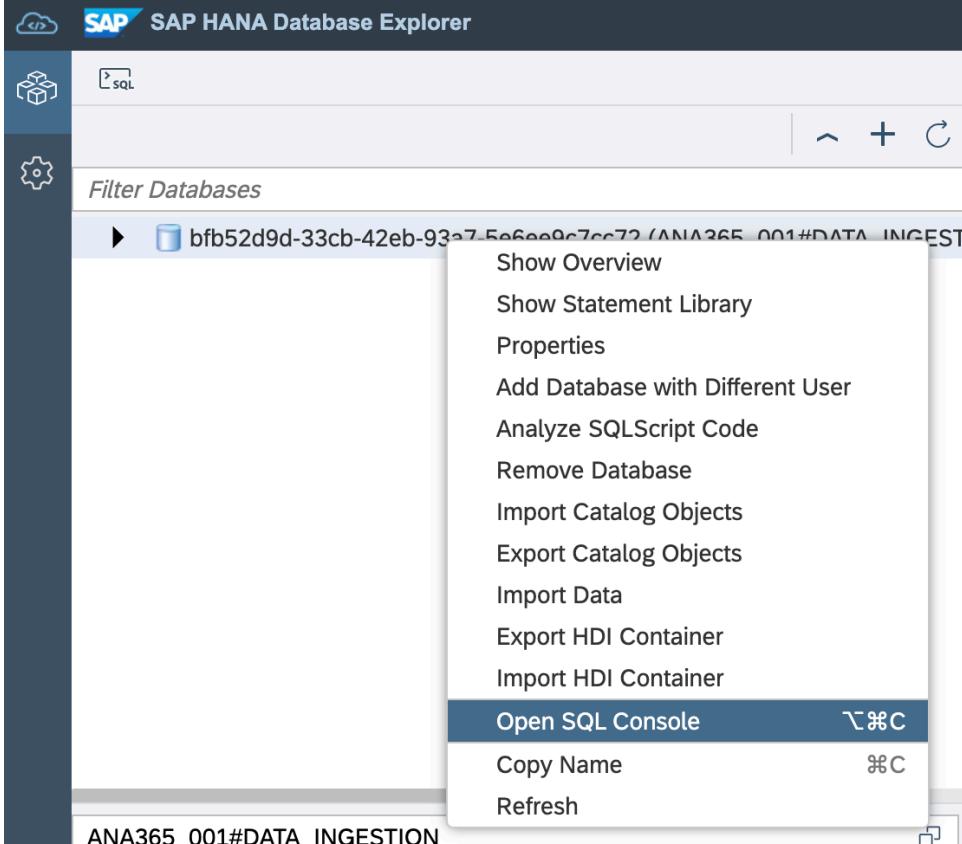
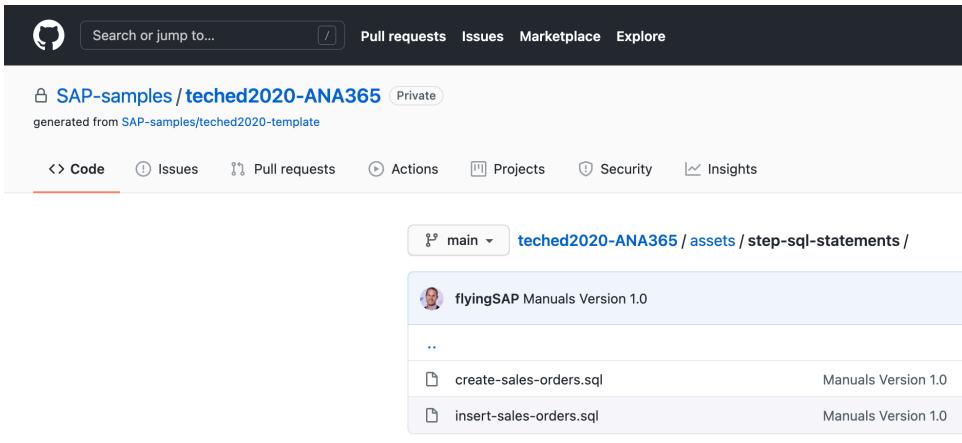
Explanation	Screenshot
48. Before we start loading data into our space, hit the Monitor Space button in the top right corner.	
49. Make sure that the space does not yet contain any data.	
50. Hit Edit Space in the top right corner to navigate back to the Management of your Space.	
51. Now it's time to prep your space with some data!	<p>As part of the second section of this hands-on we will equip your space with all the required data and setup the data models. We will ingest some data via an external SQL client (SAP HANA Database Explorer, but can be any client actually), replicate data from some of the data sets available in the SAP BW source, upload a flat file, use the Data Flow to ETL-like move data from Google Cloud Storage into your space and combine the locally available data from these different steps with some data we access virtually from the SAP BW system.</p>
52. Navigate back to the Database Access section and select the Database User you created.	

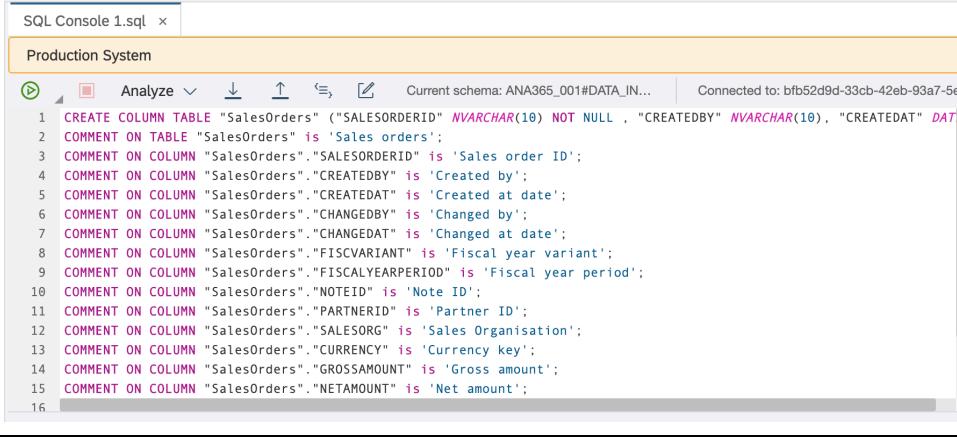
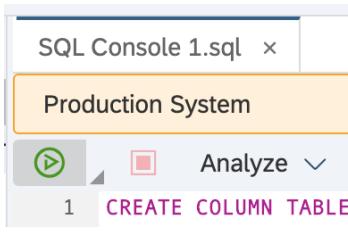
Explanation	Screenshot
53. Hit the Open Database Explorer button on the right. This takes you to the SAP HANA Database Explorer website.	 <p>The screenshot shows a menu bar with 'Create', 'Delete', 'Edit Privileges', and 'Open Database Explorer'. Below the menu is a horizontal bar with three items: 'Data Ingestion' (Enabled), 'Data Consumption' (Disabled), and 'HDI' (Disabled). The 'Open Database Explorer' button is highlighted.</p>
54. If you have enabled two-factor authentication on SAP Cloud Platform you need to enter your passcode first. If not enabled you will be directly forwarded to the screen shown in the next step.	<h2 data-bbox="528 677 1099 728">Two-Factor Authentication</h2> <p>To proceed, please enter the time-based passcode generated by your mobile device.</p> <p>E-Mail, ID, or Login Name <input type="text" value="jascha.kanngiesser@sap.com"/> <span style="float: right;">*</span></p> <p>Passcode * <input type="text"/></p> <p style="text-align: right;"><small>*Required</small></p> <p style="text-align: right; background-color: #0070C0; color: white; padding: 5px 10px; border-radius: 5px;">Continue</p>
55. Within the SAP HANA Database Explorer you can execute DML and DDL statements to create tables or views or insert table into tables.	 <p>The screenshot shows the SAP HANA Database Explorer interface with a sidebar containing icons for cloud, cube, and gear. The main area displays a table with the message 'No data'.</p>
56. Hit the + button in the top left corner.	 <p>The screenshot shows the SAP HANA Database Explorer interface with the '+' button highlighted in the top left corner of the toolbar.</p>

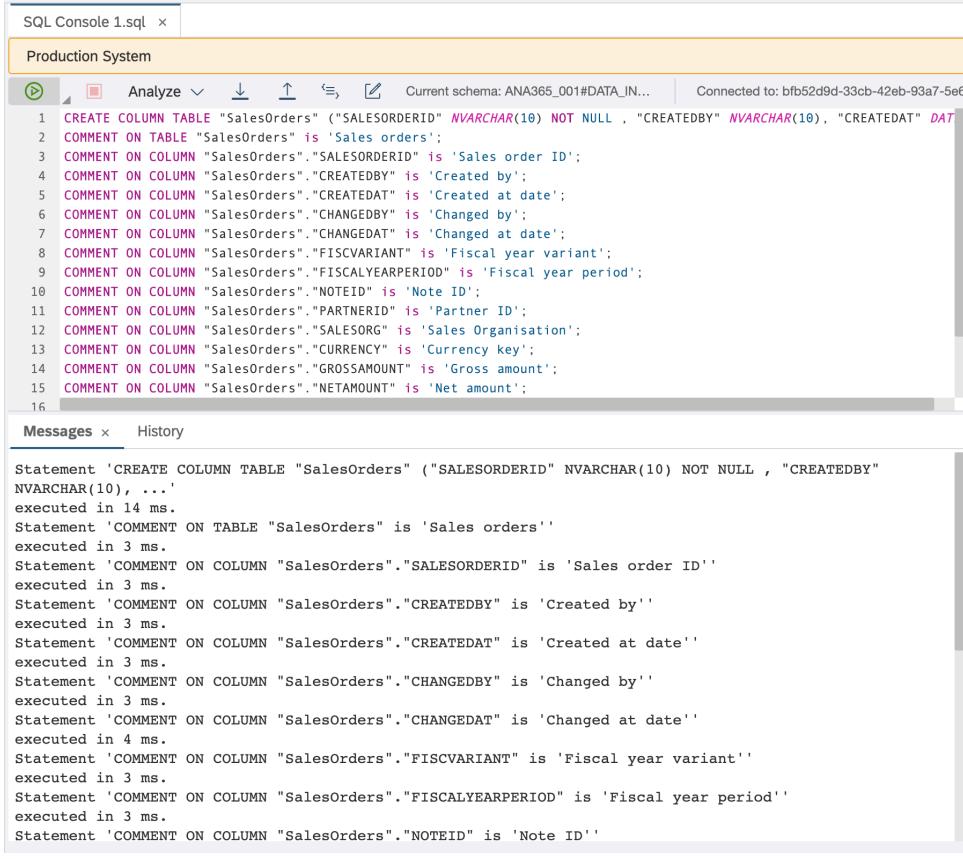
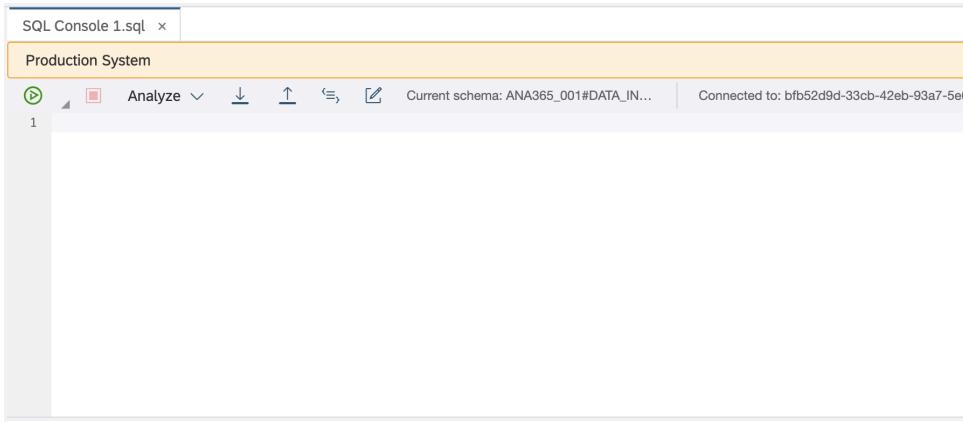
Explanation	Screenshot
<p>57. From the Database Type select SAP HANA Database.</p>	 <p>The screenshot shows the 'Add Database' dialog box. In the top right corner, there is a search icon and a grid icon. Below the title 'Add Database', there is a section labeled 'Database Type:' with a dropdown menu. The dropdown menu has the following options: 'HDI Container' (selected), 'Cockpit Database', 'HDI Container' (highlighted in blue), 'Application Managed Service Instances', 'SAP HANA Database (Multitenant)', and 'SAP HANA Database'. To the right of the dropdown, there is a table with two columns: 'Organization' and 'Space'. Below the table, it says 'containers are available'. At the bottom of the dialog box, there are 'Advanced Options:' and 'Name to Show in Display:' input fields, and 'OK' and 'Cancel' buttons.</p>

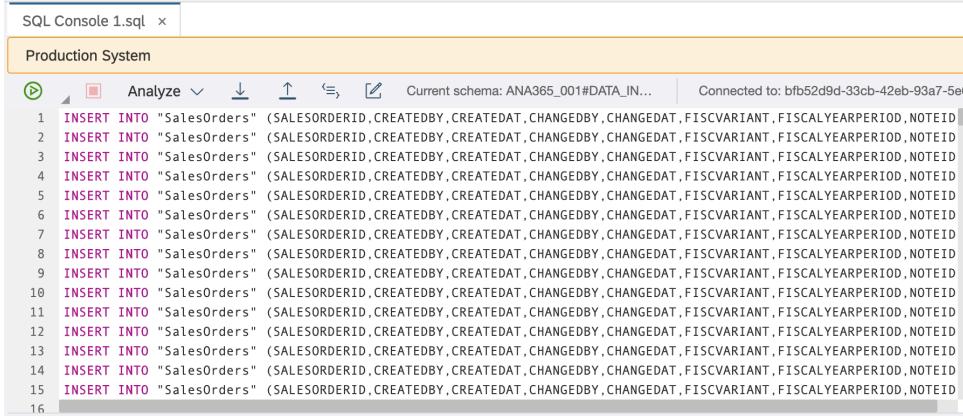
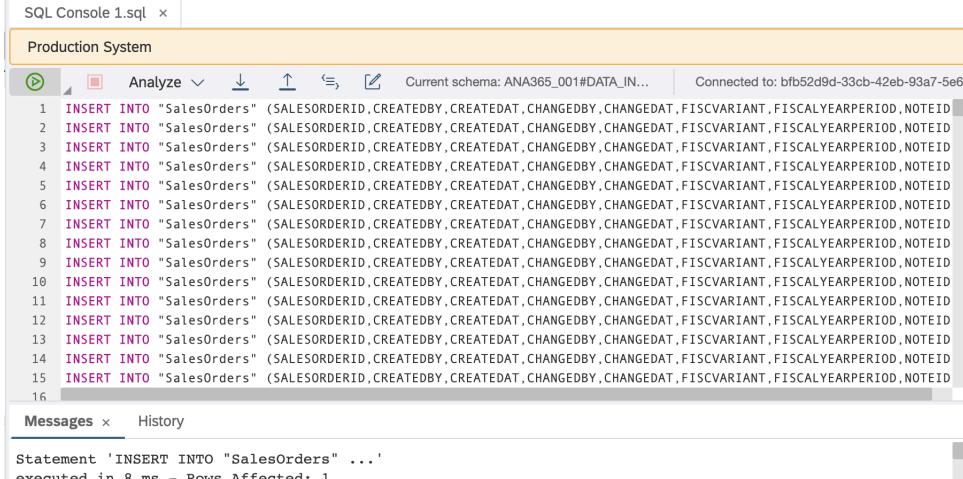
Explanation	Screenshot
<p>58. Enter the information copied earlier to a safe place when creating the database user like the Host Name, Port, Database User and Password.</p>	 <p>The screenshot shows the 'Add Database' dialog for a SAP HANA Database. The 'Host' field contains the URL 'bfb52d9d-33cb-42eb-93a7-5e6ee9c7cc72.hana.prod-us10.hanacloud.ondemand.cc'. The 'Port number' is set to 443. The 'User' field is 'ANA365_001#DATA_INGESTION' and the 'Password' field is masked. Under 'Advanced Options', there is a checkbox for 'Save password (stored in the SAP HANA secure store)' which is checked. Below it are two more checkboxes: 'Connect to the database securely using TLS/SSL (prevents data eavesdropping)' which is also checked, and 'Verify the server's certificate using the trusted certificate below' which is unchecked. At the bottom right are 'OK' and 'Cancel' buttons.</p>
<p>59. Make sure to check the Save password (stored in the SAP HANA secure store) and Connect to the database securely using TLS/SSL (prevents data eavesdropping) options. Uncheck the Verify the server's certificate using the trusted certificate below option.</p>	<p><input checked="" type="checkbox"/> Save password (stored in the SAP HANA secure store)</p> <p><input checked="" type="checkbox"/> Connect to the database securely using TLS/SSL (prevents data eavesdropping)</p> <p><input type="checkbox"/> Verify the server's certificate using the trusted certificate below</p>

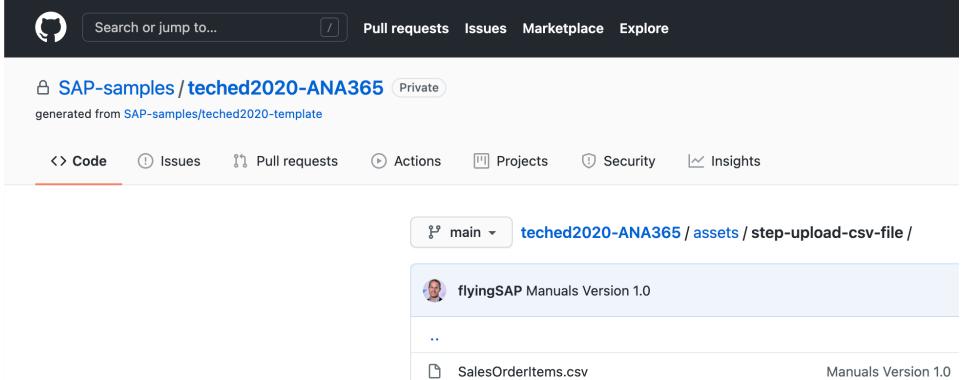
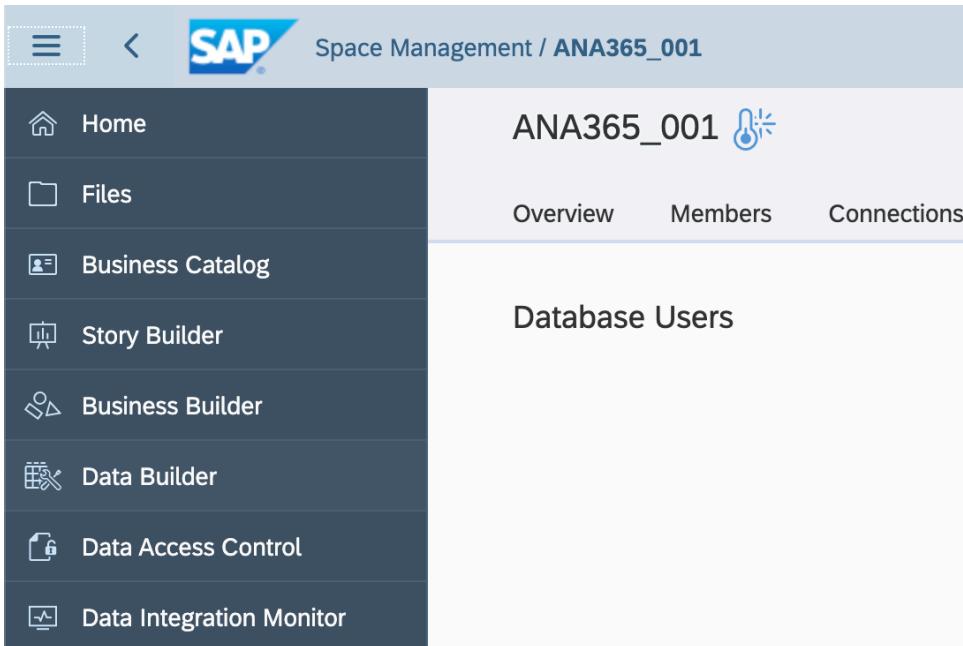
Explanation	Screenshot
<p>60. Hit the OK button to add the database to your list of databases.</p>	 <p>The screenshot shows the SAP HANA Database Explorer interface. The title bar reads "SAP HANA Database Explorer". On the left, there is a sidebar with icons for cloud, database, and settings. The main area displays a list of databases under the heading "Filter Databases". One database entry is highlighted: "bfb52d9d-33cb-42eb-93a7-5e6ee9c7cc72 (ANA365_001#DATA_INGEST)". Below this, there is a folder structure with "ANA365_001#DATA_INGESTION" expanded, showing "Search Folders" and "Catalog".</p>

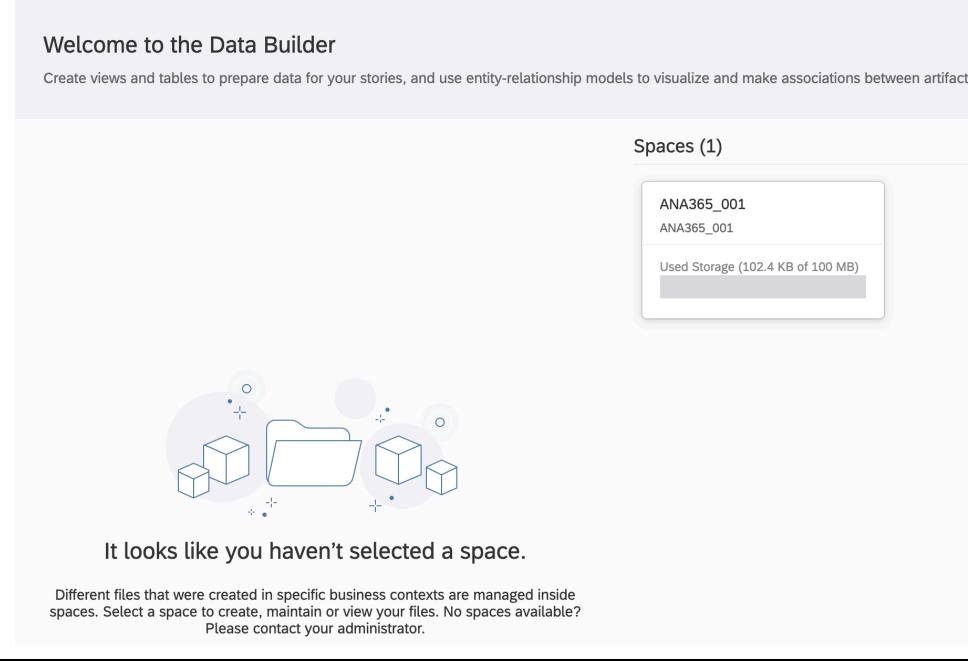
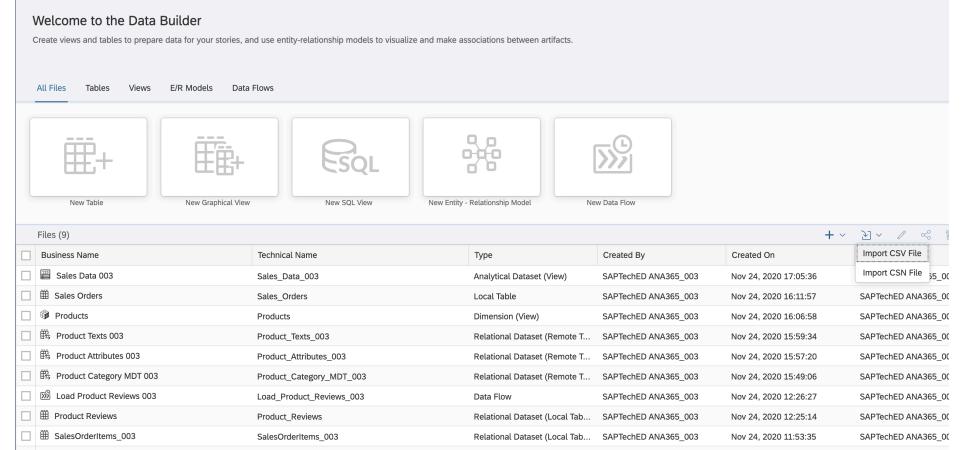
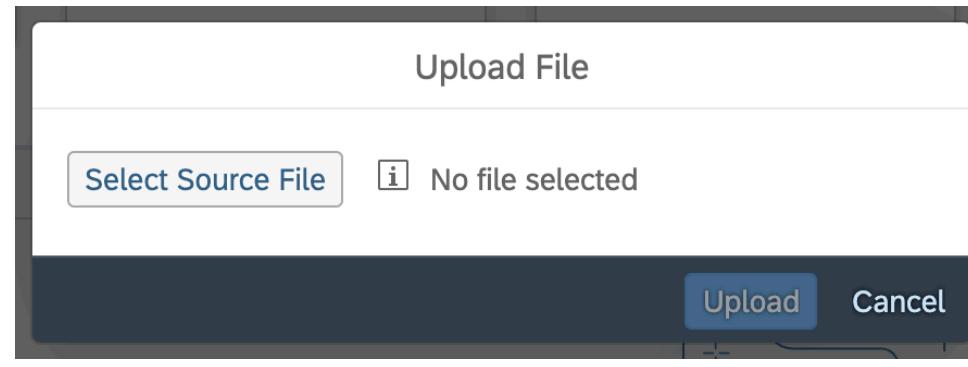
Explanation	Screenshot
<p>61. Right-click the newly created database and select Open SQL Console.</p>	 <p>The screenshot shows the SAP HANA Database Explorer interface. A context menu is open over a database entry named "ANALOG_001#DATA_INGEST". The menu options include: Show Overview, Show Statement Library, Properties, Add Database with Different User, Analyze SQLScript Code, Remove Database, Import Catalog Objects, Export Catalog Objects, Import Data, Export HDI Container, Import HDI Container, Open SQL Console (which is highlighted in blue), Copy Name, and Refresh.</p>
<p>62. Get the SQL statements from the folder in the Github repository to create and fill the table that holds the Sales Orders:  <a href="https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-sql-statements">https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-sql-statements</a></p>	 <p>The screenshot shows a GitHub repository page for "SAP-samples/teched2020-ANA365". The "step-sql-statements" folder is selected. The repository is private and was generated from "SAP-samples/teched2020-template". The main branch is "main". The folder contains two files: "create-sales-orders.sql" and "insert-sales-orders.sql", both of which are labeled "Manuals Version 1.0".</p>

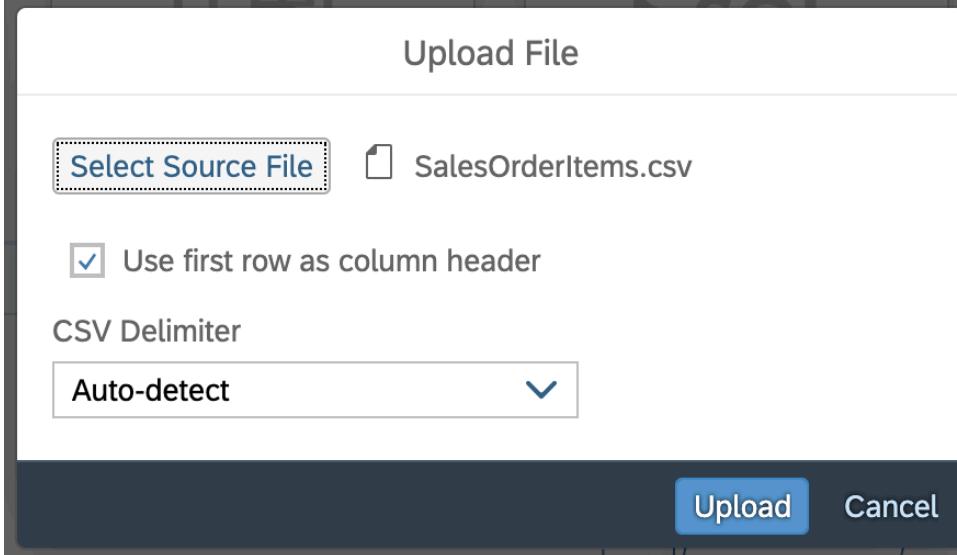
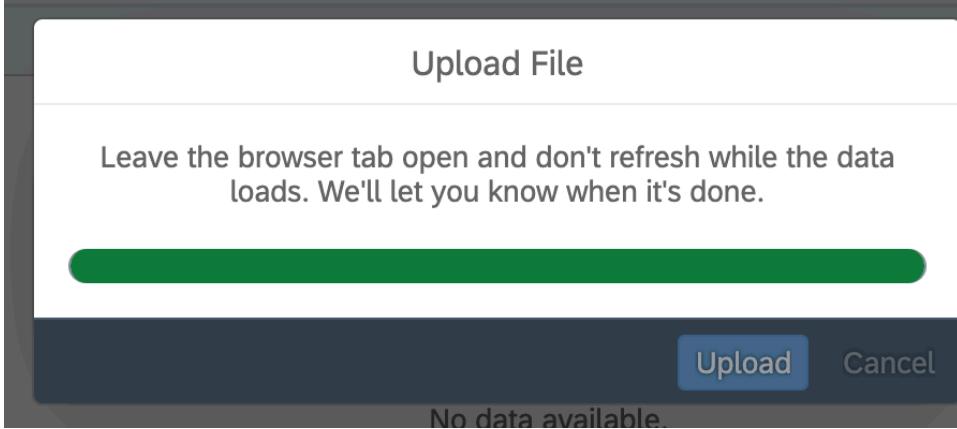
Explanation	Screenshot
63. Open the create-sales-orders.sql file and copy over the content in the SQL console opened in the SAP HANA Database Explorer.	 <p>The screenshot shows the SAP HANA Database Explorer interface with an open SQL console titled "SQL Console 1.sql". The console displays a SQL script for creating a table named "SalesOrders". The script includes column definitions and comments for each column. The "Production System" tab is selected. The status bar at the bottom indicates the current schema and connection details.</p> <pre> CREATE COLUMN TABLE "SalesOrders" ("SALESORDERID" NVARCHAR(10) NOT NULL , "CREATEDBY" NVARCHAR(10) , "CREATEDAT" DATETIME , "CHANGEDBY" NVARCHAR(10) , "CHANGEDAT" DATETIME , "FISCALVARIANT" NVARCHAR(10) , "FISCALYEARPERIOD" NVARCHAR(10) , "NOTEID" NVARCHAR(10) , "PARTNERID" NVARCHAR(10) , "SALESORG" NVARCHAR(10) , "CURRENCY" NVARCHAR(10) , "GROSSAMOUNT" DECIMAL(18,2) , "NETAMOUNT" DECIMAL(18,2)); COMMENT ON TABLE "SalesOrders" IS 'Sales orders'; COMMENT ON COLUMN "SalesOrders"."SALESORDERID" IS 'Sales order ID'; COMMENT ON COLUMN "SalesOrders"."CREATEDBY" IS 'Created by'; COMMENT ON COLUMN "SalesOrders"."CREATEDAT" IS 'Created at date'; COMMENT ON COLUMN "SalesOrders"."CHANGEDBY" IS 'Changed by'; COMMENT ON COLUMN "SalesOrders"."CHANGEDAT" IS 'Changed at date'; COMMENT ON COLUMN "SalesOrders"."FISCALVARIANT" IS 'Fiscal year variant'; COMMENT ON COLUMN "SalesOrders"."FISCALYEARPERIOD" IS 'Fiscal year period'; COMMENT ON COLUMN "SalesOrders"."NOTEID" IS 'Note ID'; COMMENT ON COLUMN "SalesOrders"."PARTNERID" IS 'Partner ID'; COMMENT ON COLUMN "SalesOrders"."SALESORG" IS 'Sales Organisation'; COMMENT ON COLUMN "SalesOrders"."CURRENCY" IS 'Currency key'; COMMENT ON COLUMN "SalesOrders"."GROSSAMOUNT" IS 'Gross amount'; COMMENT ON COLUMN "SalesOrders"."NETAMOUNT" IS 'Net amount';         </pre>
64. Hit the green Execute button to create the Sales Order table.	 <p>The screenshot shows the SAP HANA Database Explorer interface with an open SQL console titled "SQL Console 1.sql". The console displays the executed SQL command "CREATE COLUMN TABLE". The "Production System" tab is selected. The status bar at the bottom indicates the current schema and connection details.</p>

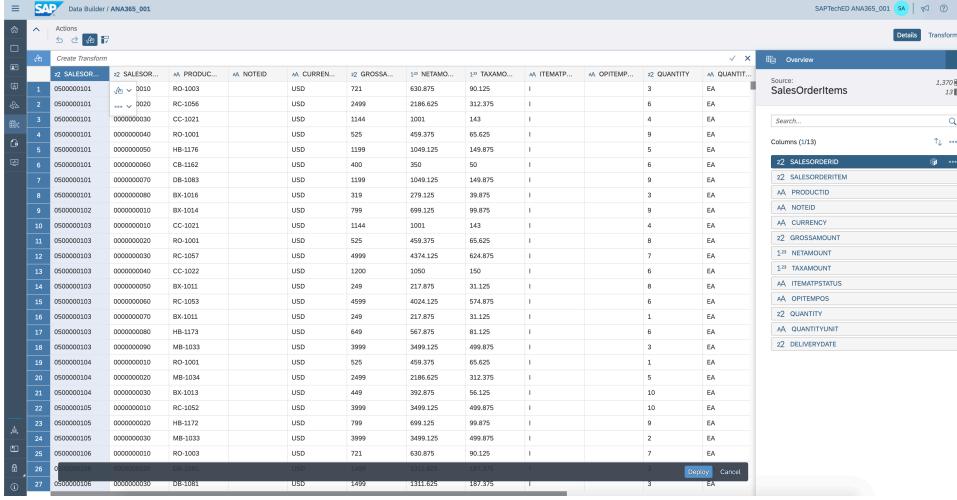
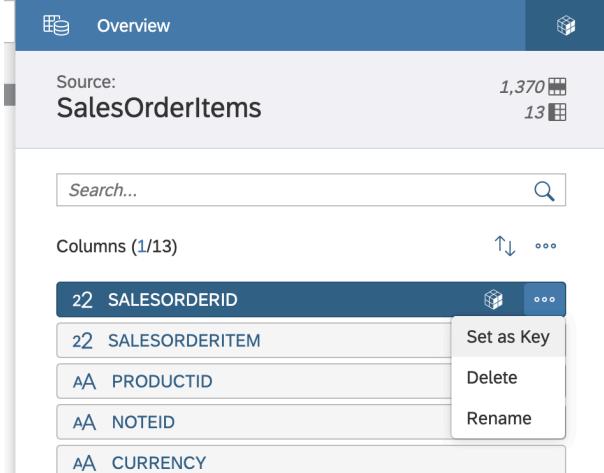
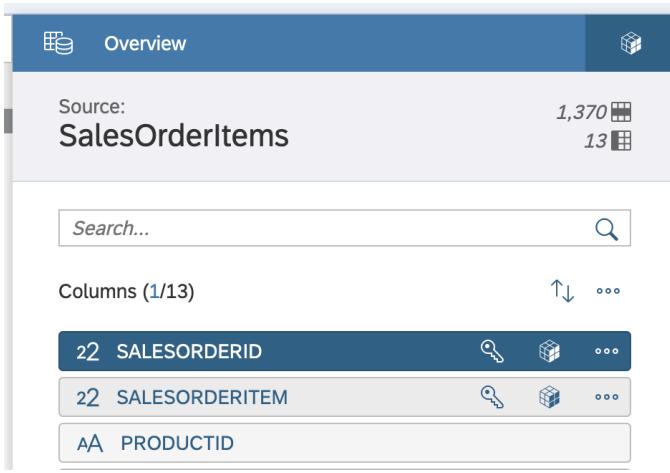
Explanation	Screenshot
<p>65. Make sure that the table was created correctly by checking the log. It should similar to what you see below, stating that the statement was executed (no errors mentioned).</p>	 <p>The screenshot shows the SAP SQL Console interface. The title bar says "SQL Console 1.sql x". The toolbar includes "Analyze", "Current schema: ANA365_001#DATA_IN...", and "Connected to: bfb52d9d-33cb-42eb-93a7-5e". The main area displays the following SQL code:</p> <pre> 1 CREATE COLUMN TABLE "SalesOrders" ("SALESORDERID" NVARCHAR(10) NOT NULL , "CREATEDBY" NVARCHAR(10) , "CREATEDAT" DAT 2 COMMENT ON TABLE "SalesOrders" IS 'Sales orders'; 3 COMMENT ON COLUMN "SalesOrders"."SALESORDERID" IS 'Sales order ID'; 4 COMMENT ON COLUMN "SalesOrders"."CREATEDBY" IS 'Created by'; 5 COMMENT ON COLUMN "SalesOrders"."CREATEDAT" IS 'Created at date'; 6 COMMENT ON COLUMN "SalesOrders"."CHANGEDBY" IS 'Changed by'; 7 COMMENT ON COLUMN "SalesOrders"."CHANGEDAT" IS 'Changed at date'; 8 COMMENT ON COLUMN "SalesOrders"."FISCVARIANT" IS 'Fiscal year variant'; 9 COMMENT ON COLUMN "SalesOrders"."FISCALYEARPERIOD" IS 'Fiscal year period'; 10 COMMENT ON COLUMN "SalesOrders"."NOTEID" IS 'Note ID'; 11 COMMENT ON COLUMN "SalesOrders"."PARTNERID" IS 'Partner ID'; 12 COMMENT ON COLUMN "SalesOrders"."SALESORG" IS 'Sales Organisation'; 13 COMMENT ON COLUMN "SalesOrders"."CURRENCY" IS 'Currency key'; 14 COMMENT ON COLUMN "SalesOrders"."GROSSAMOUNT" IS 'Gross amount'; 15 COMMENT ON COLUMN "SalesOrders"."NETAMOUNT" IS 'Net amount'; 16 </pre> <p>Below the code, the "Messages" tab is selected, showing the execution results:</p> <pre> Statement 'CREATE COLUMN TABLE "SalesOrders" ("SALESORDERID" NVARCHAR(10) NOT NULL , "CREATEDBY" NVARCHAR(10) , "CREATEDAT" DAT NVARCHAR(10), ....' executed in 14 ms. Statement 'COMMENT ON TABLE "SalesOrders" IS 'Sales orders'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."SALESORDERID" IS 'Sales order ID'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."CREATEDBY" IS 'Created by'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."CREATEDAT" IS 'Created at date'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."CHANGEDBY" IS 'Changed by'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."CHANGEDAT" IS 'Changed at date'' executed in 4 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."FISCVARIANT" IS 'Fiscal year variant'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."FISCALYEARPERIOD" IS 'Fiscal year period'' executed in 3 ms. Statement 'COMMENT ON COLUMN "SalesOrders"."NOTEID" IS 'Note ID'' </pre>
<p>66. Empty the SQL console by removing the executed statements.</p>	 <p>The screenshot shows the SAP SQL Console interface. The title bar says "SQL Console 1.sql x". The toolbar includes "Analyze", "Current schema: ANA365_001#DATA_IN...", and "Connected to: bfb52d9d-33cb-42eb-93a7-5e". The main area displays the following SQL code:</p> <pre> 1 </pre>

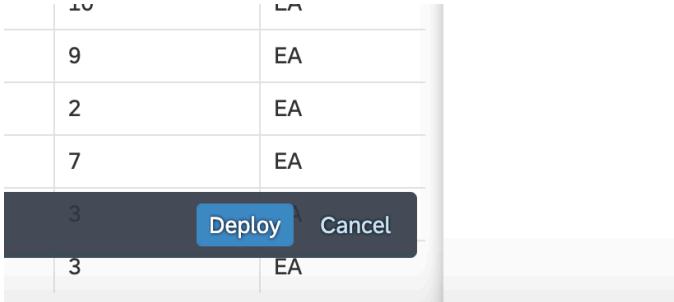
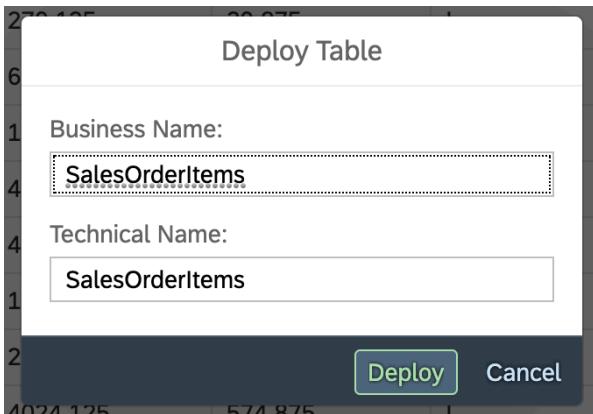
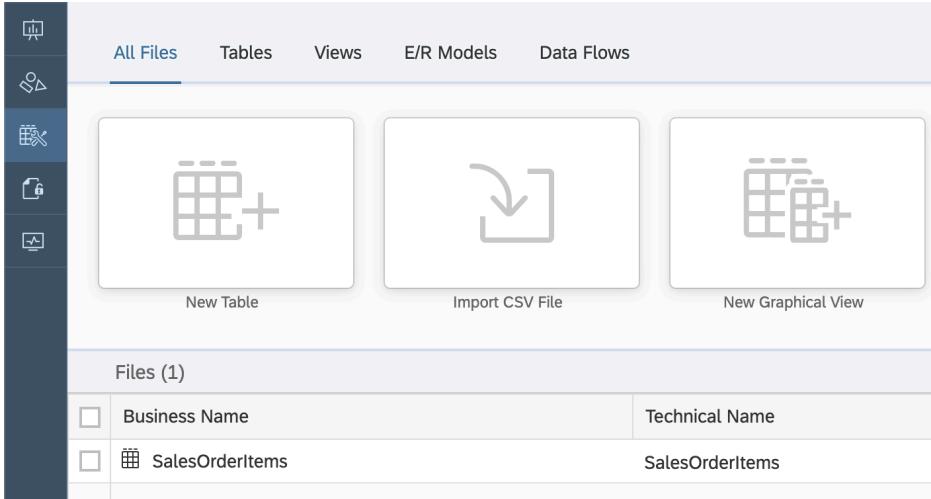
Explanation	Screenshot
67. Open the insert-sales-orders.sql file and copy over the SQL to fill the table you just created.	 <pre> SQL Console 1.sql x Production System Connected to: bfb52d9d-33cb-42eb-93a7-5e1  1 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 2 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 3 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 4 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 5 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 6 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 7 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 8 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 9 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 10 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 11 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 12 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 13 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 14 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 15 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 16 </pre>
68. Again hit the green Execute button and check the log for the successful execution.	 <pre> SQL Console 1.sql x Production System Connected to: bfb52d9d-33cb-42eb-93a7-5e1  1 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 2 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 3 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 4 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 5 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 6 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 7 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 8 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 9 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 10 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 11 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 12 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 13 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 14 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 15 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,CHANGEDAT,FISCVARIANT,FISCALYEARPERIOD,NOTEID 16  Messages x History Statement 'INSERT INTO "SalesOrders" ...' executed in 8 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 2 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 Statement 'INSERT INTO "SalesOrders" ...' executed in 3 ms - Rows Affected: 1 </pre>
69. Congratulations!	You just used an external tool to connect to your SAP Data Warehouse Cloud space via SQL, created a table and inserted data! This is one example how you can use actually any external 3rd party tool, for example also open source applications like DBeaver, to connect to your SAP Data Warehouse Cloud space from the outside and ingest data using SQL. This way you can for example integrate your SAP Data Warehouse Cloud tenant in your already existing ETL processes.

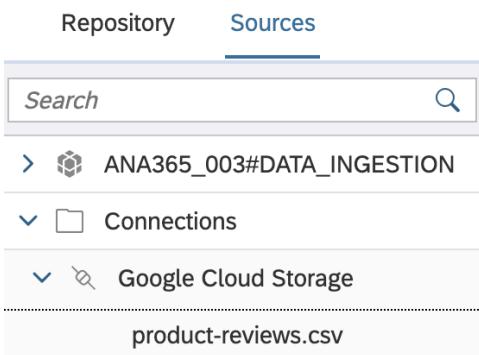
Explanation	Screenshot
<p>70. Get the required CSV file SalesOrderItems.csv from the Github repository:  <a href="https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-upload-csv-file">https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-upload-csv-file</a></p>	
<p>71. Head back to your SAP Data Warehouse Cloud tenant and navigate to the Data Builder.</p>	

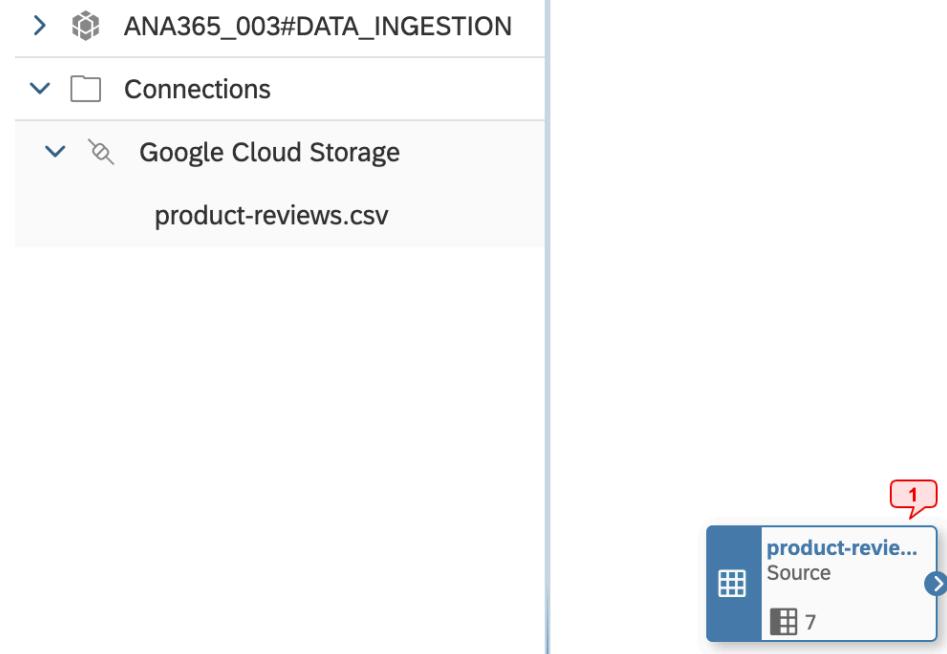
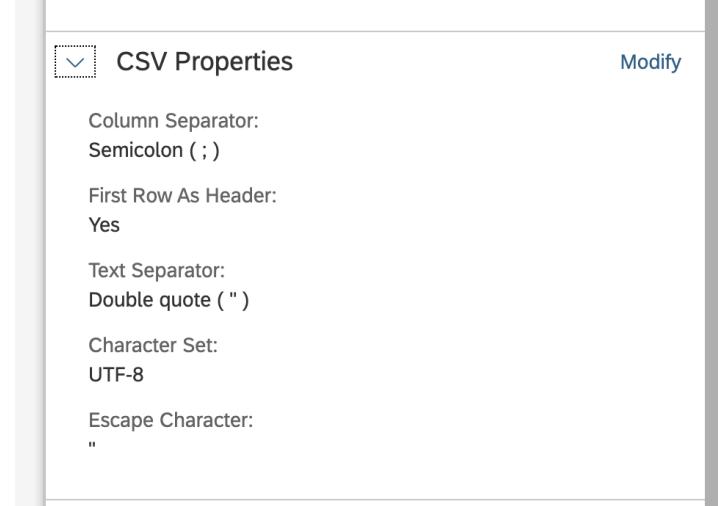
Explanation	Screenshot																																																												
<p>72. Select your space.</p>	 <p>Welcome to the Data Builder</p> <p>Create views and tables to prepare data for your stories, and use entity-relationship models to visualize and make associations between artifacts</p> <p>Spaces (1)</p> <table border="1" data-bbox="1139 544 1388 677"> <tr> <td>ANA365_001</td> </tr> <tr> <td>ANA365_001</td> </tr> <tr> <td>Used Storage (102.4 KB of 100 MB)</td> </tr> </table> <p>It looks like you haven't selected a space.</p> <p>Different files that were created in specific business contexts are managed inside spaces. Select a space to create, maintain or view your files. No spaces available? Please contact your administrator.</p>	ANA365_001	ANA365_001	Used Storage (102.4 KB of 100 MB)																																																									
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<p>73. On the right click the Import icon and select the Import CSV File option.</p>	 <p>Welcome to the Data Builder</p> <p>Create views and tables to prepare data for your stories, and use entity-relationship models to visualize and make associations between artifacts.</p> <p>All Files Tables Views E/R Models Data Flows</p> <p>New Table New Graphical View New SQL View New Entity - Relationship Model New Data Flow</p> <p>Files (9)</p> <table border="1" data-bbox="507 1269 1475 1493"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> <th>Type</th> <th>Created By</th> <th>Created On</th> <th>Import CSV File</th> </tr> </thead> <tbody> <tr> <td>Sales Data 003</td> <td>Sales_Data_003</td> <td>Analytical Dataset (View)</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 17:05:36</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Sales Orders</td> <td>Sales_Orders</td> <td>Local Table</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 16:11:57</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Products</td> <td>Products</td> <td>Dimension (View)</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 16:06:58</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Product Texts 003</td> <td>Product_Texts_003</td> <td>Relational Dataset (Remote T...</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 15:59:34</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Product Attributes 003</td> <td>Product_Attributes_003</td> <td>Relational Dataset (Remote T...</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 15:57:20</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Product Category MDT 003</td> <td>Product_Category_MDT_003</td> <td>Relational Dataset (Remote T...</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 15:49:06</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Load Product Reviews 003</td> <td>Load_Product_Reviews_003</td> <td>Data Flow</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 12:26:27</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>Product Review</td> <td>Product_Reviews</td> <td>Relational Dataset (Local Tab...</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 12:25:14</td> <td>SAPTechED ANA365_003</td> </tr> <tr> <td>SalesOrderItems 003</td> <td>SalesOrderItems_003</td> <td>Relational Dataset (Local Tab...</td> <td>SAPTechED ANA365_003</td> <td>Nov 24, 2020 11:53:35</td> <td>SAPTechED ANA365_003</td> </tr> </tbody> </table>	Business Name	Technical Name	Type	Created By	Created On	Import CSV File	Sales Data 003	Sales_Data_003	Analytical Dataset (View)	SAPTechED ANA365_003	Nov 24, 2020 17:05:36	SAPTechED ANA365_003	Sales Orders	Sales_Orders	Local Table	SAPTechED ANA365_003	Nov 24, 2020 16:11:57	SAPTechED ANA365_003	Products	Products	Dimension (View)	SAPTechED ANA365_003	Nov 24, 2020 16:06:58	SAPTechED ANA365_003	Product Texts 003	Product_Texts_003	Relational Dataset (Remote T...	SAPTechED ANA365_003	Nov 24, 2020 15:59:34	SAPTechED ANA365_003	Product Attributes 003	Product_Attributes_003	Relational Dataset (Remote T...	SAPTechED ANA365_003	Nov 24, 2020 15:57:20	SAPTechED ANA365_003	Product Category MDT 003	Product_Category_MDT_003	Relational Dataset (Remote T...	SAPTechED ANA365_003	Nov 24, 2020 15:49:06	SAPTechED ANA365_003	Load Product Reviews 003	Load_Product_Reviews_003	Data Flow	SAPTechED ANA365_003	Nov 24, 2020 12:26:27	SAPTechED ANA365_003	Product Review	Product_Reviews	Relational Dataset (Local Tab...	SAPTechED ANA365_003	Nov 24, 2020 12:25:14	SAPTechED ANA365_003	SalesOrderItems 003	SalesOrderItems_003	Relational Dataset (Local Tab...	SAPTechED ANA365_003	Nov 24, 2020 11:53:35	SAPTechED ANA365_003
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<p>74. Hit the Select Source File button and select the SalesOrderItems.csv file you just downloaded.</p>	 <p>Upload File</p> <p>Select Source File No file selected</p> <p>Upload Cancel</p>																																																												

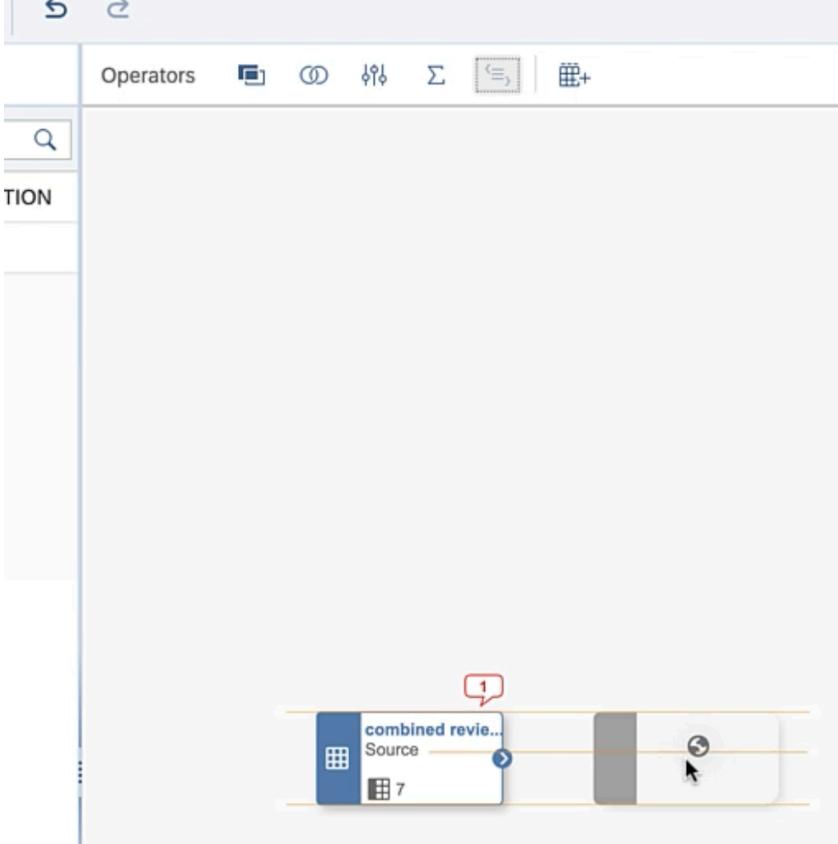
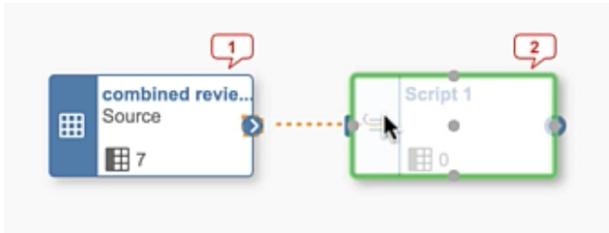
Explanation	Screenshot
75. Leave all options as is and hit the Upload button.	
76. Wait until the file was uploaded to the tenant.	

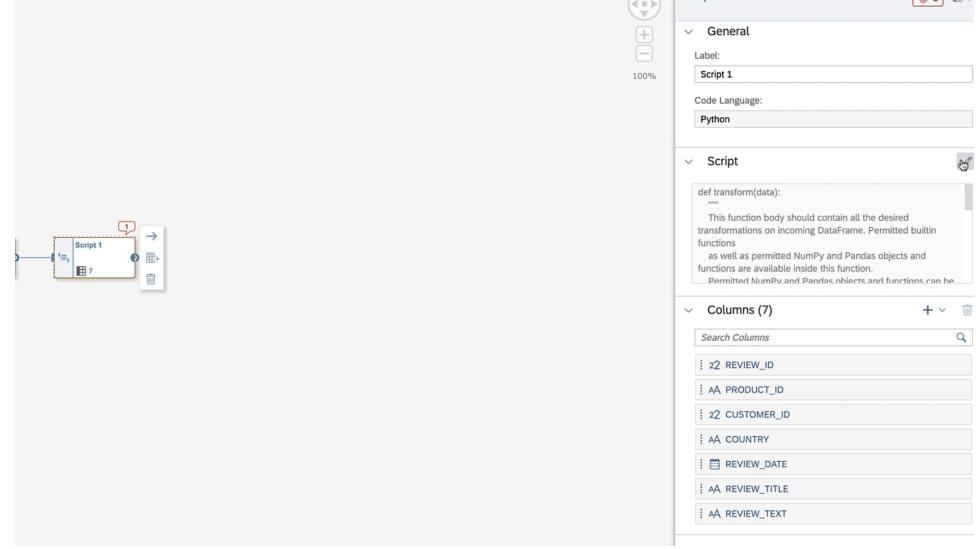
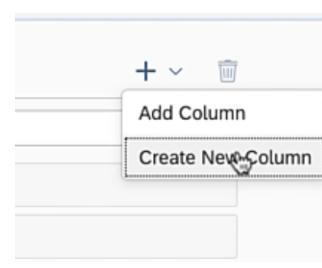
Explanation	Screenshot
<p>77. Make sure that the data is shown and the headers are identified correctly.</p>	
<p>78. Select the columns SALESORDERID and SALESORDERITEM M as key fields.</p>	
<p>79. Make sure that both columns are enabled as key fields.</p>	

Explanation	Screenshot
80. Hit Deploy to open the dialog for deploying the table into your space.	 <p>A screenshot of a table list interface. At the bottom, there is a modal dialog box titled 'Deploy' with two buttons: 'Deploy' (highlighted in blue) and 'Cancel'. The table list above shows several rows, with the last row being highlighted.</p>
81. Enter a Business Name and Technical Name and deploy the table into your space.	 <p>A screenshot of the 'Deploy Table' dialog box. It contains two input fields: 'Business Name' with the value 'SalesOrderItems' and 'Technical Name' with the value 'SalesOrderItems'. At the bottom are 'Deploy' and 'Cancel' buttons.</p>
82. Make sure that the table was correctly created in your space and is visible in the Data Builder overview.	 <p>A screenshot of the Data Builder overview page. The top navigation bar includes 'All Files', 'Tables', 'Views', 'E/R Models', and 'Data Flows'. Below the navigation are three large buttons: 'New Table', 'Import CSV File', and 'New Graphical View'. A table titled 'Files (1)' lists one item: 'Business Name' (checkbox) and 'SalesOrderItems' (checkbox). The 'Technical Name' column shows 'SalesOrderItems'.</p>
83. Congratulations!	<p>You have successfully uploaded data into your SAP Data Warehouse Cloud space using the CSV file upload! As a next step we will continue loading data into your space using the data flow feature.</p>

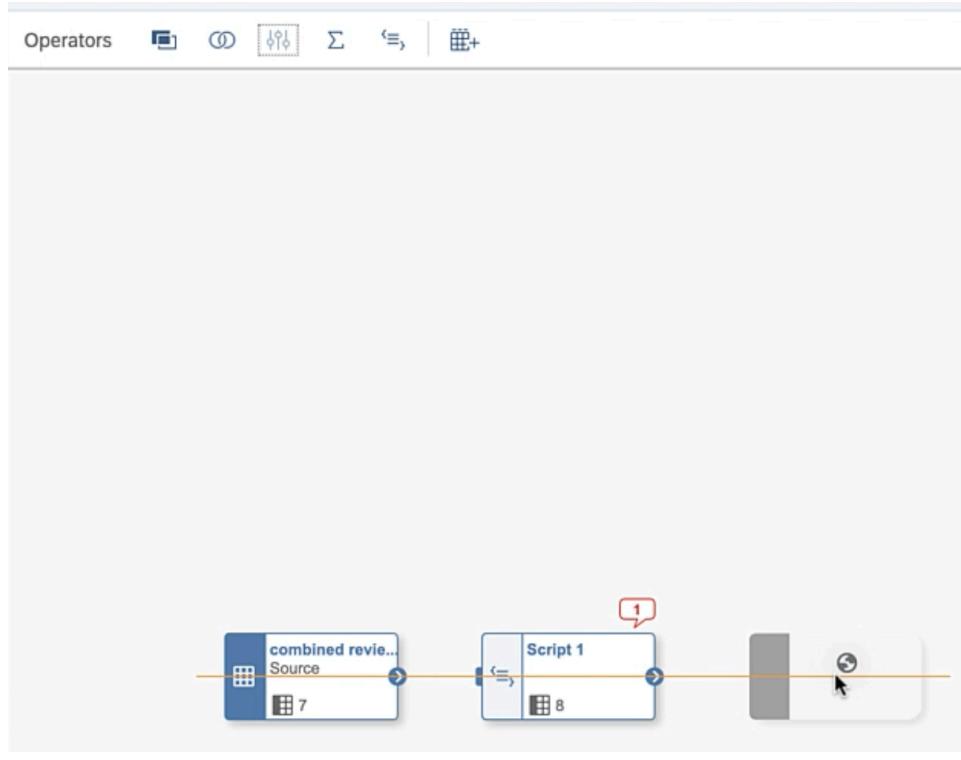
Explanation	Screenshot
<p>84. Select the New Data Flow tile.</p>	 <p>The screenshot shows the SAP Data Builder interface with the title "Data Builder / ANA365_001". The top navigation bar includes links for All Files, Tables, Views, E/R Models, and Data Flows, with "Data Flows" being the active tab. On the left, there is a vertical sidebar with various icons. In the center, under the heading "Welcome to the Data Builder", it says "Create views and tables to prepare data for your stories, and use entity-relationships to connect them". Below this, there is a large button labeled "New Data Flow" with a circular arrow icon. At the bottom, it shows "Files (0)".</p>
<p>85. Switch to the Sources tab and navigate to the product reviews folder: Connections &gt; Google Cloud Storage &gt; digital-workshop-series</p>	 <p>The screenshot shows the SAP Data Builder Repository view. The "Sources" tab is selected. At the top, there is a search bar with a magnifying glass icon. Below the search bar, there is a tree structure. The "Connections" node is expanded, showing the "Google Cloud Storage" node, which in turn contains the file "product-reviews.csv".</p>

Explanation	Screenshot
86. Select the product-reviews.csv file and drag it from the tree on the left onto the canvas.	 <p>The screenshot shows the SAP Data Warehouse Cloud interface. On the left, there is a navigation tree with the following structure:</p> <ul style="list-style-type: none"> <li>&gt;  ANA365_003#DATA_INGESTION</li> <li>&lt;  Connections</li> <li>&lt;  Google Cloud Storage             <ul style="list-style-type: none"> <li>product-reviews.csv</li> </ul> </li> </ul> <p>On the right, there is a canvas area with a single data source node. The node has a blue header with the text "product-review..." and a red speech bubble containing the number "1". Below the header, it says "Source" and "7".</p>
87. Make sure that the CSV properties are set correctly by selecting the added node and expanding the CSV properties section on the right.	 <p>The screenshot shows the "CSV Properties" dialog box. It contains the following settings:</p> <ul style="list-style-type: none"> <li>Column Separator: Semicolon ( ; )</li> <li>First Row As Header: Yes</li> <li>Text Separator: Double quote ( " )</li> <li>Character Set: UTF-8</li> <li>Escape Character: "</li> </ul>
88. In the Operators button bar above the canvas you can use several different operators for working with the data sets in your data flow.	 <p>The screenshot shows the "Operators" button bar located above the canvas. It features several icons representing different data flow operations:</p> <ul style="list-style-type: none"> <li>A square icon with a line.</li> <li>A circle icon with a line.</li> <li>A diamond icon with a line.</li> <li>A sigma symbol (<math>\Sigma</math>).</li> <li>A less than or equal to symbol (<math>\leq</math>).</li> <li>A plus sign (+) inside a grid.</li> </ul>

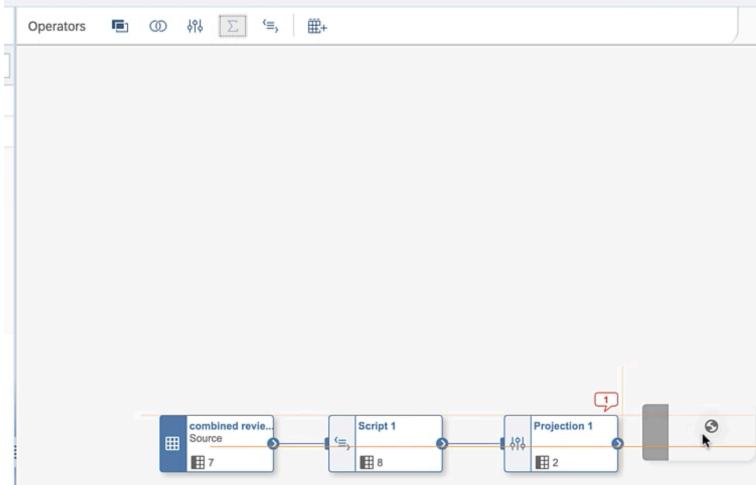
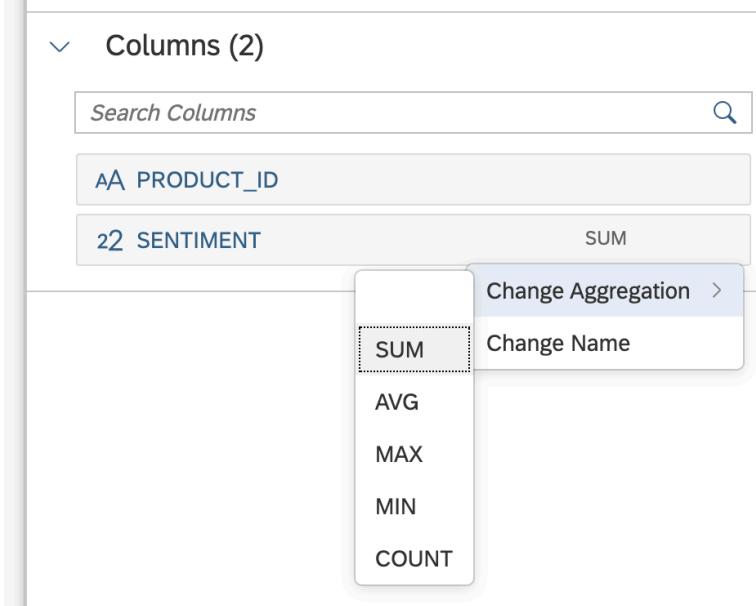
Explanation	Screenshot
<p>89. First, we want to calculate a sentiment from the available product reviews. Add the Script operator as a target node after the combined reviews source node. Please note that the left node should be named product-reviews in your case (this applies to the following screenshots, too).</p>	 <p>The screenshot shows the SAP Data Warehouse Cloud Data Flow interface. On the left, there is a sidebar with a search icon and the word 'TION'. The main area has a toolbar at the top with icons for Operators, Join, Union, Min, Max, Sum, and a plus sign. Below the toolbar, there is a list of nodes. A blue 'combined review...' Source node is selected. To its right is a grey Script target node. A red callout bubble labeled '1' points to the output port of the Source node, and another red callout bubble labeled '2' points to the input port of the Script node.</p>
<p>90. Connect the two nodes by dragging a line from the left to the right node.</p>	 <p>The screenshot shows the SAP Data Warehouse Cloud Data Flow interface. The 'combined review...' Source node (labeled '1') is connected by a dashed orange line to the 'Script 1' target node (labeled '2'). Both nodes are highlighted with green boxes.</p>

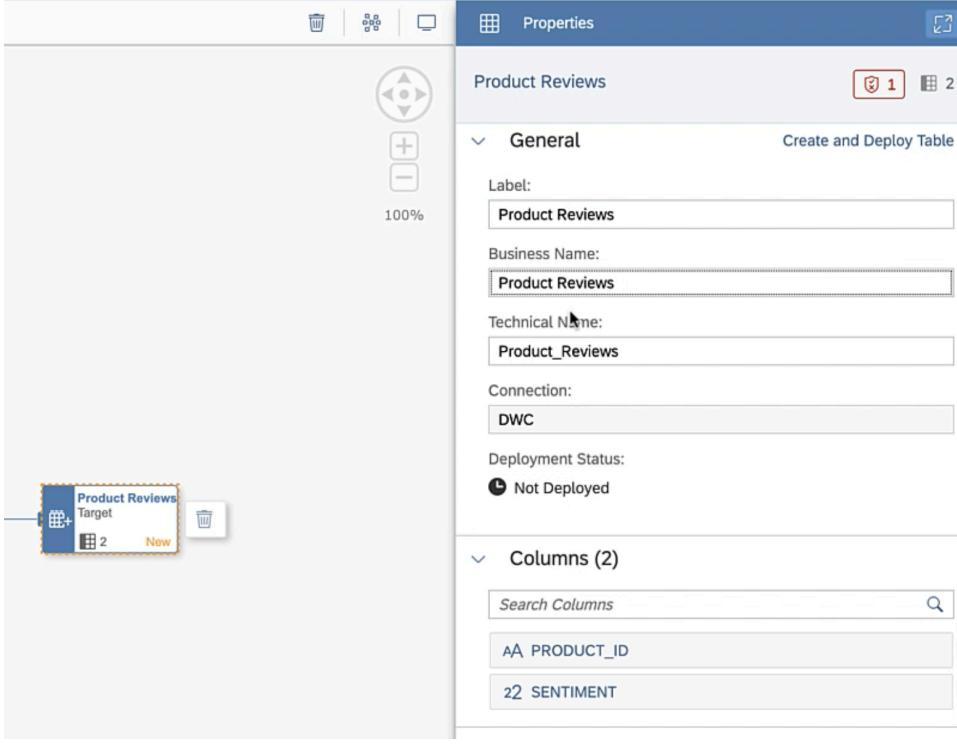
Explanation	Screenshot
<p>91. Select the Script node and navigate to the Script details by selecting the Edit button on the right.</p>	 <p>The screenshot shows a data flow diagram with a 'Script 1' node highlighted. To the right, the 'Script 1' properties panel is open, showing the general settings (Label: Script 1, Code Language: Python) and the script code area:</p> <pre>def transform(data):     This function body should contain all the desired     transformations on incoming DataFrame. Permitted builtin     functions     as well as permitted NumPy and Pandas objects and     functions are available inside this function.     Permitted NumPy and Pandas objects and functions can be</pre> <p>Below the script, the 'Columns (7)' section lists the input columns: z2 REVIEW_ID, AA PRODUCT_ID, z2 CUSTOMER_ID, AA COUNTRY, REVIEW_DATE, AA REVIEW_TITLE, and AA REVIEW_TEXT.</p>
<p>92. Select the Columns section.</p>	 <p>The screenshot shows the 'Properties' dialog for 'Script 1'. The 'Columns' tab is selected. The 'Columns (7)' list displays the same seven columns as the previous screenshot: z2 REVIEW_ID, AA PRODUCT_ID, z2 CUSTOMER_ID, AA COUNTRY, REVIEW_DATE, AA REVIEW_TITLE, and AA REVIEW_TEXT.</p>
<p>93. Add a new column named SENTIMENT with data type INT8.</p>	 <p>The screenshot shows the 'Add Column' dialog. The 'Create New Column' option is selected, indicating the user is about to define a new column.</p>

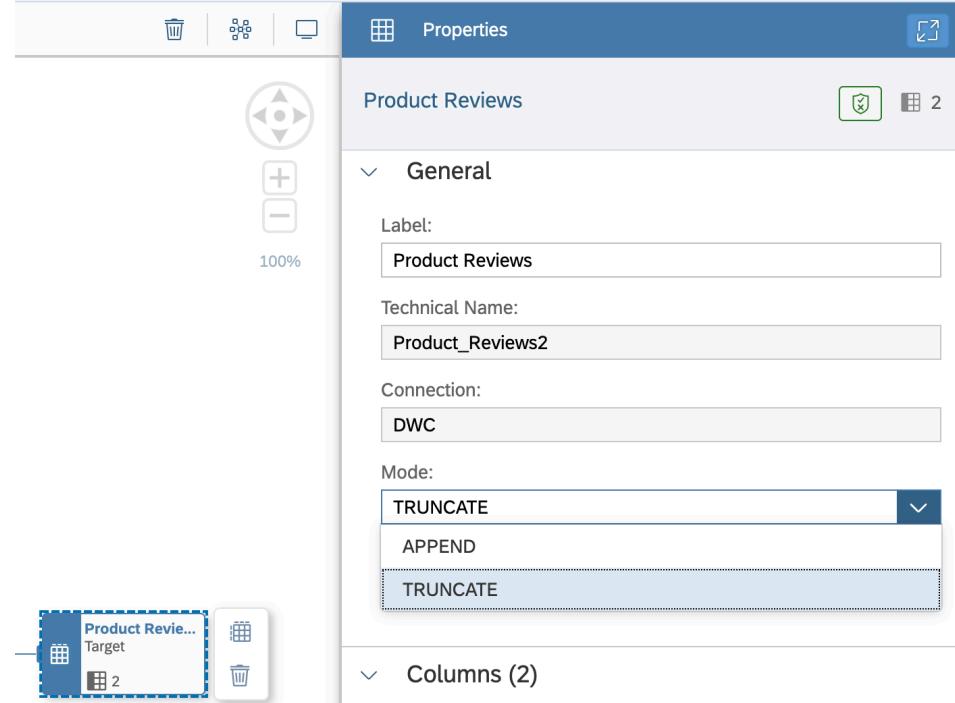
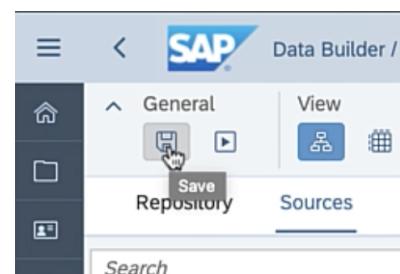
Explanation	Screenshot
94. Confirm the details by clicking Save.	
95. Switch to the Script section and start entering your python script for a sentiment analysis.	 <pre> Properties Script 1 General Script Columns  &lt; Script 1 def transform(data): 2     """ 3         This function body should contain all the desired transformations on incoming DataFrame. Permitted builtin functions 4         as well as permitted NumPy and Pandas objects and functions are available inside this function. 5         Permitted NumPy and Pandas objects and functions can be used with aliases 'np' and 'pd' respectively. 6         This function executes in a sandbox mode. Please refer the documentation for permitted objects and functions. Using 7         any restricted functions or objects would cause an internal exception and result in a pipeline failure. 8         Any code outside this function body will not be executed and inclusion of such code is discouraged. 9         :param data: Pandas DataFrame 10        :return: Pandas DataFrame 11        """ 12        ##### 13        # Provide the function body for data transformation # 14        ##### 15 16        # your function to calculate a sentiment 17 18        return data 19 20 21 </pre>
96. It's up to you!	<p>Here's the thing: Are you a Python expert? We've got a challenge for you!</p> <p>You can either try to figure out the right script yourself using the pandas library. Pro-tip: Check out the pandas data frame apply method documentation here: <a href="https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.apply.html">https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.apply.html</a></p> <p>To make your life easier, we have already provided you with a list of predefined key words and assigned sentiments in the file assets/step-data-flow-script/sentiment-key-words.py</p> <p>Using the list of words and assigned sentiment values (1: positive; -1: negative; word not mentioned: neutral / 0) you want to do two things:</p> <ol style="list-style-type: none"> <li>1) Define a function that takes a row from the input data and checks whether the column REVIEW_TITLE contains any of the words from the words sentiment array. If a match is found, you want to return the sentiment associated with this word, otherwise (no match) you want to return zero using the string.lower() and string.find() methods.</li> <li>2) You want to use the pandas dataframe apply() function to loop over the data and call the function defined in 1) for each row. Make sure to specify the axis as 1 and the result_type=reduce!</li> </ol>

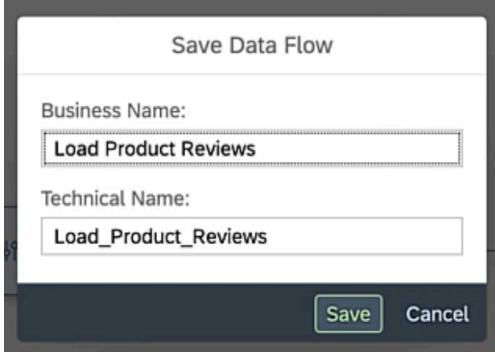
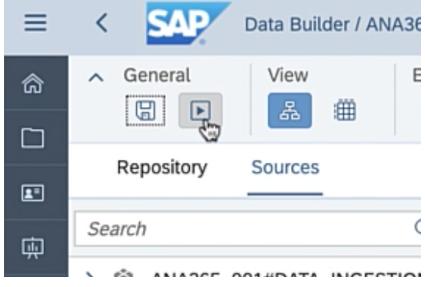
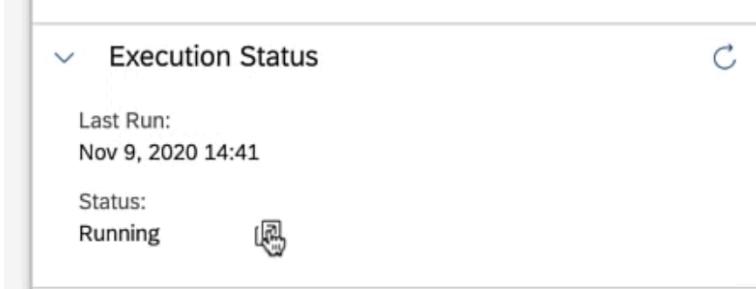
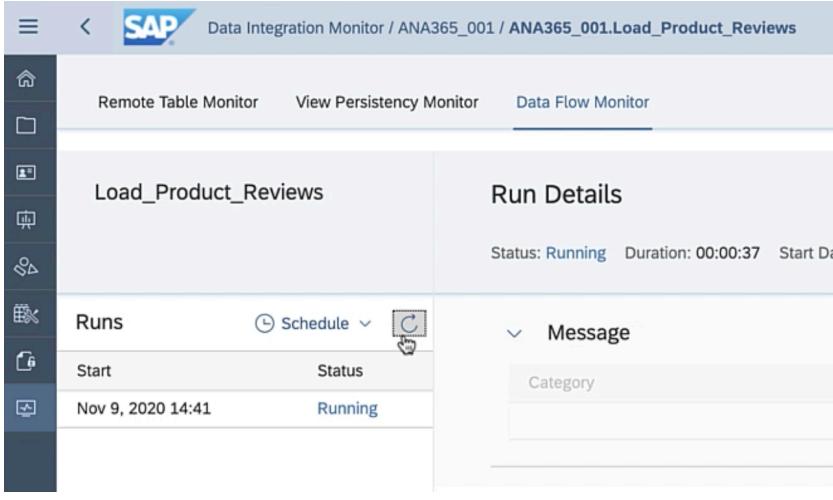
Explanation	Screenshot
97. Want to take the quick route?	Ok, fair enough – here's the deal. You can use the pre-build solution from the assets/step-data-flow-script/sentiment-analysis-script.py file. If you do so, don't put the blame on us that the solution is not the nicest or you finished the hands-on well before the scheduled 2hrs! ;-)
98. Add a Projection node to filter out unwanted columns or to apply a filter on the data to be extracted. Make sure to connect it to the previous Script 1 node.	 <p>The screenshot shows the SAP Data Flow Modeling interface. At the top, there is a toolbar with various icons labeled "Operators". Below the toolbar, the main workspace displays a data flow. The flow starts with a blue "combined review..." Source node, which has two outputs. The first output connects to a "Script 1" node, represented by a blue rectangle with a script icon. A red callout bubble with the number "1" is positioned above the "Script 1" node. The second output from the Source node connects to a grey projection node, which is a rectangle with a grid icon. The projection node has two outputs, one of which ends with a circular arrow icon, indicating a loop or a feedback path.</p>

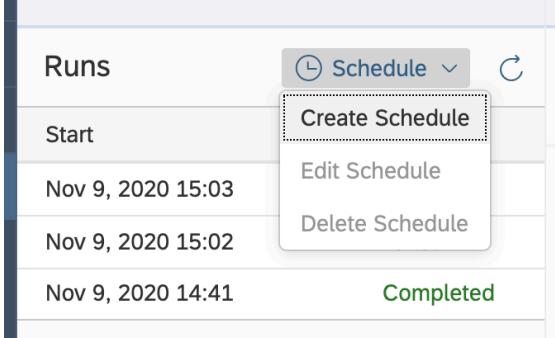
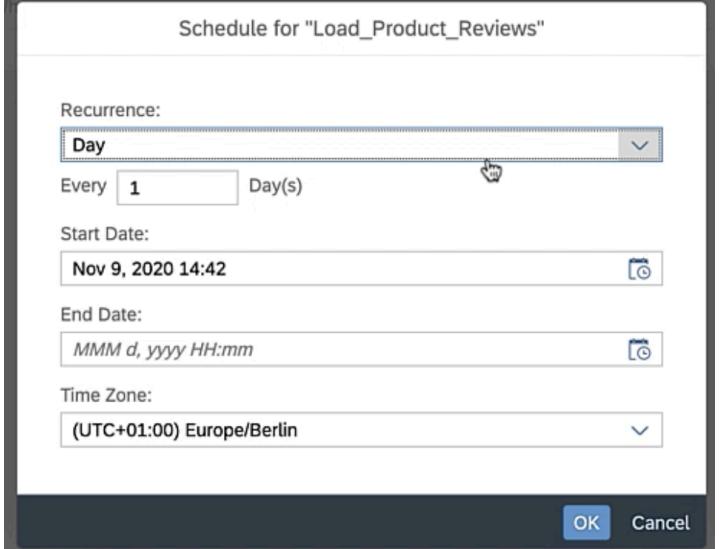
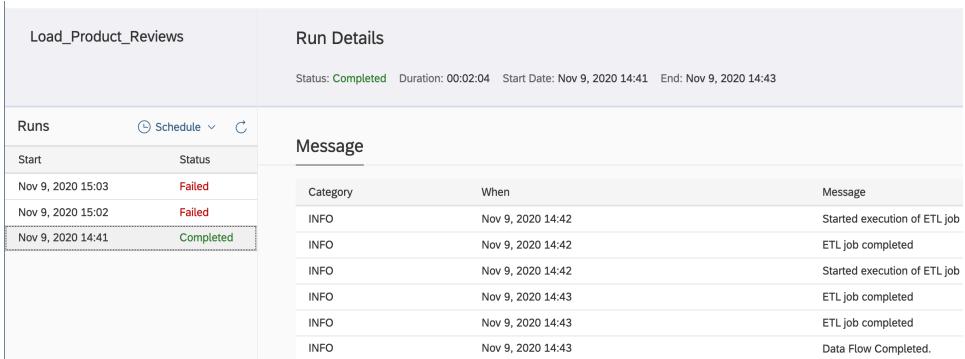
Explanation	Screenshot
<p>99. Select the added Projection node and select Remove Column to hide the following columns from the Details screen on the right:</p> <ul style="list-style-type: none"> <li>- REVIEW_ID</li> <li>- CUSTOMER_ID</li> <li>- COUNTRY</li> <li>- REVIEW_DATE</li> <li>- REVIEW_TITLE</li> <li>- REVIEW_TEXT</li> </ul>	<p>Columns (8)</p> <p>Search Columns</p> <ul style="list-style-type: none"> <li>z2 REVIEW_ID</li> <li>AA PRODUCT_ID</li> <li>z2 CUSTOMER_ID</li> <li>AA COUNTRY</li> <li>AA REVIEW_DATE</li> <li>AA REVIEW_TITLE</li> <li>AA REVIEW_TEXT</li> <li>z2 SENTIMENT</li> </ul>
<p>100. After removing all columns, only the following two columns should be available.</p>	<p>Columns (2)</p> <p>Search Columns</p> <ul style="list-style-type: none"> <li>AA PRODUCT_ID</li> <li>z2 SENTIMENT</li> </ul> <p>Filter</p>

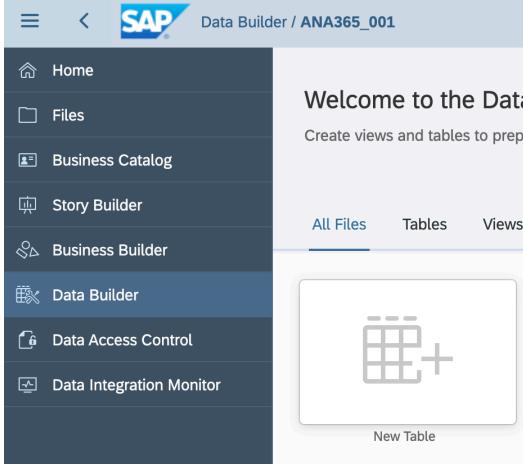
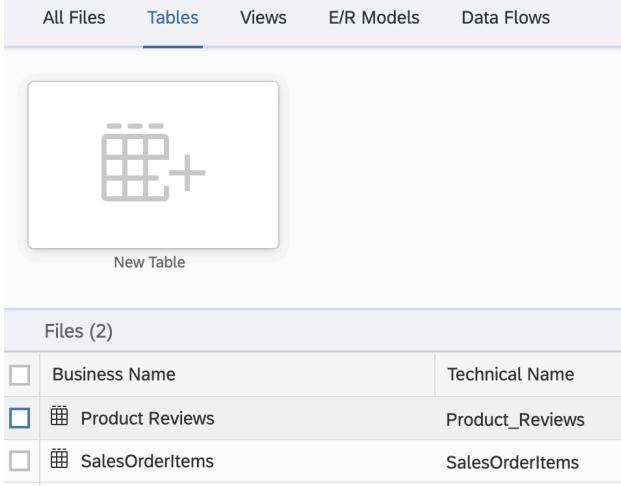
Explanation	Screenshot
101. Next, add an Aggregation node and connect it to the previous Projection 1 node.	
102. Select the node and from the Details pane on the right set the aggregation for the column SENTIMENT.	
103. Select the Add Table operator or use the context menu from the added aggregation node to add the target table in which we will persist the data.	

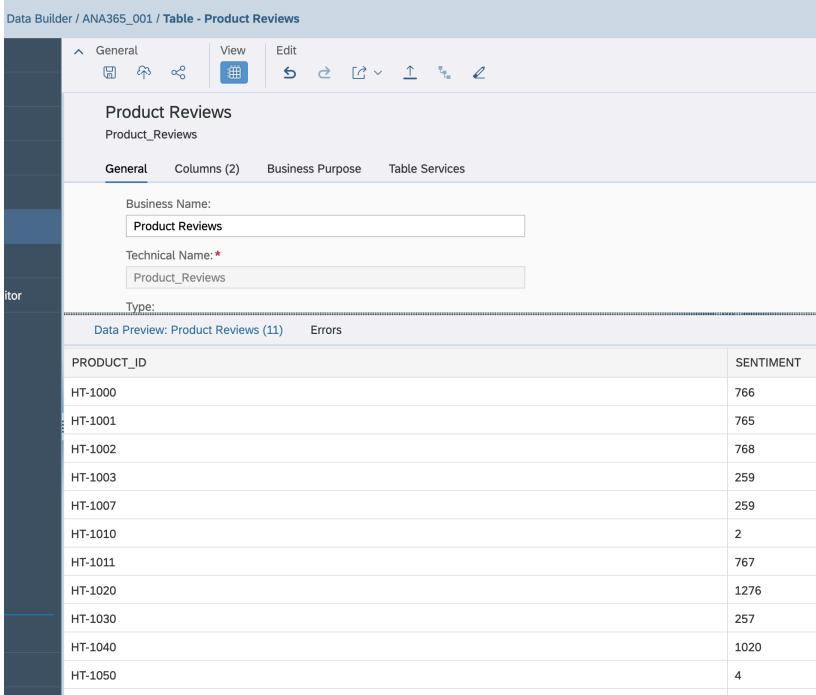
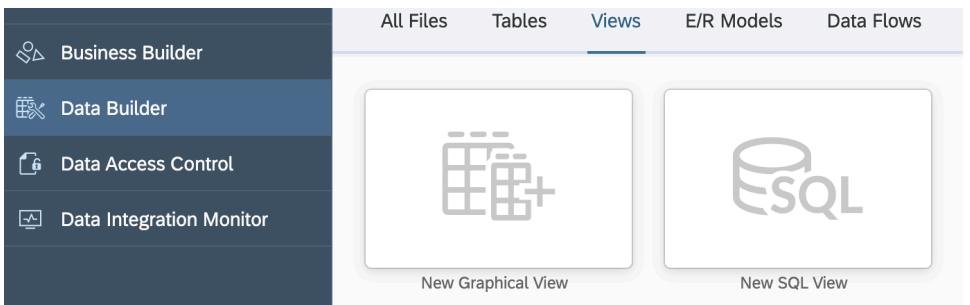
Explanation	Screenshot
104. Select the newly added node and define a label, business name and technical name for the target table.	 <p>Properties</p> <p>Product Reviews</p> <p>General</p> <p>Label: Product Reviews</p> <p>Business Name: Product Reviews</p> <p>Technical Name: Product_Reviews</p> <p>Connection: DWC</p> <p>Deployment Status: Not Deployed</p> <p>Columns (2)</p> <p>Search Columns</p> <p>AA PRODUCT_ID</p> <p>22 SENTIMENT</p>
105. Select the Create and Deploy Table button to create the table in the repository.	 <p>Properties</p> <p>Product Reviews</p> <p>General</p> <p>Create and Deploy Table</p> <p>Label: Product Reviews</p> <p>Business Name:</p>
106. Confirm the dialog to create the table.	 <p>i Information</p> <p>The target table 'Product_Reviews' will be created and deployed in your repository with all the output columns added to the target.</p> <p>Create and Deploy Close</p>

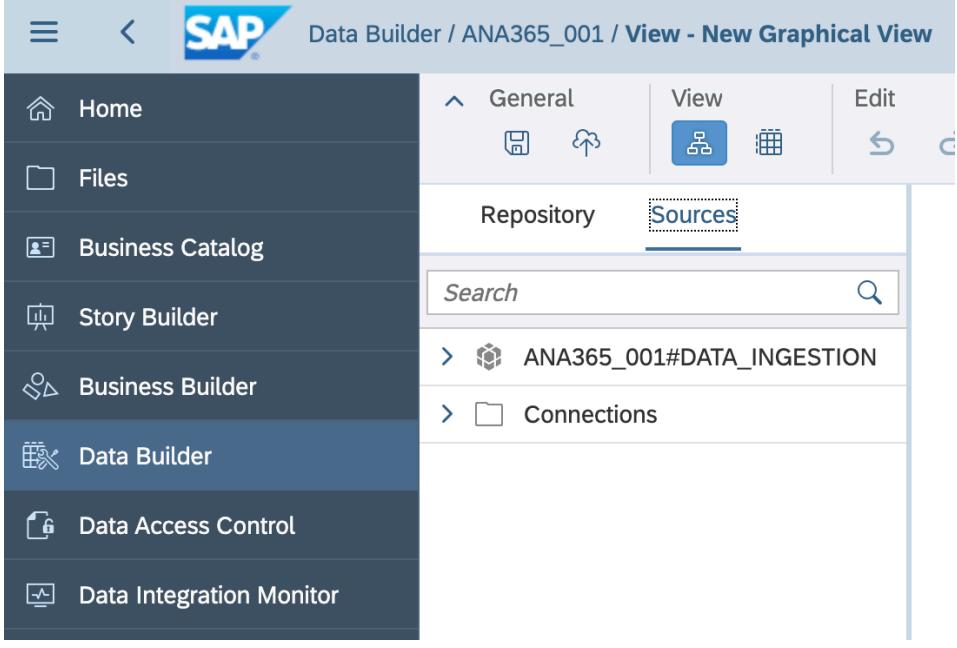
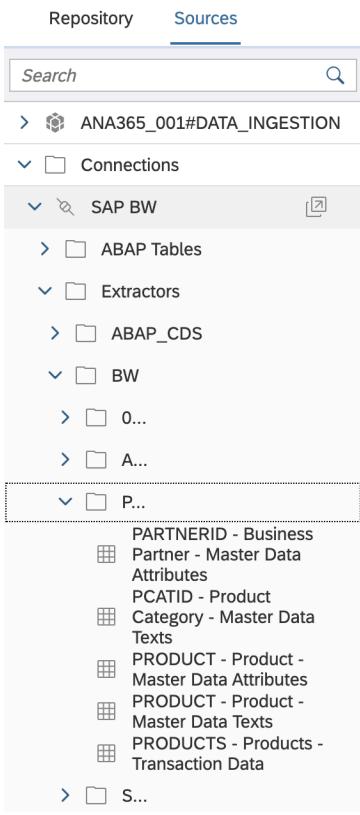
Explanation	Screenshot
<p>107. Change the mode from APPEND to TRUNCATE to make sure that in case of repetitive loads only the most recent data is available in the target table.</p>	
<p>108. This is how your data flow should look like by now.</p>	
<p>109. Save the data flow.</p>	

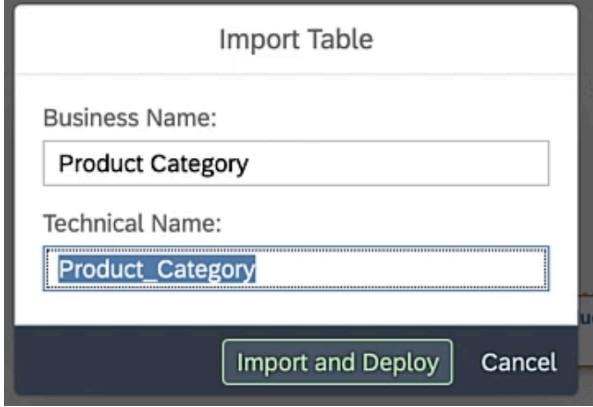
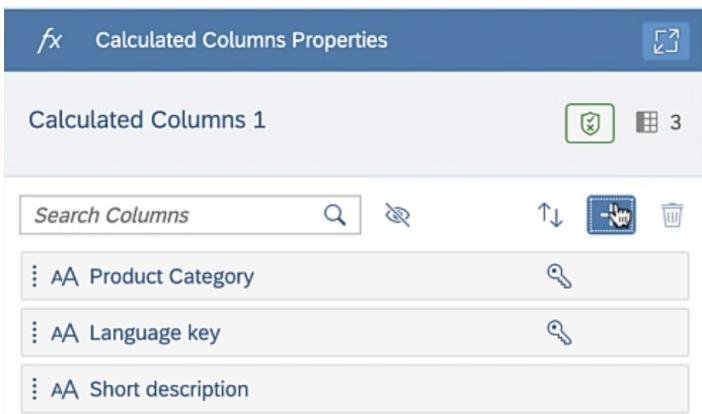
Explanation	Screenshot
110. Provide a name for the data flow and hit Save.	
111. After saving the data flow execute it.	
112. Navigate to the data flow monitor by selecting the navigation icon from the left to navigate to the run details.	
113. Hit the Refresh button until the data flow run completes. If the message Authorize us to run... is visible you can simply ignore it. ☺	

Explanation	Screenshot																					
114. If you wanted to, you could also define a schedule to run the data flow repeatedly. This is however not needed for this session. ☺ You can define schedules by selecting the Schedule item from the left next to the Refresh icon.																						
115. You can specify different options like recurrence, start and end date.																						
116. Make sure that your executed data flow executed completely.	 <table border="1" data-bbox="801 1516 1483 1700"> <thead> <tr> <th>Category</th> <th>When</th> <th>Message</th> </tr> </thead> <tbody> <tr> <td>INFO</td> <td>Nov 9, 2020 14:42</td> <td>Started execution of ETL job</td> </tr> <tr> <td>INFO</td> <td>Nov 9, 2020 14:42</td> <td>ETL job completed</td> </tr> <tr> <td>INFO</td> <td>Nov 9, 2020 14:42</td> <td>Started execution of ETL job</td> </tr> <tr> <td>INFO</td> <td>Nov 9, 2020 14:43</td> <td>ETL job completed</td> </tr> <tr> <td>INFO</td> <td>Nov 9, 2020 14:43</td> <td>ETL job completed</td> </tr> <tr> <td>INFO</td> <td>Nov 9, 2020 14:43</td> <td>Data Flow Completed.</td> </tr> </tbody> </table>	Category	When	Message	INFO	Nov 9, 2020 14:42	Started execution of ETL job	INFO	Nov 9, 2020 14:42	ETL job completed	INFO	Nov 9, 2020 14:42	Started execution of ETL job	INFO	Nov 9, 2020 14:43	ETL job completed	INFO	Nov 9, 2020 14:43	ETL job completed	INFO	Nov 9, 2020 14:43	Data Flow Completed.
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Explanation	Screenshot
<p>117. Navigate to the Data Builder to check whether the table created during the data flow execution is filled correctly.</p>	 <p>The screenshot shows the SAP Data Builder interface. The left sidebar has a dark blue background with white icons and text. The 'Data Builder' icon is highlighted with a blue background. The main area is titled 'Welcome to the Data' and contains a large button labeled 'New Table' with a grid icon and a plus sign. Below the main area, there are tabs: 'All Files', 'Tables' (which is underlined in blue), 'Views', 'E/R Models', and 'Data Flows'. The 'Tables' tab is currently active.</p>
<p>118. Select the Tables tab and select the Products Reviews table.</p>	 <p>The screenshot shows the SAP Data Builder interface with the 'Tables' tab selected. In the main area, there is a 'New Table' button. Below it, a section titled 'Files (2)' lists two tables: 'Business Name' and 'Product Reviews'. The 'Product Reviews' table is selected, indicated by a blue checkbox next to its name. The other table, 'SalesOrderItems', is not selected.</p>

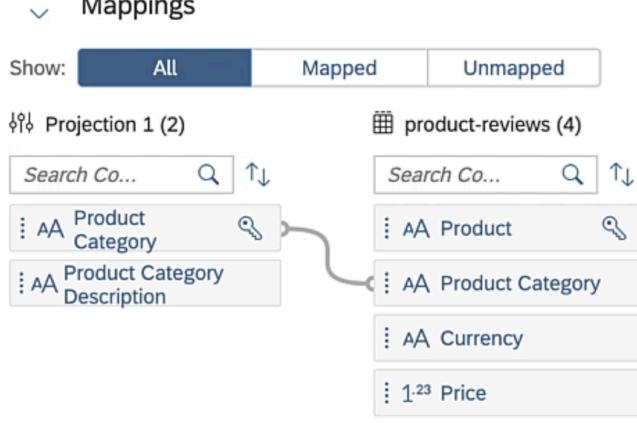
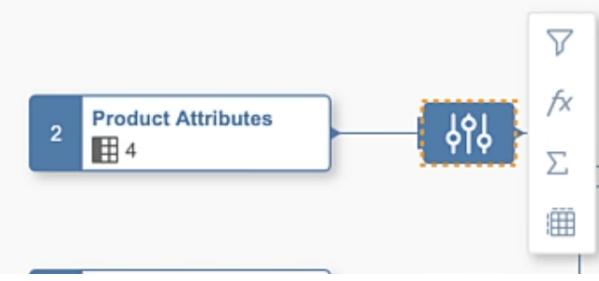
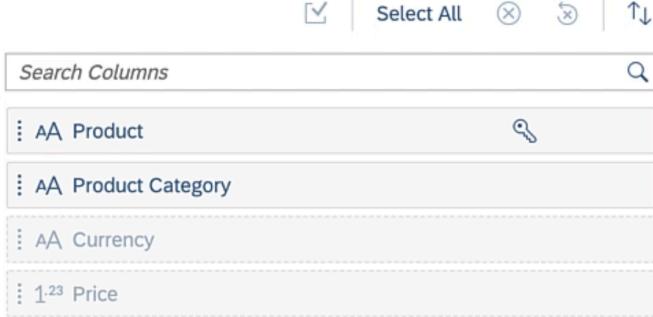
Explanation	Screenshot																								
<p>119. Open the Data Preview by clicking on the Data Preview button in the View section at the top. Make sure the different products are listed and the sentiment is shown. The aggregated sentiment or product IDs might look a little different in your case from what is visible in this screenshot.</p>	 <table border="1"> <thead> <tr> <th>PRODUCT_ID</th> <th>SENTIMENT</th> </tr> </thead> <tbody> <tr><td>HT-1000</td><td>766</td></tr> <tr><td>HT-1001</td><td>765</td></tr> <tr><td>HT-1002</td><td>768</td></tr> <tr><td>HT-1003</td><td>259</td></tr> <tr><td>HT-1007</td><td>259</td></tr> <tr><td>HT-1010</td><td>2</td></tr> <tr><td>HT-1011</td><td>767</td></tr> <tr><td>HT-1020</td><td>1276</td></tr> <tr><td>HT-1030</td><td>257</td></tr> <tr><td>HT-1040</td><td>1020</td></tr> <tr><td>HT-1050</td><td>4</td></tr> </tbody> </table>	PRODUCT_ID	SENTIMENT	HT-1000	766	HT-1001	765	HT-1002	768	HT-1003	259	HT-1007	259	HT-1010	2	HT-1011	767	HT-1020	1276	HT-1030	257	HT-1040	1020	HT-1050	4
PRODUCT_ID	SENTIMENT																								
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HT-1011	767																								
HT-1020	1276																								
HT-1030	257																								
HT-1040	1020																								
HT-1050	4																								
<p>120. Congratulations!</p>	<p>You have successfully created and executed your first Data Flow instance in SAP Data Warehouse Cloud! You now know how to create ETL processes, schedule data loads using data flows and how to transform the incoming data.</p> <p>As a next step, let's take a look at how you can integrate data virtually from the connected SAP BW system to add the required product master data to our data model. We will now build a virtual master data dimension.</p>																								
<p>121. Navigate to the Views area in the Data Builder.</p>																									

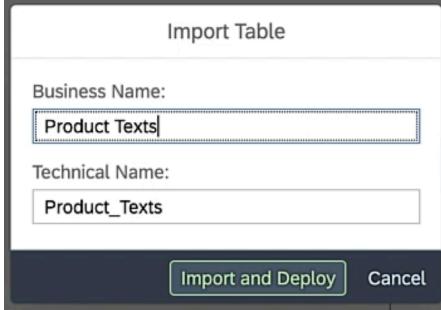
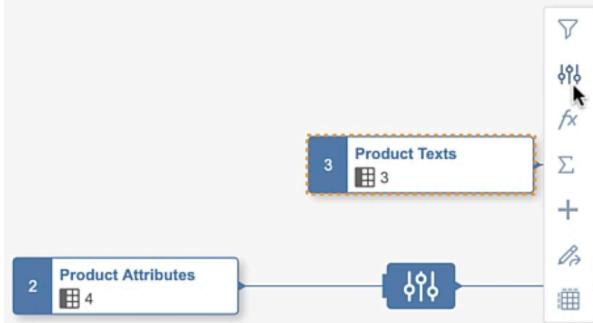
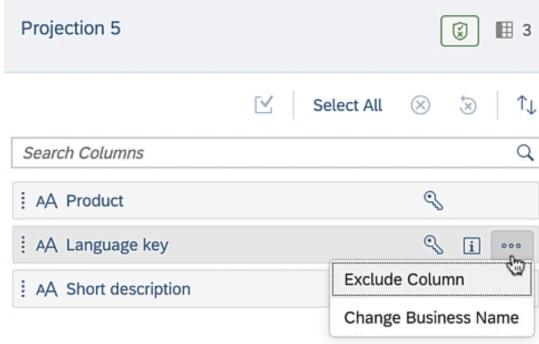
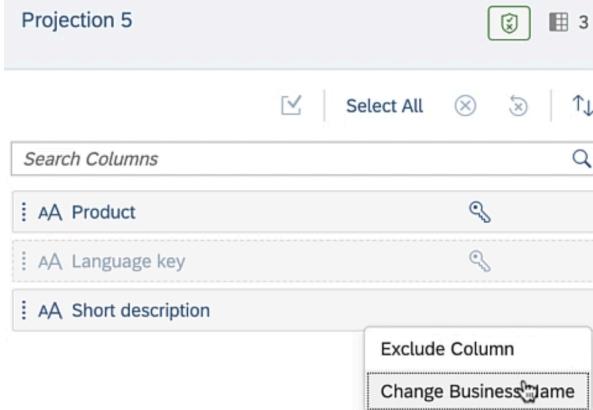
Explanation	Screenshot
122. Select the New Graphical View tile and select the Sources tab.	
123. Drill down into the SAP BW connection and navigate to SAP BW > Extractors > BW > P...	 <pre>         PARTNERID - Business         Partner - Master Data         Attributes         PCATID - Product         Category - Master Data         Texts         PRODUCT - Product -         Master Data Attributes         PRODUCT - Product -         Master Data Texts         PRODUCTS - Products -         Transaction Data     </pre>

Explanation	Screenshot
124. Start off by dragging over the PCATID – Product Category – Master Data Texts.	 <p>It looks like you have selected a master data category</p> <p>Drag and drop</p>
125. Provide a meaningful Business Name and Technical Name.	
126. Add a calculation node.	
127. Add a new calculated column.	

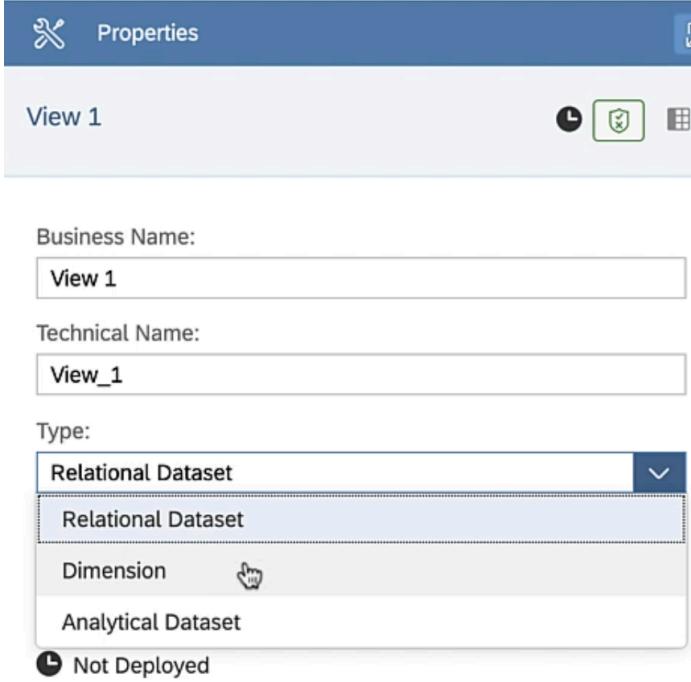
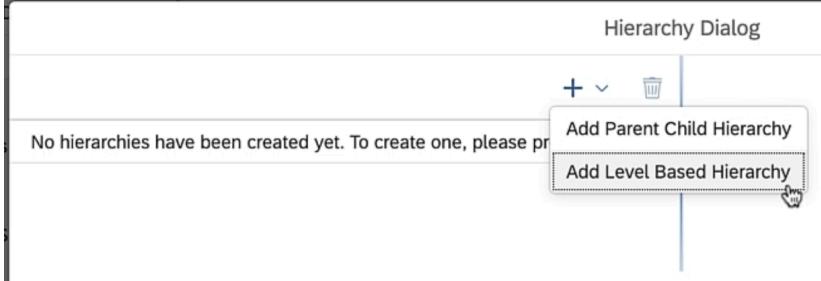
Explanation	Screenshot
128. Provide a meaningful Business Name and Technical Name and define the Data Type as String.	<p>Business Name:</p> <input type="text" value="Product Category Description"/> <p>Technical Name:</p> <input type="text" value="Product_Category_Description"/> <p>Data Type:</p> <input type="text" value="AA String"/> <p>Length:</p> <input type="text" value="10"/>
129. Select the column TXTSH from the list of columns as the Expression.	<p>Expression <span style="float: right;">Validate</span></p> <input type="text" value="TXTSH"/> <p>The expression of calculated column 'Product_Category_Description' is invalid.</p> <p style="text-align: center;"> <a href="#">Functions (140)</a> <span style="background-color: #0070C0; color: white; padding: 2px 10px; border-radius: 5px;">Columns (4)</span> <a href="#">Other</a> </p> <p style="margin-top: 10px;"> <input type="text" value="Search"/> <span style="font-size: 2em; vertical-align: middle;">🔍</span> </p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>AA <a href="#">/BIC/PCATID</a> Product Category</p> <hr/> <p>AA <a href="#">LANGU</a> Language key</p> <hr/> <p>AA <a href="#">TXTSH</a> Short description</p> </div>
130. Hit the Validate button to make sure the expression is valid.	<p>Expression <span style="float: right;">Validate</span></p> <input type="text" value="TXTSH"/>

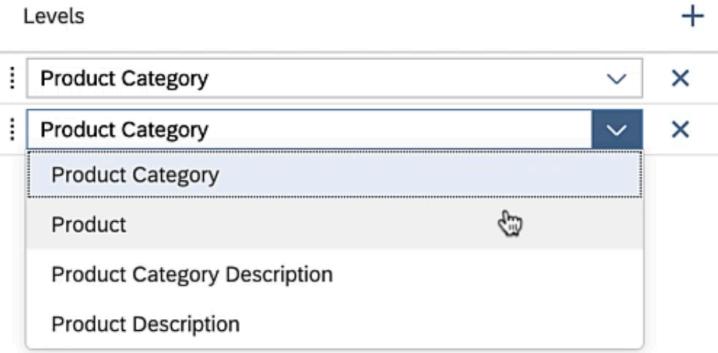
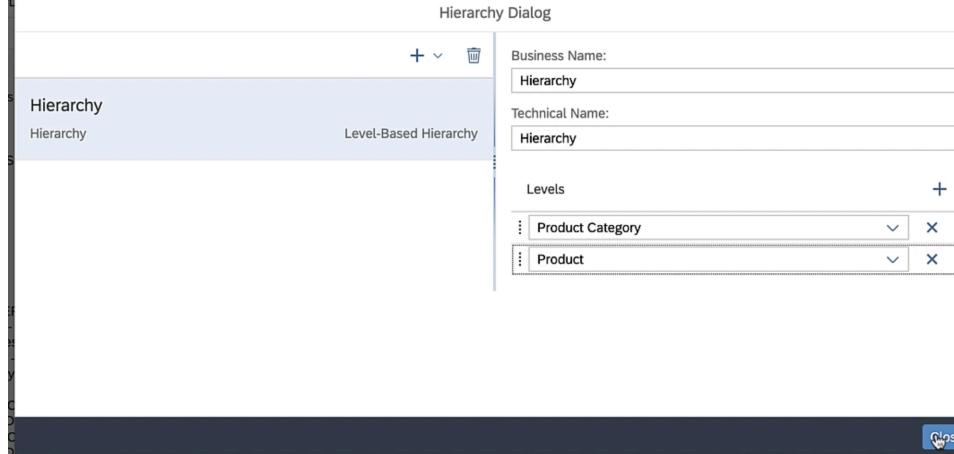
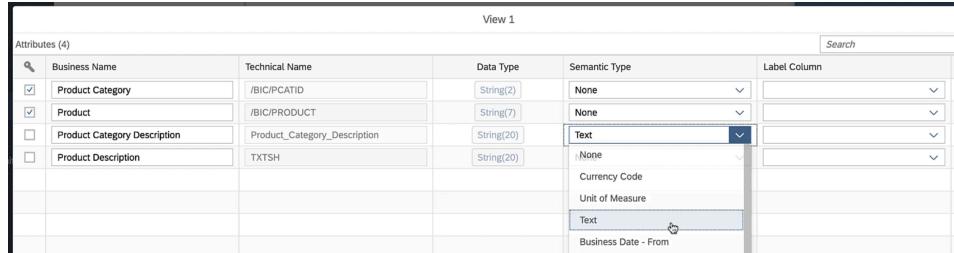
Explanation	Screenshot
131. Add a projection node after the calculation node.	
132. Make sure to exclude the column Short Description and Language key.	
133. Next, drag over the PRODUCT – Product – Master Data Attributes from the Sources tree and put it onto the projection node. Make sure that the option Join is selected when dropping the table!	
134. Again, provide a meaningful Business Name and Technical Name. Then, click on Import and Deploy.	

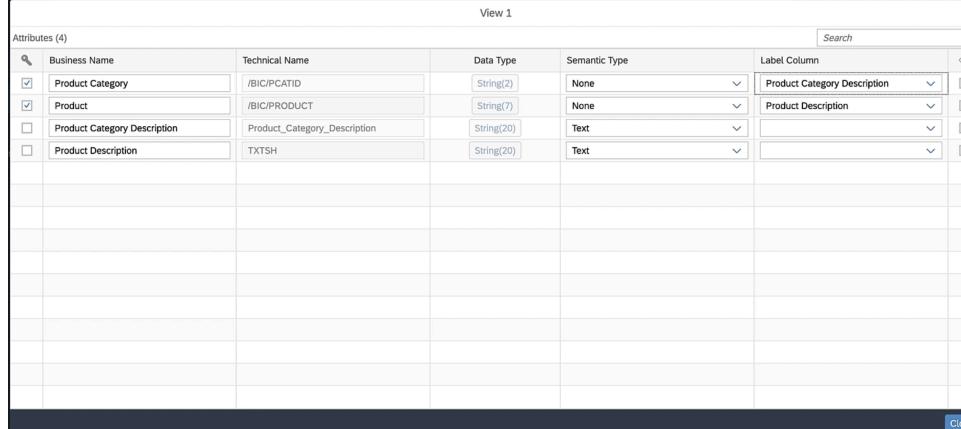
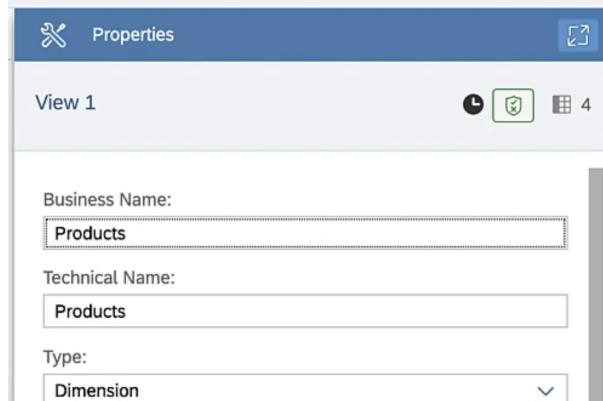
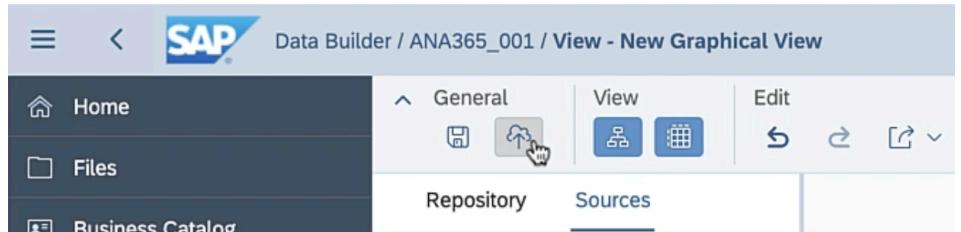
Explanation	Screenshot
135. Make sure that the Join mapping is defined correctly.	 <p>Mappings</p> <p>Show: All Mapped Unmapped</p> <p>Projection 1 (2)</p> <ul style="list-style-type: none"> <li>Search Co... ↕</li> <li>AA Product Category ↗</li> <li>AA Product Category Description ↗</li> </ul> <p>Projection 2 (4)</p> <ul style="list-style-type: none"> <li>Search Co... ↕</li> <li>AA Product ↗</li> <li>AA Product Category ↗</li> <li>AA Currency ↗</li> <li>1:23 Price ↗</li> </ul>
136. Add a projection node after the Product Attributes.	
137. Exclude the columns Currency and Price. We don't need these columns because the Sales Order data sets already contain this information.	 <p>Search Columns</p> <p>Select All</p> <p>AA Product</p> <p>AA Product Category</p> <p>AA Currency</p> <p>1:23 Price</p>
138. Next, drag over the PRODUCT – Product – Master Data Texts and drop it on the projection node you created after the Product Attributes table.	

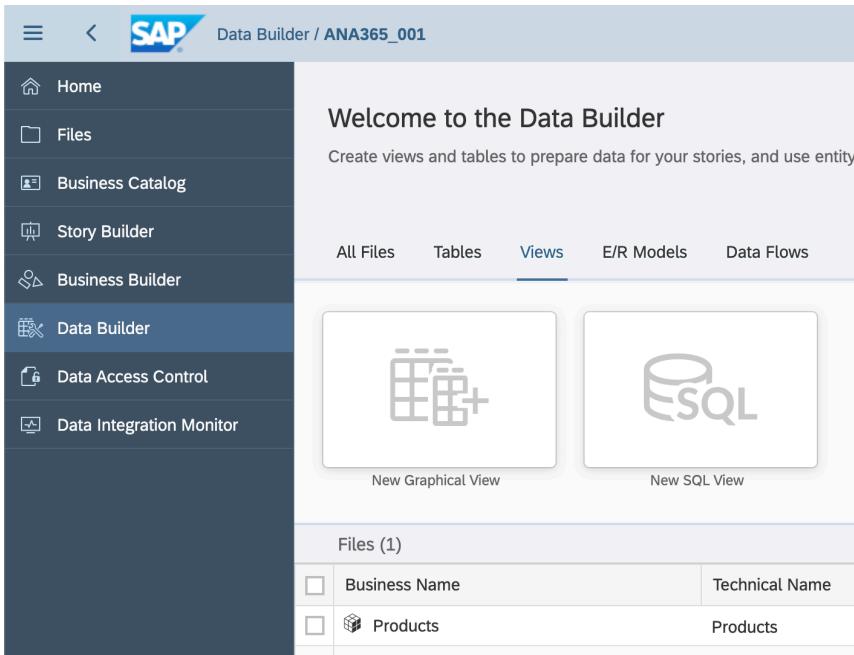
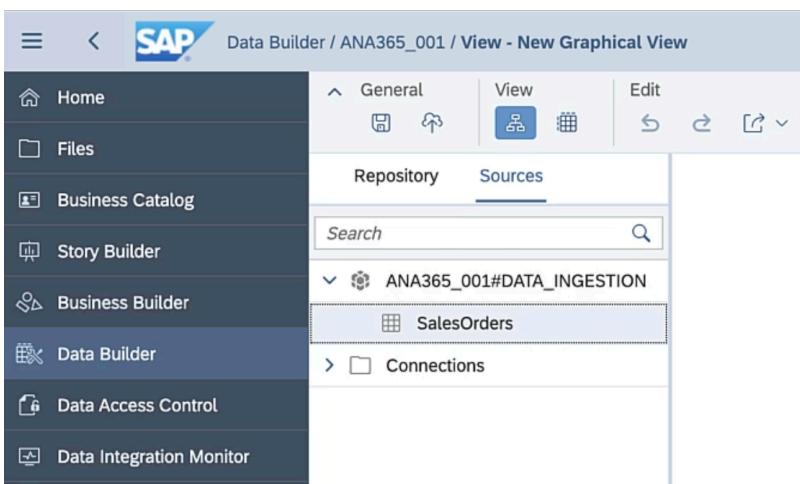
Explanation	Screenshot
139. Provide a meaningful Business Name and Technical Name.	 <p>The dialog box shows the 'Import Table' interface. It has two input fields: 'Business Name:' containing 'Product Texts' and 'Technical Name:' containing 'Product_Texts'. At the bottom are 'Import and Deploy' and 'Cancel' buttons.</p>
140. Add a projection node after the Product Texts node.	 <p>The diagram shows a data flow starting with a 'Product Attributes' node (2 rows, 4 columns) connected to a projection node. The projection node then connects to a 'Product Texts' node (3 rows, 3 columns). A context menu is open over the projection node, with the 'Add' icon highlighted.</p>
141. Exclude the Language key column.	 <p>The 'Projection 5' configuration screen shows three columns: 'AA Product', 'AA Language key', and 'AA Short description'. The 'AA Language key' row has a context menu open with 'Exclude Column' selected.</p>
142. Change the Business Name of the Short description column.	 <p>The 'Projection 5' configuration screen shows three columns: 'AA Product', 'AA Language key', and 'AA Short description'. The 'AA Short description' row has a context menu open with 'Change Business Name' selected.</p>

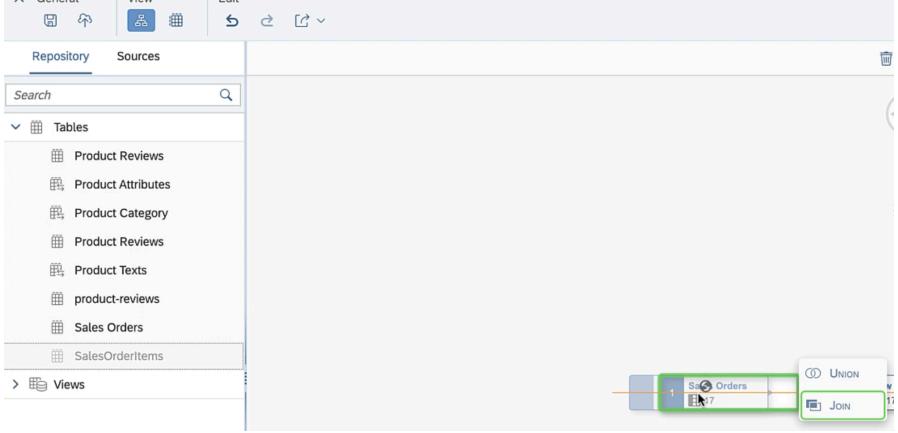
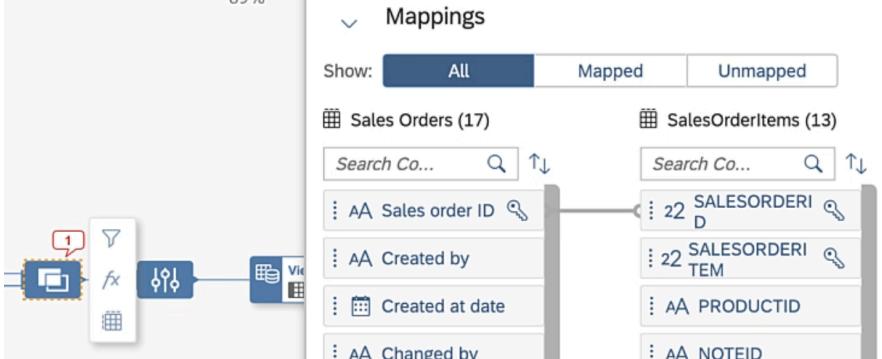
Explanation	Screenshot																							
143. Provide a meaningful name like Product Description.	<p>Search Columns</p> <ul style="list-style-type: none"> <li>AA Product</li> <li>AA Language key</li> <li>AA <b>Product Description</b></li> </ul> <p>The business name for columns must be unique.</p>																							
144. This is how your model should look like by now.	<pre> graph LR     A[Product Texts 003 3] --&gt; B1[fx]     B[Product Attributes 003 4] --&gt; B2[fx]     C[Product Category MD... 3] --&gt; B3[fx]     B1 --&gt; D[View 1 4]     B2 --&gt; D     B3 --&gt; D     </pre>																							
145. Select the View 1 output node and open the data preview. Make sure that the data is displayed.	<table border="1"> <thead> <tr> <th data-bbox="507 1262 752 1284">Data Preview: View_1 (44)</th> <th data-bbox="768 1262 833 1284">Errors</th> <th data-bbox="1339 1262 1470 1284">Preview SQL</th> </tr> </thead> <tbody> <tr> <td data-bbox="507 1305 752 1332">/BIC/PCATID</td> <td data-bbox="768 1305 882 1332">/BIC/PRODUCT</td> <td data-bbox="997 1305 1209 1332">Product_Category_Descri...</td> <td data-bbox="1241 1305 1290 1332">TXTSH</td> </tr> <tr> <td data-bbox="507 1353 752 1381">BX</td> <td data-bbox="768 1353 882 1381">BX-1011</td> <td data-bbox="997 1353 1209 1381">BMX</td> <td data-bbox="1241 1353 1372 1381">BMX Vintage 1011</td> </tr> <tr> <td data-bbox="507 1402 752 1429">BX</td> <td data-bbox="768 1402 882 1429">BX-1012</td> <td data-bbox="997 1402 1209 1429">BMX</td> <td data-bbox="1241 1402 1356 1429">BMX Jump 1012</td> </tr> <tr> <td data-bbox="507 1450 752 1476">BX</td> <td data-bbox="768 1450 882 1476">BX-1013</td> <td data-bbox="997 1450 1209 1476">BMX</td> <td data-bbox="1241 1450 1356 1476">BMX Jump Lux I</td> </tr> <tr> <td data-bbox="507 1497 752 1522">BX</td> <td data-bbox="768 1497 882 1522">BX-1014</td> <td data-bbox="997 1497 1209 1522">BMX</td> <td data-bbox="1241 1497 1356 1522">BMX Jump Lux II</td> </tr> </tbody> </table>	Data Preview: View_1 (44)	Errors	Preview SQL	/BIC/PCATID	/BIC/PRODUCT	Product_Category_Descri...	TXTSH	BX	BX-1011	BMX	BMX Vintage 1011	BX	BX-1012	BMX	BMX Jump 1012	BX	BX-1013	BMX	BMX Jump Lux I	BX	BX-1014	BMX	BMX Jump Lux II
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BX	BX-1013	BMX	BMX Jump Lux I																					
BX	BX-1014	BMX	BMX Jump Lux II																					

Explanation	Screenshot
<p>146.In the Properties pane change the Type from Relational Dataset to Dimension.</p>	 <p>Business Name: View 1</p> <p>Technical Name: View_1</p> <p>Type:</p> <ul style="list-style-type: none"> <li>Relational Dataset</li> <li>Dimension</li> <li>Analytical Dataset</li> </ul> <p>Not Deployed</p>
<p>147.In the Attributes section select the hierarchy icon.</p>	 <p>Attributes (4)</p> <ul style="list-style-type: none"> <li>AA Product Category</li> <li>AA Product</li> </ul>
<p>148.In the dialog add a new level-based hierarchy.</p>	 <p>Hierarchy Dialog</p> <p>No hierarchies have been created yet. To create one, please press</p> <ul style="list-style-type: none"> <li>Add Parent Child Hierarchy</li> <li>Add Level Based Hierarchy</li> </ul>

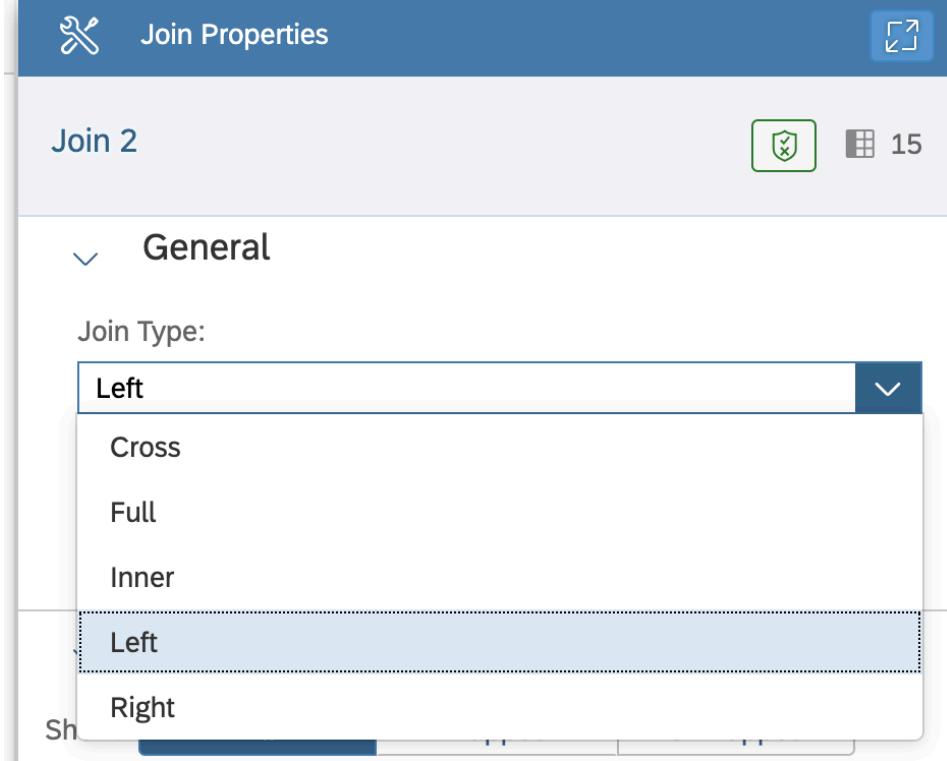
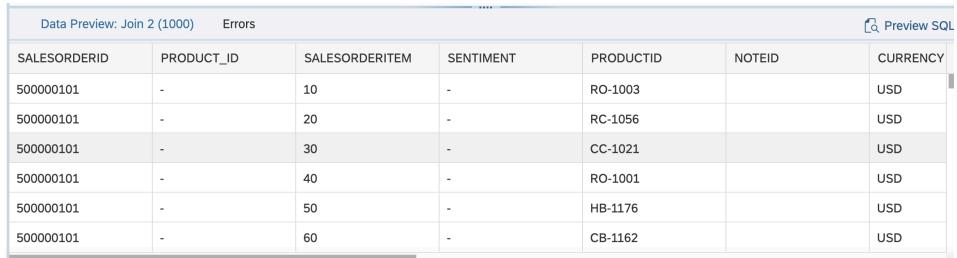
Explanation	Screenshot
149. Add two levels and specify the first level as Product Category and the second level as Product.	 <p>The screenshot shows the 'Levels' dialog. It contains a list of levels with a '+' button at the top right. The first level is 'Product Category'. Below it is another 'Product Category' entry, which is expanded to show its children: 'Product', 'Product Category Description', and 'Product Description'. A cursor is hovering over the 'Product' entry.</p>
150. Confirm the dialog to create the hierarchy.	 <p>The screenshot shows the 'Hierarchy Dialog' for creating a 'Level-Based Hierarchy'. On the left, there's a tree view labeled 'Hierarchy'. On the right, there are fields for 'Business Name' (set to 'Hierarchy') and 'Technical Name' (set to 'Hierarchy'). Below these are sections for 'Levels' and 'Dimensions'. Under 'Levels', 'Product Category' is listed as the first level, and 'Product' is listed as the second level. At the bottom right is a 'Close' button.</p>
151. Select the edit icon in the Attributes section.	 <p>The screenshot shows the 'Attributes' section with four entries: 'Product Category', 'Product', 'Product Category Description', and 'Product Description'. Each entry has a small edit icon to its right.</p>
152. In the dialog change the Semantic Type for the columns Product Category Description and Product Description to Text.	 <p>The screenshot shows the 'Attributes' dialog with four rows. The fourth row, 'Product Description', has its 'Semantic Type' dropdown set to 'Text'. Other columns include 'Business Name', 'Technical Name', 'Data Type', and 'Label Column'. There are also sections for 'Currency Code', 'Unit of Measure', and 'Business Date - From'.</p>

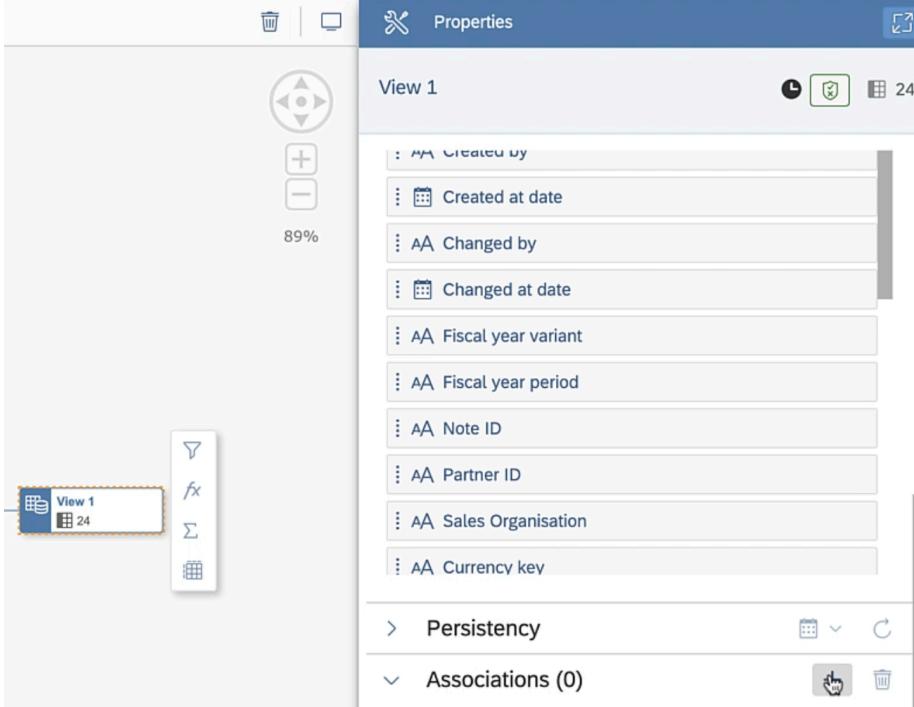
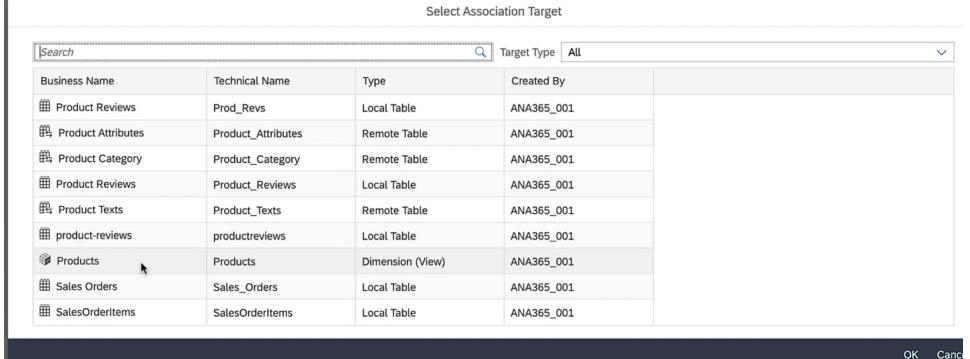
Explanation	Screenshot																									
153. Change the Label Column values for the first row to Product Category Description and for the second row to Product Description.	 <table border="1"> <thead> <tr> <th>Semantic Type</th> <th>Label Column</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>Product Category Description</td> </tr> <tr> <td>None</td> <td>Product Description</td> </tr> <tr> <td>Text</td> <td></td> </tr> <tr> <td>Text</td> <td></td> </tr> </tbody> </table>	Semantic Type	Label Column	None	Product Category Description	None	Product Description	Text		Text																
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154. Confirm the dialog.	 <table border="1"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> <th>Data Type</th> <th>Semantic Type</th> <th>Label Column</th> </tr> </thead> <tbody> <tr> <td>Product Category</td> <td>/BIC/PCATID</td> <td>String(2)</td> <td>None</td> <td>Product Category Description</td> </tr> <tr> <td>Product</td> <td>/BIC/PRODUCT</td> <td>String(7)</td> <td>None</td> <td>Product Description</td> </tr> <tr> <td>Product Category Description</td> <td>Product_Category_Description</td> <td>String(20)</td> <td>Text</td> <td></td> </tr> <tr> <td>Product Description</td> <td>TXTSH</td> <td>String(20)</td> <td>Text</td> <td></td> </tr> </tbody> </table>	Business Name	Technical Name	Data Type	Semantic Type	Label Column	Product Category	/BIC/PCATID	String(2)	None	Product Category Description	Product	/BIC/PRODUCT	String(7)	None	Product Description	Product Category Description	Product_Category_Description	String(20)	Text		Product Description	TXTSH	String(20)	Text	
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Product Description	TXTSH	String(20)	Text																							
155. Change the Business Name and Technical Name of the view to Products.	 <p>Properties</p> <p>View 1</p> <p>Business Name: Products</p> <p>Technical Name: Products</p> <p>Type: Dimension</p>																									
156. Save and deploy the view.	 <p>Data Builder / ANA365_001 / View - New Graphical View</p> <p>General View Edit</p> <p>Repository Sources</p>																									

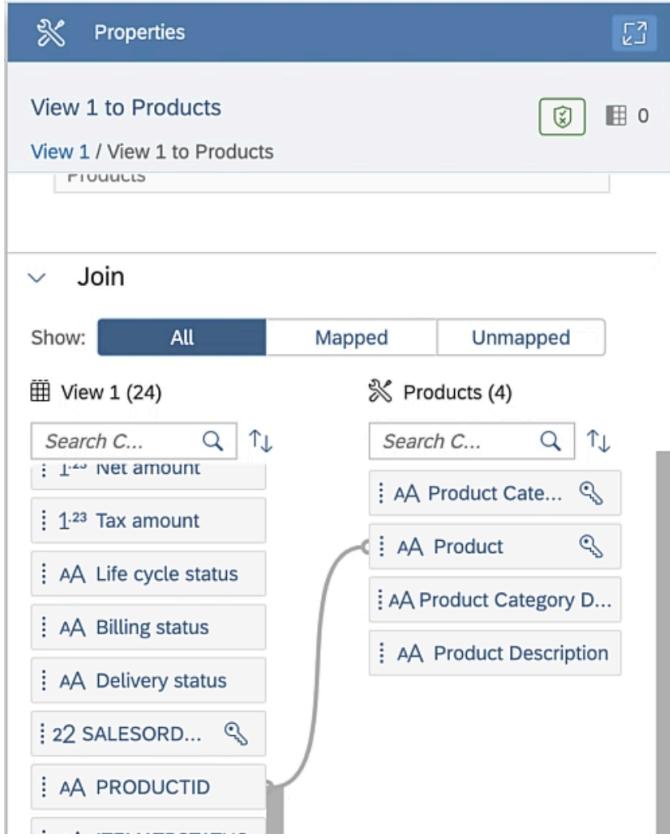
Explanation	Screenshot
157.Congratulations!	<p>You created your first master data dimension in SAP Data Warehouse Cloud! By now the dimension is all virtual. The data we put together in the dimension is fetched live from the connected SAP BW system whenever we query the data model, be it the data preview or when used later in a SAP Analytics Cloud story.</p> <p>Next, we create our final data model combining all the different data assets in a single model.</p>
158.Navigate to the Data Builder and create a new Graphical View.	 <p>The screenshot shows the SAP Data Builder interface. The left sidebar has links for Home, Files, Business Catalog, Story Builder, Business Builder, Data Builder (which is selected), Data Access Control, and Data Integration Monitor. The main area is titled 'Welcome to the Data Builder' with the sub-instruction 'Create views and tables to prepare data for your stories, and use entity-...'. Below this are tabs for All Files, Tables, Views (which is underlined), E/R Models, and Data Flows. Two large buttons are visible: 'New Graphical View' (with a grid icon) and 'New SQL View' (with a database icon). Below these buttons is a section titled 'Files (1)' containing a table with two rows: one for 'Business Name' and one for 'Products'.</p>
159.We start with the Sales Order and Sales Order Items we created in the Open SQL Schema using the Database User. Switch to the Sources tab and drill down into the Open SQL Schema connection. Select the SalesOrders table and drag it onto the canvas.	 <p>The screenshot shows the 'New Graphical View' configuration screen. The top navigation bar includes 'General', 'View', 'Edit', and tabs for 'Repository' and 'Sources' (which is selected). A search bar is present. Below this, a tree view shows a connection named 'ANA365_001#DATA_INGESTION' expanded, with its child 'SalesOrders' table selected and highlighted with a dashed border. Other items like 'Connections' are also visible in the tree.</p>

Explanation	Screenshot
160. Provide a meaningful Business Name and Technical Name.	
161. Select the Repository tab and select the SalesOrderItems table. Drag it onto the Sales Orders table and make sure the Join option is selected.	
162. Select the Join node and make sure the field mapping is correctly defined (Sales order ID -> SALESORDERID).	

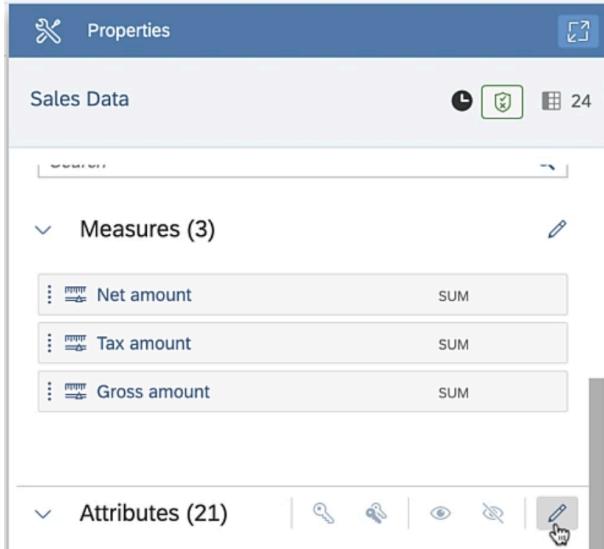
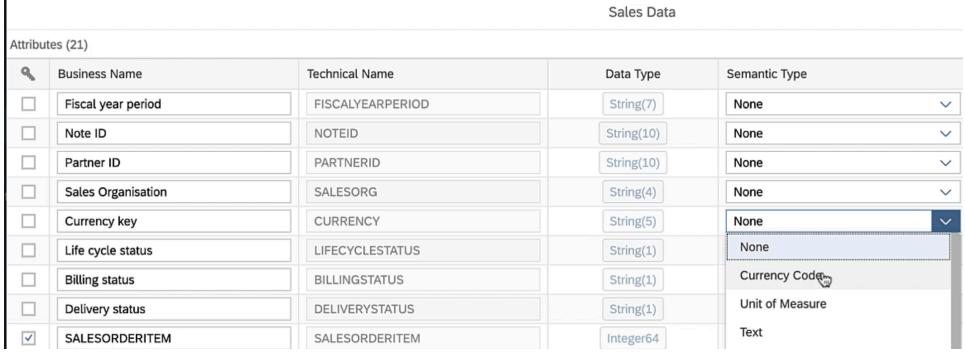
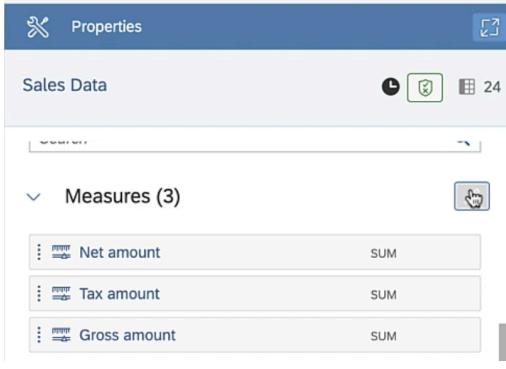
Explanation	Screenshot								
<p>163. Switch to the Repository tab and in the Tables list select the Product Reviews table. Drag it onto the canvas and drop it onto the Sales Order Items node.</p>									
<p>164. Select the join node and make sure that the join field mapping is correct (PRODUCTID -&gt; PRODUCT_ID) Don't worry in case your output node on the right is still named View 1, we will get to that.</p>	<table border="1"> <caption>Mappings</caption> <thead> <tr> <th>Show:</th> <th>All</th> <th>Mapped</th> <th>Unmapped</th> </tr> </thead> <tbody> <tr> <td>SalesOrderItems (13)</td> <td>22 SALESORDERID 22 SALESORDERITEM AA PRODUCTID AA NOTEID AA CURRENCY 22 GROSSAMOUNT 123 NETAMOUNT 123 TAXAMOUNT AA ITEMATPSTATUS</td> <td>AA PRODUCT_ID 22 Sentiment</td> <td></td> </tr> </tbody> </table>	Show:	All	Mapped	Unmapped	SalesOrderItems (13)	22 SALESORDERID 22 SALESORDERITEM AA PRODUCTID AA NOTEID AA CURRENCY 22 GROSSAMOUNT 123 NETAMOUNT 123 TAXAMOUNT AA ITEMATPSTATUS	AA PRODUCT_ID 22 Sentiment	
Show:	All	Mapped	Unmapped						
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Explanation	Screenshot																																																	
<p>165. In the General section make sure to set the Join Type as Left so that products for which no reviews exist are still available in the final result set.</p>	 <p>The screenshot shows the 'Join Properties' dialog for 'Join 2'. At the top, there's a wrench icon and the title 'Join Properties'. Below that, the identifier 'Join 2' is displayed along with a shield icon and the number '15'. Under the 'General' section, the 'Join Type:' dropdown is open, showing 'Left' as the selected option. Other options listed are 'Cross', 'Full', and 'Inner'. A scroll bar is visible on the right side of the dropdown menu.</p>																																																	
<p>166. Do data preview on join node to validate that data is available. Again, the output might look a little different – don't worry. ☺</p>	 <p>The screenshot shows the 'Data Preview' interface for 'Join 2 (1000)'. The table has the following data:</p> <table border="1"> <thead> <tr> <th>SALESORDERID</th> <th>PRODUCT_ID</th> <th>SALESORDERITEM</th> <th>SENTIMENT</th> <th>PRODUCTID</th> <th>NOTEID</th> <th>CURRENCY</th> </tr> </thead> <tbody> <tr> <td>500000101</td> <td>-</td> <td>10</td> <td>-</td> <td>RO-1003</td> <td></td> <td>USD</td> </tr> <tr> <td>500000101</td> <td>-</td> <td>20</td> <td>-</td> <td>RC-1056</td> <td></td> <td>USD</td> </tr> <tr> <td>500000101</td> <td>-</td> <td>30</td> <td>-</td> <td>CC-1021</td> <td></td> <td>USD</td> </tr> <tr> <td>500000101</td> <td>-</td> <td>40</td> <td>-</td> <td>RO-1001</td> <td></td> <td>USD</td> </tr> <tr> <td>500000101</td> <td>-</td> <td>50</td> <td>-</td> <td>HB-1176</td> <td></td> <td>USD</td> </tr> <tr> <td>500000101</td> <td>-</td> <td>60</td> <td>-</td> <td>CB-1162</td> <td></td> <td>USD</td> </tr> </tbody> </table>	SALESORDERID	PRODUCT_ID	SALESORDERITEM	SENTIMENT	PRODUCTID	NOTEID	CURRENCY	500000101	-	10	-	RO-1003		USD	500000101	-	20	-	RC-1056		USD	500000101	-	30	-	CC-1021		USD	500000101	-	40	-	RO-1001		USD	500000101	-	50	-	HB-1176		USD	500000101	-	60	-	CB-1162		USD
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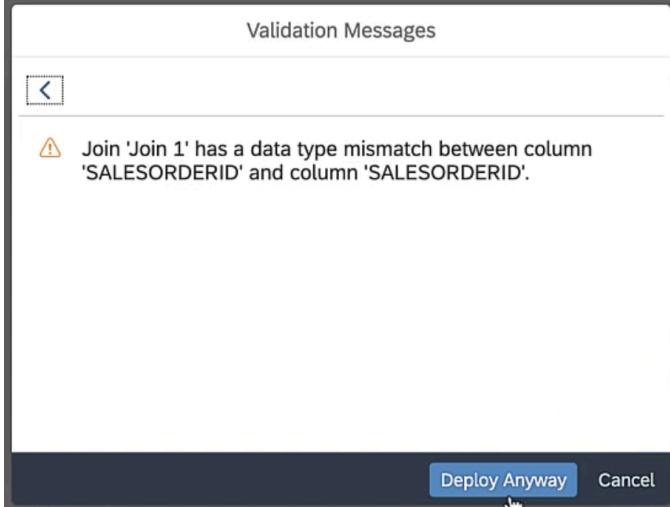
Explanation	Screenshot																																								
167. Select the View 1 output node and scroll down to the Associations section. Hit the Add button to add a new association. The number of columns might be different from what you see in your tenant, but don't worry.	 <p>The screenshot shows the SAP Data Warehouse Cloud Properties dialog for a View 1 node. The Associations section is open, displaying a list of existing associations. A tooltip at the bottom left of the Associations section states: "The number of columns might be different from what you see in your tenant, but don't worry."</p>																																								
168. From the list of dimensions select the Products view and hit OK.	 <p>The screenshot shows the 'Select Association Target' dialog. The 'Products' dimension is selected in the list of targets.</p> <table border="1"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> <th>Type</th> <th>Created By</th> </tr> </thead> <tbody> <tr> <td>Product Reviews</td> <td>Prod_Revs</td> <td>Local Table</td> <td>ANA365_001</td> </tr> <tr> <td>Product Attributes</td> <td>Product_Attributes</td> <td>Remote Table</td> <td>ANA365_001</td> </tr> <tr> <td>Product Category</td> <td>Product_Category</td> <td>Remote Table</td> <td>ANA365_001</td> </tr> <tr> <td>Product Reviews</td> <td>Product_Reviews</td> <td>Local Table</td> <td>ANA365_001</td> </tr> <tr> <td>Product Texts</td> <td>Product_Texts</td> <td>Remote Table</td> <td>ANA365_001</td> </tr> <tr> <td>product-reviews</td> <td>productreviews</td> <td>Local Table</td> <td>ANA365_001</td> </tr> <tr> <td>Products</td> <td>Products</td> <td>Dimension (View)</td> <td>ANA365_001</td> </tr> <tr> <td>Sales Orders</td> <td>Sales_Orders</td> <td>Local Table</td> <td>ANA365_001</td> </tr> <tr> <td>SalesOrderItems</td> <td>SalesOrderItems</td> <td>Local Table</td> <td>ANA365_001</td> </tr> </tbody> </table>	Business Name	Technical Name	Type	Created By	Product Reviews	Prod_Revs	Local Table	ANA365_001	Product Attributes	Product_Attributes	Remote Table	ANA365_001	Product Category	Product_Category	Remote Table	ANA365_001	Product Reviews	Product_Reviews	Local Table	ANA365_001	Product Texts	Product_Texts	Remote Table	ANA365_001	product-reviews	productreviews	Local Table	ANA365_001	Products	Products	Dimension (View)	ANA365_001	Sales Orders	Sales_Orders	Local Table	ANA365_001	SalesOrderItems	SalesOrderItems	Local Table	ANA365_001
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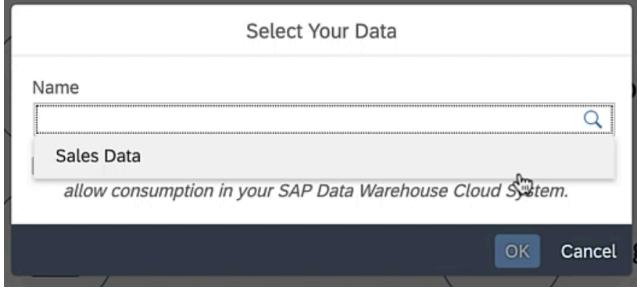
Explanation	Screenshot
<p>169. In the details on the added association make sure that the join fields are defined correctly (PRODUCTID -&gt; Product).</p>	 <p>The screenshot shows the 'Properties' screen for a node named 'View 1 to Products'. Under the 'Join' section, there are two lists: 'View 1 (24)' on the left and 'Products (4)' on the right. A curved arrow points from the 'AA PRODUCTID' field in the 'View 1 (24)' list to the 'AA Product' field in the 'Products (4)' list, indicating a mapping between these fields.</p>
<p>170. Navigate back to the main Properties screen of the View 1 output node by clicking on the View 1 bread crumb navigation at the top.</p>	 <p>The screenshot shows the 'Properties' screen for the same node. The 'General' tab is currently selected. The breadcrumb navigation at the top shows 'View 1 / View 1 to Products', with 'View 1' being the active part.</p>

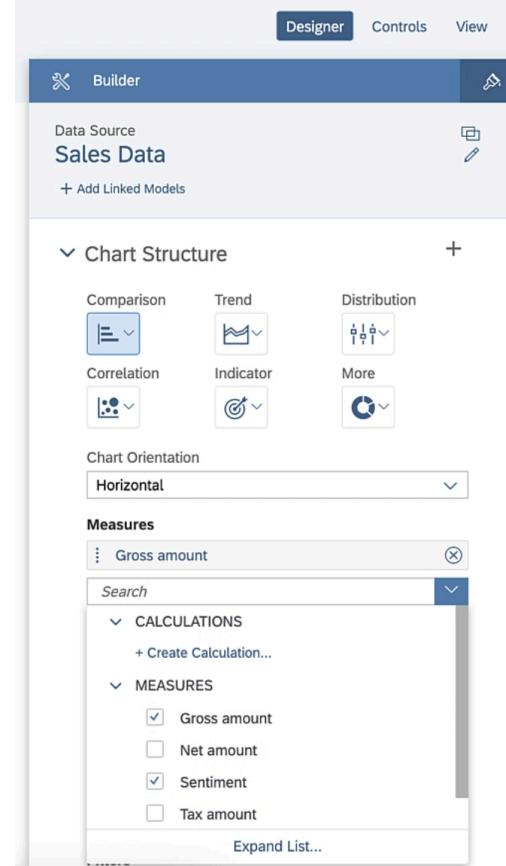
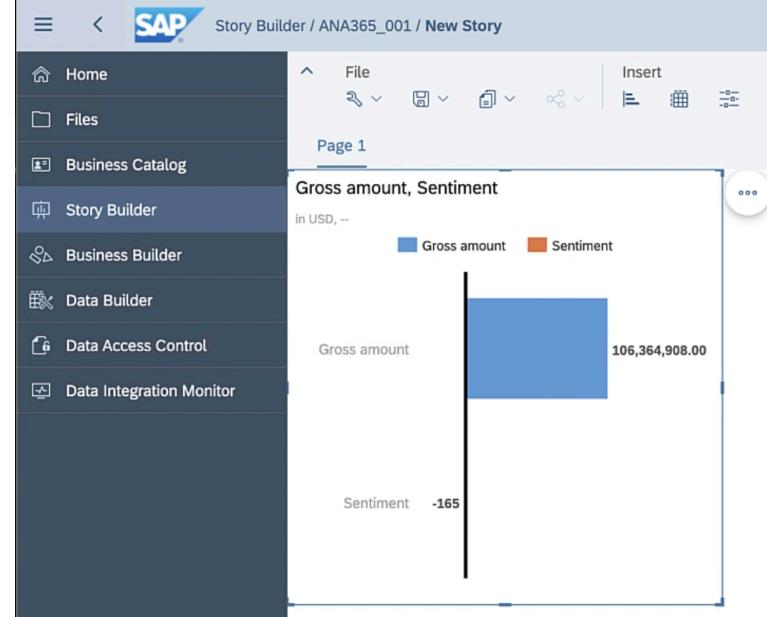
Explanation	Screenshot
<p>171. Provide a meaningful Business Name and Technical Name and set the type to Analytical Dataset. Make sure to switch on the Exposing option.</p>	
<p>172. Now that you have set the type as Analytical Dataset you can define measures. Scroll down and move the columns Sentiment, Gross amount, Net amount and Tax amount from the list of Attributes to the list of Measures.</p>	

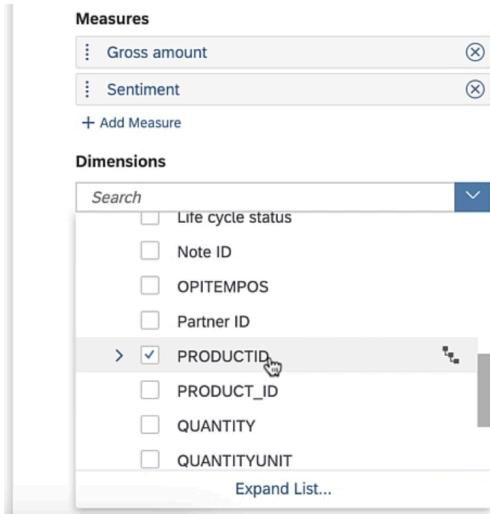
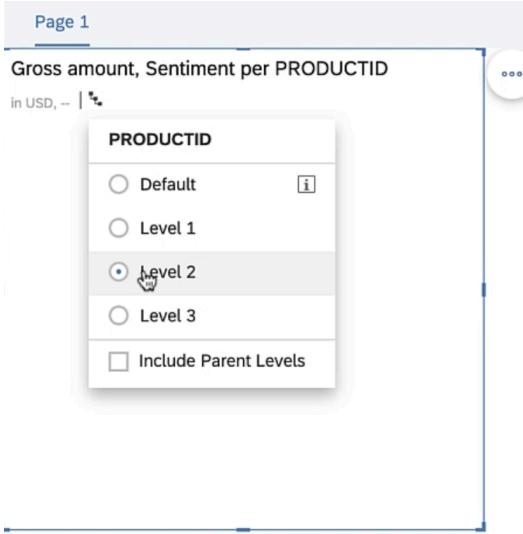
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174. Change the Semantic Type for the column Currency key to Currency Code.	 <table border="1" data-bbox="518 946 1483 1305"> <thead> <tr> <th colspan="5">Attributes (21)</th> <th>Sales Data</th> </tr> <tr> <th></th> <th>Business Name</th> <th>Technical Name</th> <th>Data Type</th> <th>Semantic Type</th> <th></th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td>Fiscal year period</td> <td>FISCALYEARPERIOD</td> <td>String(7)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Note ID</td> <td>NOTEID</td> <td>String(10)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Partner ID</td> <td>PARTNERID</td> <td>String(10)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Sales Organisation</td> <td>SALESORG</td> <td>String(4)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Currency key</td> <td>CURRENCY</td> <td>String(5)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Life cycle status</td> <td>LIFECYCLESTATUS</td> <td>String(1)</td> <td>None</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Billing status</td> <td>BILLINGSTATUS</td> <td>String(1)</td> <td>Currency Code</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Delivery status</td> <td>DELIVERYSTATUS</td> <td>String(1)</td> <td>Unit of Measure</td> <td><input type="button" value="Edit"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>SALESORDERITEM</td> <td>SALESORDERITEM</td> <td>Integer64</td> <td>Text</td> <td><input type="button" value="Edit"/></td> </tr> </tbody> </table>	Attributes (21)					Sales Data		Business Name	Technical Name	Data Type	Semantic Type		<input type="checkbox"/>	Fiscal year period	FISCALYEARPERIOD	String(7)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Note ID	NOTEID	String(10)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Partner ID	PARTNERID	String(10)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Sales Organisation	SALESORG	String(4)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Currency key	CURRENCY	String(5)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Life cycle status	LIFECYCLESTATUS	String(1)	None	<input type="button" value="Edit"/>	<input type="checkbox"/>	Billing status	BILLINGSTATUS	String(1)	Currency Code	<input type="button" value="Edit"/>	<input type="checkbox"/>	Delivery status	DELIVERYSTATUS	String(1)	Unit of Measure	<input type="button" value="Edit"/>	<input checked="" type="checkbox"/>	SALESORDERITEM	SALESORDERITEM	Integer64	Text	<input type="button" value="Edit"/>
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175. Select the edit button for Measures.																																																																			

Explanation	Screenshot																								
176.Specify a readable business name for each of the measures.	<table border="1"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> <th>Data Type</th> <th>Aggregation</th> </tr> </thead> <tbody> <tr> <td>Sentiment</td> <td>SENTIMENT</td> <td>Integer</td> <td>SUM</td> </tr> <tr> <td>Tax amount</td> <td>TAXAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> </tr> <tr> <td>Net amount</td> <td>NETAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> </tr> <tr> <td>Gross amount</td> <td>GROSSAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> </tr> </tbody> </table>	Business Name	Technical Name	Data Type	Aggregation	Sentiment	SENTIMENT	Integer	SUM	Tax amount	TAXAMOUNT	Decimal(15, 2)	SUM	Net amount	NETAMOUNT	Decimal(15, 2)	SUM	Gross amount	GROSSAMOUNT	Decimal(15, 2)	SUM				
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177.Change the Semantic Type for the three measures Gross amount, Net amount and Tax amount to Amount with Currency. Specify no semantic type for Sentiment.																									
178.For the Unit Column select Currency key for the three measures expect Sentiment.																									
179.Close the dialog.	<table border="1"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> <th>Data Type</th> <th>Aggregation</th> <th>Semantic Type</th> <th>Unit Column</th> </tr> </thead> <tbody> <tr> <td>Net amount</td> <td>NETAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> <td>Amount with Currency</td> <td>Currency key</td> </tr> <tr> <td>Tax amount</td> <td>TAXAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> <td>Amount with Currency</td> <td>Currency key</td> </tr> <tr> <td>Gross amount</td> <td>GROSSAMOUNT</td> <td>Decimal(15, 2)</td> <td>SUM</td> <td>Amount with Currency</td> <td>Currency key</td> </tr> </tbody> </table>	Business Name	Technical Name	Data Type	Aggregation	Semantic Type	Unit Column	Net amount	NETAMOUNT	Decimal(15, 2)	SUM	Amount with Currency	Currency key	Tax amount	TAXAMOUNT	Decimal(15, 2)	SUM	Amount with Currency	Currency key	Gross amount	GROSSAMOUNT	Decimal(15, 2)	SUM	Amount with Currency	Currency key
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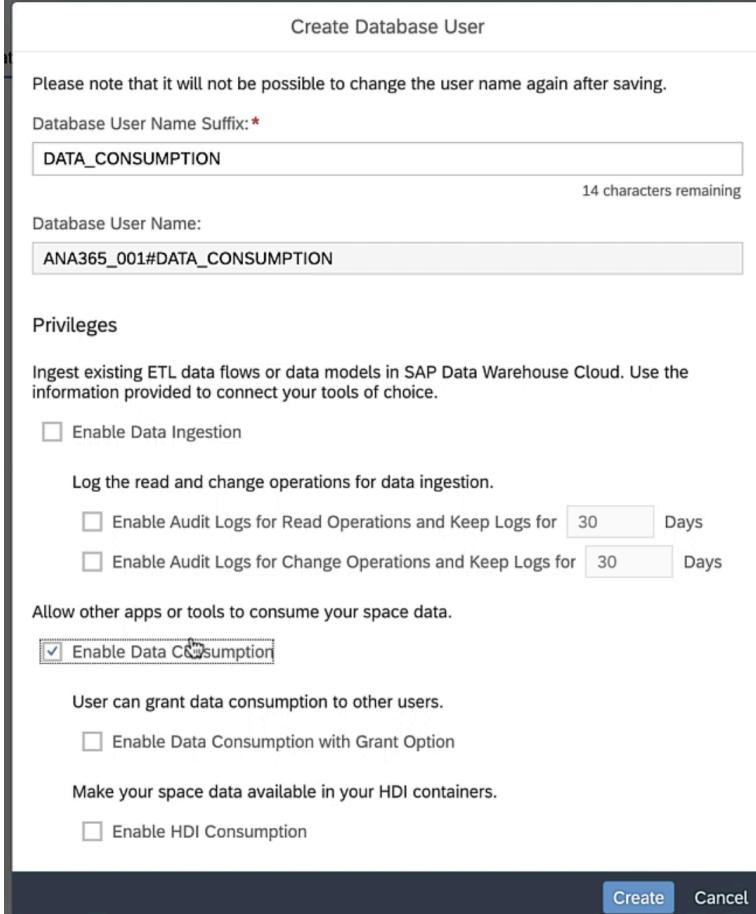
Explanation	Screenshot
180. Save and deploy the view and confirm the validation message in case it is shown.	
181. Congratulations!	<p>You created your data model and combined the different data assets. We are now ready to consume the data model in an application like SAP Analytics Cloud or a 3<sup>rd</sup> party external SQL application.</p> <p>In the next section we will experience both possible ways, before we finally take a look at how the models can be tweaked further to improve the performance and make sure that the source systems are not overloaded with data requests.</p> <p>We will start with creating a SAP Analytics Cloud story as an example, then take a look at how you can consume the exposed data models in a 3<sup>rd</sup> party SQL tool.</p>
182. Select the Story Builder from the navigation bar and create a new story.	

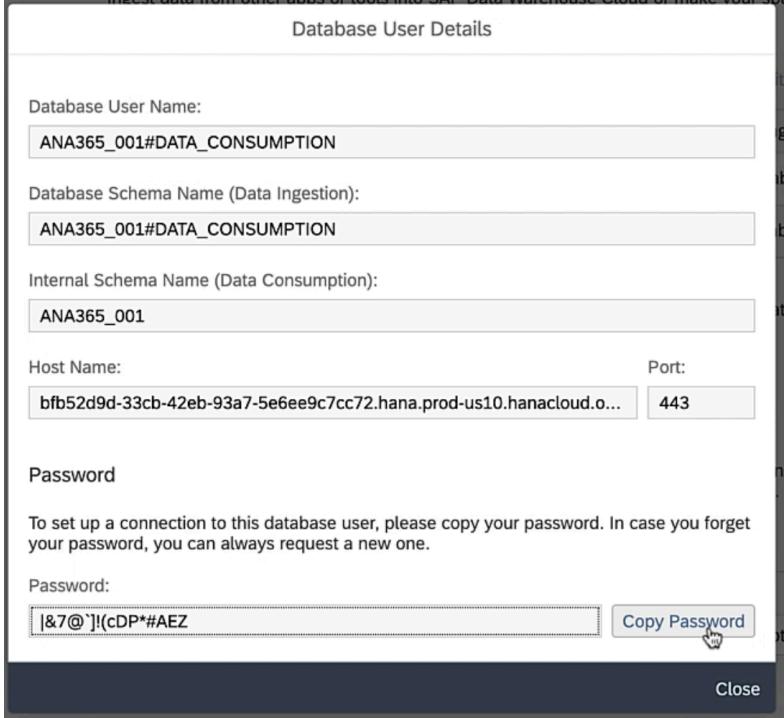
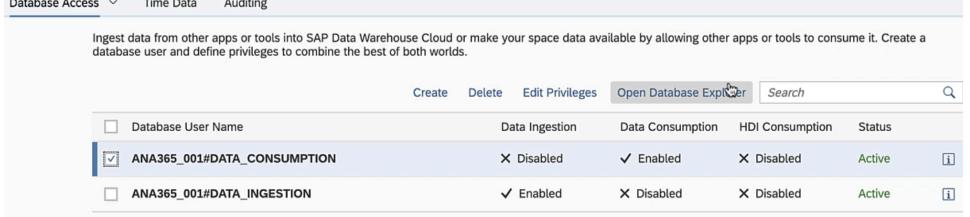
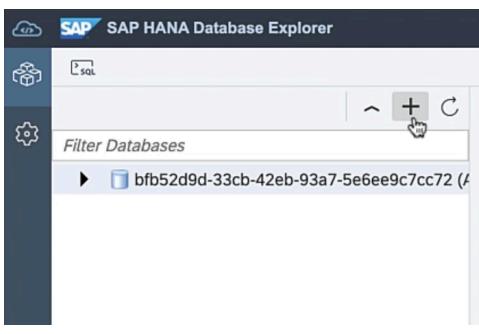
Explanation	Screenshot
<p>183. Select the Sales Data set you created earlier. If no entry is visible navigate back to the graphical Sales Data view and make sure the Exposing option is switched on!</p>	
<p>184. Select the Chart option.</p>	<p>Add an object to the story canvas.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>You've added the field Sales Data to your story.</p> <p>Now that you've uploaded data, select the first object you would like to add to your story canvas.</p> </div> <div style="display: grid; grid-template-columns: 1fr 1fr;"> <div style="text-align: center;">  <p>Chart</p> </div> <div style="text-align: center;">  <p>Geo Map</p> </div> <div style="text-align: center;">  <p>Table</p> </div> <div style="text-align: center;">  <p>Image</p> </div> <div style="text-align: center;">  <p>Shape</p> </div> <div style="text-align: center;">  <p>Text</p> </div> </div> </div>

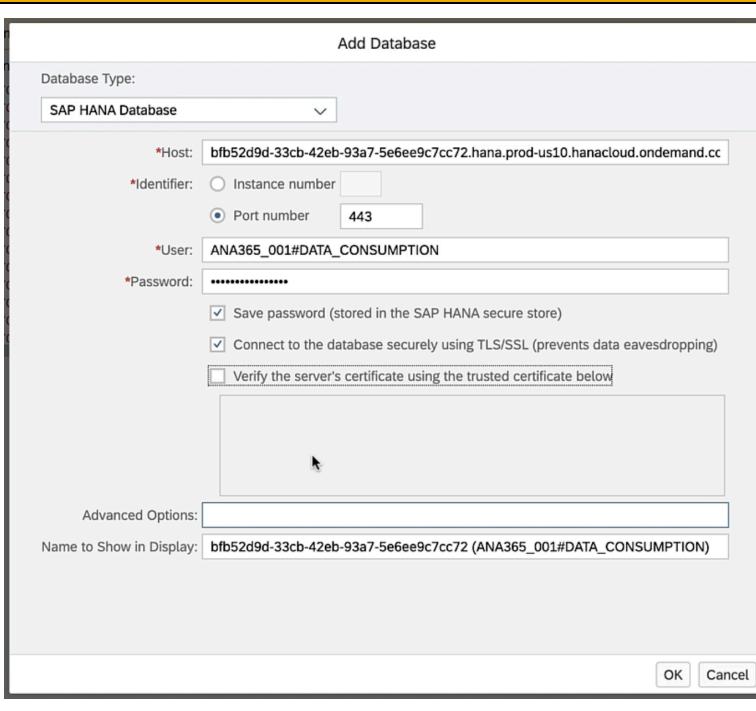
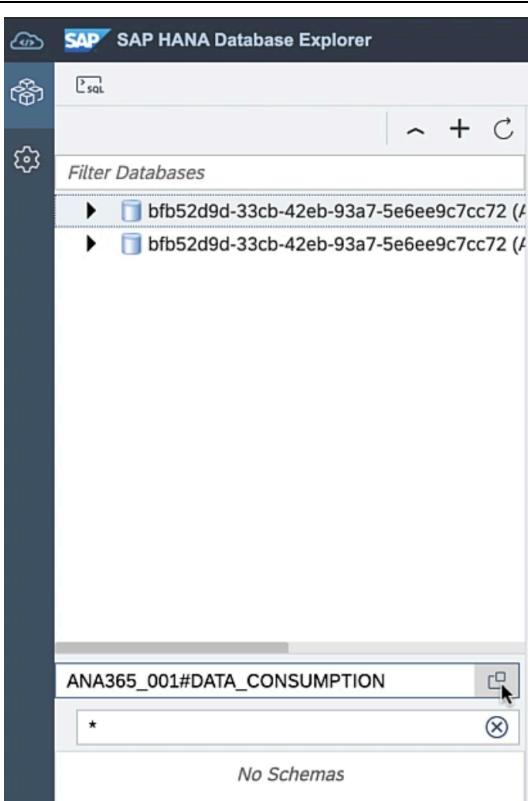
Explanation	Screenshot
<p>185. On the right add the two measures Gross amount and Sentiment.</p>	 <p>The screenshot shows the SAP Data Warehouse Cloud Builder interface. In the 'Chart Structure' section, under 'Measures', 'Gross amount' is selected under 'CALCULATIONS'. Under 'MEASURES', 'Gross amount' and 'Sentiment' are selected. Both checkboxes are checked.</p>
<p>186. The aggregated sum and sentiment is shown on the left.</p>	 <p>The screenshot shows the SAP Story Builder interface. A bar chart titled 'Gross amount, Sentiment' is displayed. The chart has two bars: 'Gross amount' (blue) with a value of 106,364,908.00 and 'Sentiment' (orange) with a value of -165. The legend at the bottom identifies the colors for each category.</p>

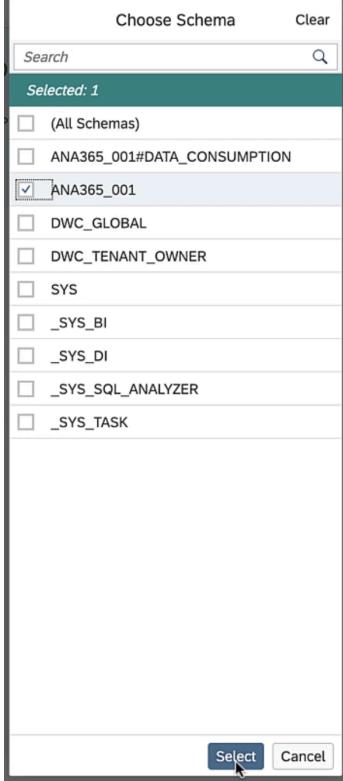
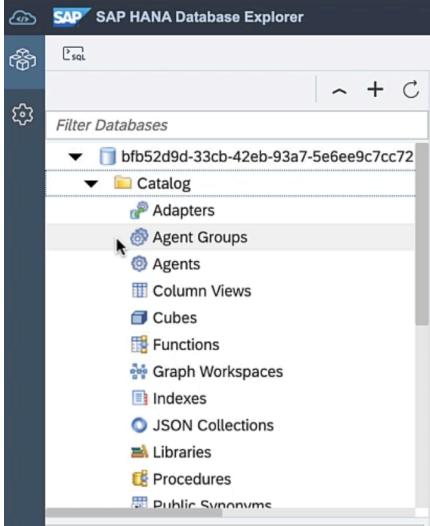
Explanation	Screenshot
187. Add the PRODUCTID dimension to the list of Dimensions.	 <p>The screenshot shows the configuration interface for measures and dimensions. Under 'Measures', 'Gross amount' and 'Sentiment' are listed. Under 'Dimensions', a search bar is at the top. Below it, a list of dimensions includes 'Life cycle status', 'Note ID', 'OPITEMPOS', 'Partner ID', and 'PRODUCTID'. 'PRODUCTID' is selected, indicated by a checked checkbox and highlighted in blue. Other options like 'PRODUCT_ID' and 'QUANTITY' are also listed.</p>
188. Change the PRODUCTID hierarchy display to Level 2.	 <p>The screenshot shows a dropdown menu for 'PRODUCTID' hierarchy levels. The options are 'Default', 'Level 1', 'Level 2', 'Level 3', and 'Include Parent Levels'. 'Level 2' is selected, indicated by a checked radio button and highlighted in blue. The menu is labeled 'Page 1' at the top.</p>

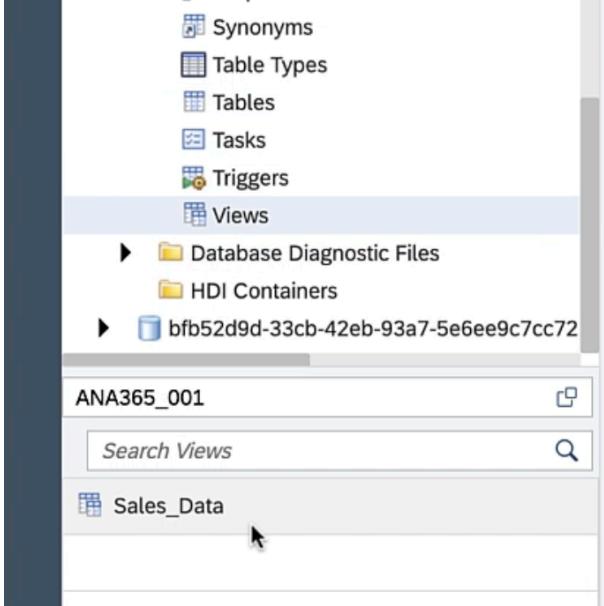
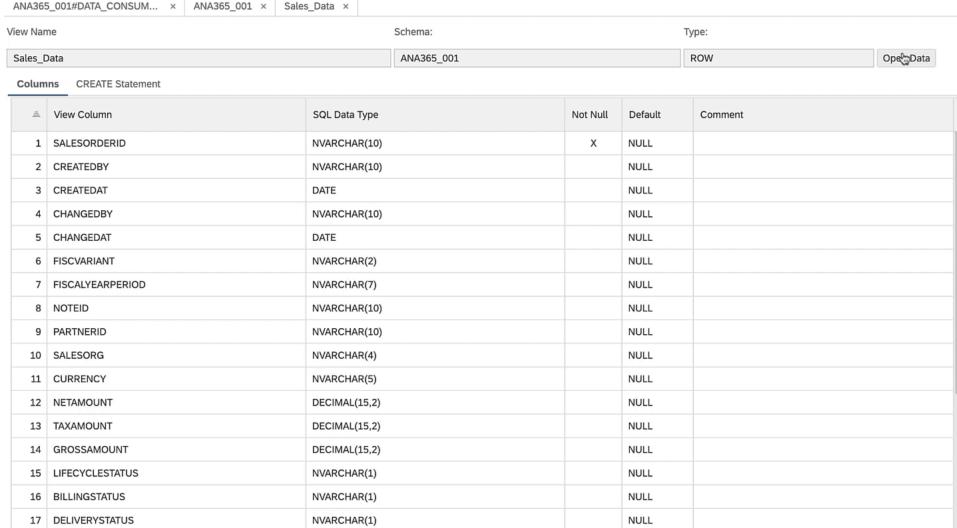
Explanation	Screenshot
189. Drag the canvas a little wider to get a good overview on the aggregated sentiment per product category.	<p>The screenshot shows a SAP Story Builder interface with a chart titled "Gross amount, Sentiment per PRODUCTID". The chart is a horizontal bar chart with "Gross amount" in blue and "Sentiment" in red. The Y-axis lists product categories: BMX, Cruiser, Cyclo-cross Bike, Downhill Bike, eBike, Hybrid Bike, Mountain Bike, Racing Bike, and Road Bike. The X-axis shows numerical values for each category. The chart structure panel on the right shows "Measures" (Gross amount, Sentiment) and "Dimensions" (PRODUCTID).</p>
190. Congratulations!	<p>You have successfully consumed the data set in the SAP Analytics Cloud story builder. You can go ahead and tweak and fine-tune the story as you like, however we will not drill down deeper into the possibilities of the SAP Analytics Cloud story builder for the sake of this data integration session.</p> <p>As a next step, let's check out how you can consume the very same data model using a 3rd party SQL external application.</p>
191. Navigate back to the Space Management into your space to the Database Access section. Hit Create to create another Database User.	<p>The screenshot shows the SAP Space Management interface for space "ANA365_001". Under the "Database Access" tab, the "Database Users" section is shown. It lists a user "ANA365_001#DATA_INGESTION" with "Enabled" checked and "Data Ingestion" set to "Disabled". Below this, the "HDI Containers" section is visible, showing a message about using HDI containers in SAP Data Warehouse Cloud. The left sidebar includes links for Home, Files, Business Catalog, Story Builder, Business Builder, Data Builder, Data Access Control, Data Integration Monitor, Space Management, Content Network, Security, and About.</p>

Explanation	Screenshot
<p>192. Provide a Database User Name Suffix like DATA_CONSUMPTION and make sure to select the Enable Data Consumption checkbox.</p>	 <p>Create Database User</p> <p>Please note that it will not be possible to change the user name again after saving.</p> <p>Database User Name Suffix:*</p> <input type="text" value="DATA_CONSUMPTION"/> <p>14 characters remaining</p> <p>Database User Name:</p> <input type="text" value="ANA365_001#DATA_CONSUMPTION"/> <p><b>Privileges</b></p> <p>Ingest existing ETL data flows or data models in SAP Data Warehouse Cloud. Use the information provided to connect your tools of choice.</p> <p><input type="checkbox"/> Enable Data Ingestion</p> <p>Log the read and change operations for data ingestion.</p> <p><input type="checkbox"/> Enable Audit Logs for Read Operations and Keep Logs for <input type="text" value="30"/> Days</p> <p><input type="checkbox"/> Enable Audit Logs for Change Operations and Keep Logs for <input type="text" value="30"/> Days</p> <p>Allow other apps or tools to consume your space data.</p> <p><input checked="" type="checkbox"/> Enable Data Consumption</p> <p>User can grant data consumption to other users.</p> <p><input type="checkbox"/> Enable Data Consumption with Grant Option</p> <p>Make your space data available in your HDI containers.</p> <p><input type="checkbox"/> Enable HDI Consumption</p> <p><b>Create</b> <b>Cancel</b></p>

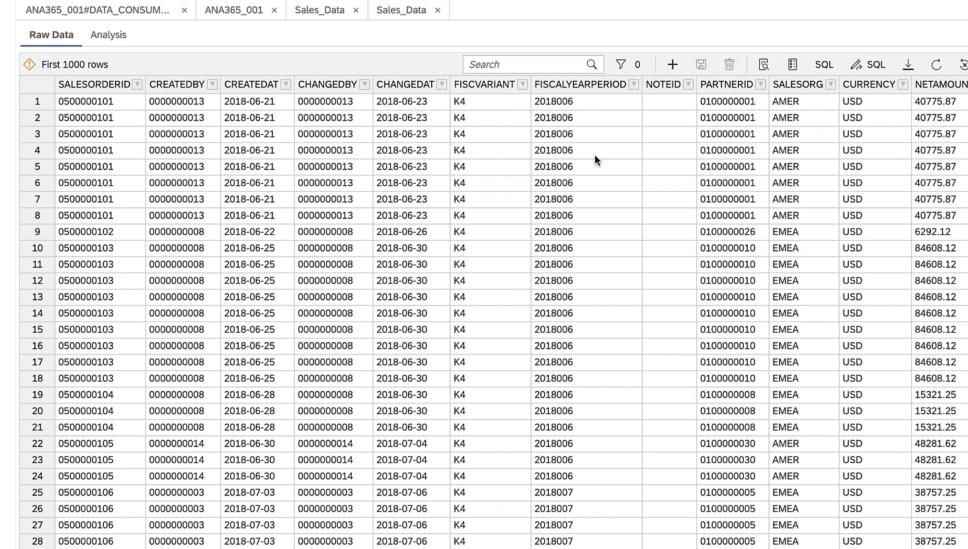
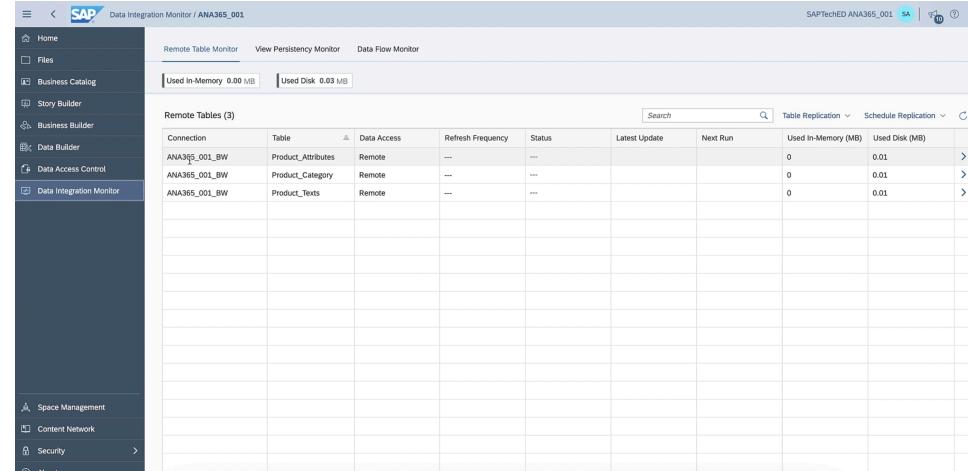
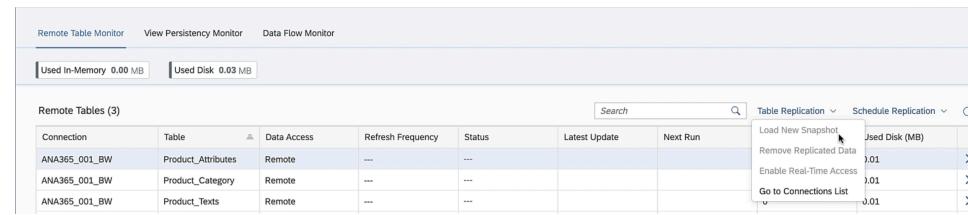
Explanation	Screenshot
193. Copy over the Database User Name, Host Name, Port and Password to for example notepad. In case you lost the password later you can always return to this dialog and request a new password.	 <p>The screenshot shows the 'Database User Details' dialog box. It contains fields for 'Database User Name' (ANA365_001#DATA_CONSUMPTION), 'Database Schema Name (Data Ingestion)' (ANA365_001#DATA_CONSUMPTION), 'Internal Schema Name (Data Consumption)' (ANA365_001), 'Host Name' (bf52d9d-33cb-42eb-93a7-5e6ee9c7cc72.hana.prod-us10.hanacloud.o...), 'Port' (443), and a 'Password' field containing a complex string. A 'Copy Password' button is visible next to the password input field.</p>
194. Select the newly created database user and hit the Open Database Explorer button on the right.	 <p>The screenshot shows the 'Database Access' interface. It displays a table of database users with their privileges. The user 'ANA365_001#DATA_CONSUMPTION' is selected, showing 'Disabled' under 'Data Ingestion' and 'Enabled' under 'Data Consumption'. Other users like 'ANA365_001#DATA_INGESTION' are also listed with their respective privilege status.</p>
195. In the SAP HANA Database Explorer (you can also use any other 3rd party SQL tool instead) hit the Add Database button.	 <p>The screenshot shows the SAP HANA Database Explorer interface. On the left is a sidebar with icons for cloud, database, and settings. The main area is titled 'SAP HANA Database Explorer' and shows a list of databases. A large blue '+' button is prominently displayed in the center of the main area, indicating the 'Add Database' function.</p>

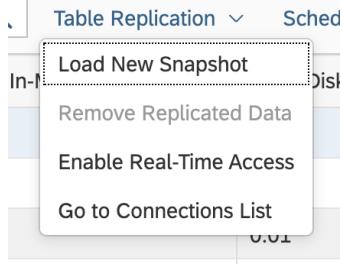
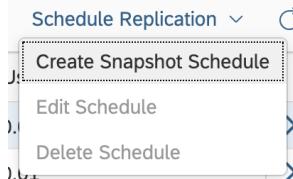
Explanation	Screenshot
196. Select the Database Type SAP HANA Database and enter the host, Port number, User and Password which you copied over from the other dialog in SAP Data Warehouse Cloud. Make sure to check the checkboxes Save password and Connect to the database... Make sure to un-check the Verify the server's certificate... checkbox.	
197. Select the value help button.	

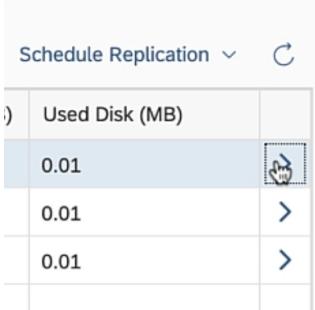
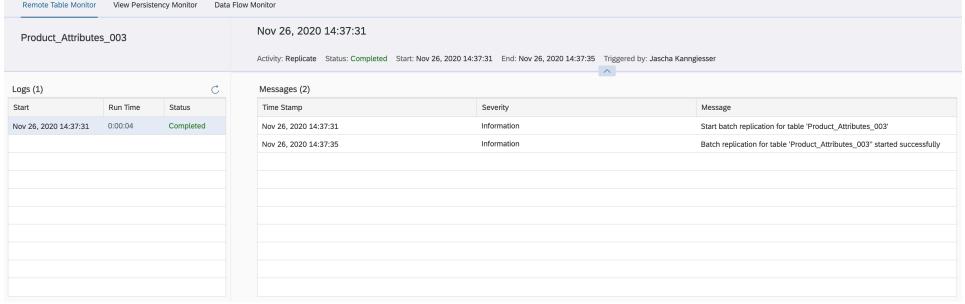
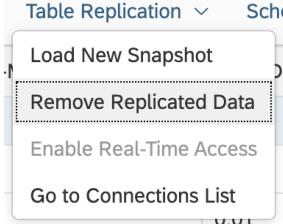
Explanation	Screenshot
<p>198. Choose the schema matching your space name, for example ANA365_001.</p>	
<p>199. Expand the database you just added and scroll down to Views.</p>	

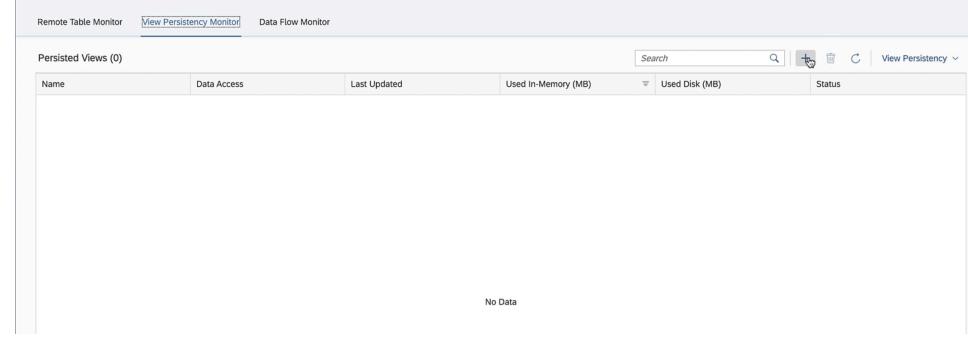
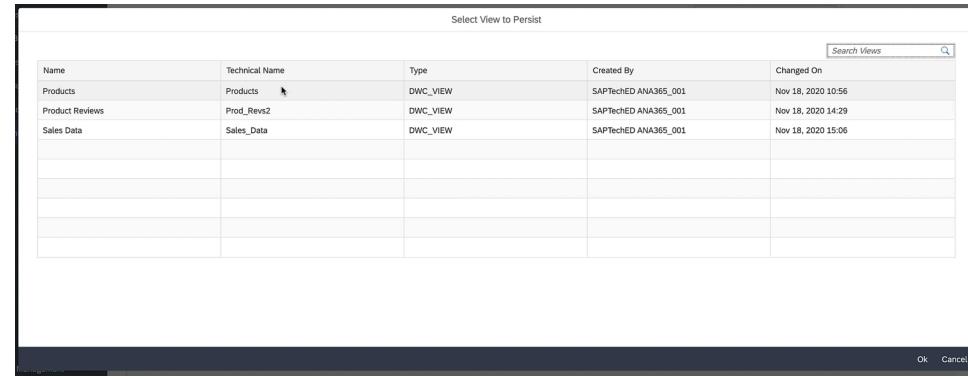
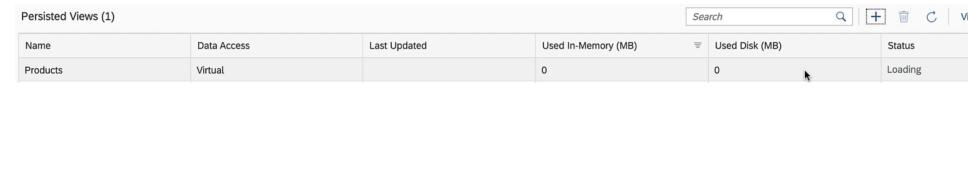
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<p>200. Select Views and select your view Sales_Data from the list of available views below.</p>																																																																																											
<p>201. A new tab opens displaying the columns of this view like you created it in SAP Data Warehouse Cloud. Hit the Open Data button in the top right corner to preview the available data.</p>	 <table border="1"> <thead> <tr> <th>View Column</th> <th>SQL Data Type</th> <th>Not Null</th> <th>Default</th> <th>Comment</th> </tr> </thead> <tbody> <tr><td>1 SALESORDERID</td><td>NVARCHAR(10)</td><td>X</td><td>NULL</td><td></td></tr> <tr><td>2 CREATEDBY</td><td>NVARCHAR(10)</td><td></td><td>NULL</td><td></td></tr> <tr><td>3 CREATEDAT</td><td>DATE</td><td></td><td>NULL</td><td></td></tr> <tr><td>4 CHANGEDBY</td><td>NVARCHAR(10)</td><td></td><td>NULL</td><td></td></tr> <tr><td>5 CHANGEDAT</td><td>DATE</td><td></td><td>NULL</td><td></td></tr> <tr><td>6 FISCVARIANT</td><td>NVARCHAR(2)</td><td></td><td>NULL</td><td></td></tr> <tr><td>7 FISCALYEARPERIOD</td><td>NVARCHAR(7)</td><td></td><td>NULL</td><td></td></tr> <tr><td>8 NOTEID</td><td>NVARCHAR(10)</td><td></td><td>NULL</td><td></td></tr> <tr><td>9 PARTNERID</td><td>NVARCHAR(10)</td><td></td><td>NULL</td><td></td></tr> <tr><td>10 SALESORG</td><td>NVARCHAR(4)</td><td></td><td>NULL</td><td></td></tr> <tr><td>11 CURRENCY</td><td>NVARCHAR(5)</td><td></td><td>NULL</td><td></td></tr> <tr><td>12 NETAMOUNT</td><td>DECIMAL(15,2)</td><td></td><td>NULL</td><td></td></tr> <tr><td>13 TAXAMOUNT</td><td>DECIMAL(15,2)</td><td></td><td>NULL</td><td></td></tr> <tr><td>14 GROSSAMOUNT</td><td>DECIMAL(15,2)</td><td></td><td>NULL</td><td></td></tr> <tr><td>15 LIFECYCLESTATUS</td><td>NVARCHAR(1)</td><td></td><td>NULL</td><td></td></tr> <tr><td>16 BILLINGSTATUS</td><td>NVARCHAR(1)</td><td></td><td>NULL</td><td></td></tr> <tr><td>17 DELIVERYSTATUS</td><td>NVARCHAR(1)</td><td></td><td>NULL</td><td></td></tr> </tbody> </table>	View Column	SQL Data Type	Not Null	Default	Comment	1 SALESORDERID	NVARCHAR(10)	X	NULL		2 CREATEDBY	NVARCHAR(10)		NULL		3 CREATEDAT	DATE		NULL		4 CHANGEDBY	NVARCHAR(10)		NULL		5 CHANGEDAT	DATE		NULL		6 FISCVARIANT	NVARCHAR(2)		NULL		7 FISCALYEARPERIOD	NVARCHAR(7)		NULL		8 NOTEID	NVARCHAR(10)		NULL		9 PARTNERID	NVARCHAR(10)		NULL		10 SALESORG	NVARCHAR(4)		NULL		11 CURRENCY	NVARCHAR(5)		NULL		12 NETAMOUNT	DECIMAL(15,2)		NULL		13 TAXAMOUNT	DECIMAL(15,2)		NULL		14 GROSSAMOUNT	DECIMAL(15,2)		NULL		15 LIFECYCLESTATUS	NVARCHAR(1)		NULL		16 BILLINGSTATUS	NVARCHAR(1)		NULL		17 DELIVERYSTATUS	NVARCHAR(1)		NULL	
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14 GROSSAMOUNT	DECIMAL(15,2)		NULL																																																																																								
15 LIFECYCLESTATUS	NVARCHAR(1)		NULL																																																																																								
16 BILLINGSTATUS	NVARCHAR(1)		NULL																																																																																								
17 DELIVERYSTATUS	NVARCHAR(1)		NULL																																																																																								

## ANA365 - Data Integration and Data Flow Modeling with SAP Data Warehouse Cloud

Explanation	Screenshot
<p>202.The same data is displayed as in SAP Data Warehouse Cloud. The data is fetched live from the view you created in the Data Builder in your space.</p>	
<p>203.Congratulations!</p>	<p>You now know how to consume data models within SAP Data Warehouse Cloud using the Story Builder or externally via the Open SQL Schema using Database Users enabled for consumption and any external 3<sup>rd</sup> party SQL client.</p> <p>Let's continue with the last section of this hands-on! We will now check out how we can replicate data to SAP Data Warehouse Cloud using the Remote Table replication and View Materialization.</p>
<p>204.In SAP Data Warehouse Cloud navigate to the Data Integration Monitor.</p>	
<p>205.For any remote table you create in your space in SAP Data Warehouse Cloud you can control whether the data access is</p>	

Explanation	Screenshot								
<p>remote (no data is stored permanently in your space, but always accessed live during query runtime) or replicated (real-time or snapshot). Using the Table Replication menu in the top right corner you can enable snapshot or realtime replication if available.</p>									
<p>206. Select the line for the Product_Attributes table and then select Load New Snapshot to replicate the remote table Product_Attributes to your space for the sake of demonstrating the Snapshot Schedule option. For specific data sets you can also enable Real-Time Access if required.</p>									
<p>207. Refresh the page and wait until the Status changes to Available.</p>	<table border="1" data-bbox="514 1351 1475 1453"> <thead> <tr> <th data-bbox="514 1351 775 1383">Data Access</th><th data-bbox="775 1351 1003 1383">Refresh Frequency</th><th data-bbox="1003 1351 1264 1383">Status</th><th data-bbox="1264 1351 1475 1383">Latest Update</th></tr> </thead> <tbody> <tr> <td data-bbox="514 1383 775 1415">Replicated</td><td data-bbox="775 1383 1003 1415">None</td><td data-bbox="1003 1383 1264 1415">Available</td><td data-bbox="1264 1383 1475 1415">Nov 26, 2020 14:37:35</td></tr> </tbody> </table>	Data Access	Refresh Frequency	Status	Latest Update	Replicated	None	Available	Nov 26, 2020 14:37:35
Data Access	Refresh Frequency	Status	Latest Update						
Replicated	None	Available	Nov 26, 2020 14:37:35						
<p>208. For snapshot replications you can also create a schedule. Creating a schedule allows you to automatically create new snapshots based on the provided frequency. Go ahead and create a Snapshot Schedule for this table.</p>									

Explanation	Screenshot
209. Clicking on the little arrow icon on the right takes you to the replication monitor logs for the data replication tasks for the selected table.	
210. The Logs screen gives you an overview of all past and currently running replications.	
211. Replicating a remote table always replicates all the data from this table 1:1. This might not be needed if you apply filters in views that use this table and therefore only require a subset of the actual data of this remote table. Go back to the Remote Table Monitor and change the Data Access back to Remote.	

Explanation	Screenshot
212. To only persist the result of a modeled view, select the View Persistence Monitor. Hit the Add button on the right create a new view persistence.	 <p>The screenshot shows the SAP Data Warehouse Cloud interface with the 'View Persistence Monitor' tab selected. The main area displays a table titled 'Persisted Views (0)' with columns: Name, Data Access, Last Updated, Used In-Memory (MB), Used Disk (MB), and Status. A search bar and filter icons are at the top. Below the table, it says 'No Data'.</p>
213. From the dialog select the Products view.	 <p>The screenshot shows a modal dialog titled 'Select View to Persist'. It lists three views: 'Products', 'Product Reviews', and 'Sales Data'. Each row includes columns for Name, Technical Name, Type, Created By, and Changed On. The 'Products' row is selected. At the bottom are 'Ok' and 'Cancel' buttons.</p>
214. After confirming the dialog, you can see that a new view persistence was created and the status is Loading.	 <p>The screenshot shows the 'Persisted Views (1)' list. It contains one entry for 'Products' with a 'Virtual' data access type. The 'Used In-Memory (MB)' and 'Used Disk (MB)' values are both 0. The 'Status' column shows 'Loading' with a cursor icon over it. The interface includes a search bar and various navigation buttons.</p>
215. Hit Refresh until the status changes to Available.	 <p>The screenshot shows the same 'Persisted Views (1)' list as before, but the 'Status' column now shows 'Available' for the 'Products' entry. The interface remains the same with its search and refresh features.</p>
216. Congratulations!	<p>You made it! You finished the exercise and experienced all the different aspects of data integration in SAP Data Warehouse Cloud. As a review, during the session you learned about, how to create federated and replicated connections to SAP &amp; non-SAP, cloud and on-premises data sources, how to load data into SAP Data Warehouse Cloud using external SQL clients, how to upload CSV files, how to model ETL processes to extract data from external sources into SAP Data Warehouse Cloud, how to consume &amp; visualize data models using the SAP Analytics Cloud story builder and external SQL clients, ... hope you enjoyed it!</p>

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