

PUBLIC

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

Exercises
Jascha Kanngiesser / SAP SE

TABLE OF CONTENTS

SYSTEMS	3
Participating live.....	3
On Demand	3
THINGS YOU WILL LEARN IN THIS SESSION	3

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 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:

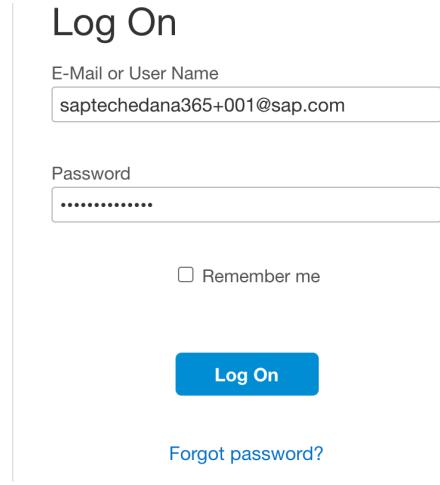
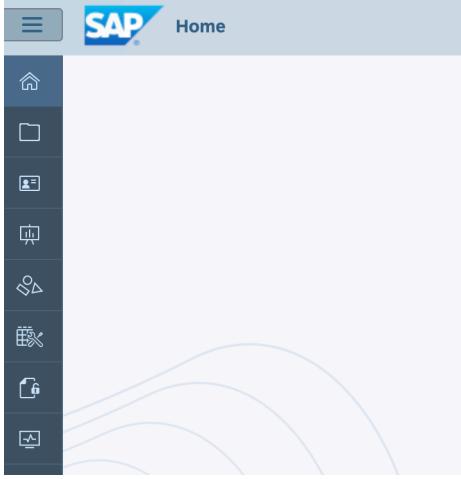
<https://saphanajourney.com/data-warehouse-cloud/trial/>

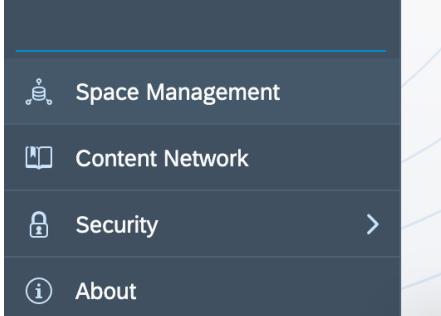
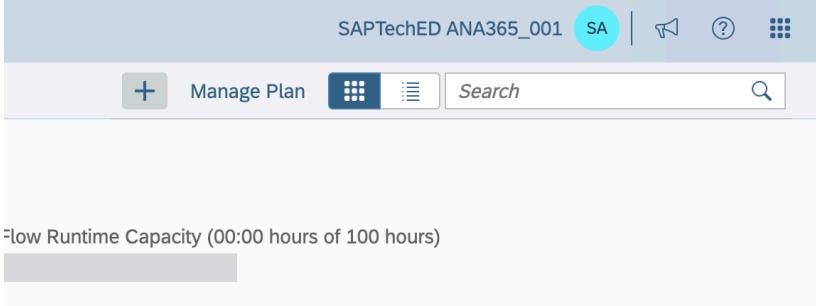
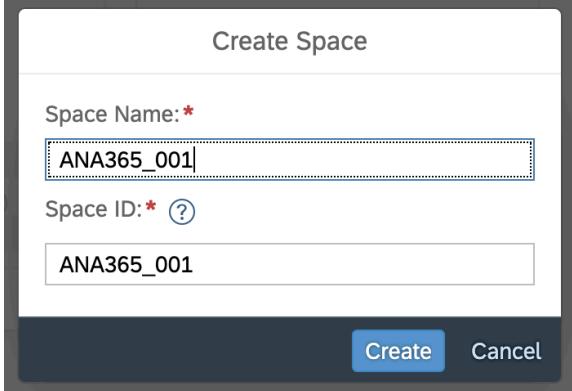
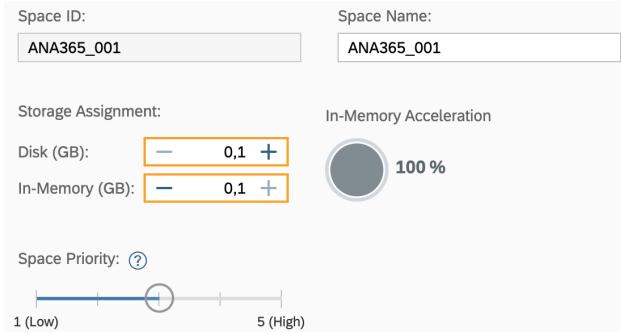
You need to set up all the required connectivity yourself, including the Data Provisioning Agent, uploading certificates, creating the data sets in the remote sources (or uploading the data sets to SAP Data Warehouse Cloud).

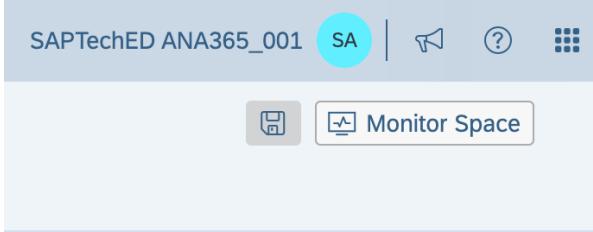
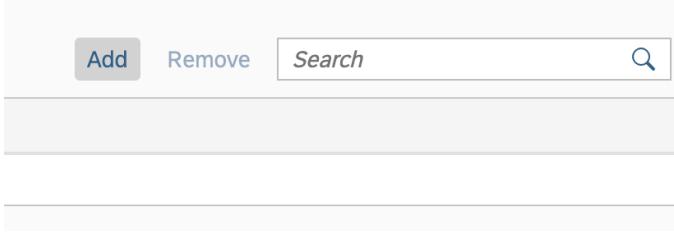
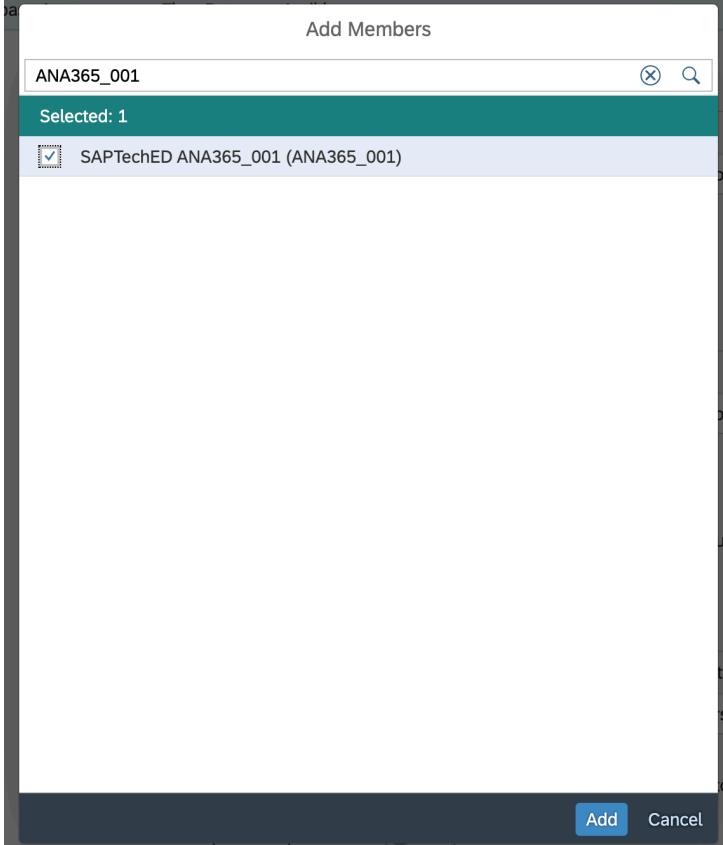
Please note that the exercise below is written for attending the live session. Therefore, for example the user credentials and tenant information might not match in case you are following the materials later on demand. In this case please substitute any live session-specific information with the individual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

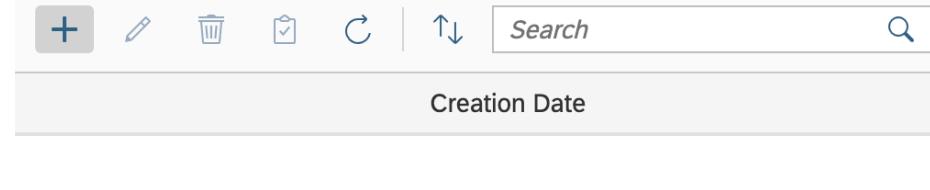
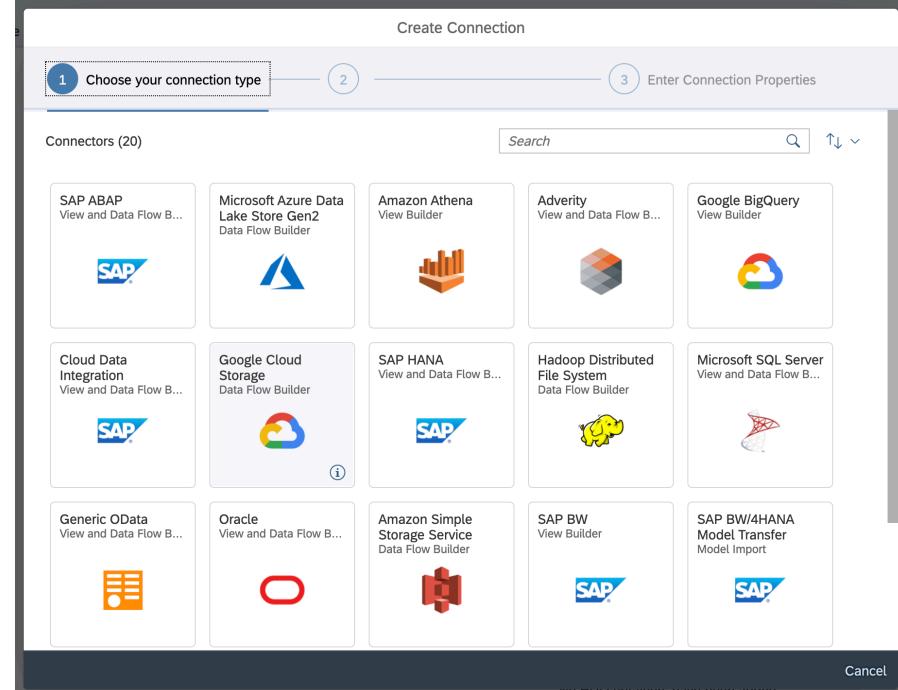
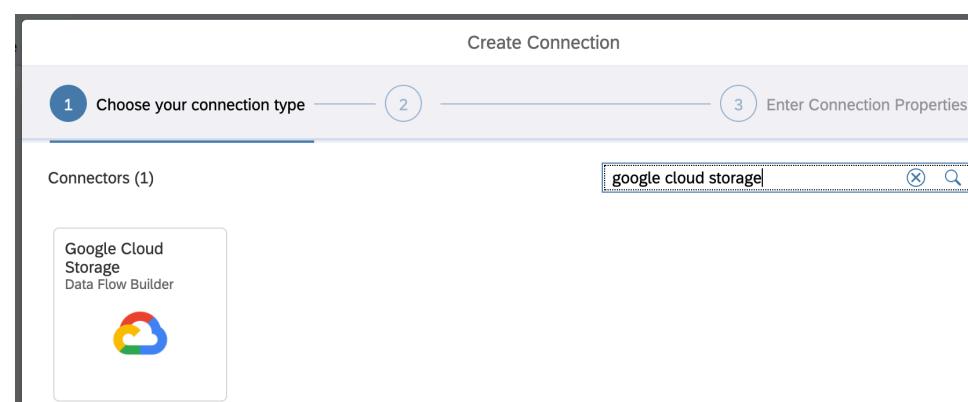
THINGS YOU WILL LEARN IN THIS SESSION

- 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.

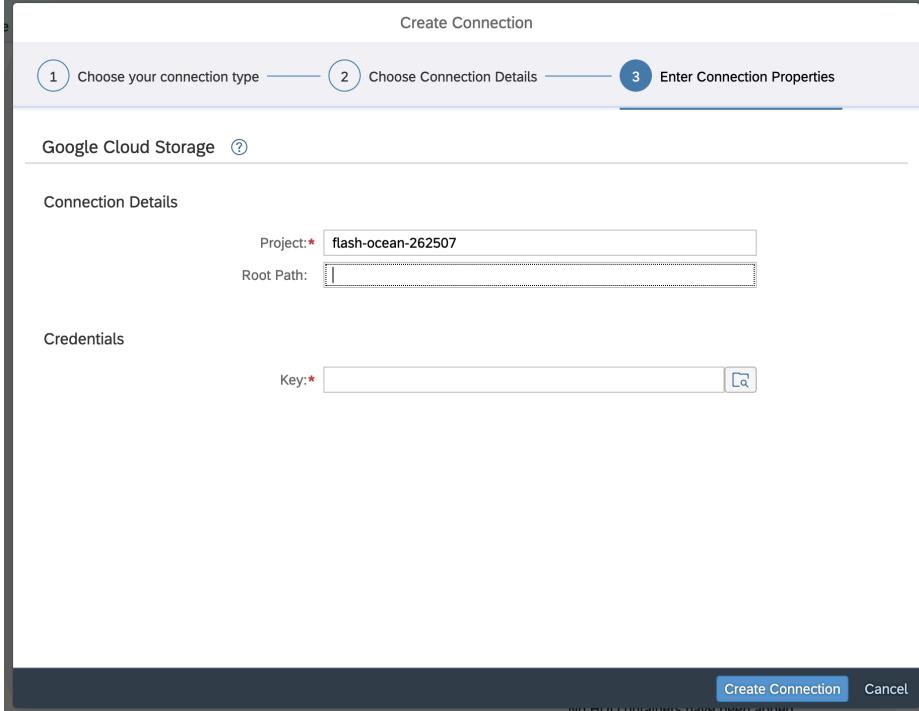
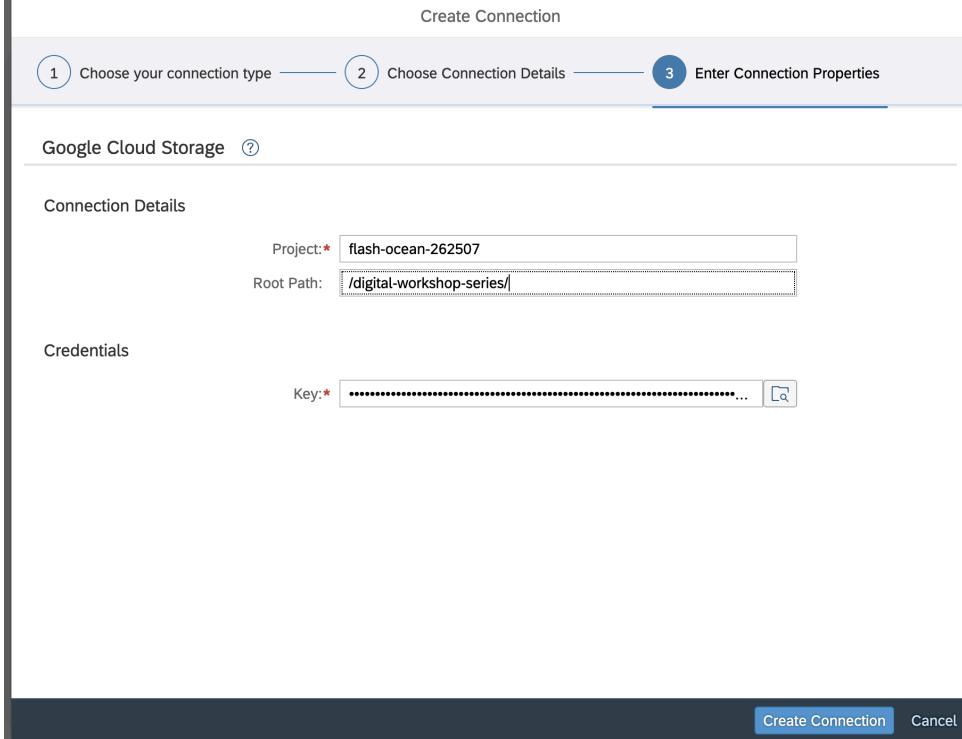
Explanation	Screenshot
<p>1. Make sure you have the login credentials available to you. You should have received a username like saptechdana365+xyz@sapcom and a password. Replace the value xyz with the number assigned to you.</p>	 <p>Log On</p> <p>E-Mail or User Name saptechdana365+001@sap.com</p> <p>Password</p> <p><input type="checkbox"/> Remember me</p> <p>Log On</p> <p>Forgot password?</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. Click on the menu bar to expand the navigation menu.</p>	

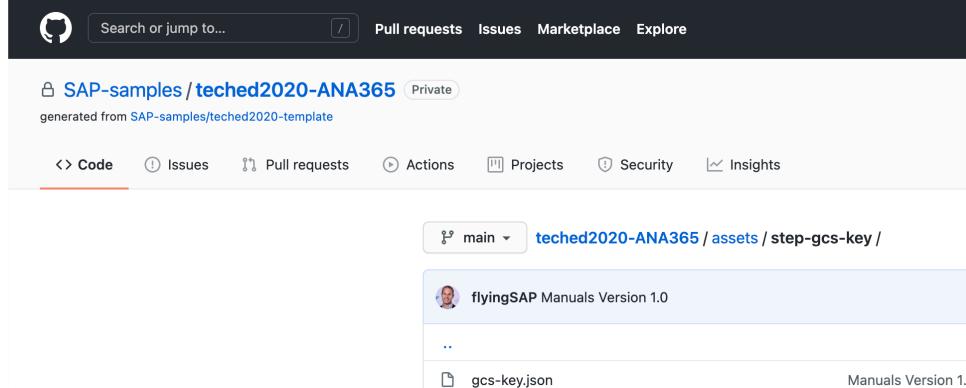
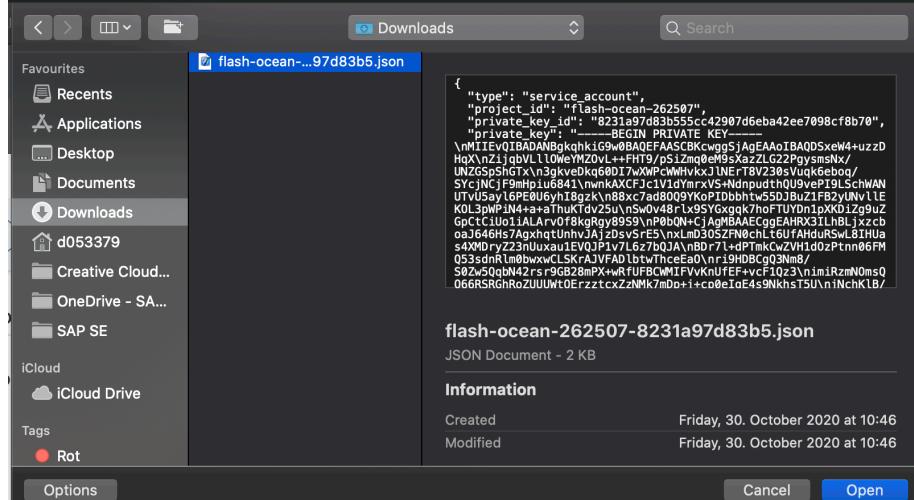
Explanation	Screenshot
4. Select Space Management in the bottom left corner.	
5. Hit the Create Space + button in the top right corner to create a new space.	
6. Enter a Space Name and Space ID. Make sure that at least the Space ID follows the syntax ANA365_<your three-digit number>. Then hit Create to create your space.	
7. 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).	

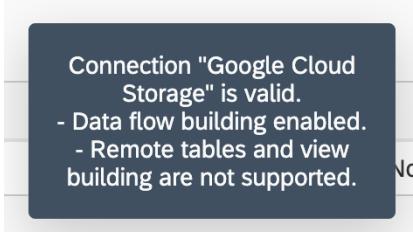
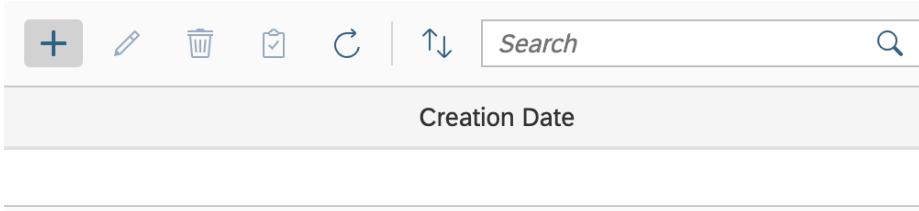
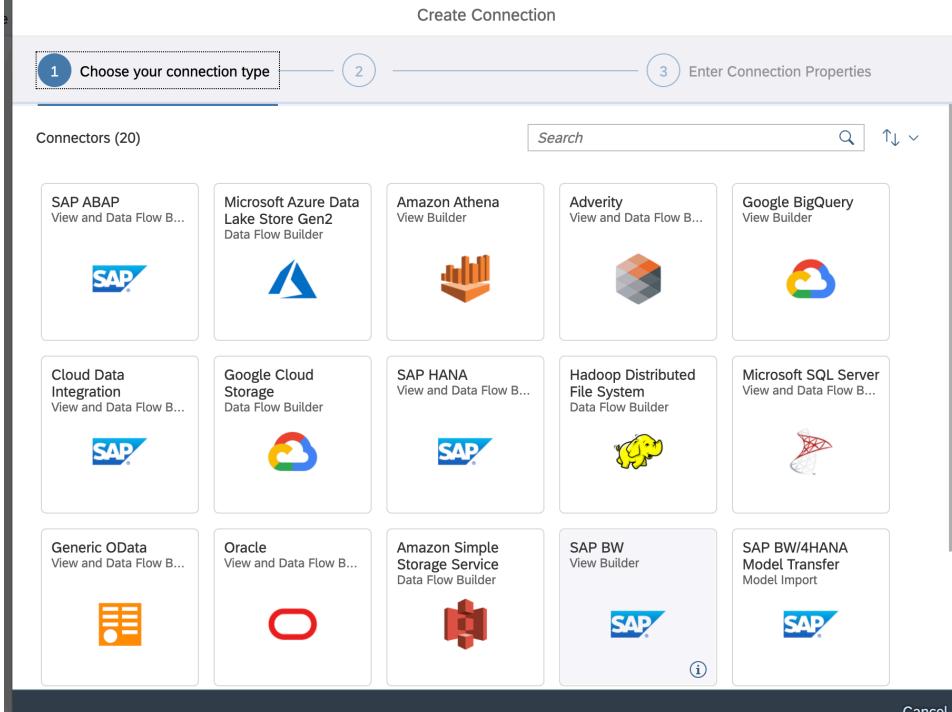
Explanation	Screenshot
<p>8. Hit Save in the top right corner to save your changes.</p>	
<p>9. Head on to the Members section and hit the Add button on the right to add yourself to your space.</p>	
<p>10. Search for your user ANA365_<your three digit number> in the dialog, select your user and hit Add to close the dialog. Make sure that it is really your ANA365 user!</p>	

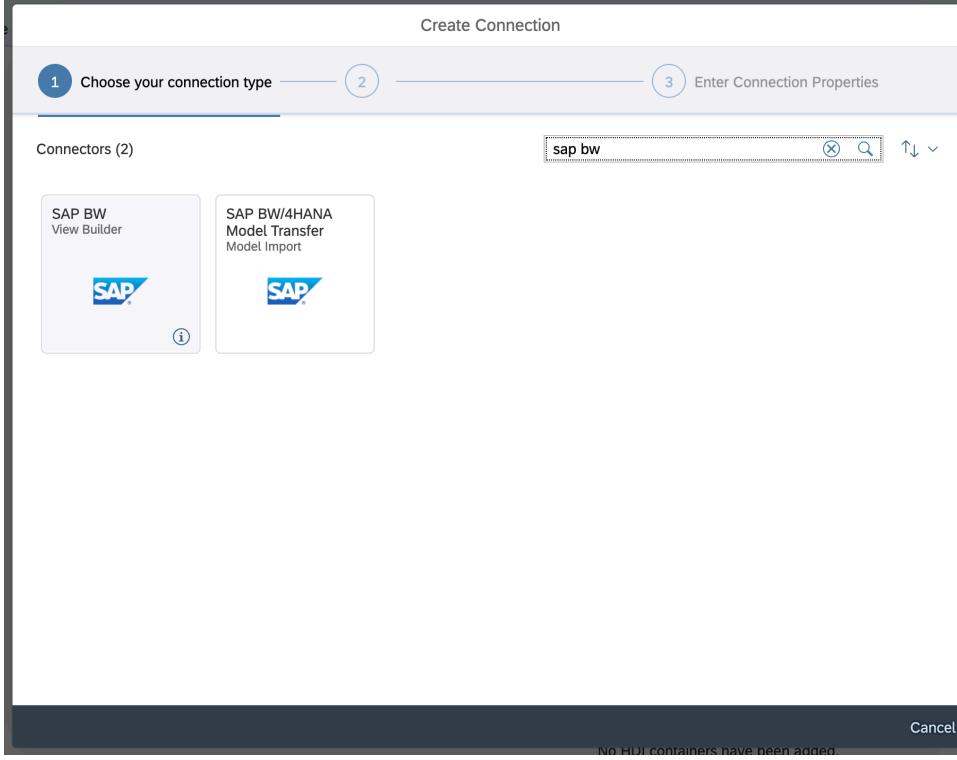
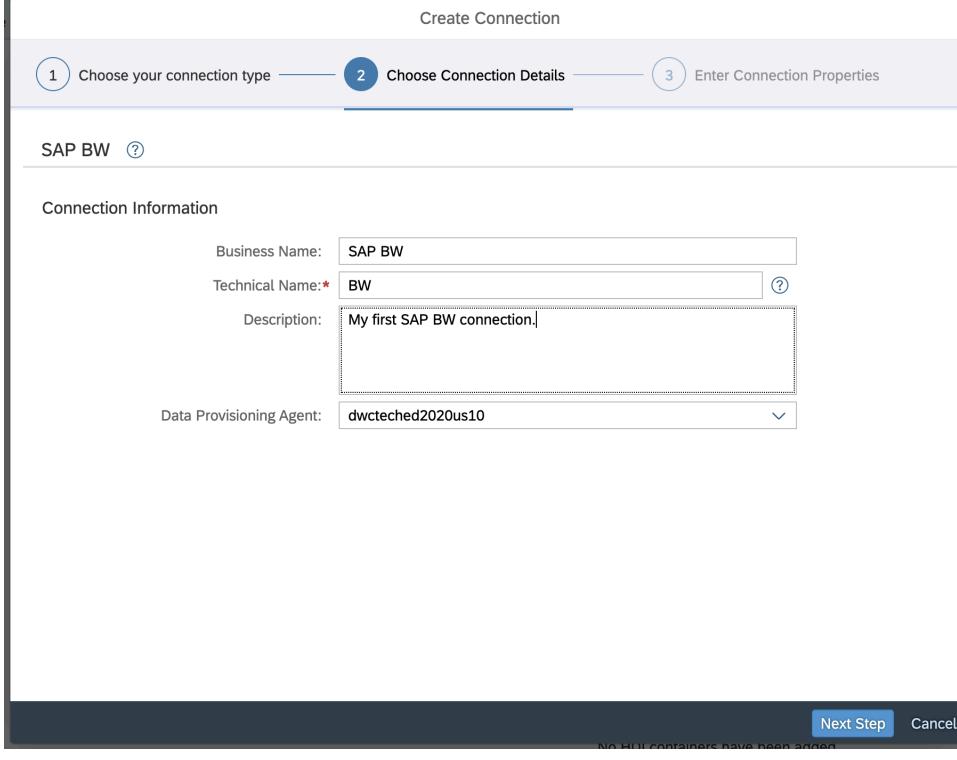
Explanation	Screenshot
11. Head on to the Connections (Local Connections) section and hit the + - button to create a new connection.	
12. Select the Google Cloud Storage tile.	
13. Or use the filter and search for Google Cloud storage in case you cannot find it in the list of connections.	

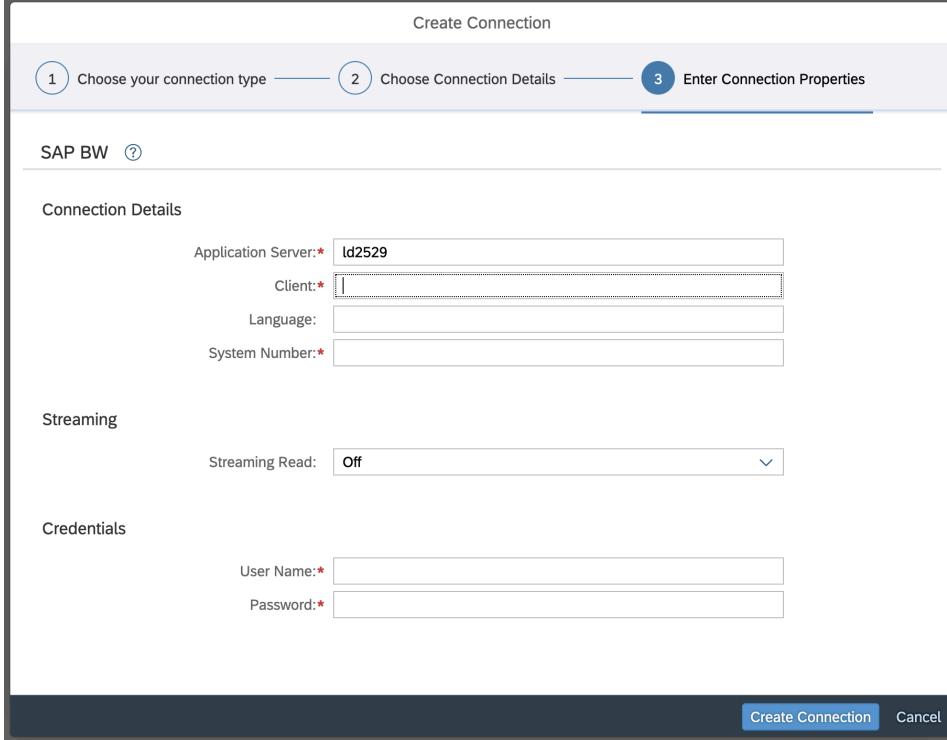
Explanation	Screenshot
<p>14. Enter a meaningful business name and technical name as well as a useful description.</p>	<p>The screenshot shows the 'Create Connection' interface. Step 2, 'Choose Connection Details', is active. A 'Google Cloud Storage' connection is selected. The 'Connection Information' section contains the following fields:</p> <ul style="list-style-type: none"> Business Name: Google Cloud Storage Technical Name: GCS Description: My first Google Cloud Storage connection. <p>At the bottom right are 'Next Step' and 'Cancel' buttons.</p>
<p>15. 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. The 'Connection Details' section contains the following fields:</p> <ul style="list-style-type: none"> Project: (empty input field) Root Path: (empty input field) <p>The 'Credentials' section contains a 'Key:' field with an empty input field and a magnifying glass icon.</p> <p>At the bottom right are 'Create Connection' and 'Cancel' buttons.</p>

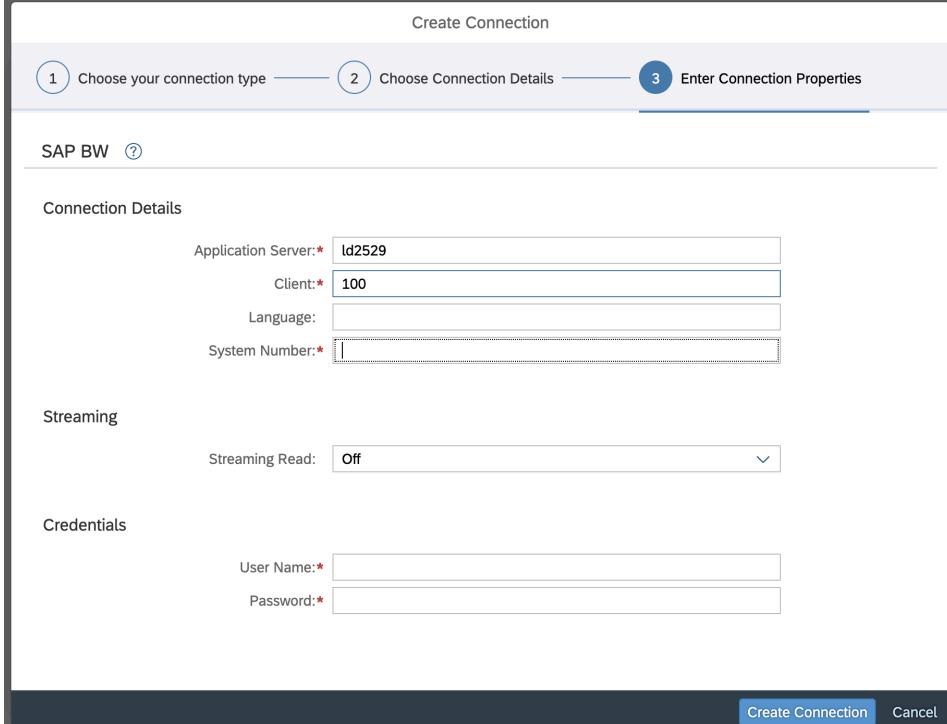
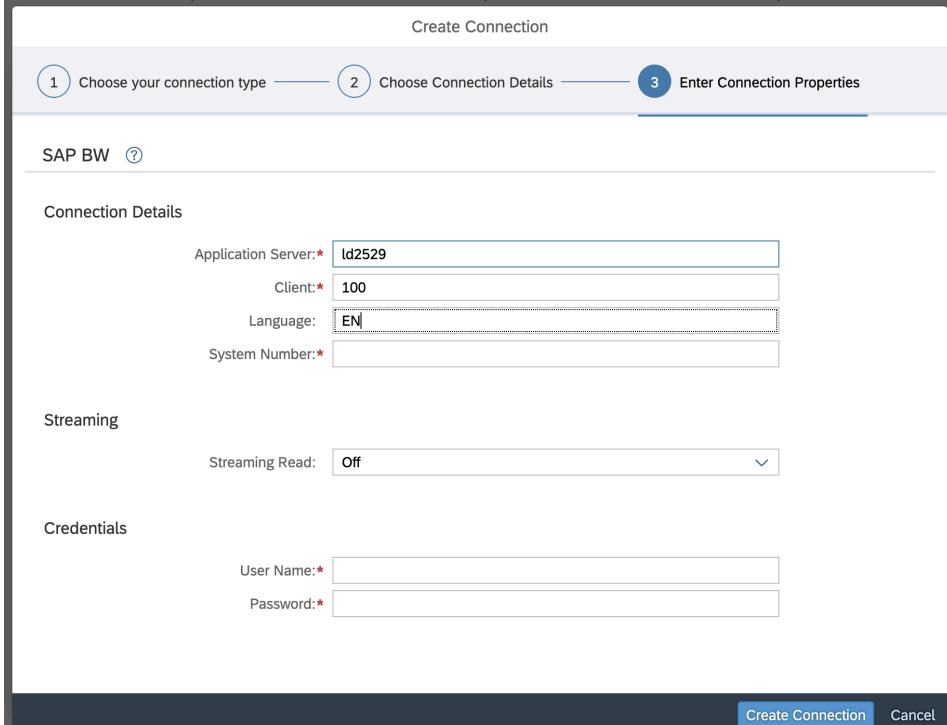
Explanation	Screenshot
<p>16. Enter the Project as flash-ocean-262507</p>	 <p>The screenshot shows the 'Create Connection' dialog for Google Cloud Storage. It is divided into three steps: 1. Choose your connection type (done), 2. Choose Connection Details (done), and 3. Enter Connection Properties (selected). 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>17. 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 'Create Connection' and 'Cancel' buttons at the bottom, remains the same.</p>

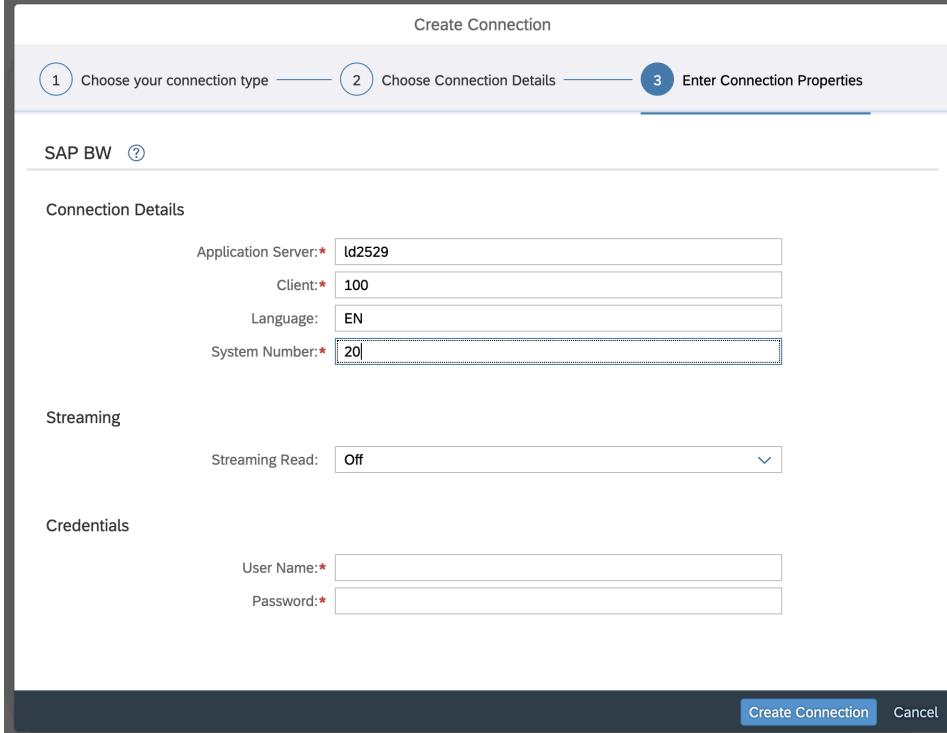
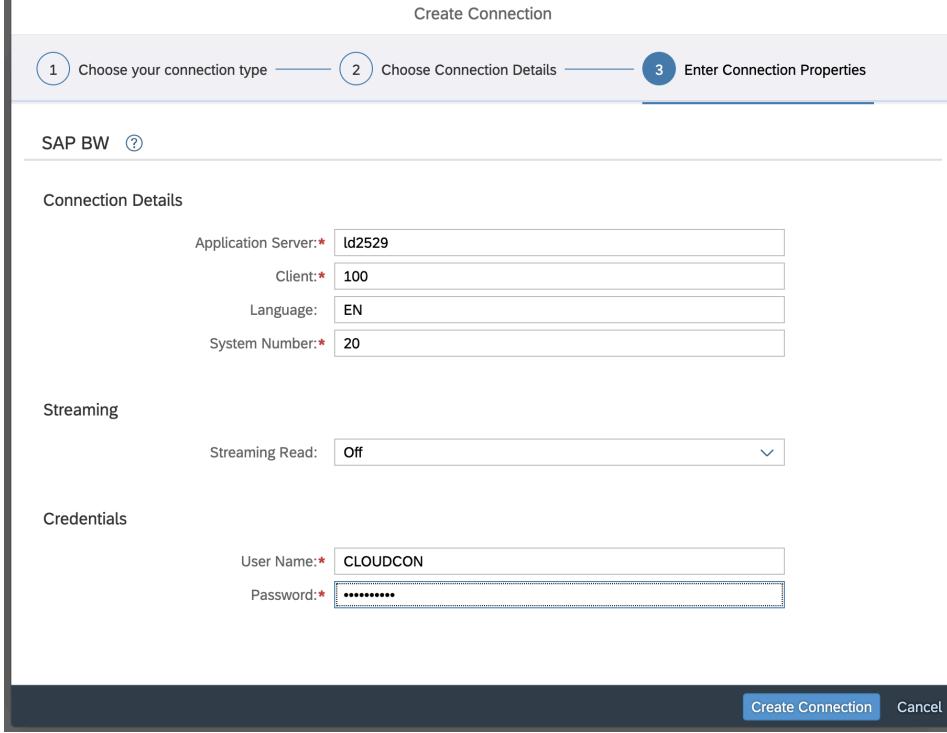
Explanation	Screenshot
<p>18. Download the key <code>gcs-key.json</code> from the assets folder in the Github repository here: https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-gcs-key</p>	
<p>19. Hit the Browse button next to the Key entry field and select the downloaded file.</p>	
<p>20. Hit Create Connection to finish the dialog.</p>	
<p>21. Select the created connection from the list of connections and hit the Validate Connection button on the right.</p>	

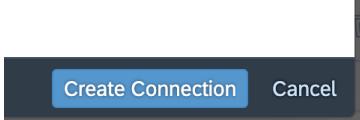
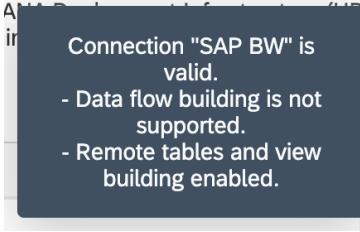
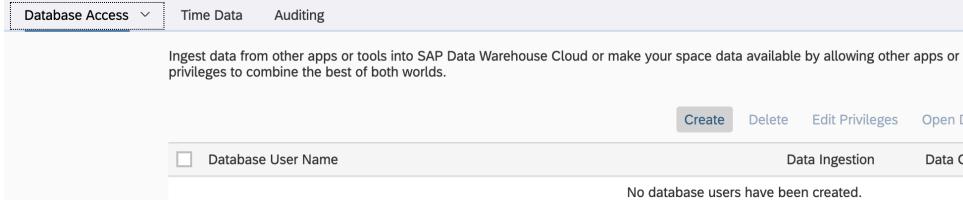
Explanation	Screenshot
<p>22. Make sure that the connection is valid for data flow building in the toast message show non the bottom of the screen.</p>	 <p>Connection "Google Cloud Storage" is valid. - Data flow building enabled. - Remote tables and view building are not supported.</p>
<p>23. Hit the + button again to create another connection.</p>	 <p>Creation Date</p>
<p>24. This time select the SAP BW connection.</p>	 <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"> SAP ABAP View and Data Flow B...  Microsoft Azure Data Lake Store Gen2 Data Flow Builder  Amazon Athena View Builder  Adverity View and Data Flow B...  Google BigQuery View Builder  Cloud Data Integration View and Data Flow B...  Google Cloud Storage Data Flow Builder  SAP HANA View and Data Flow B...  Hadoop Distributed File System Data Flow Builder  Microsoft SQL Server View and Data Flow B...  Generic OData View and Data Flow B...  Oracle View and Data Flow B...  Amazon Simple Storage Service Data Flow Builder  SAP BW View Builder  SAP BW/4HANA Model Transfer Model Import  <p>No HANA containers have been added.</p> <p>Cancel</p>

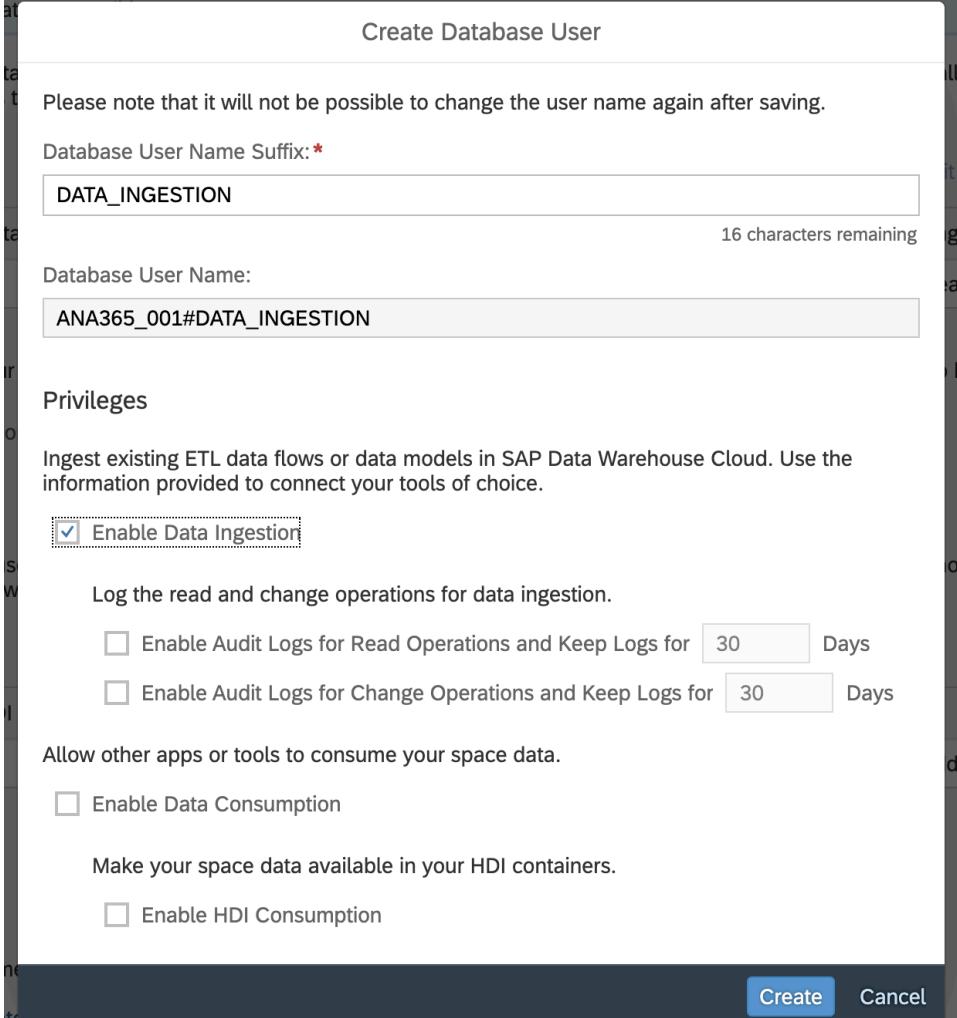
Explanation	Screenshot
<p>25. In case you cannot find it, search for SAP BW in the filter bar.</p>	
<p>26. Enter a meaningful business name and technical name as well as a descriptive description.</p>	

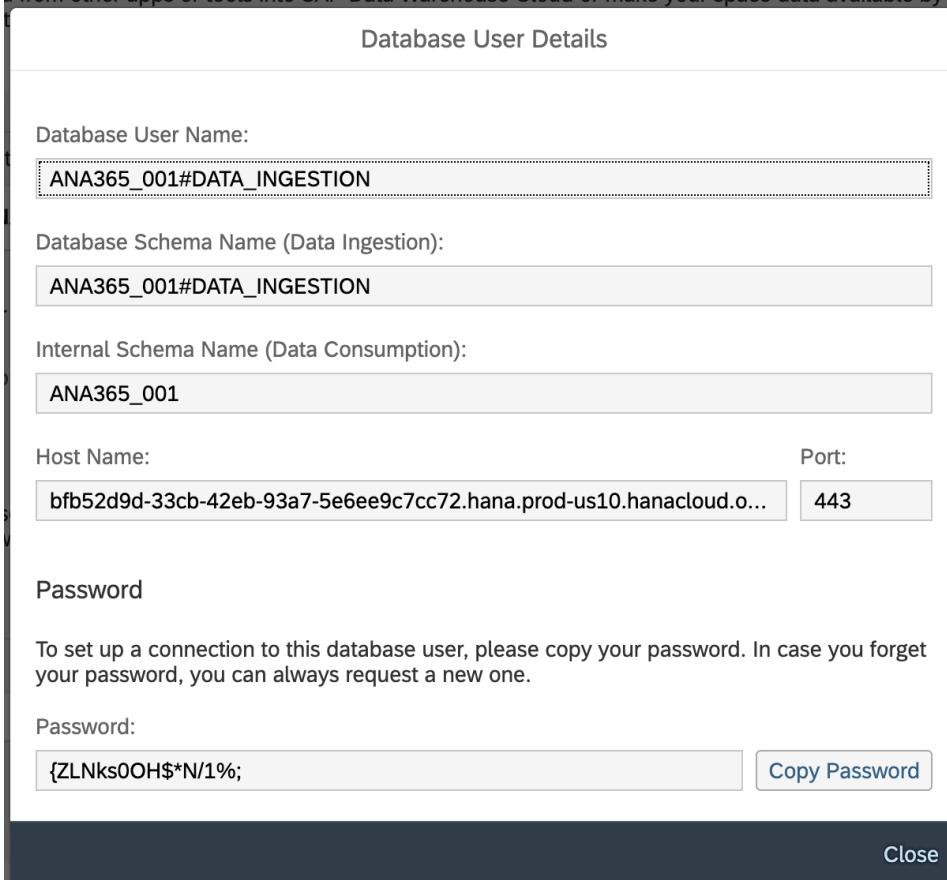
Explanation	Screenshot
27. Make sure that the right Data Provisioning Agent is selected. The ending (in this case us10) should match the tenant you are logged in to.	Data Provisioning Agent: <input type="text" value="dwcteched2020us10"/> <input type="button" value="▼"/> <input type="text" value="dwcteched2020us10"/>
28. Hit Next Step.	
29. Fill out the Connection Details. Use Id2529 as the Application Server.	 <p>Create Connection</p> <p>SAP BW ?</p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="Id2529"/></p> <p>Client: * <input type="text"/></p> <p>Language: <input type="text"/></p> <p>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"/></p> <p>Password: * <input type="text"/></p> <p><input type="button" value="Create Connection"/> <input type="button" value="Cancel"/></p>

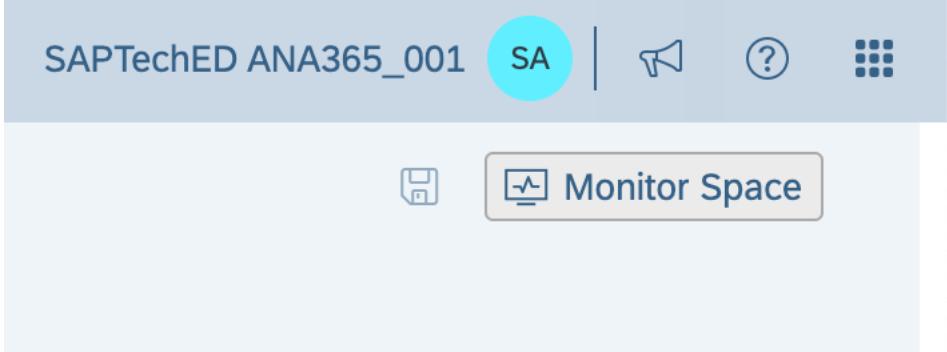
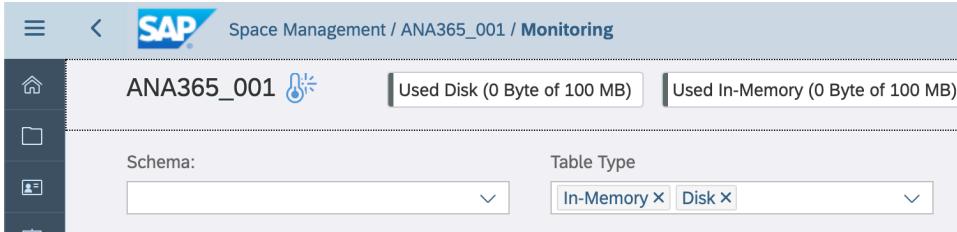
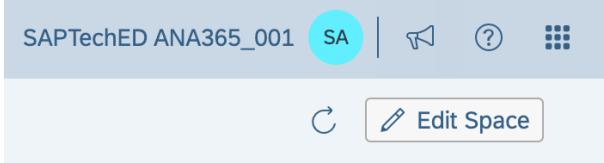
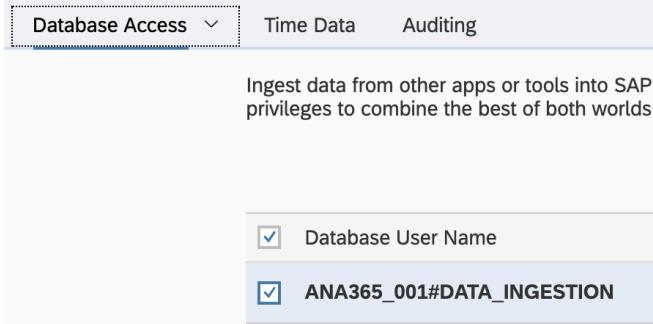
Explanation	Screenshot
30. Enter Client 100.	 <p>Create Connection</p> <p>1 Choose your connection type — 2 Choose Connection Details — 3 Enter Connection Properties</p> <p>SAP BW ⓘ</p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="id2529"/> Client: * <input type="text" value="100"/> Language: <input type="text"/> System Number: * <input type="text"/></p> <p>Streaming</p> <p>Streaming Read: <input type="text" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text"/> Password: * <input type="text"/></p> <p>Create Connection Cancel</p>
31. Optionally enter the language as EN (is the default anyway).	 <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="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="text" value="Off"/></p> <p>Credentials</p> <p>User Name: * <input type="text"/> Password: * <input type="text"/></p> <p>Create Connection Cancel</p>

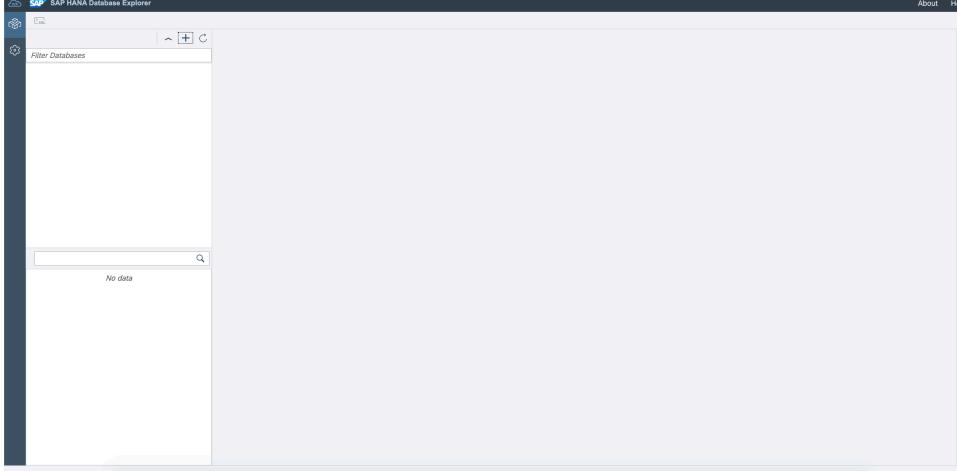
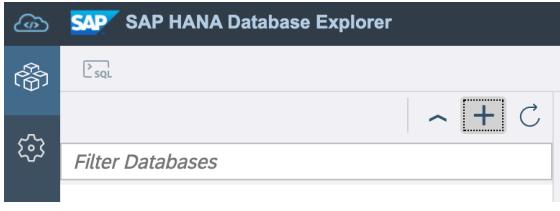
Explanation	Screenshot
<p>32. Enter System Number 20.</p>	 <p>Create Connection</p> <p>1 Choose your connection type 2 Choose Connection Details 3 Enter Connection Properties</p> <p>SAP BW ?</p> <p>Connection Details</p> <p>Application Server: * <input type="text" value="ld2529"/> Client: * <input type="text" 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>Create Connection Cancel</p>
<p>33. 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>Create Connection Cancel</p>

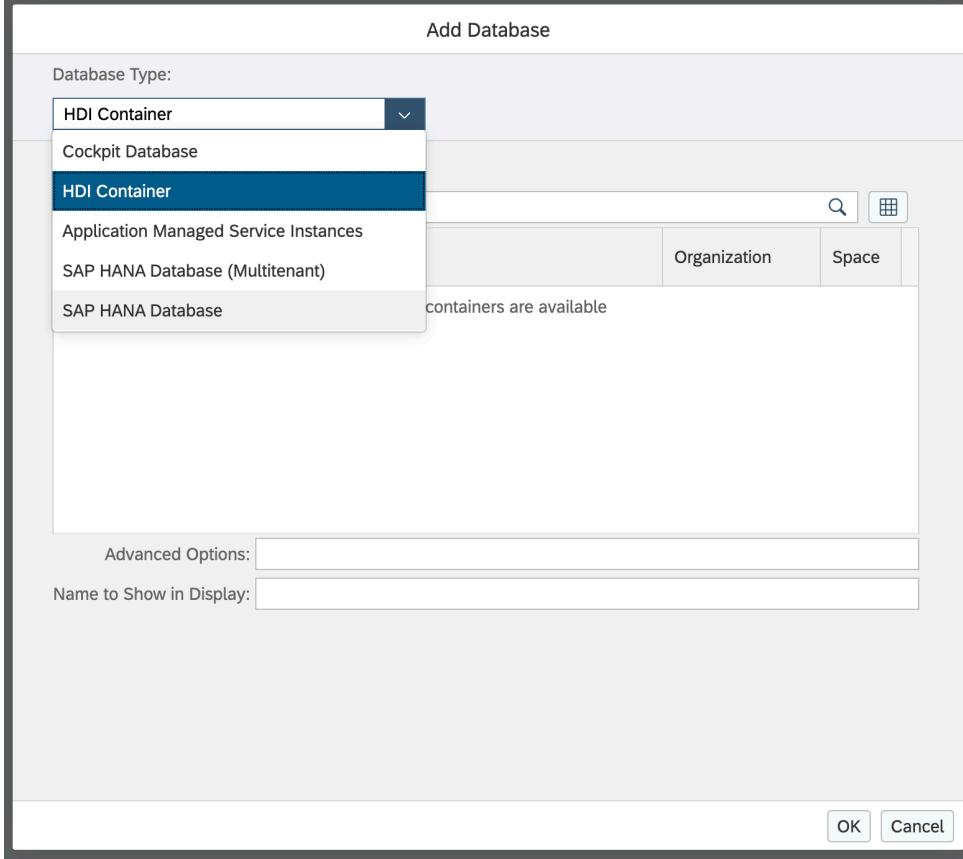
Explanation	Screenshot
34. Hit Create Connection to finish the dialog.	
35. Select the newly created SAP BW connection and again hit the Validate Connection button on the right.	
36. Make sure that the toast message on the bottom of the screen mentions that the connection can be used in the view builder.	
37. Head on to the Database Access (Database Users) section. Hit the Create button to create a new database user.	

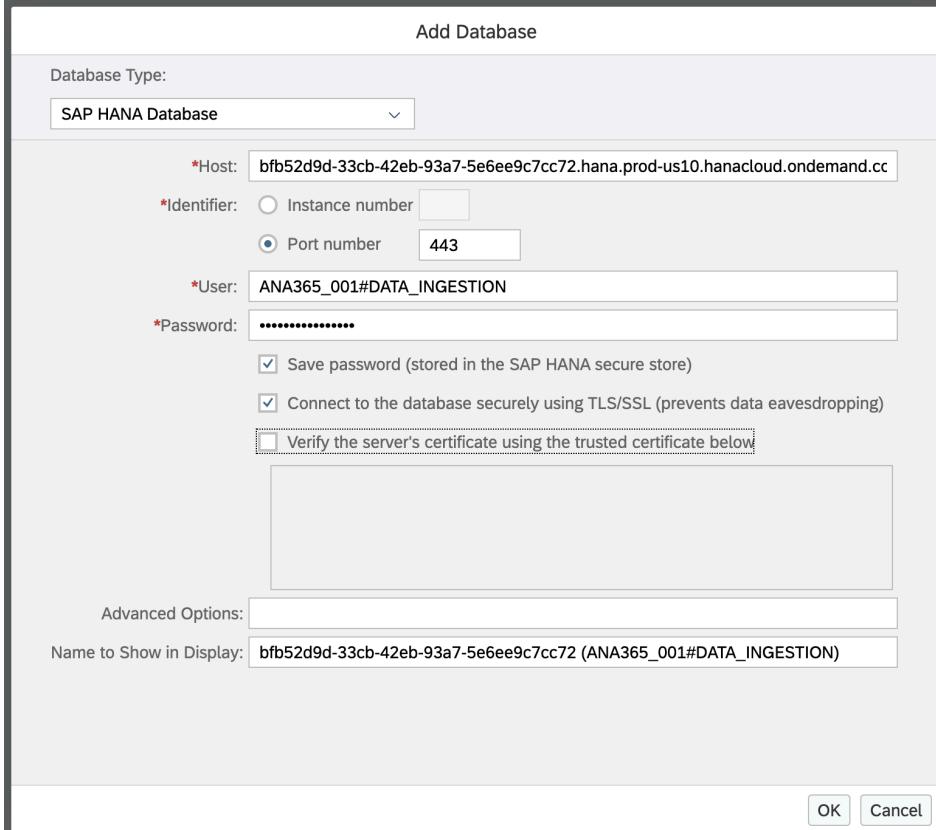
Explanation	Screenshot
<p>38. Enter a meaningful Database User Name suffix and make sure to select the Enable Data Ingestion checkbox in the Privileges section. Then hit Create to close the dialog.</p>	 <p>Create Database User</p> <p>Please note that it will not be possible to change the user name again 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>Privileges</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>Create Cancel</p>

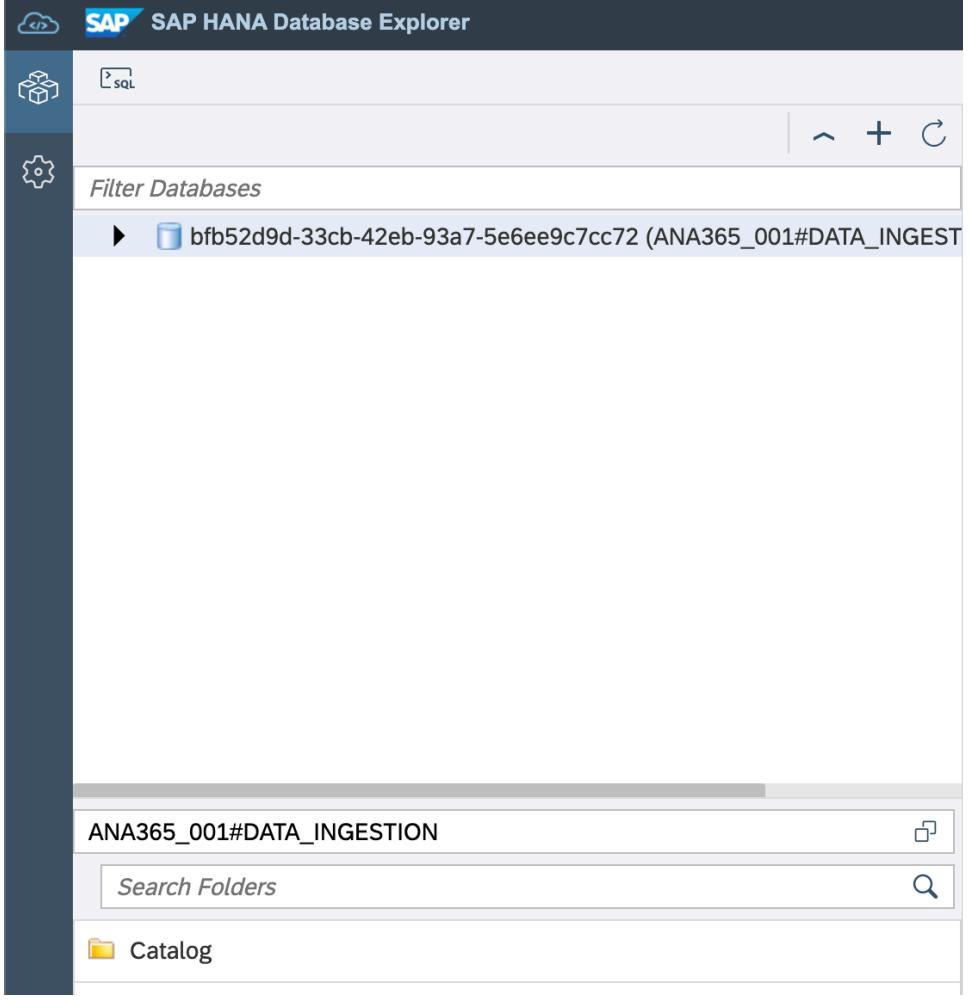
Explanation	Screenshot															
<p>39. Make sure to copy the Host Name, Port, Database User Name and Password to a safe place, for example your local notes on Mac or Notepad on Windows. Then hit Close to finish the user creation.</p>																
<p>40. The created database user should be shown with status Active.</p>	<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" data-bbox="518 1347 1480 1431"> <thead> <tr> <th data-bbox="518 1347 551 1368"></th><th data-bbox="518 1368 747 1389">Database User Name</th><th data-bbox="1041 1347 1090 1368">Create</th><th data-bbox="1106 1347 1139 1368">Delete</th><th data-bbox="1155 1347 1220 1368">Edit Privileges</th><th data-bbox="1237 1347 1318 1368">Open Database Explorer</th><th data-bbox="1334 1347 1367 1368">Search</th></tr> </thead> <tbody> <tr> <td data-bbox="518 1389 551 1410"><input type="checkbox"/></td><td data-bbox="518 1410 747 1431">ANA365_001#DATA_INGESTION</td><td data-bbox="1041 1389 1090 1410"></td><td data-bbox="1106 1389 1139 1410"></td><td data-bbox="1155 1389 1220 1410">✓ Enabled</td><td data-bbox="1237 1389 1302 1410">✗ Disabled</td><td data-bbox="1318 1389 1383 1410">✗ Disabled</td><td data-bbox="1400 1389 1432 1410">Active</td></tr> </tbody> </table>		Database User Name	Create	Delete	Edit Privileges	Open Database Explorer	Search	<input type="checkbox"/>	ANA365_001#DATA_INGESTION			✓ Enabled	✗ Disabled	✗ Disabled	Active
	Database User Name	Create	Delete	Edit Privileges	Open Database Explorer	Search										
<input type="checkbox"/>	ANA365_001#DATA_INGESTION			✓ Enabled	✗ Disabled	✗ Disabled	Active									
<p>41. Congratulations!</p>	<p>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.</p>															

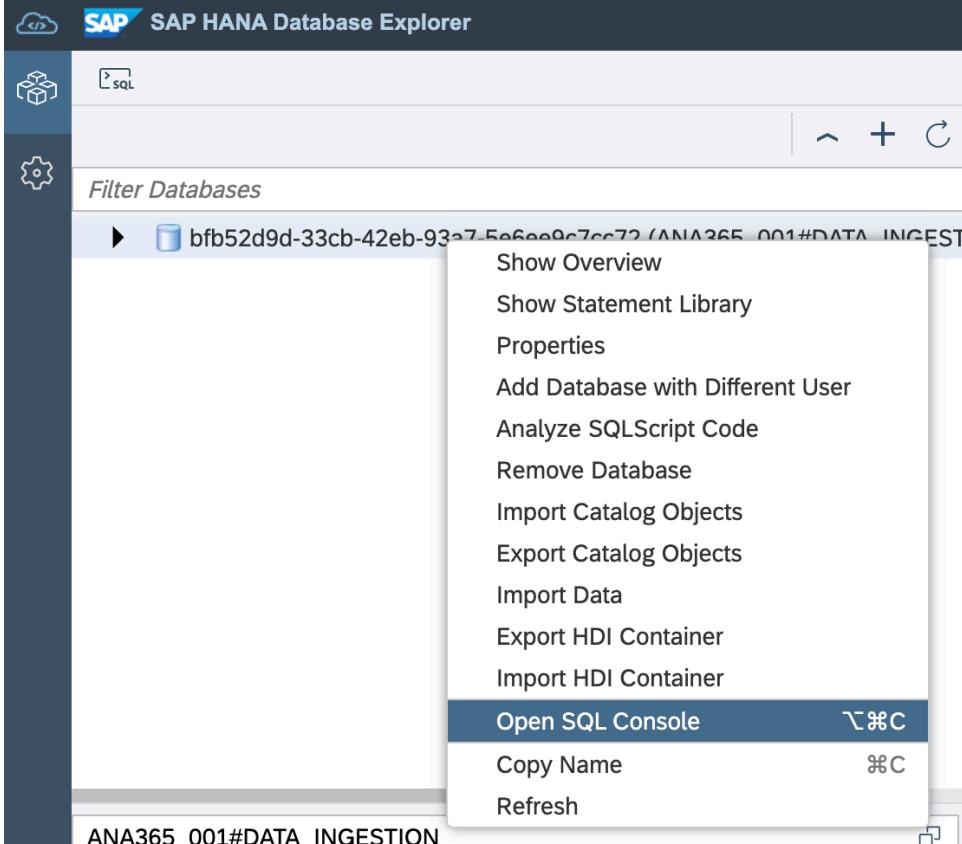
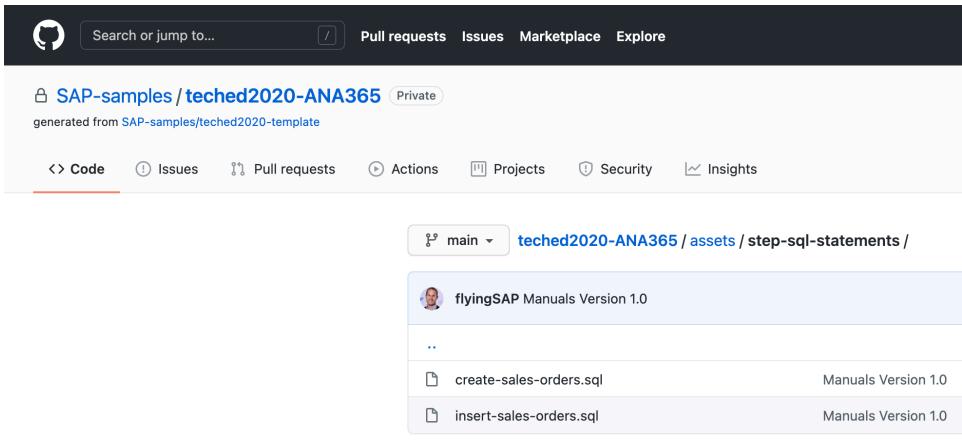
Explanation	Screenshot
42. Before we start loading data into our space, hit the Monitor Space button in the top right corner.	
43. Make sure that the space does not yet contain any data.	
44. Hit Edit Space in the top right corner to navigate back to the Management of your Space.	
45. Now it's time to 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>
46. Navigate back to the Database Access section and select the Database User you created.	

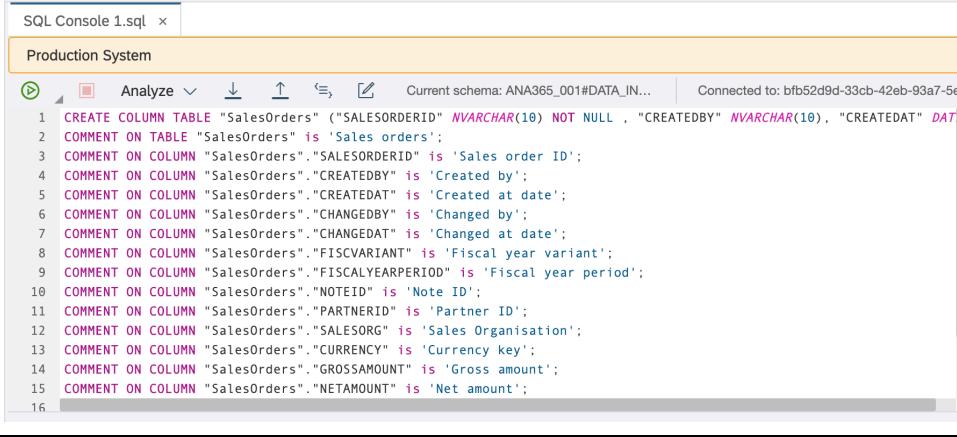
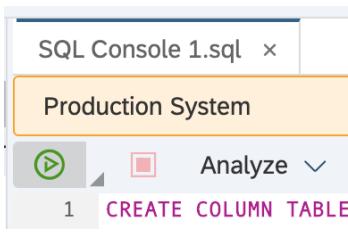
Explanation	Screenshot
47. Hit the Open Database Explorer button on the right. This takes you to the SAP HANA Database Explorer website.	 <p>The screenshot shows a menu bar with 'Create', 'Delete', 'Edit Privileges', and 'Open Database Explorer'. Below the menu is a horizontal bar with three items: 'Data Ingestion' (Enabled), 'Data Consumption' (Disabled), and 'HDI' (Disabled). The 'Open Database Explorer' button is highlighted with a blue background.</p>
48. 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"/> <small>Required</small></p> <p>Passcode * <input type="text"/></p> <p><small>*Required</small></p> <p>Continue</p>
49. 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, database, and settings. The main area displays a message: 'No data'.</p>
50. 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>

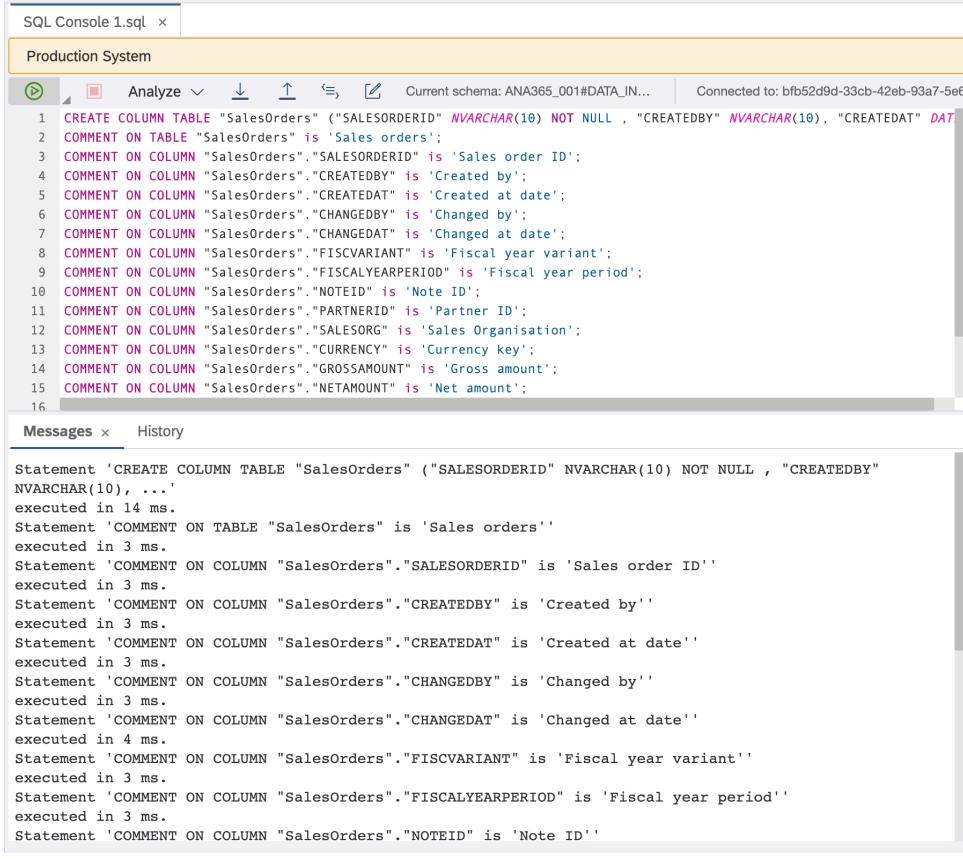
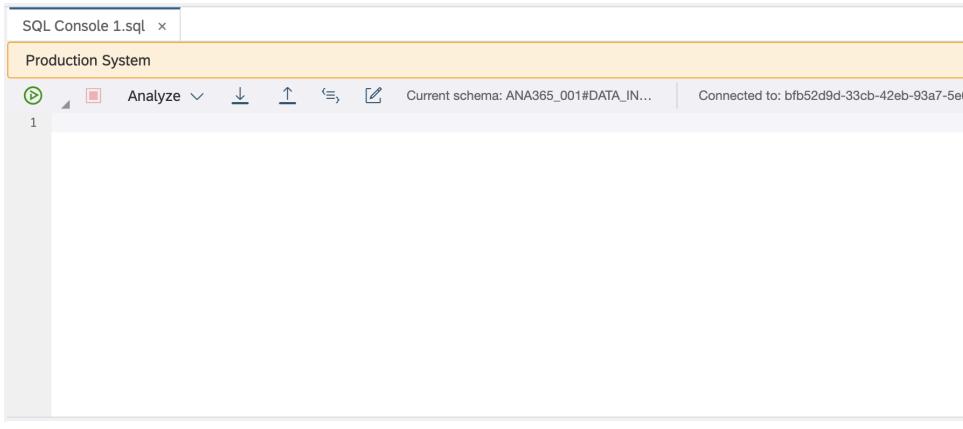
Explanation	Screenshot
<p>51. From the Database Type select SAP HANA Database.</p>	 <p>The screenshot shows the 'Add Database' dialog box. In the top right corner, there is a title 'Add Database'. Below it, a section labeled 'Database Type:' contains a dropdown menu. The dropdown is currently set to 'HDI Container'. A list of options is visible in the dropdown menu, including 'Cockpit Database', 'HDI Container' (which is highlighted in blue), 'Application Managed Service Instances', 'SAP HANA Database (Multitenant)', and 'SAP HANA Database'. To the right of the dropdown, there is a search icon (magnifying glass) and a grid icon. Below the dropdown, a message says 'containers are available'. At the bottom of the dialog box, there are two input fields: 'Advanced Options:' and 'Name to Show in Display:', both of which are currently empty. In the bottom right corner, there are 'OK' and 'Cancel' buttons.</p>

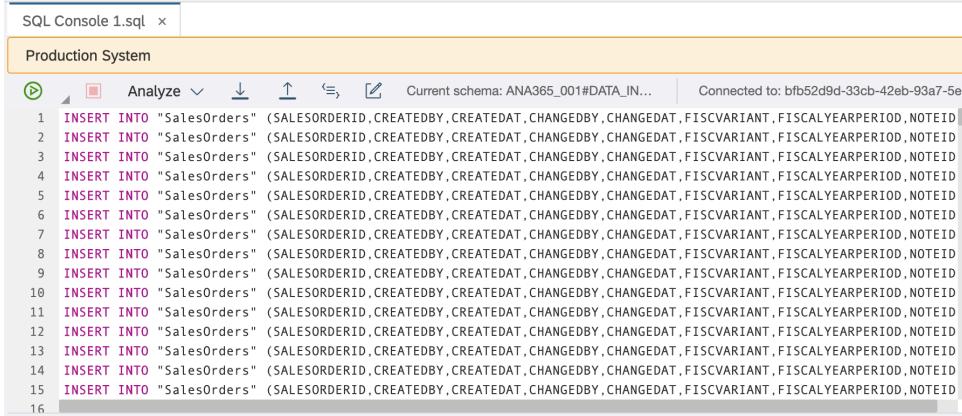
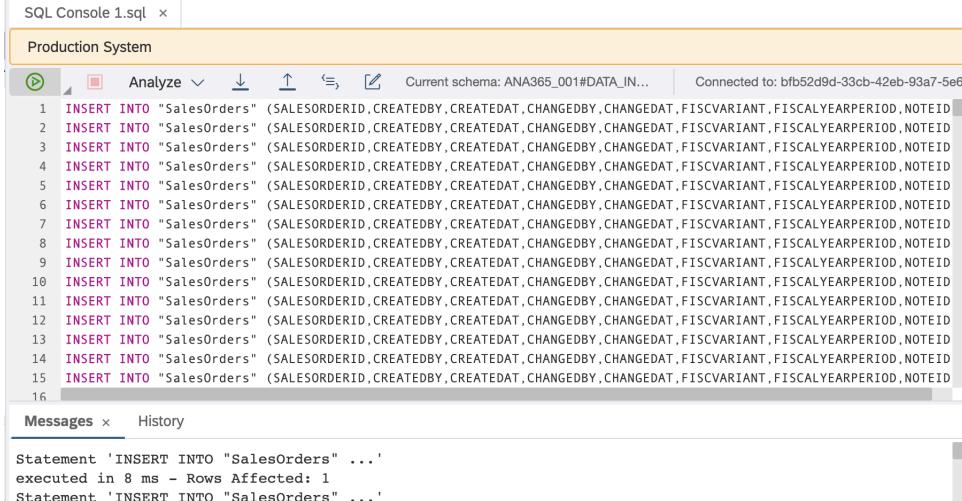
Explanation	Screenshot
<p>52. Enter the information copied earlier to a safe place when creating the database user like the Host Name, Port, Database User and Password.</p>	 <p>The screenshot shows the 'Add Database' dialog box for a SAP HANA Database. The 'Database Type' dropdown is set to 'SAP HANA Database'. The 'Host' field contains the URL 'bfb52d9d-33cb-42eb-93a7-5e6ee9c7cc72.hana.prod-us10.hanacloud.ondemand.cc'. The 'Identifier' section has 'Port number' selected with the value '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>53. 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>

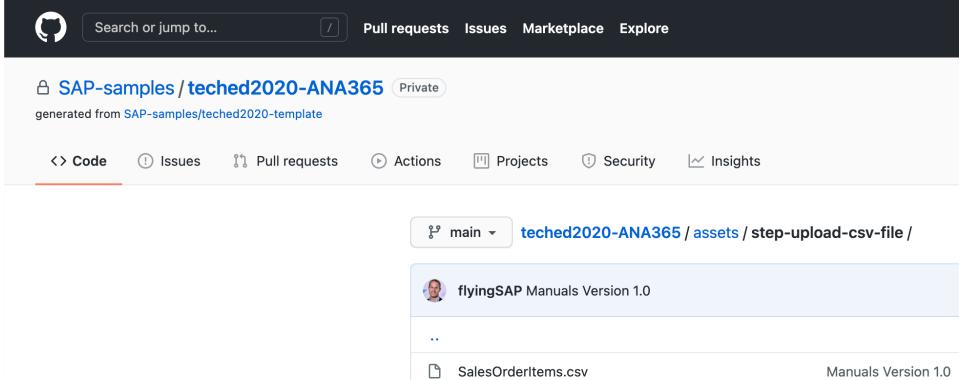
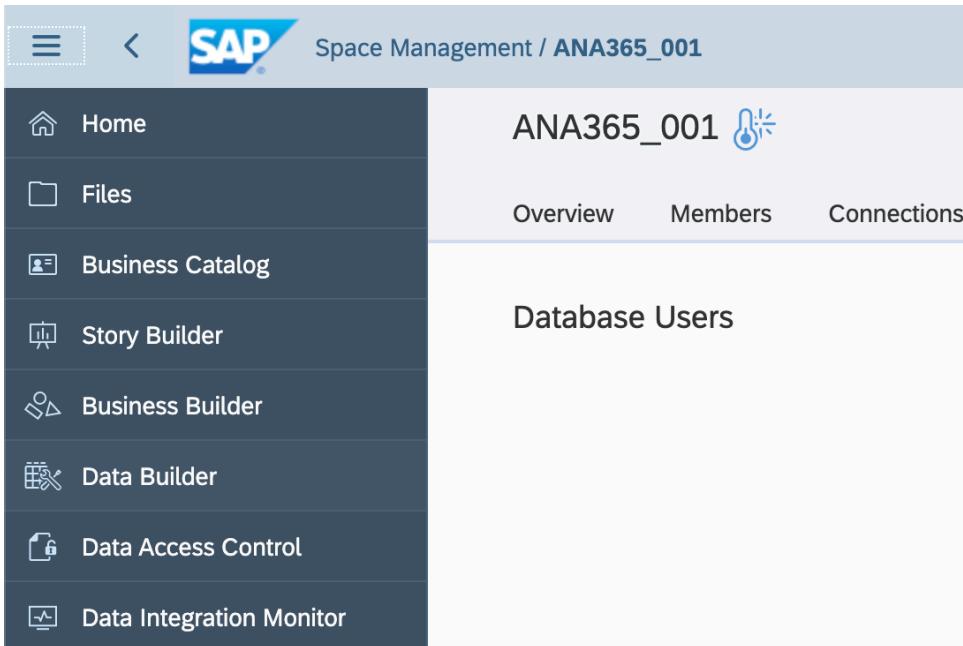
Explanation	Screenshot
<p>54. Hit the OK button to add the database to your list of databases.</p>	 <p>The screenshot shows the SAP HANA Database Explorer interface. On the left is a sidebar with icons for cloud, database, and settings. The main area has a header "SAP HANA Database Explorer" with tabs for "Cloud" and "SQL". Below the header is a search bar labeled "Filter Databases". A list of databases is displayed, with one entry highlighted: "bf852d9d-33cb-42eb-93a7-5e6ee9c7cc72 (ANA365_001#DATA_INGEST)". At the bottom of the main area, there is a breadcrumb navigation bar with "ANA365_001#DATA_INGESTION" and a refresh icon. Below the breadcrumb is a search bar labeled "Search Folders" with a magnifying glass icon. The bottom-most item in the sidebar is "Catalog".</p>

Explanation	Screenshot
<p>55. 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 items 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>56. Get the SQL statements from the folder in the Github repository to create and fill the table that holds the Sales Orders: https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-sql-statements</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 repository has 1 branch (main), 1 issue, 0 pull requests, 0 actions, 0 projects, 0 security, and 0 insights. The "create-sales-orders.sql" and "insert-sales-orders.sql" files are listed under the folder, both labeled "Manuals Version 1.0".</p>

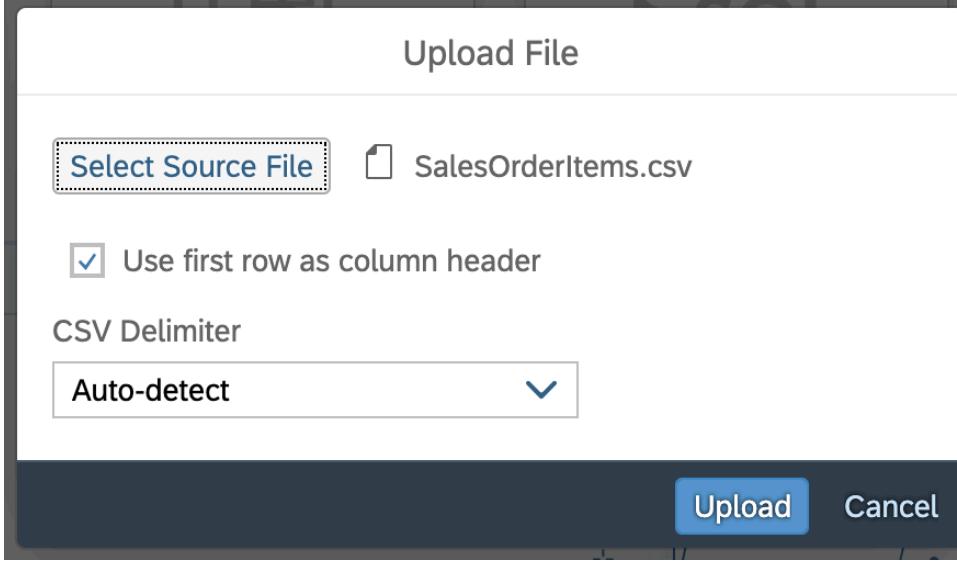
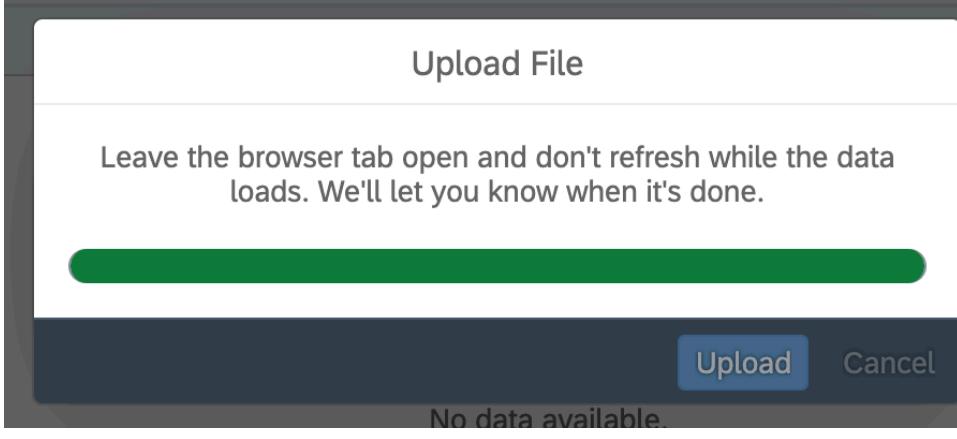
Explanation	Screenshot
<p>57. Open the create-sales-orders.sql file and copy over the content in the SQL console opened in the SAP HANA Database Explorer.</p>	 <p>The screenshot shows the SAP HANA Database Explorer interface with an open SQL console titled "SQL Console 1.sql". The console displays a SQL script for creating a table named "SalesOrders". The script includes column definitions and comments for each column. The "Production System" connection is selected, and the schema is set to ANA365_001#DATA_IN... The status bar indicates the connection ID and the current schema.</p> <pre> 1 CREATE COLUMN TABLE "SalesOrders" ("SALESORDERID" NVARCHAR(10) NOT NULL , "CREATEDBY" NVARCHAR(10) , "CREATEDAT" DATETIME 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"."FISCALVARIANT" 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>58. Hit the green Execute button to create the Sales Order table.</p>	 <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 command "CREATE COLUMN TABLE". The "Production System" connection is selected, and the schema is set to ANA365_001#DATA_IN... The status bar indicates the connection ID and the current schema.</p>

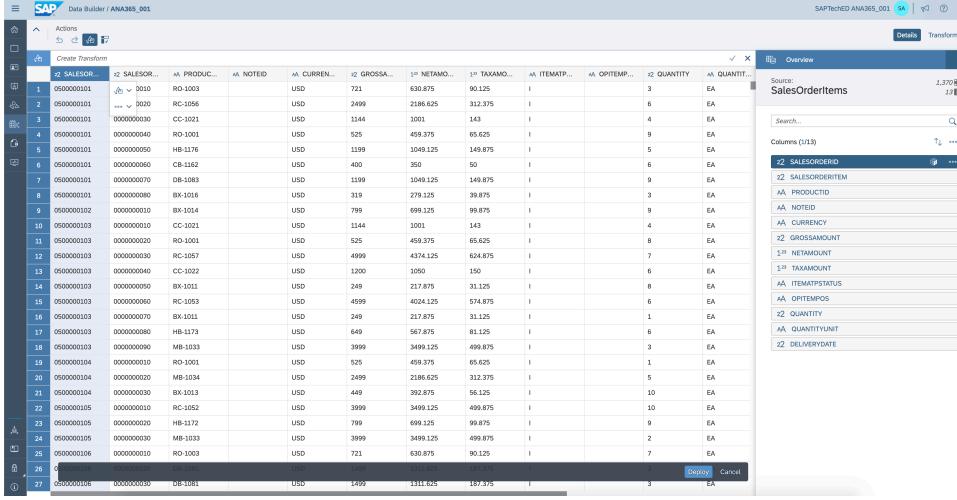
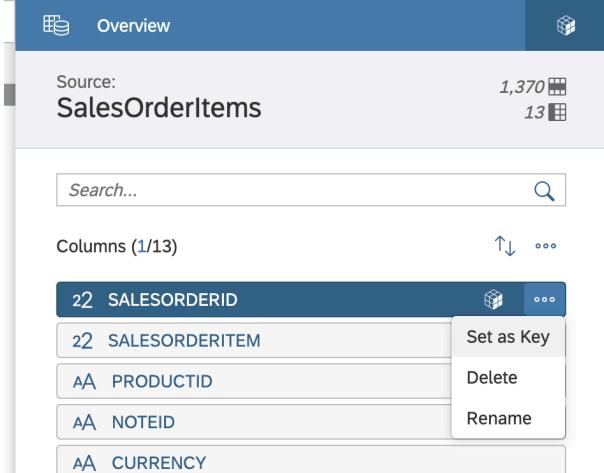
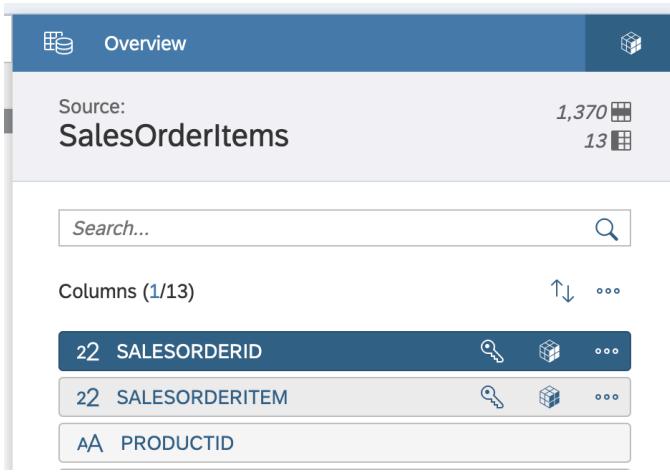
Explanation	Screenshot
<p>59. Make sure that the table was created correctly by checking the log. It should similar to what you see below, stating that the statement was executed (no errors mentioned).</p>	 <p>The screenshot shows the SAP SQL Console interface. The title bar says "SQL Console 1.sql x". 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), ...' 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>60. 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>

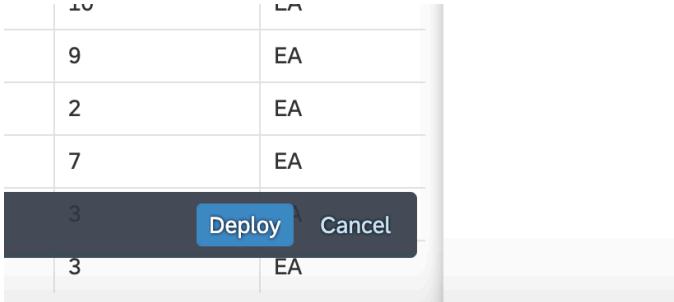
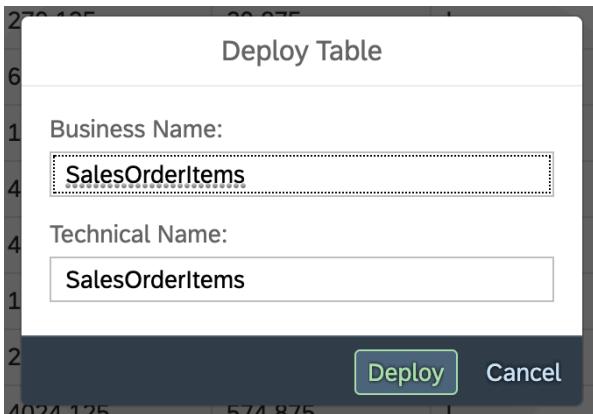
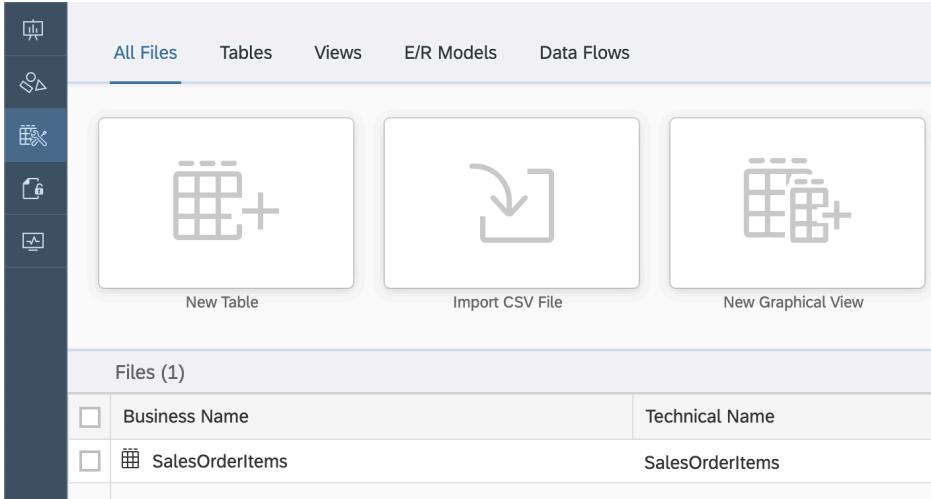
Explanation	Screenshot
61. Open the insert-sales-orders.sql file and copy over the SQL to fill the table you just created.	 <pre> SQL Console 1.sql x Production System Connected to: bfb52d9d-33cb-42eb-93a7-5e1 1 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 2 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 3 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 4 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 5 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 6 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 7 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 8 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 9 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 10 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 11 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 12 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 13 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 14 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 15 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 16 </pre>
62. 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,FISCVARIANT,FISCALYEARPERIOD,NOTEID 2 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 3 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 4 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 5 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 6 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 7 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 8 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 9 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 10 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 11 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 12 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 13 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 14 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,FISCVARIANT,FISCALYEARPERIOD,NOTEID 15 INSERT INTO "SalesOrders" (SALESORDERID,CREATEDBY,CREATEDAT,CHANGEDBY,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 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>
63. 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.

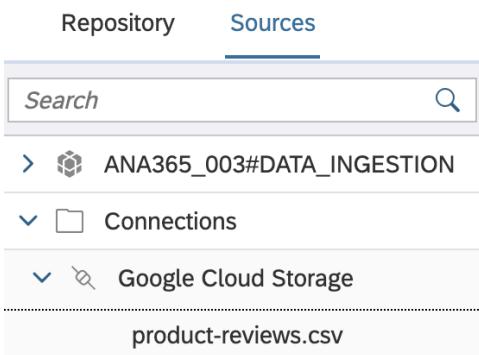
Explanation	Screenshot
<p>64. Get the required CSV file SalesOrderItems.csv from the Github repository: https://github.com/SAP-samples/teched2020-ANA365/tree/main/assets/step-upload-csv-file</p>	
<p>65. Head back to your SAP Data Warehouse Cloud tenant and navigate to the Data Builder.</p>	

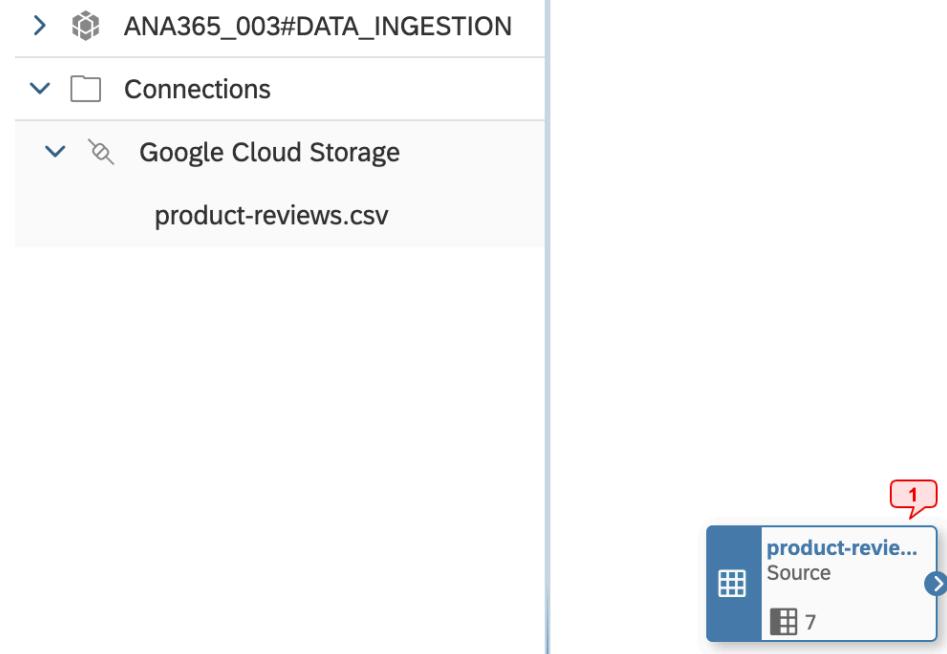
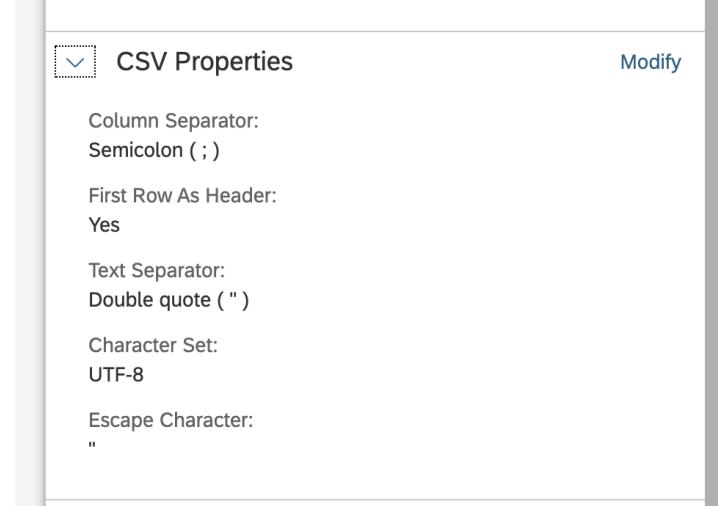
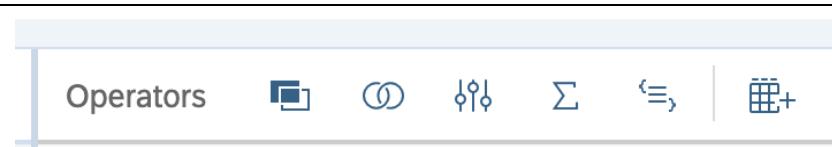
Explanation	Screenshot																																																																	
66. Select your space.	<p>Welcome to the Data Builder</p> <p>Create views and tables to prepare data for your stories, and use entity-relationship models to visualize and make associations between artifacts</p> <p>Spaces (1)</p> <table border="1" data-bbox="1139 544 1390 686"> <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)																																																														
ANA365_001																																																																		
ANA365_001																																																																		
Used Storage (102.4 KB of 100 MB)																																																																		
67. On the right click the Import icon and select the Import CSV File option.	<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> <table border="1" data-bbox="523 1163 1165 1248"> <tr> <td>New Table</td> <td>New Graphical View</td> <td>New SQL View</td> <td>New Entity - Relationship Model</td> <td>New Data Flow</td> </tr> </table> <p>Files (9)</p> <table border="1" data-bbox="523 1262 1465 1484"> <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>	New Table	New Graphical View	New SQL View	New Entity - Relationship Model	New Data Flow	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
New Table	New Graphical View	New SQL View	New Entity - Relationship Model	New Data Flow																																																														
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																																																													
68. Hit the Select Source File button and select the SalesOrderItems.csv file you just downloaded.	<p>Upload File</p> <p>Select Source File i No file selected</p> <p>Upload Cancel</p>																																																																	

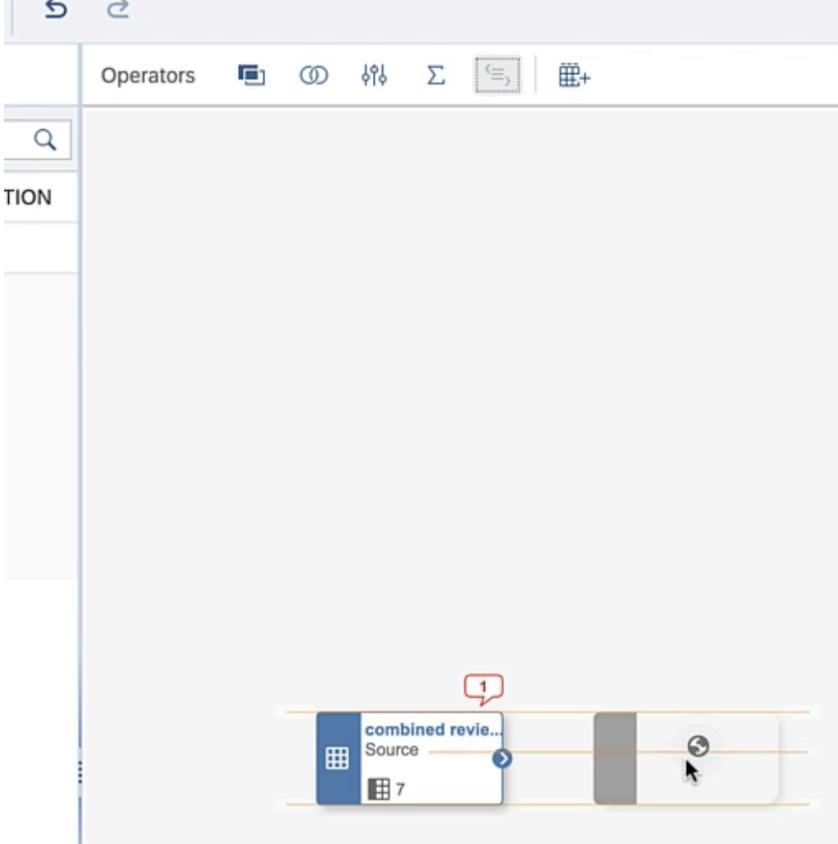
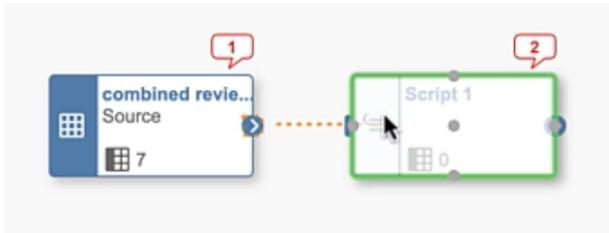
Explanation	Screenshot
69. Leave all options as is and hit the Upload button.	
70. Wait until the file was uploaded to the tenant.	

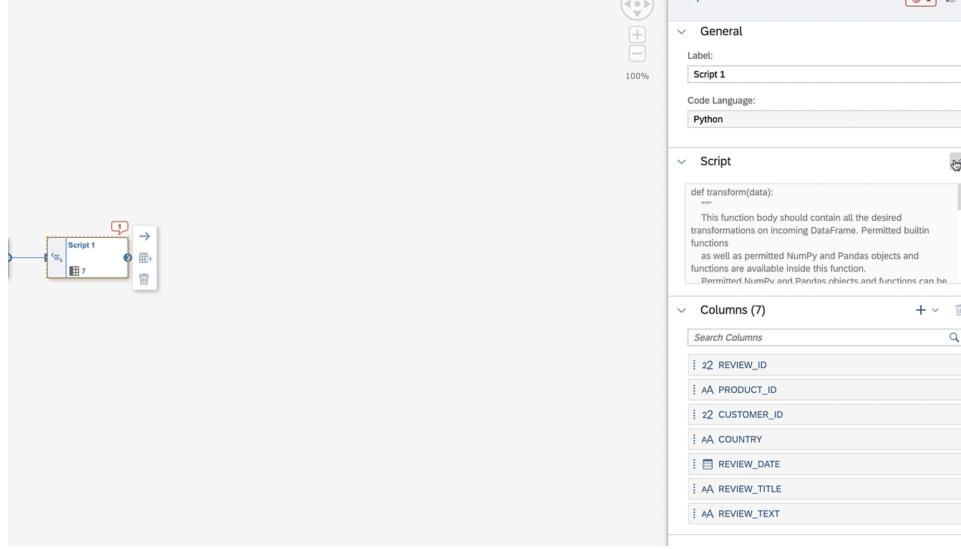
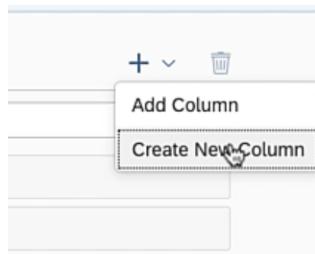
Explanation	Screenshot
<p>71. Make sure that the data is shown and the headers are identified correctly.</p>	
<p>72. Select the columns SALESORDERID and SALESORDERITEM M as key fields.</p>	
<p>73. Make sure that both columns are enabled as key fields.</p>	

Explanation	Screenshot
74. Hit Deploy to open the dialog for deploying the table into your space.	
75. Enter a Business Name and Technical Name and deploy the table into your space.	
76. Make sure that the table was correctly created in your space and is visible in the Data Builder overview.	
77. Congratulations!	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.

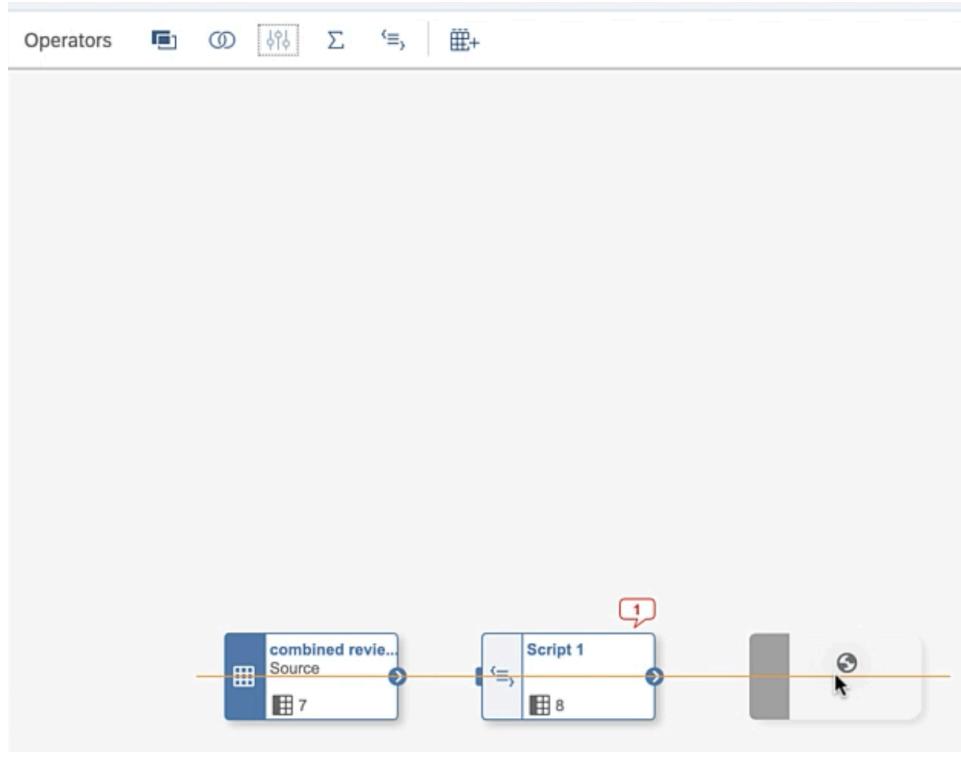
Explanation	Screenshot
<p>78. Select the New Data Flow tile.</p>	 <p>The screenshot shows the SAP Data Builder interface with the title "Data Builder / ANA365_001". The top navigation bar includes "All Files", "Tables", "Views", "E/R Models", and "Data Flows", with "Data Flows" being the active tab. On the left, there is a sidebar with various icons. In the center, a large button labeled "New Data Flow" with a circular arrow icon is prominently displayed. Below it, a message says "Welcome to the Data Builder" and "Create views and tables to prepare data for your stories, and use entity-relationships to connect them". At the bottom, it says "Files (0)".</p>
<p>79. Switch to the Sources tab and navigate to the product reviews folder: Connections > Google Cloud Storage > digital-workshop-series</p>	 <p>The screenshot shows the SAP Data Builder Repository Sources tab. The "Sources" tab is selected. The left sidebar has "Repository" and "Sources" tabs. Under "Sources", there is a search bar and a tree view. The tree view shows "Connections" expanded, revealing "Google Cloud Storage" which contains the file "product-reviews.csv".</p>

Explanation	Screenshot
80. Select the product-reviews.csv file and drag it from the tree on the left onto the canvas.	
81. Make sure that the CSV properties are set correctly by selecting the added node and expanding the CSV properties section on the right.	
82. In the Operators button bar above the canvas you can use several different operators for working with the data sets in your data flow.	

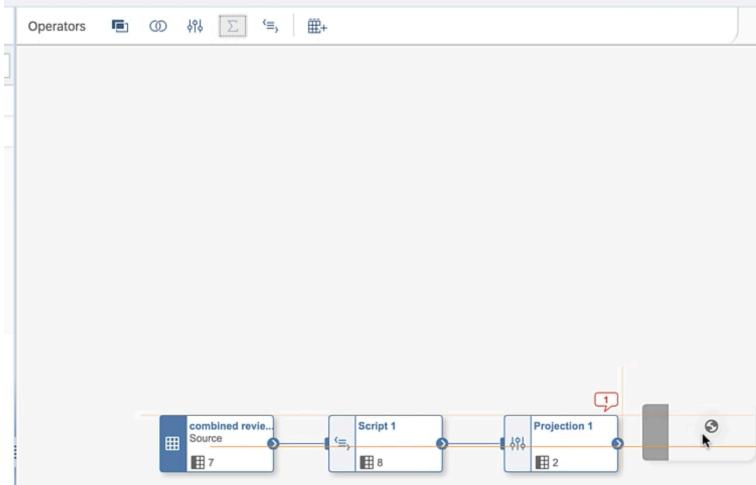
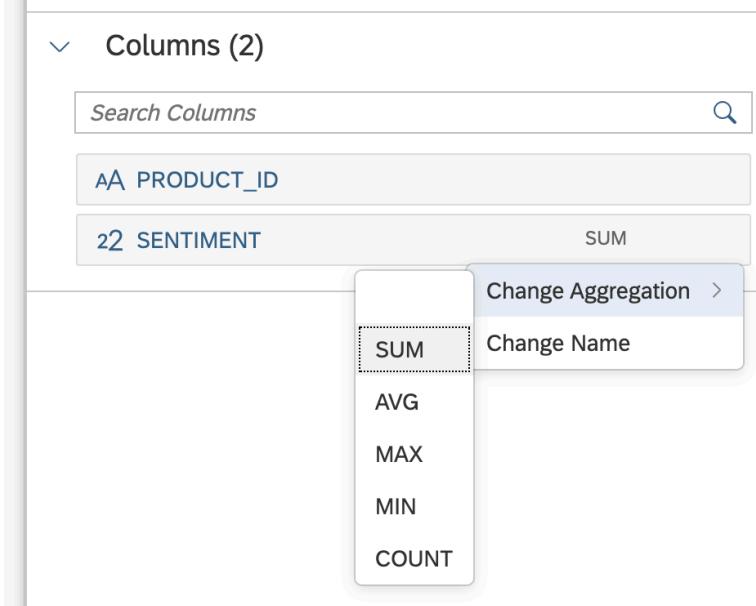
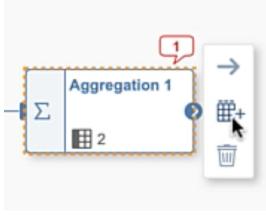
Explanation	Screenshot
<p>83. First, we want to calculate a sentiment from the available product reviews. Add the Script operator as a target node after the combined reviews source node. Please note that the left node should be named product-reviews in your case (this applies to the following screenshots, 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 back, forward, search, and various operators like filter, group, and aggregate. Below the toolbar, there are two nodes: a blue 'combined review...' Source node and a grey Script target node. A yellow connection line connects the Source node to the Script 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>84. 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 with the same two nodes and connection as the previous screenshot. The connection line is now a solid orange line, indicating it is active or selected. Red callout bubbles labeled '1' and '2' point to the output port of the Source node and the input port of the Script node respectively, highlighting the connection points.</p>

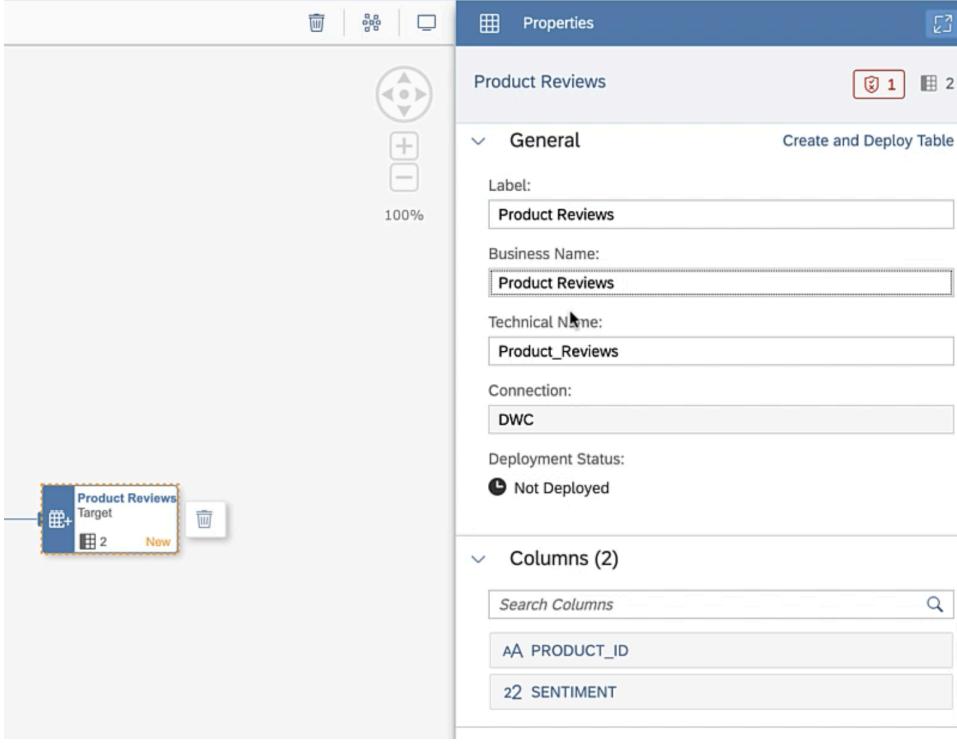
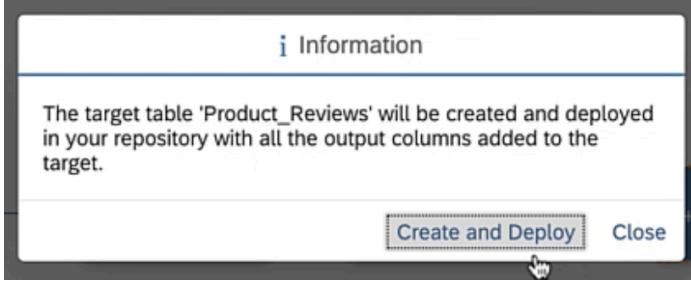
Explanation	Screenshot
<p>85. Select the Script node and navigate to the Script details by selecting the Edit button on the right.</p>	 <p>The screenshot shows a data flow diagram with a 'Script 1' node selected. To the right, the 'Script 1' properties panel is open, showing the general settings (Label: 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>86. 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>87. Add a new column named SENTIMENT with data type INT8.</p>	 <p>The screenshot shows the 'Create New Column' dialog box. It includes fields for 'Name' (SENTIMENT), 'Type' (INT8), and 'Format' (None). Below these, there are sections for 'Script' and 'Script Parameters'.</p>

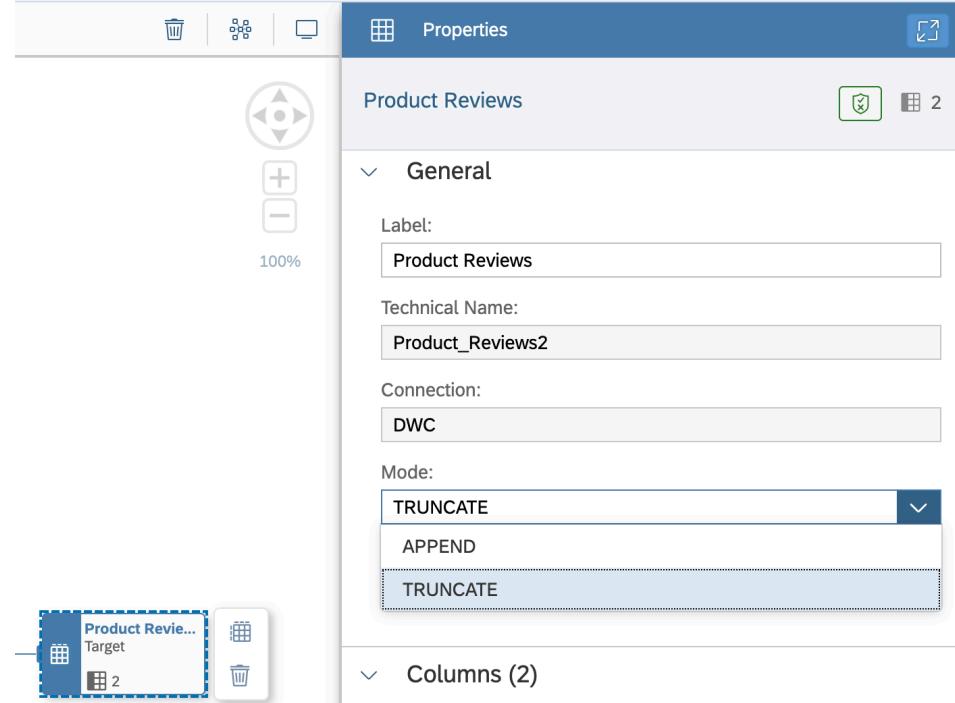
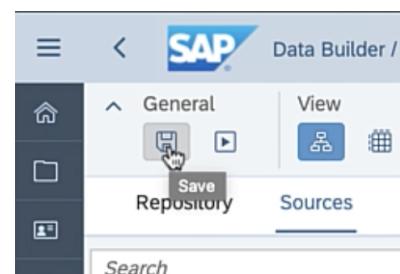
Explanation	Screenshot
88. Confirm the details by clicking Save.	
89. Switch to the Script section and start entering your python script for a sentiment analysis.	 <pre> Properties Script 1 General Script Columns <script> 1 def transform(data): 2 """ 3 This function body should contain all the desired 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>
90. 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: https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.apply.html</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"> 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. 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!

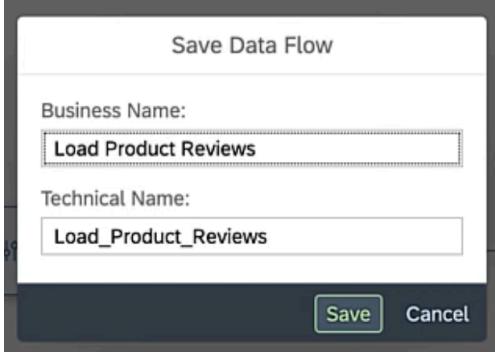
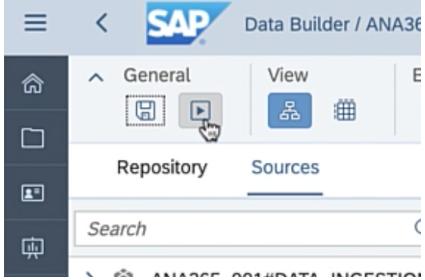
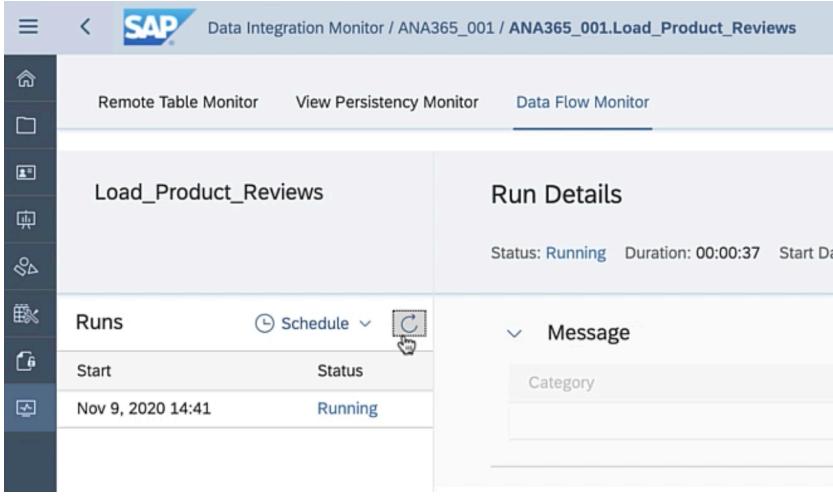
Explanation	Screenshot
91. Want to take the quick route?	Ok, fair enough – here's the deal. You can use the pre-build solution from the assets/step-data-flow-script/sentiment-analysis-script.py file. If you do so, don't put the blame on us that the solution is not the nicest or you finished the hands-on well before the scheduled 2hrs! ;-)
92. 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 a data flow in the SAP Data Flow Modeling interface. At the top, there is a toolbar with various icons labeled "Operators". Below the toolbar, the data flow consists of three main components connected by arrows: 1. A blue rectangular node labeled "combined review... Source" with the identifier "7" below it. 2. A blue rectangular node labeled "Script 1" with the identifier "8" below it. 3. A grey rectangular node representing a projection, which is the final step in the flow. A red callout bubble with the number "1" is positioned above the projection node, likely indicating a step or tip for the user.</p>

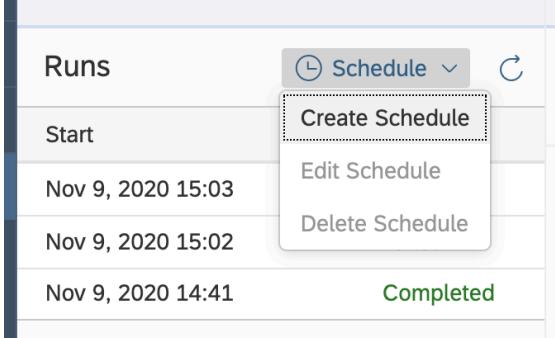
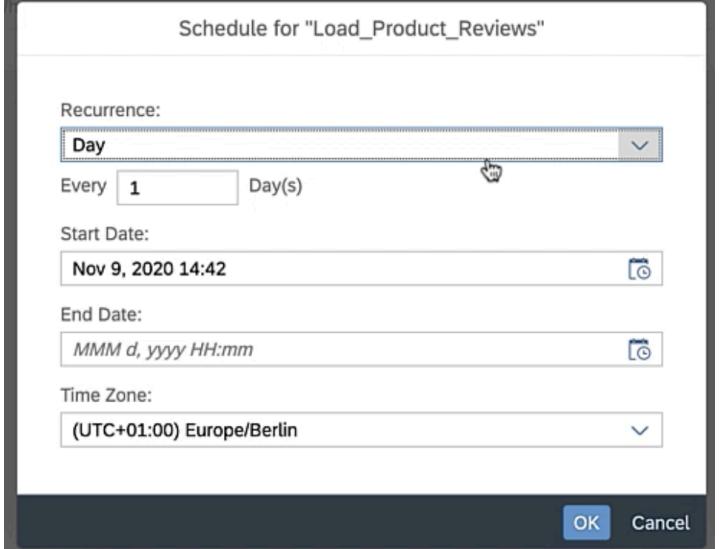
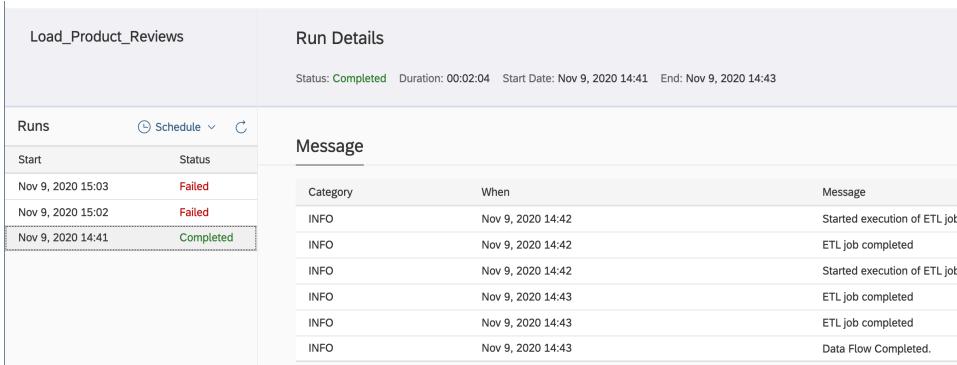
Explanation	Screenshot
<p>93. Select the added Projection node and select Remove Column to hide the following columns from the Details screen on the right:</p> <ul style="list-style-type: none"> - REVIEW_ID - CUSTOMER_ID - COUNTRY - REVIEW_DATE - REVIEW_TITLE - REVIEW_TEXT 	<p>Columns (8)</p> <p>Search Columns</p> <ul style="list-style-type: none"> z2 REVIEW_ID AA PRODUCT_ID z2 CUSTOMER_ID AA COUNTRY AA REVIEW_DATE AA REVIEW_TITLE AA REVIEW_TEXT z2 SENTIMENT
<p>94. 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"> AA PRODUCT_ID z2 SENTIMENT <p>Filter</p>

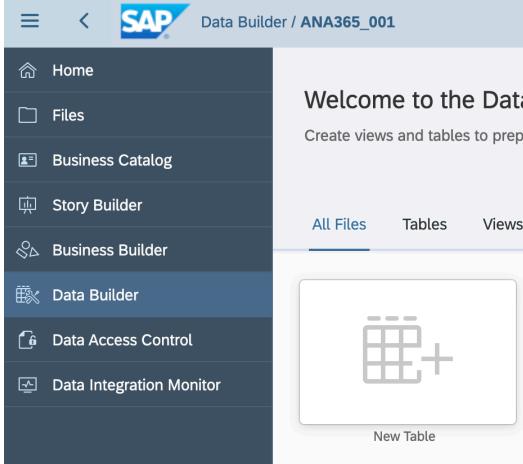
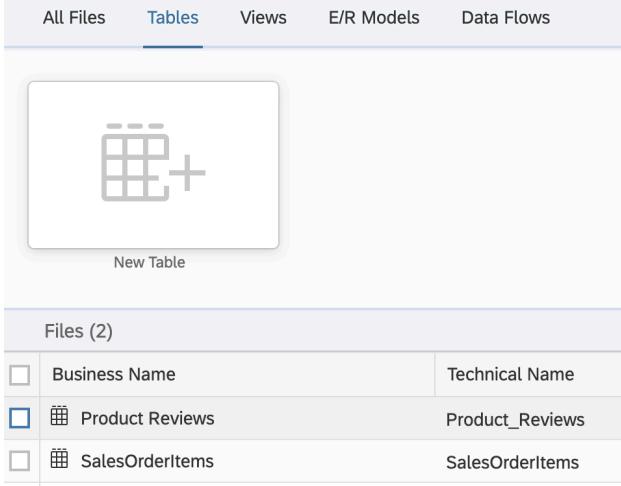
Explanation	Screenshot
95. Next, add an Aggregation node and connect it to the previous Projection 1 node.	
96. Select the node and from the Details pane on the right set the aggregation for the column SENTIMENT.	
97. Select the Add Table operator or use the context menu from the added aggregation node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

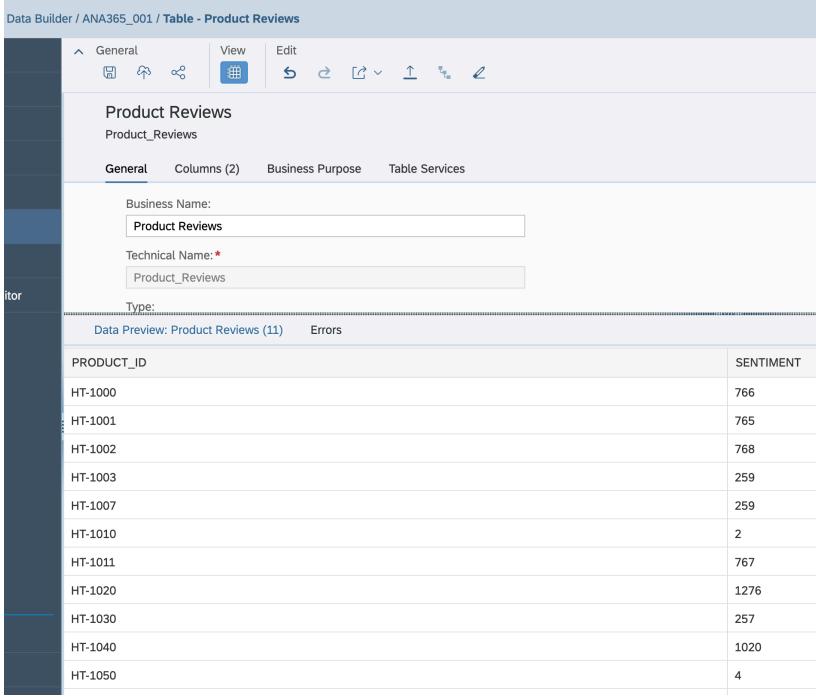
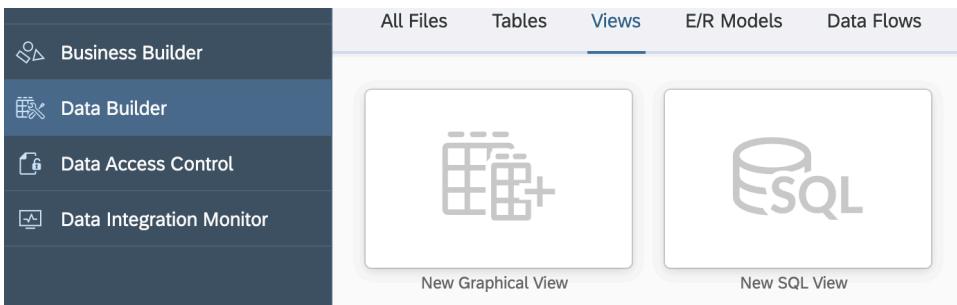
Explanation	Screenshot
98. Select the newly added node and define a label, business name and technical name for the target table.	
99. Select the Create and Deploy Table button to create the table in the repository.	
100. Confirm the dialog to create the table.	

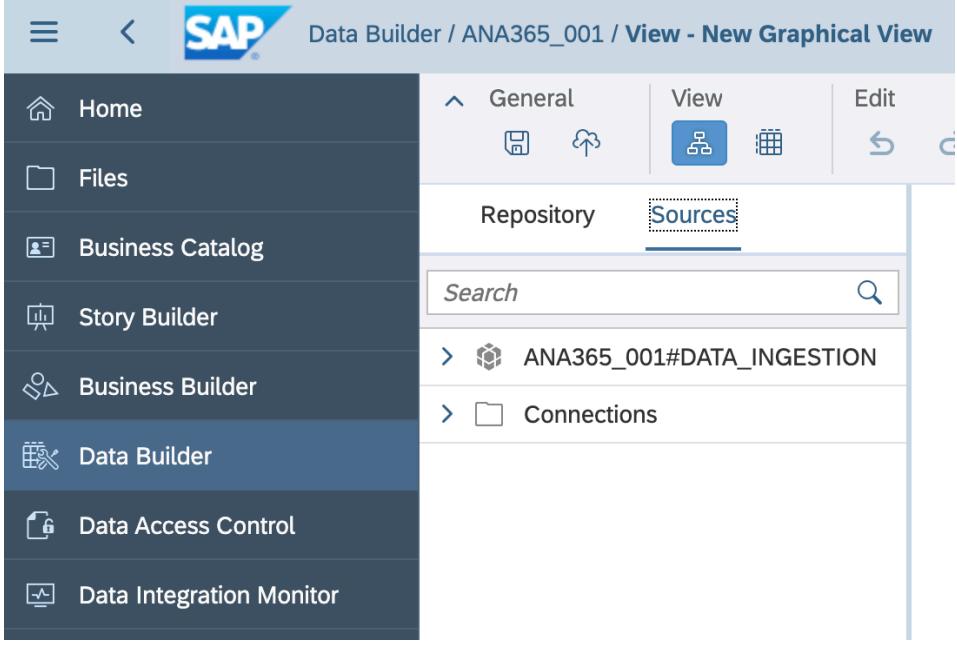
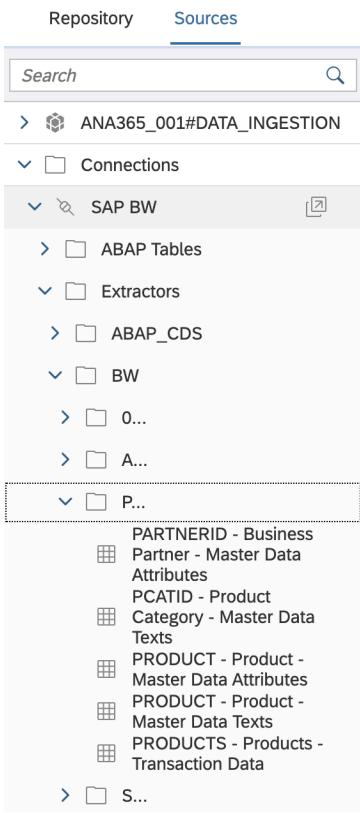
Explanation	Screenshot
<p>101. Change the mode from APPEND to TRUNCATE to make sure that in case of repetitive loads only the most recent data is available in the target table.</p>	 <p>The screenshot shows the SAP Data Builder interface with the 'Properties' dialog open for a target table named 'Product Reviews'. The 'Mode' dropdown menu is visible, with 'TRUNCATE' selected (highlighted in blue). Other options in the menu include 'APPEND' and 'TRUNCATE'.</p>
<p>102. This is how your data flow should look like by now.</p>	 <p>The screenshot shows a data flow diagram consisting of five sequential steps: 1. Source (CSV file), 2. Script (SQL query), 3. Selection (Filter), 4. Aggregation (Summarization), and 5. Target (CSV file).</p>
<p>103. Save the data flow.</p>	 <p>The screenshot shows the SAP Data Builder interface with the 'General' tab selected. A mouse cursor is hovering over and clicking the 'Save Repository' button.</p>

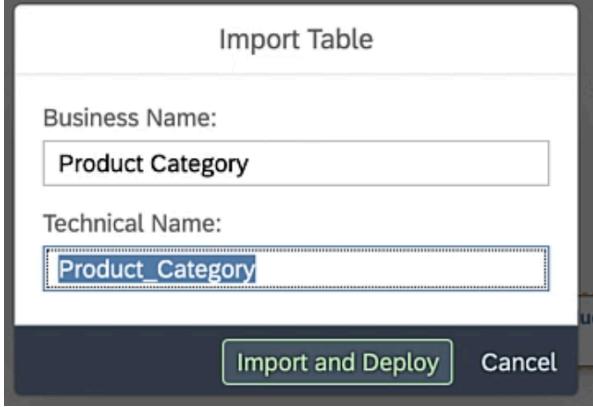
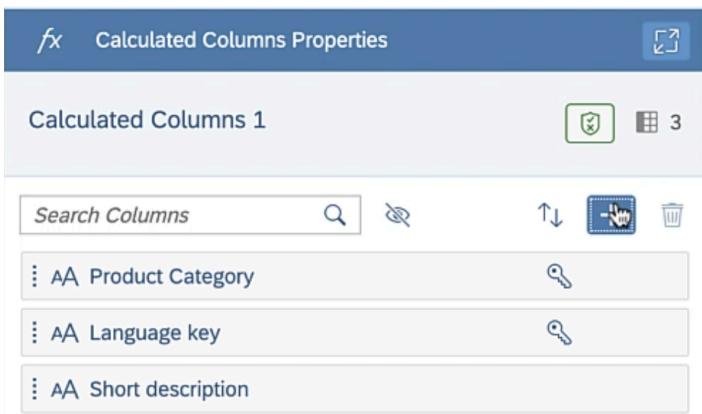
Explanation	Screenshot
104. Provide a name for the data flow and hit Save.	
105. After saving the data flow execute it.	
106. Navigate to the data flow monitor by selecting the navigation icon from the left to navigate to the run details.	
107. Hit the Refresh button until the data flow run completes.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

Explanation	Screenshot																					
108.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.																						
109.You can specify different options like recurrence, start and end date.																						
110.Make sure that your executed data flow executed completely.	 <table border="1" data-bbox="802 1453 1475 1706"> <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.
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.																				

Explanation	Screenshot						
<p>111. 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 square. Other options include Home, Files, Business Catalog, Story Builder, Business Builder, Data Access Control, and Data Integration Monitor. The main area has a light gray background with the title 'Data Builder / ANA365_001'. It displays a message 'Welcome to the Data' and 'Create views and tables to prepare data for analysis'. Below this are tabs for 'All Files', 'Tables', and 'Views', with 'Tables' being the active tab. A large button labeled 'New Table' with a grid icon is centered in the main area.</p>						
<p>112. 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 top navigation bar. Below it, there's a 'New Table' button. Under the 'Tables' tab, there's a section titled 'Files (2)' containing two entries:</p> <table border="1"> <thead> <tr> <th>Business Name</th> <th>Technical Name</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> Product Reviews</td> <td>Product_Reviews</td> </tr> <tr> <td><input type="checkbox"/> SalesOrderItems</td> <td>SalesOrderItems</td> </tr> </tbody> </table>	Business Name	Technical Name	<input checked="" type="checkbox"/> Product Reviews	Product_Reviews	<input type="checkbox"/> SalesOrderItems	SalesOrderItems
Business Name	Technical Name						
<input checked="" type="checkbox"/> Product Reviews	Product_Reviews						
<input type="checkbox"/> SalesOrderItems	SalesOrderItems						

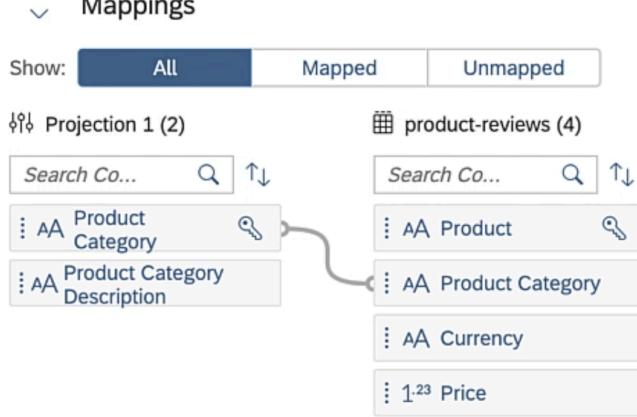
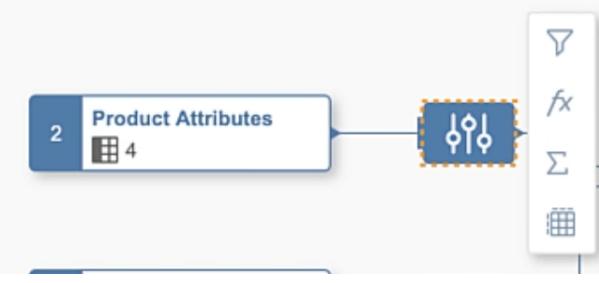
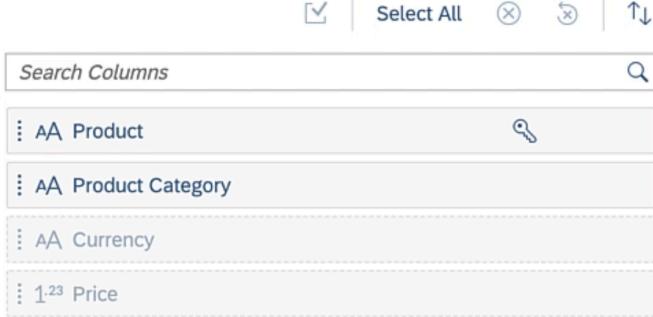
Explanation	Screenshot																								
<p>113. Open the Data Preview by clicking on the Data Preview button in the View section at the top. Make sure the different products are listed and the sentiment is shown. The aggregated sentiment or product IDs might look a little different in your case 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																								
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																								
<p>114. 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>115. Navigate to the Views area in the Data Builder.</p>																									

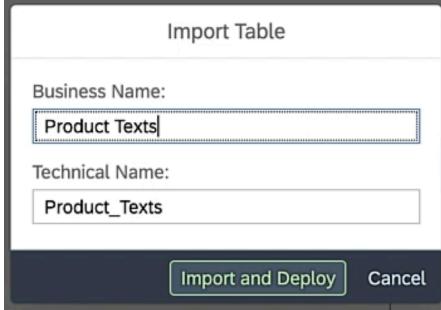
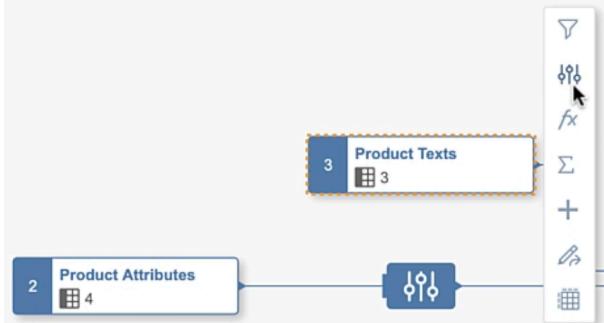
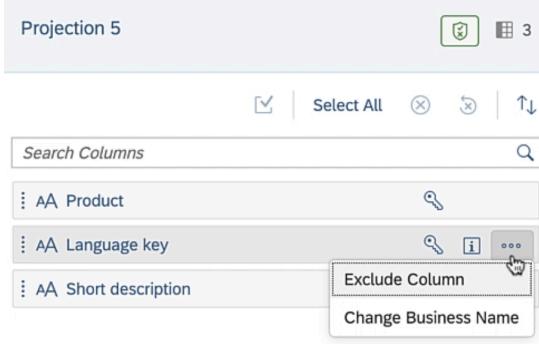
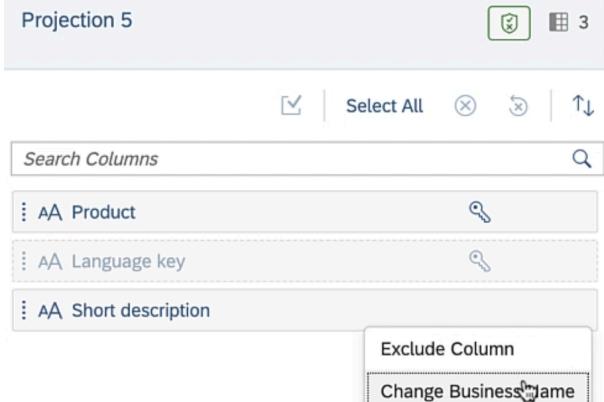
Explanation	Screenshot
116. Select the New Graphical View tile and select the Sources tab.	
117. Drill down into the SAP BW connection and navigate to SAP BW > Extractors > BW > P...	

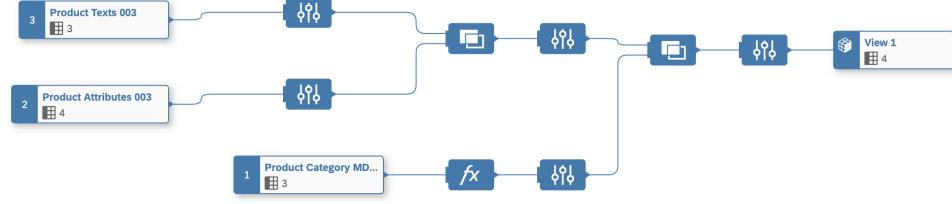
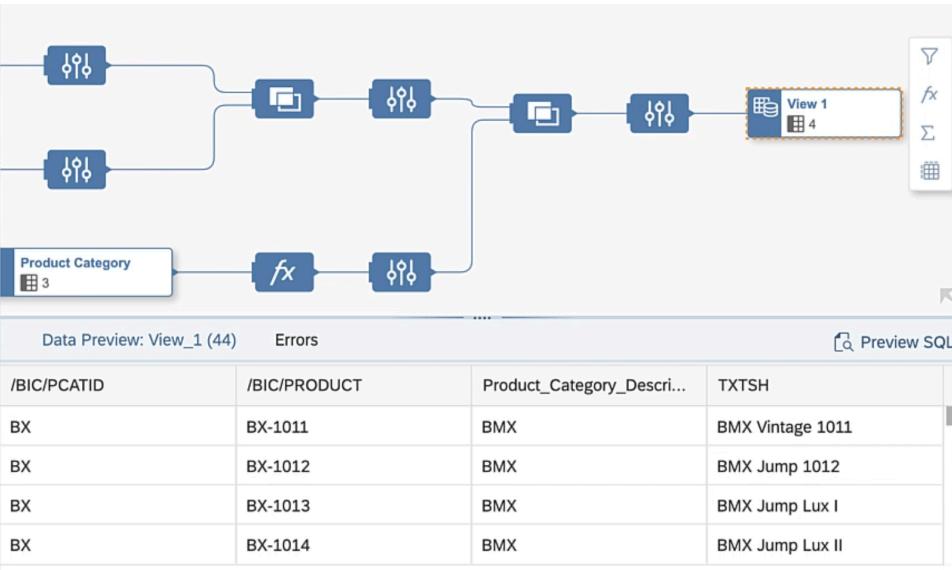
Explanation	Screenshot
118. Start off by dragging over the PCATID – Product Category – Master Data Texts.	 <p>It looks like you have selected a master data category</p> <p>Drag and drop</p>
119. Provide a meaningful Business Name and Technical Name.	
120. Add a calculation node.	
121. Add a new calculated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

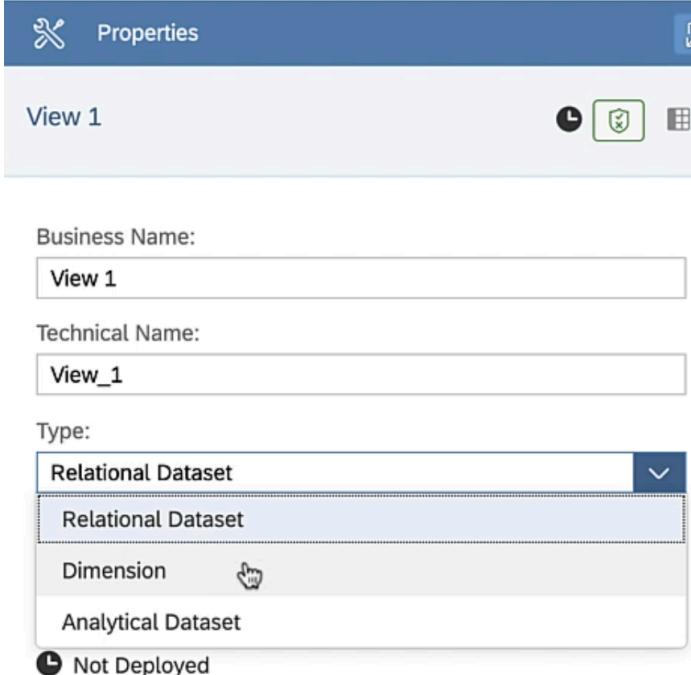
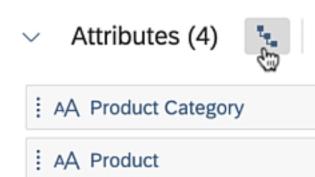
Explanation	Screenshot
122. Provide a meaningful Business Name and Technical Name and define the Data Type as String.	<p>Business Name:</p> <input type="text" value="Product Category Description"/> <p>Technical Name:</p> <input type="text" value="Product_Category_Description"/> <p>Data Type:</p> <input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

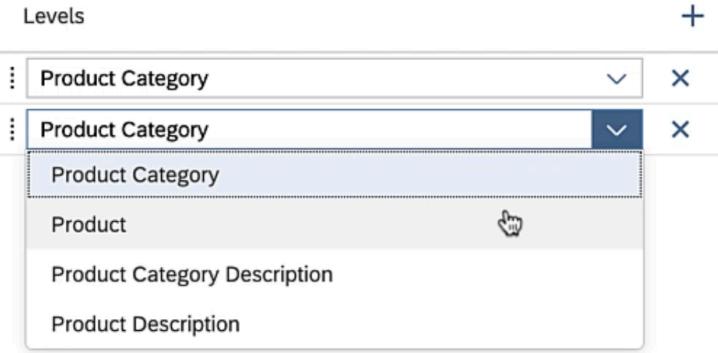
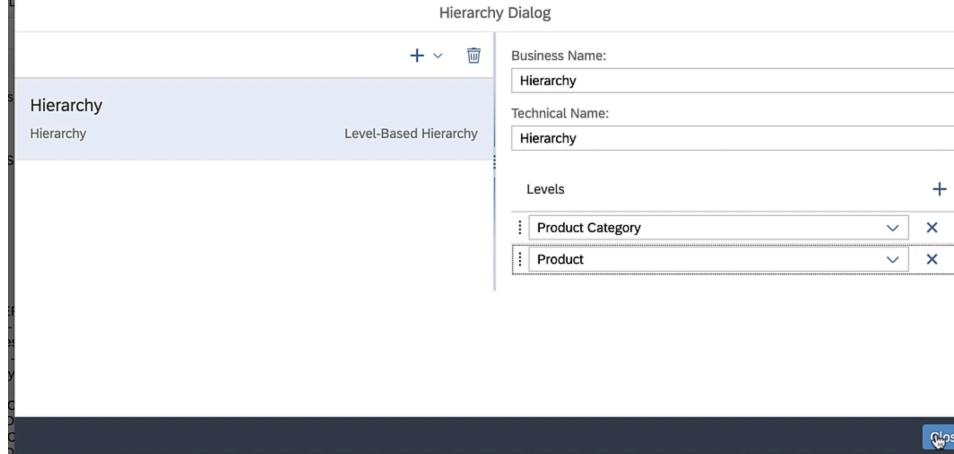
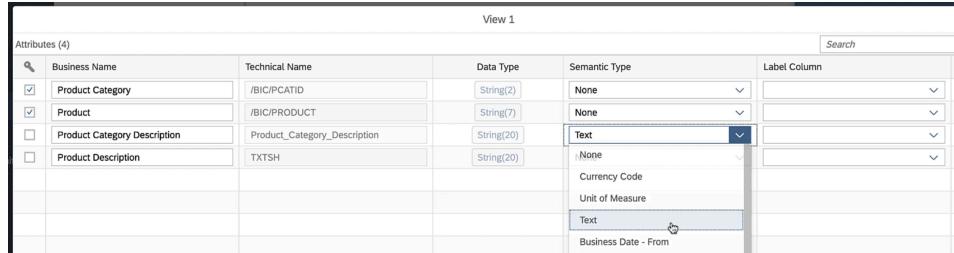
Explanation	Screenshot
125.Add a projection node after the calculation node.	
126.Make sure to exclude the column Short Description and Language key.	
127.Next, drag over the PRODUCT – Product – Master Data Attributes from the Sources tree and put it onto the projection node. Make sure that the option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

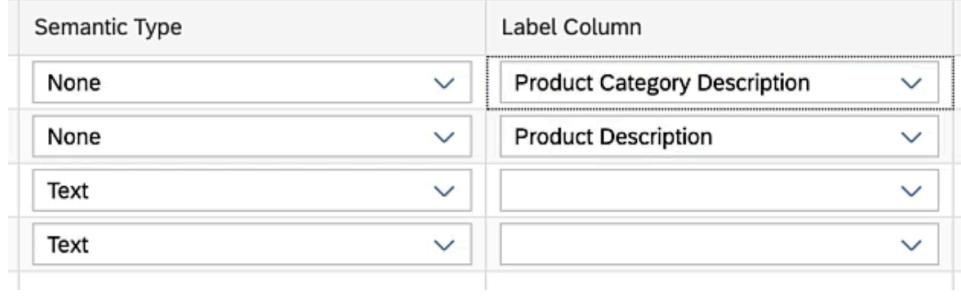
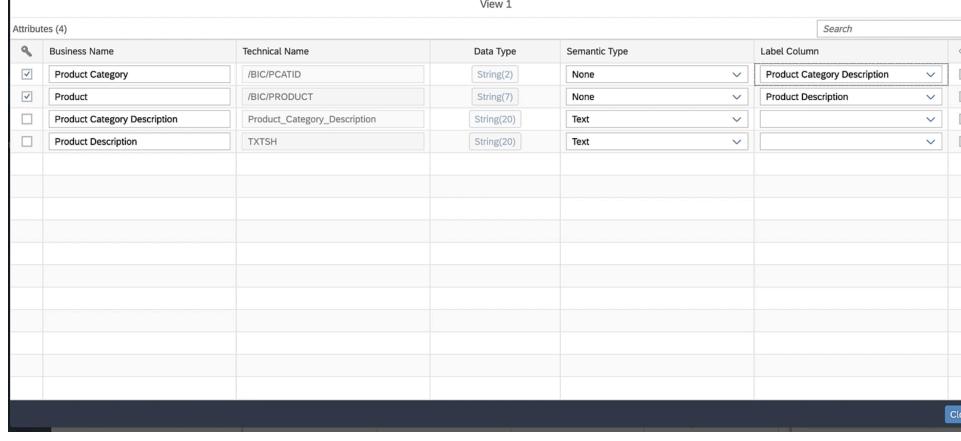
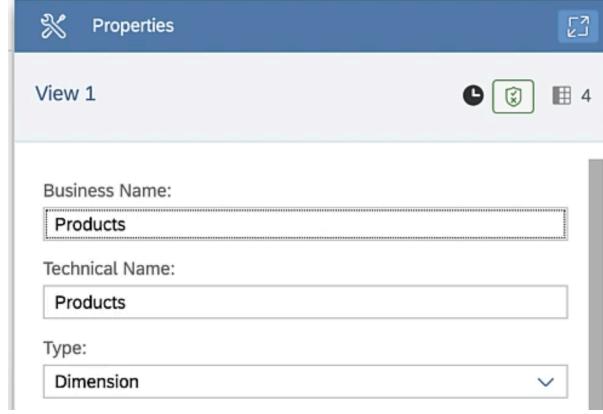
Explanation	Screenshot
129. Make sure that the Join mapping is defined correctly.	 <p>The screenshot shows the 'Mappings' section of the SAP Data Warehouse Cloud interface. It displays two projections: 'Projection 1 (2)' and 'Projection 2 (4)'. Projection 1 contains 'Product Category' and 'Product Category Description'. Projection 2 contains 'product-reviews', 'Product', 'Product Category', 'Currency', and 'Price'. A join mapping is defined between 'Product Category' from both projections.</p>
130. Add a projection node after the Product Attributes.	 <p>The screenshot shows a data flow diagram. A 'Product Attributes' node (labeled 2, 4 rows) is connected to a projection node icon (represented by a dashed orange rectangle). To the right of the projection node is a vertical toolbar with icons for filter, search, sum, and calendar.</p>
131. Exclude the columns Currency and Price. We don't need these columns because the Sales Order data sets already contain this information.	 <p>The screenshot shows a 'Select Columns' dialog. The 'Currency' and 'Price' columns are listed and have a dashed border around them, indicating they are excluded from the selection. Other columns like 'Product' and 'Product Category' are included.</p>
132. Next, drag over the PRODUCT – Product – Master Data Texts and drop it on the projection node you created after the Product Attributes table.	 <p>The screenshot shows a data flow diagram. A table named 'PRODUCT - Product - Master Data Texts' is being dragged from a list of tables on the left and placed onto a projection node icon (dashed orange rectangle) in the flow.</p>

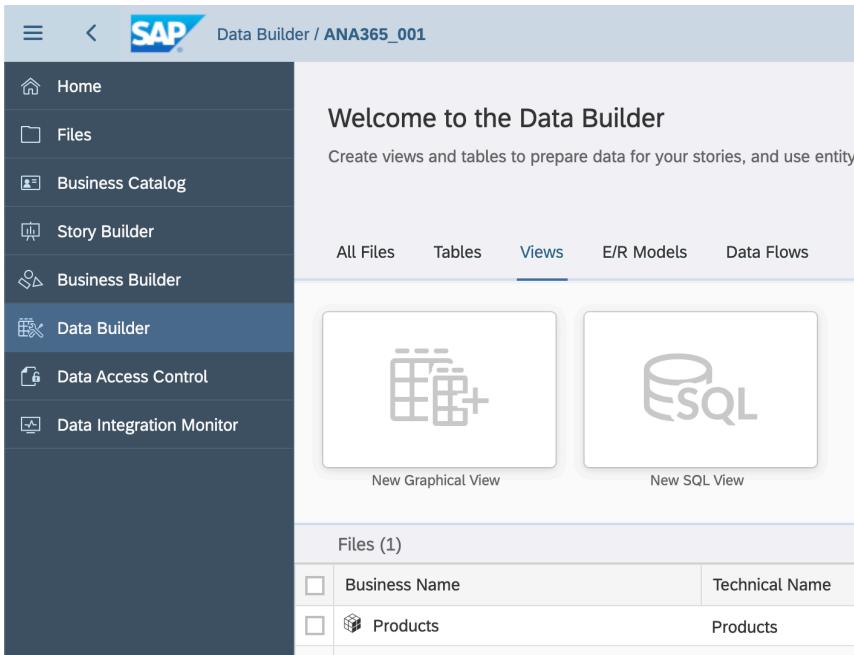
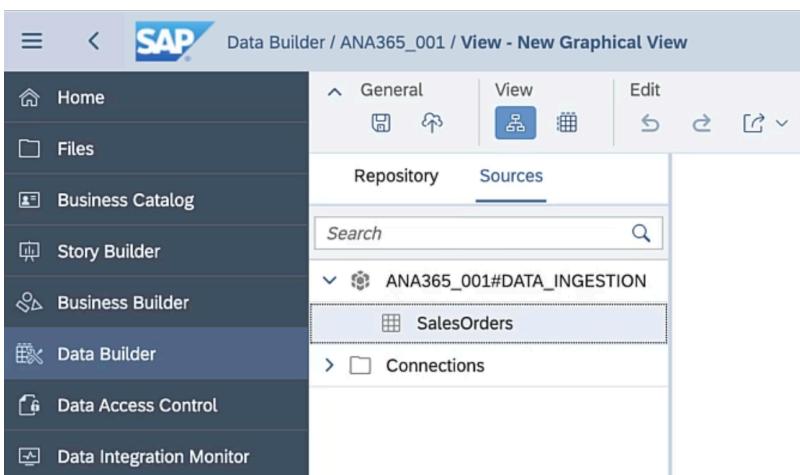
Explanation	Screenshot
133. Provide a meaningful Business Name and Technical Name.	 <p>The dialog box shows the 'Import Table' interface. It has two input fields: 'Business Name:' containing 'Product Texts' and 'Technical Name:' containing 'Product_Texts'. At the bottom are 'Import and Deploy' and 'Cancel' buttons.</p>
134. Add a projection node after the Product Texts node.	 <p>The diagram shows a data flow starting with a 'Product Attributes' node (2 rows) connected to a projection node. The projection node then connects to a 'Product Texts' node (3 rows). A context menu is open over the projection node, with the 'Add' icon highlighted.</p>
135. 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' column has a context menu open with 'Exclude Column' selected.</p>
136. 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' column has a context menu open with 'Change Business Name' selected.</p>

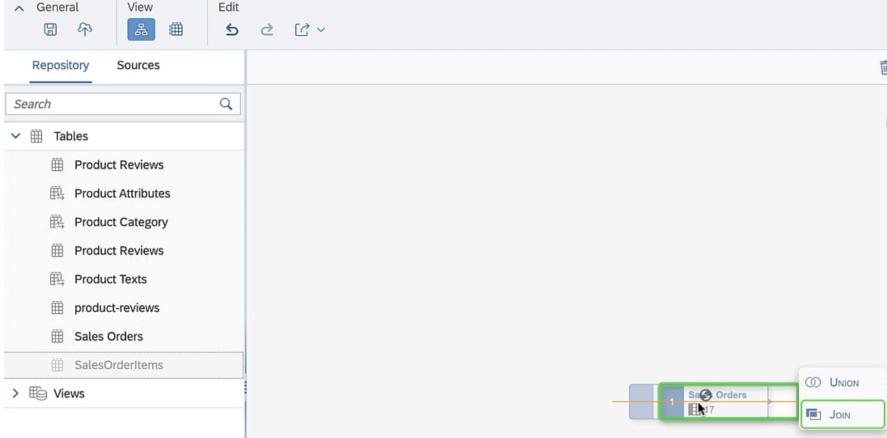
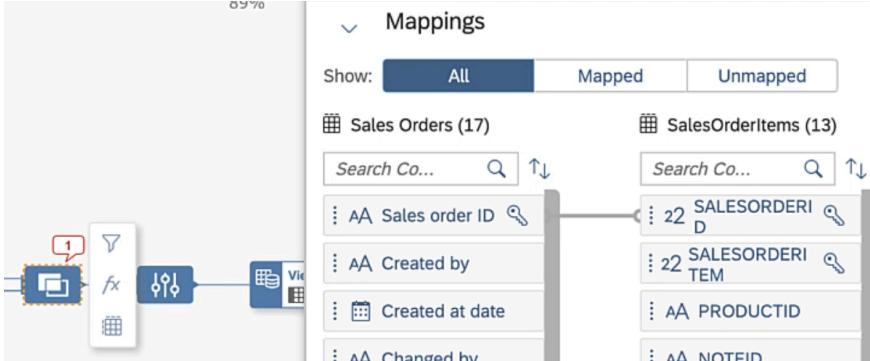
Explanation	Screenshot																				
137. Provide a meaningful name like Product Description.	 <p>The business name for columns must be unique.</p>																				
138. This is how your model should look like by now.																					
139. Select the View 1 output node and open the data preview. Make sure that the data is displayed.	 <table border="1"> <thead> <tr> <th data-bbox="523 1262 747 1284">/BIC/PCATID</th><th data-bbox="747 1262 926 1284">/BIC/PRODUCT</th><th data-bbox="926 1262 1237 1284">Product_Category_Descri...</th><th data-bbox="1237 1262 1475 1284">TXTSH</th></tr> </thead> <tbody> <tr> <td data-bbox="523 1326 747 1347">BX</td><td data-bbox="747 1326 926 1347">BX-1011</td><td data-bbox="926 1326 1237 1347">BMX</td><td data-bbox="1237 1326 1475 1347">BMX Vintage 1011</td></tr> <tr> <td data-bbox="523 1368 747 1389">BX</td><td data-bbox="747 1368 926 1389">BX-1012</td><td data-bbox="926 1368 1237 1389">BMX</td><td data-bbox="1237 1368 1475 1389">BMX Jump 1012</td></tr> <tr> <td data-bbox="523 1410 747 1431">BX</td><td data-bbox="747 1410 926 1431">BX-1013</td><td data-bbox="926 1410 1237 1431">BMX</td><td data-bbox="1237 1410 1475 1431">BMX Jump Lux I</td></tr> <tr> <td data-bbox="523 1453 747 1474">BX</td><td data-bbox="747 1453 926 1474">BX-1014</td><td data-bbox="926 1453 1237 1474">BMX</td><td data-bbox="1237 1453 1475 1474">BMX Jump Lux II</td></tr> </tbody> </table>	/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
/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																		

Explanation	Screenshot
<p>140.In the Properties pane change the Type from Relational Dataset to Dimension.</p>	 <p>The screenshot shows the SAP Datasphere Properties pane for a view named "View 1". The "Type" dropdown menu is open, displaying "Relational Dataset", "Dimension", "Analytical Dataset", and "Not Deployed". The "Dimension" option is highlighted with a cursor icon.</p>
<p>141.In the Attributes section select the hierarchy icon.</p>	 <p>The screenshot shows the "Attributes" section with two entries: "Product Category" and "Product", each preceded by a hierarchy icon.</p>
<p>142.In the dialog add a new level-based hierarchy.</p>	 <p>The screenshot shows the "Hierarchy Dialog". It displays a message: "No hierarchies have been created yet. To create one, please press one of the buttons below." Two buttons are visible: "Add Parent Child Hierarchy" and "Add Level Based Hierarchy". The "Add Level Based Hierarchy" button is highlighted with a cursor icon.</p>

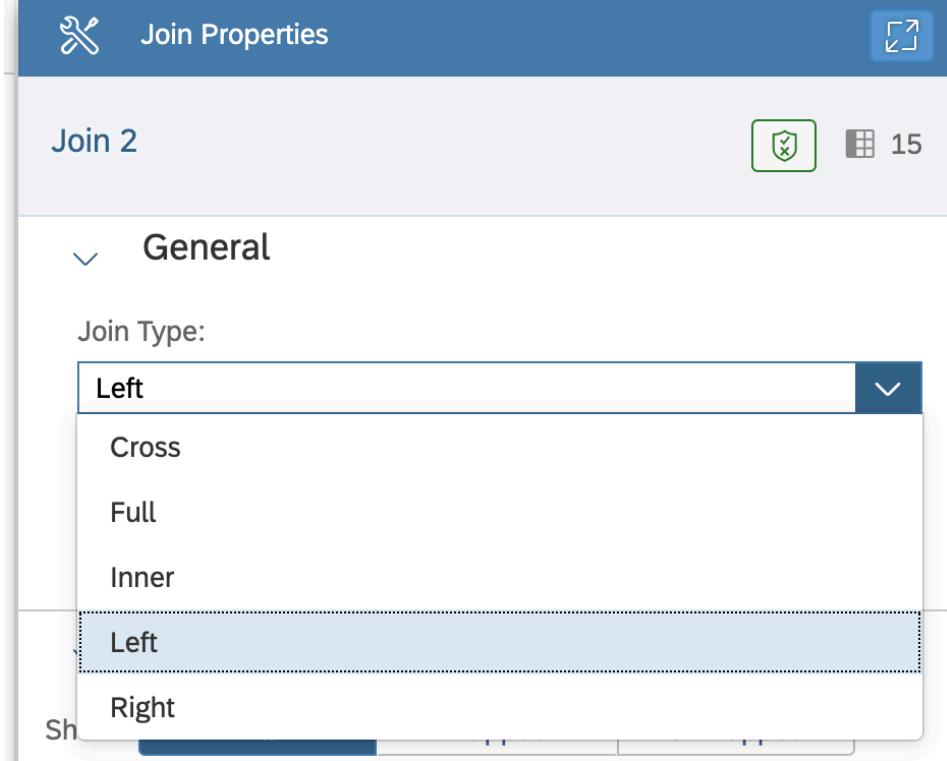
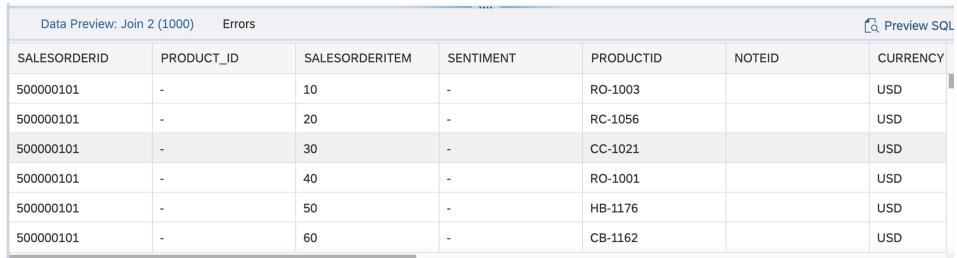
Explanation	Screenshot
143. Add two levels and specify the first level as Product Category and the second level as Product.	 <p>The screenshot shows the 'Levels' dialog. It contains a list of levels with a '+' button at the top right. The first level is 'Product Category'. Below it is another 'Product 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>
144. 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>
145. 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>
146. 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>

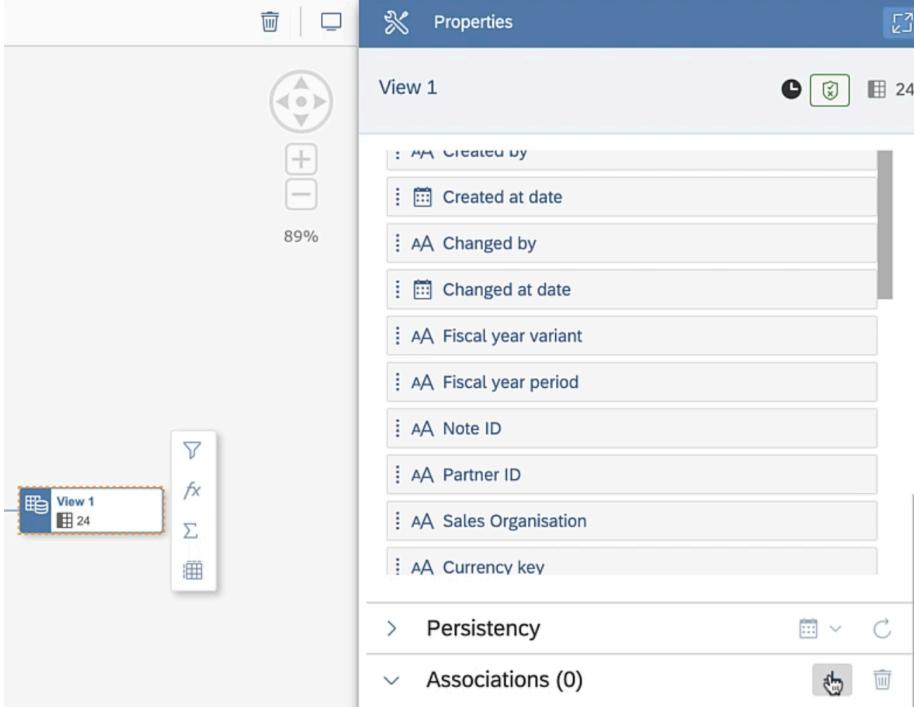
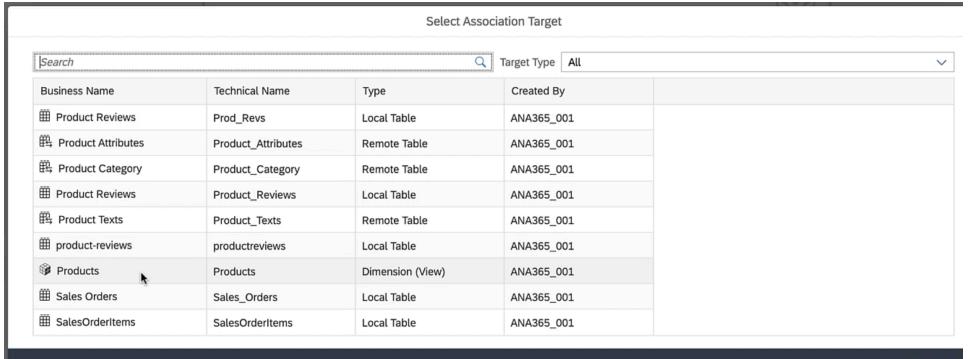
Explanation	Screenshot
147. Change the Label Column values for the first row to Product Category Description and for the second row to Product Description.	
148. Confirm the dialog.	
149. Change the Business Name and Technical Name of the view to Products.	
150. Save and deploy the view.	

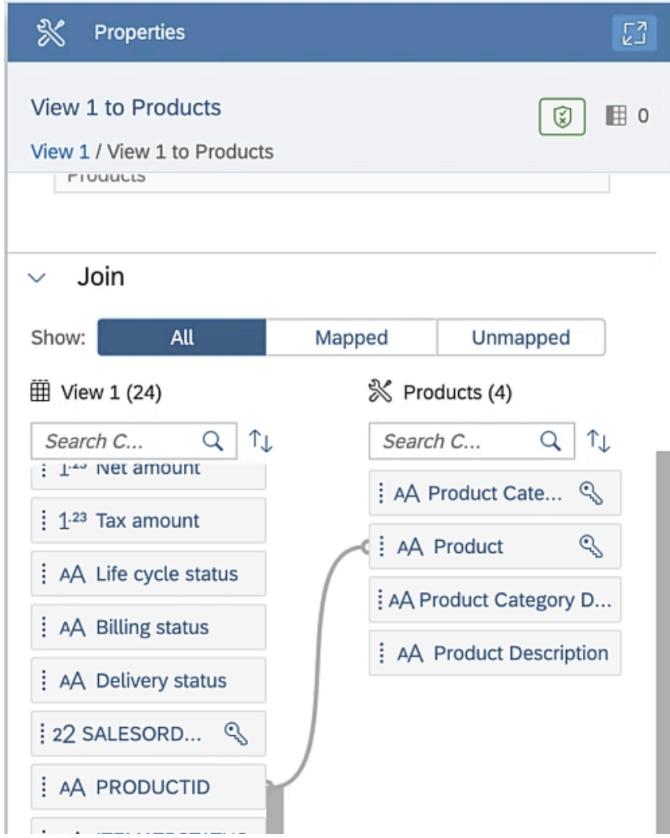
Explanation	Screenshot
151.Congratulations!	<p>You created your first master data dimension in SAP Data Warehouse Cloud! By now the dimension is all virtual. The data we put together in the dimension is fetched live from the connected SAP BW system whenever we query the data model, be it the data preview 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>
152.Navigate to the Data Builder and create a new Graphical View.	
153.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.	

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

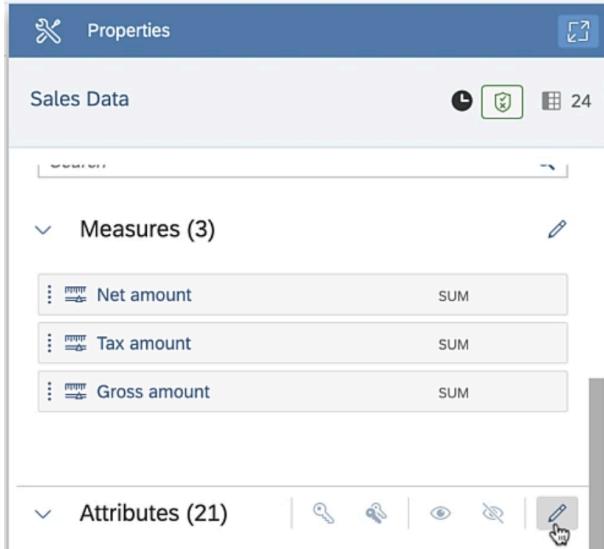
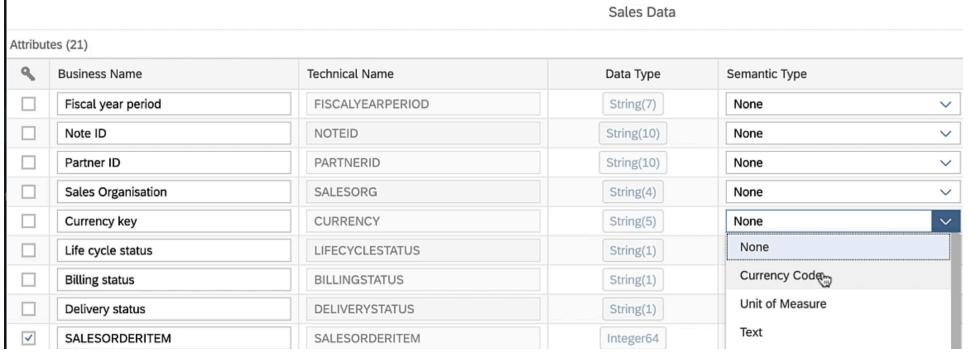
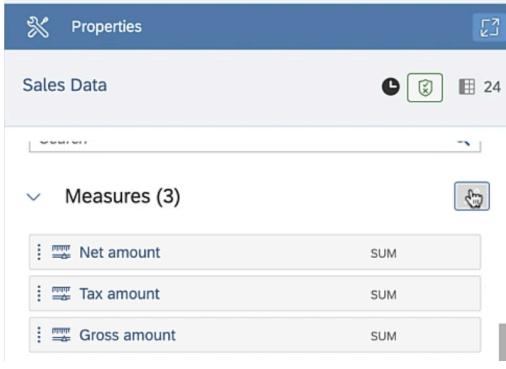
Explanation	Screenshot														
<p>157. Switch to the Repository tab and in the Tables list select the Product Reviews table. Drag it onto the canvas and drop it onto the Sales Order Items node.</p>															
<p>158. Select the join node and make sure that the join field mapping is correct (PRODUCTID -> 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>Source Column</th> <th>Target Column</th> </tr> </thead> <tbody> <tr> <td>SALESORDERITEMS.SALESORDERID</td> <td>AA_PRODUCT_ID</td> </tr> <tr> <td>SALESORDERITEMS.ITEMID</td> <td>AA_SENTIMENT</td> </tr> <tr> <td>SALESORDERITEMS.AMOUNT</td> <td>AA_GROSSAMOUNT</td> </tr> <tr> <td>SALESORDERITEMS.TAXAMOUNT</td> <td>AA_NETAMOUNT</td> </tr> <tr> <td>SALESORDERITEMS.CURRENCY</td> <td>AA_TAXAMOUNT</td> </tr> <tr> <td>SALESORDERITEMS.STATUS</td> <td>AA_ITEMSTATUS</td> </tr> </tbody> </table>	Source Column	Target Column	SALESORDERITEMS.SALESORDERID	AA_PRODUCT_ID	SALESORDERITEMS.ITEMID	AA_SENTIMENT	SALESORDERITEMS.AMOUNT	AA_GROSSAMOUNT	SALESORDERITEMS.TAXAMOUNT	AA_NETAMOUNT	SALESORDERITEMS.CURRENCY	AA_TAXAMOUNT	SALESORDERITEMS.STATUS	AA_ITEMSTATUS
Source Column	Target Column														
SALESORDERITEMS.SALESORDERID	AA_PRODUCT_ID														
SALESORDERITEMS.ITEMID	AA_SENTIMENT														
SALESORDERITEMS.AMOUNT	AA_GROSSAMOUNT														
SALESORDERITEMS.TAXAMOUNT	AA_NETAMOUNT														
SALESORDERITEMS.CURRENCY	AA_TAXAMOUNT														
SALESORDERITEMS.STATUS	AA_ITEMSTATUS														

Explanation	Screenshot																																																	
<p>159. 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 it, the identifier 'Join 2' is shown along with a shield icon and the number '15'. Under the 'General' section, the 'Join Type:' dropdown is open, displaying 'Left' as the selected option. Other options listed are 'Cross', 'Full', and 'Inner'. A partially visible 'Right' option is at the bottom of the list.</p>																																																	
<p>160. 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
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																																												

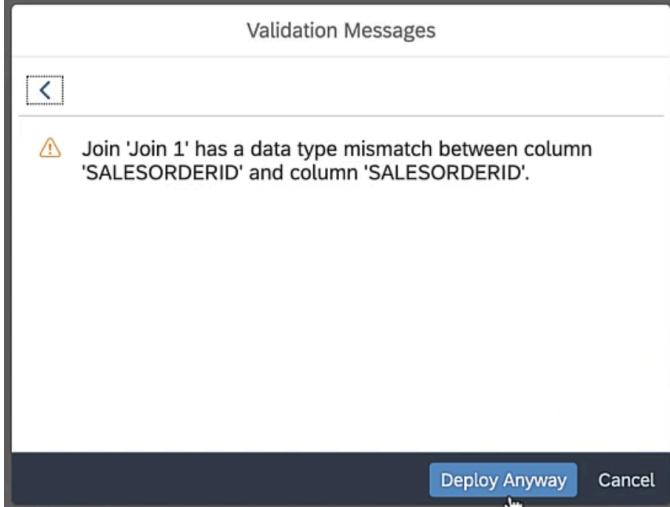
Explanation	Screenshot																																								
<p>161. Select the View 1 output node and scroll down to the Associations section. Hit the Add button to add a new association. The number of columns might be different from what you see in your tenant, but don't worry.</p>																																									
<p>162. From the list of dimensions select the Products view and hit OK.</p>	 <table border="1" data-bbox="543 1142 1171 1438"> <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
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																																						

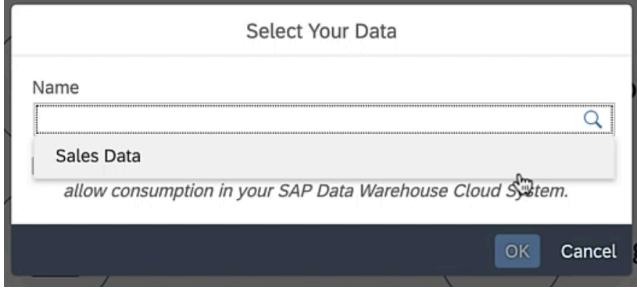
Explanation	Screenshot
<p>163. In the details on the added association make sure that the join fields are defined correctly (PRODUCTID -> Product).</p>	 <p>The screenshot shows the 'Properties' screen for a 'View 1 to Products' output node. The 'Join' section is expanded, showing two sides: 'View 1 (24)' and 'Products (4)'. Under 'View 1 (24)', there is a list of fields including 'Net amount', 'Tax amount', 'Life cycle status', 'Billing status', 'Delivery status', 'SALESORD...', and 'PRODUCTID'. Under 'Products (4)', there is a list of fields including 'Product Category D...', 'Product Description', and 'Product'. A curved arrow points from the 'PRODUCTID' field in 'View 1 (24)' to the 'Product' field in 'Products (4)', indicating a mapping or association.</p>
<p>164. 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 a 'View 1 to Products' output node. The 'General' tab is selected. The breadcrumb navigation at the top shows 'View 1 / View 1 to Products', indicating the current path in the application.</p>

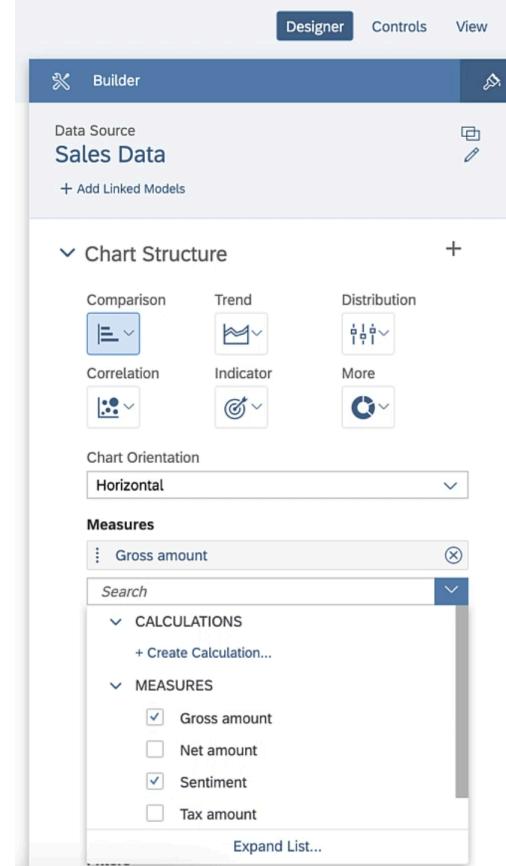
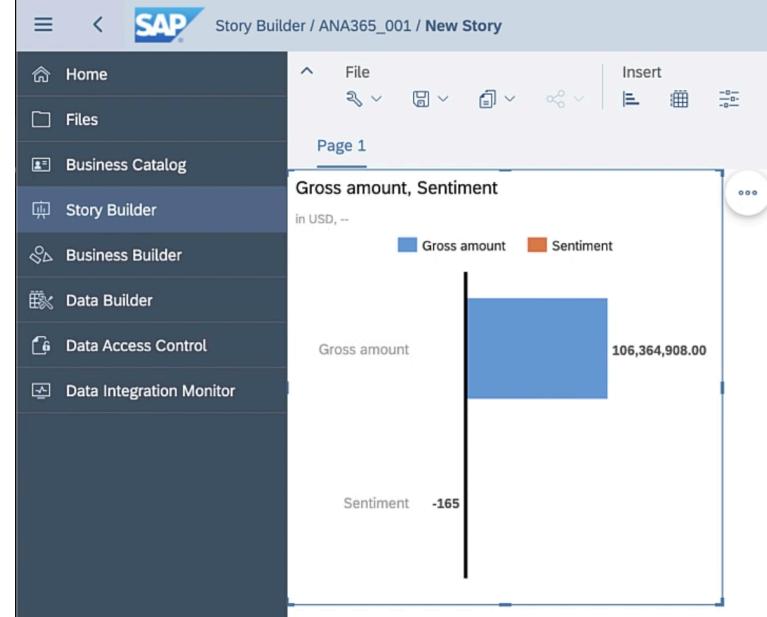
Explanation	Screenshot
<p>165. Provide a meaningful Business Name and Technical Name and set the type to Analytical Dataset. Make sure to switch on the Exposing option.</p>	
<p>166. Now that you have set the type as Analytical Dataset you can define measures. Scroll down and move the columns Sentiment, Gross amount, Net amount and Tax amount from the list of Attributes to the list of Measures.</p>	

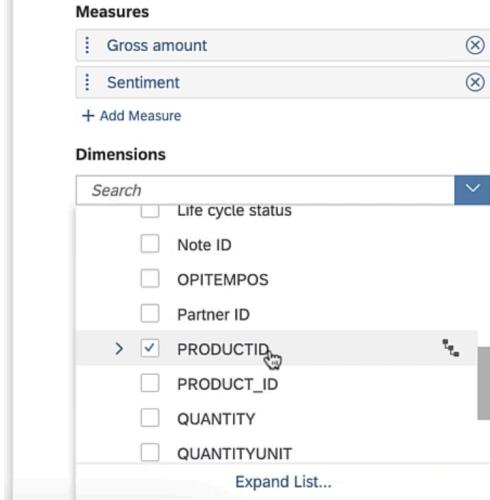
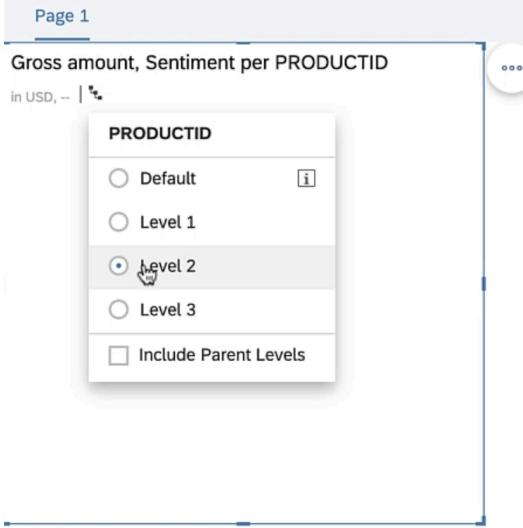
Explanation	Screenshot																																																																		
167. Select the edit button for the Attributes. Don't worry if your view contains more than 21 attributes.																																																																			
168. Change the Semantic Type for the column Currency key to Currency Code.	 <table border="1" data-bbox="518 946 1488 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>✓</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Note ID</td> <td>NOTEID</td> <td>String(10)</td> <td>None</td> <td>✓</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Partner ID</td> <td>PARTNERID</td> <td>String(10)</td> <td>None</td> <td>✓</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Sales Organisation</td> <td>SALESORG</td> <td>String(4)</td> <td>None</td> <td>✓</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Currency key</td> <td>CURRENCY</td> <td>String(5)</td> <td>None</td> <td>✓</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Life cycle status</td> <td>LIFECYCLESTATUS</td> <td>String(1)</td> <td>None</td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td>Billing status</td> <td>BILLINGSTATUS</td> <td>String(1)</td> <td>Currency Code</td> <td>✓</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></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>SALESORDERITEM</td> <td>SALESORDERITEM</td> <td>Integer64</td> <td>Text</td> <td></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="checkbox"/>	Note ID	NOTEID	String(10)	None	✓	<input type="checkbox"/>	Partner ID	PARTNERID	String(10)	None	✓	<input type="checkbox"/>	Sales Organisation	SALESORG	String(4)	None	✓	<input type="checkbox"/>	Currency key	CURRENCY	String(5)	None	✓	<input type="checkbox"/>	Life cycle status	LIFECYCLESTATUS	String(1)	None		<input type="checkbox"/>	Billing status	BILLINGSTATUS	String(1)	Currency Code	✓	<input type="checkbox"/>	Delivery status	DELIVERYSTATUS	String(1)	Unit of Measure		<input checked="" type="checkbox"/>	SALESORDERITEM	SALESORDERITEM	Integer64	Text	
Attributes (21)					Sales Data																																																														
	Business Name	Technical Name	Data Type	Semantic Type																																																															
<input type="checkbox"/>	Fiscal year period	FISCALYEARPERIOD	String(7)	None	✓																																																														
<input type="checkbox"/>	Note ID	NOTEID	String(10)	None	✓																																																														
<input type="checkbox"/>	Partner ID	PARTNERID	String(10)	None	✓																																																														
<input type="checkbox"/>	Sales Organisation	SALESORG	String(4)	None	✓																																																														
<input type="checkbox"/>	Currency key	CURRENCY	String(5)	None	✓																																																														
<input type="checkbox"/>	Life cycle status	LIFECYCLESTATUS	String(1)	None																																																															
<input type="checkbox"/>	Billing status	BILLINGSTATUS	String(1)	Currency Code	✓																																																														
<input type="checkbox"/>	Delivery status	DELIVERYSTATUS	String(1)	Unit of Measure																																																															
<input checked="" type="checkbox"/>	SALESORDERITEM	SALESORDERITEM	Integer64	Text																																																															
169. Select the edit button for Measures.																																																																			

Explanation	Screenshot																								
170.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				
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																						
171.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.																									
172.For the Unit Column select Currency key for the three measures expect Sentiment.																									
173.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
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																				

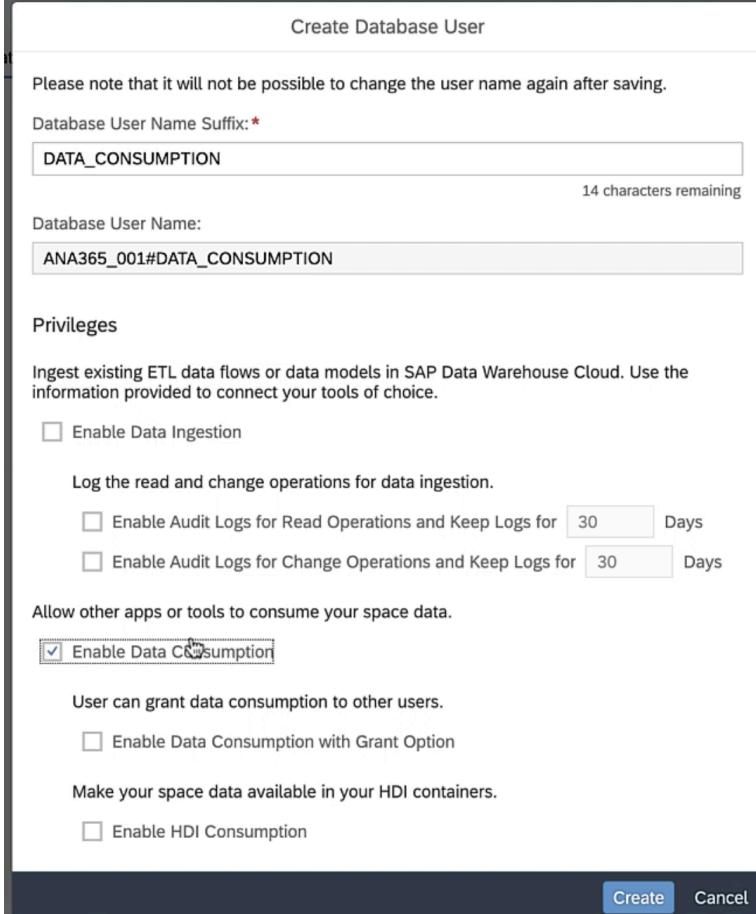
Explanation	Screenshot
174. Save and deploy the view and confirm the validation message in case it is shown.	
175. Congratulations!	<p>You created your data model and combined the different data assets. We are now ready to consume the data model in an application like SAP Analytics Cloud or a 3rd party 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 3rd party SQL tool.</p>
176. Select the Story Builder from the navigation bar and create a new story.	

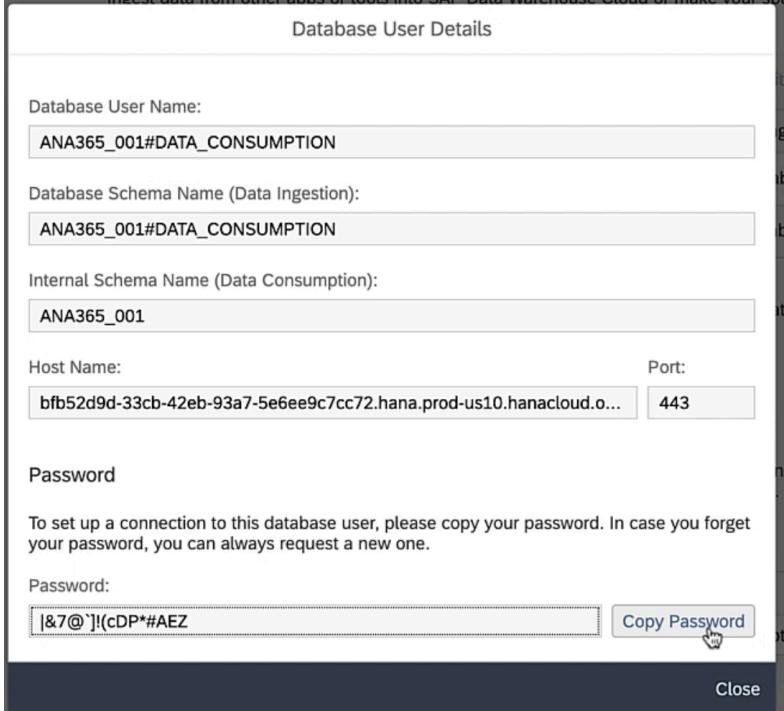
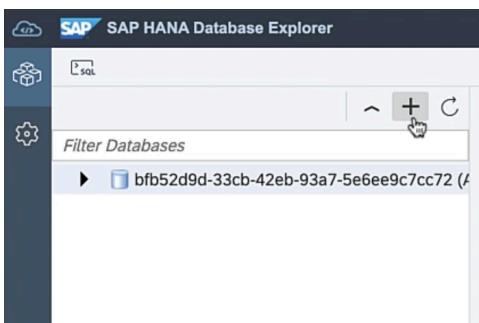
Explanation	Screenshot
<p>177. Select the Sales Data set you created earlier. If no entry is visible navigate back to the graphical Sales Data view and make sure the Exposing option is switched on!</p>	
<p>178. Select the Chart option.</p>	<p>Add an object to the story canvas.</p> <div style="display: 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>179. On the right add the two measures Gross amount and Sentiment.</p>	
<p>180. The aggregated sum and sentiment is shown on the left.</p>	

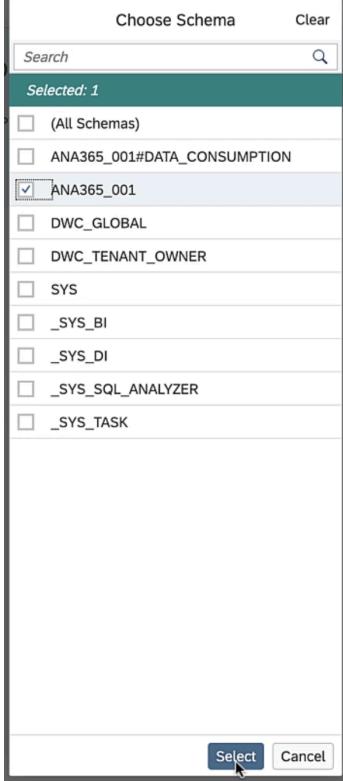
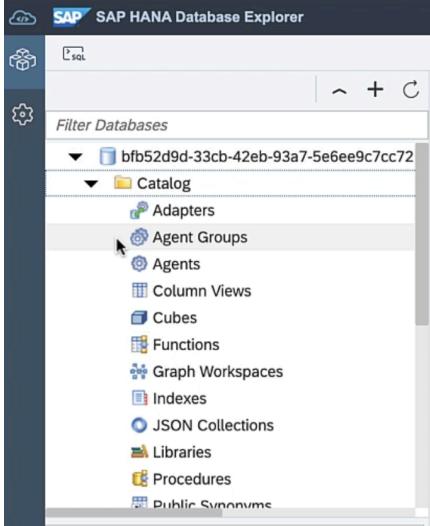
Explanation	Screenshot
181.Add the PRODUCTID dimension to the list of Dimensions.	
182.Change the PRODUCTID hierarchy display to Level 2.	

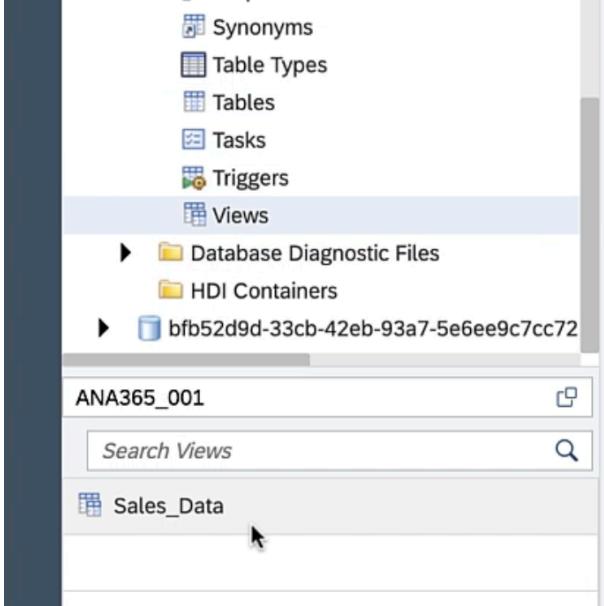
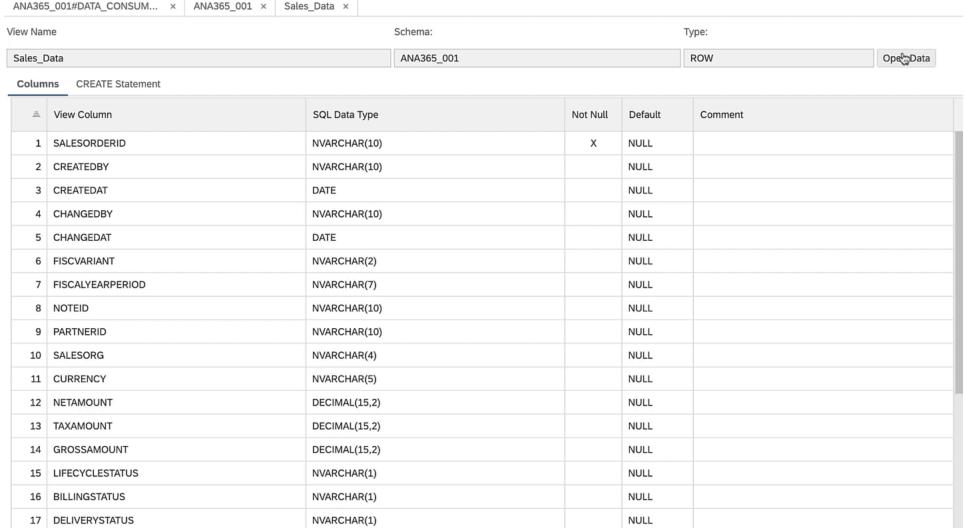
Explanation	Screenshot																														
<p>183. Drag the canvas a little wider to get a good overview on the aggregated sentiment per product category.</p>	<table border="1"> <thead> <tr> <th>Category</th> <th>Gross amount (USD)</th> <th>Sentiment</th> </tr> </thead> <tbody> <tr> <td>BMX</td> <td>16,332,817.00</td> <td></td> </tr> <tr> <td>Cruiser</td> <td>7,214,774.00</td> <td></td> </tr> <tr> <td>Cyclo-cross Bike</td> <td>7,954,082.00</td> <td></td> </tr> <tr> <td>Downhill Bike</td> <td>7,159,982.00</td> <td></td> </tr> <tr> <td>eBike</td> <td>20,440,518.00</td> <td></td> </tr> <tr> <td>Hybrid Bike</td> <td>12,000,412.00</td> <td></td> </tr> <tr> <td>Mountain Bike</td> <td>10,791,173.00</td> <td></td> </tr> <tr> <td>Racing Bike</td> <td>19,107,879.00</td> <td></td> </tr> <tr> <td>Road Bike</td> <td>5,363,271.00</td> <td></td> </tr> </tbody> </table>	Category	Gross amount (USD)	Sentiment	BMX	16,332,817.00		Cruiser	7,214,774.00		Cyclo-cross Bike	7,954,082.00		Downhill Bike	7,159,982.00		eBike	20,440,518.00		Hybrid Bike	12,000,412.00		Mountain Bike	10,791,173.00		Racing Bike	19,107,879.00		Road Bike	5,363,271.00	
Category	Gross amount (USD)	Sentiment																													
BMX	16,332,817.00																														
Cruiser	7,214,774.00																														
Cyclo-cross Bike	7,954,082.00																														
Downhill Bike	7,159,982.00																														
eBike	20,440,518.00																														
Hybrid Bike	12,000,412.00																														
Mountain Bike	10,791,173.00																														
Racing Bike	19,107,879.00																														
Road Bike	5,363,271.00																														
<p>184. Congratulations!</p>	<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>																														
<p>185. Navigate back to the Space Management into your space to the Database Access section. Hit Create to create another Database User.</p>	<table border="1"> <thead> <tr> <th>Database User Name</th> <th>Data Ingestion</th> <th>HDI Consumption</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>ANA365_001 DATA_INGESTION</td> <td>Enabled</td> <td>Disabled</td> <td>Active</td> </tr> </tbody> </table>	Database User Name	Data Ingestion	HDI Consumption	Status	ANA365_001 DATA_INGESTION	Enabled	Disabled	Active																						
Database User Name	Data Ingestion	HDI Consumption	Status																												
ANA365_001 DATA_INGESTION	Enabled	Disabled	Active																												

Explanation	Screenshot
<p>186. 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>Privileges</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>Create Cancel</p>

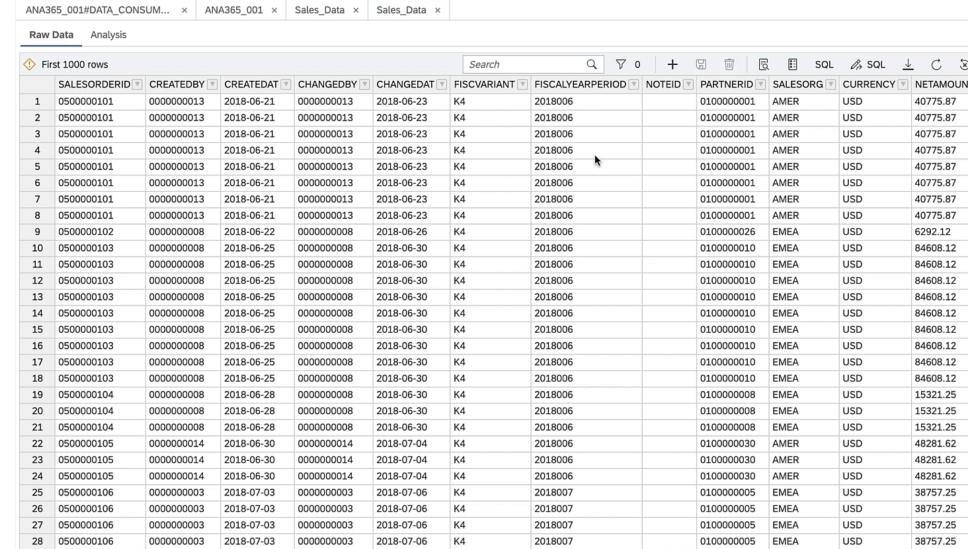
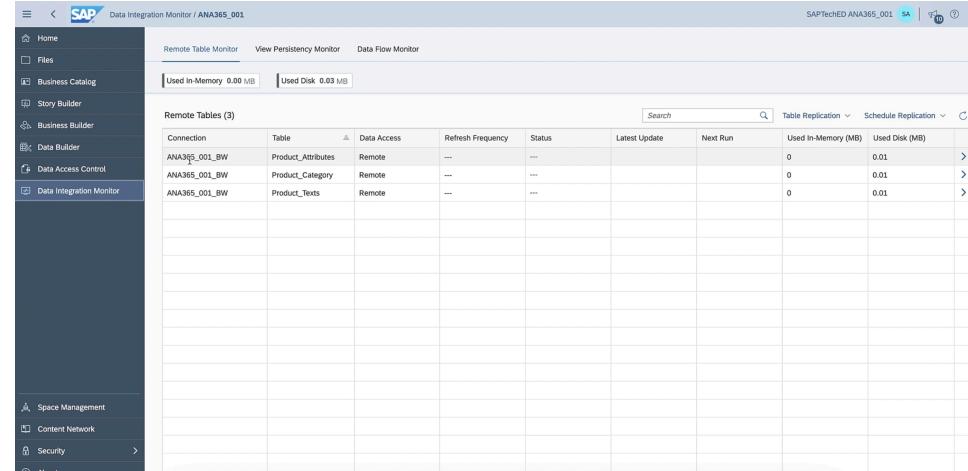
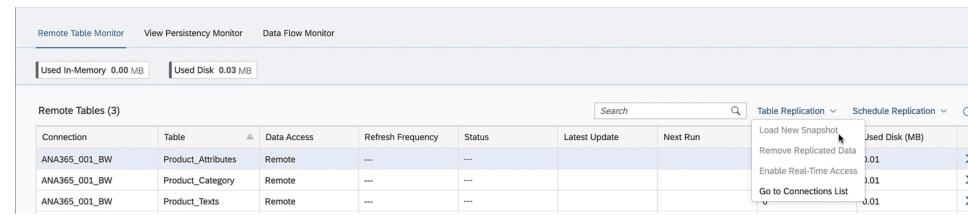
Explanation	Screenshot																									
187. Copy over the Database User Name, Host Name, Port and Password to for example notepad. In case you lost the password later you can always return to this dialog and request a new password.																										
188. Select the newly created database user and hit the Open Database Explorer button on the right.	<table border="1" data-bbox="518 1104 1475 1322"> <thead> <tr> <th colspan="5">Database Access</th> </tr> <tr> <th></th> <th>Create</th> <th>Delete</th> <th>Edit Privileges</th> <th>Open Database Explorer</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Database User Name</td> <td></td> <td></td> <td></td> <td>Data Ingestion</td> </tr> <tr> <td><input checked="" type="checkbox"/> ANA365_001#DATA_CONSUMPTION</td> <td>X Disabled</td> <td>✓ Enabled</td> <td>X Disabled</td> <td>Active</td> </tr> <tr> <td><input type="checkbox"/> ANA365_001#DATA_INGESTION</td> <td>✓ Enabled</td> <td>X Disabled</td> <td>X Disabled</td> <td>Active</td> </tr> </tbody> </table>	Database Access						Create	Delete	Edit Privileges	Open Database Explorer	<input type="checkbox"/> Database User Name				Data Ingestion	<input checked="" type="checkbox"/> ANA365_001#DATA_CONSUMPTION	X Disabled	✓ Enabled	X Disabled	Active	<input type="checkbox"/> ANA365_001#DATA_INGESTION	✓ Enabled	X Disabled	X Disabled	Active
Database Access																										
	Create	Delete	Edit Privileges	Open Database Explorer																						
<input type="checkbox"/> Database User Name				Data Ingestion																						
<input checked="" type="checkbox"/> ANA365_001#DATA_CONSUMPTION	X Disabled	✓ Enabled	X Disabled	Active																						
<input type="checkbox"/> ANA365_001#DATA_INGESTION	✓ Enabled	X Disabled	X Disabled	Active																						
189. In the SAP HANA Database Explorer (you can also use any other 3rd party SQL tool instead) hit the Add Database button.																										

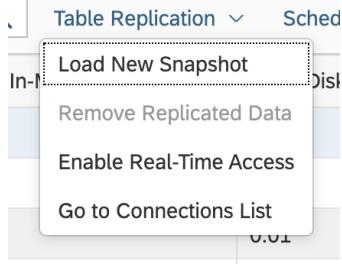
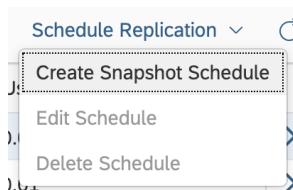
Explanation	Screenshot
<p>190. Select the Database Type SAP HANA Database and enter the host, Port number, User and Password which you copied over from the other dialog in SAP Data Warehouse Cloud. Make sure to check the checkboxes Save password and Connect to the database... Make sure to un-check the Verify the server's certificate... checkbox.</p>	
<p>191. Select the value help button.</p>	

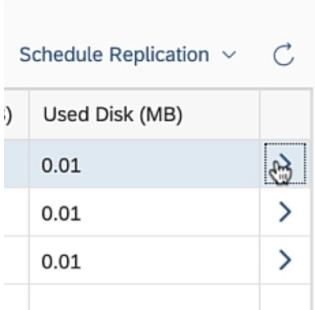
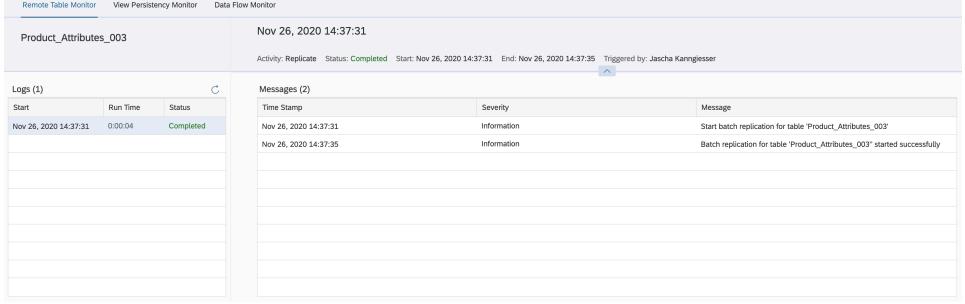
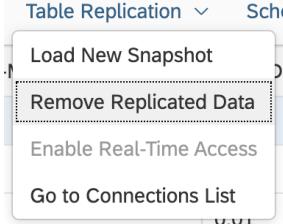
Explanation	Screenshot
<p>192. Choose the schema matching your space name, for example ANA365_001.</p>	
<p>193. Expand the database you just added and scroll down to Views.</p>	

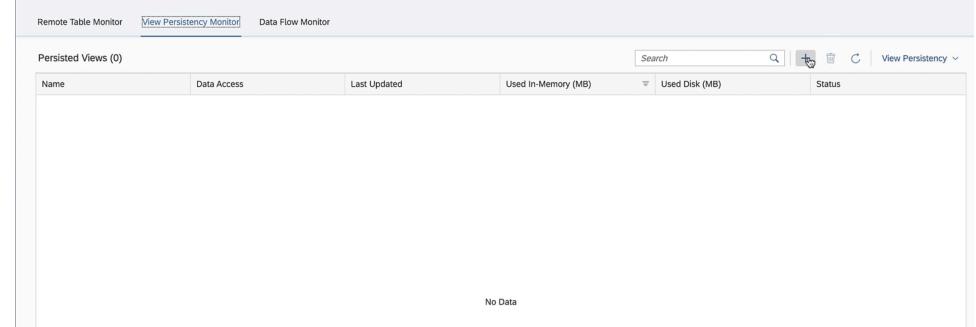
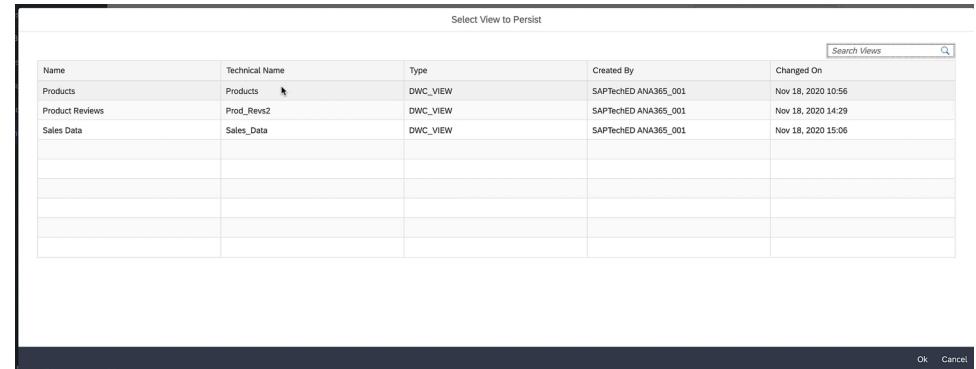
Explanation	Screenshot																																																																																										
194. Select Views and select your view Sales_Data from the list of available views below.																																																																																											
195. A 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.	 <table border="1" data-bbox="518 1056 1483 1537"> <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	
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																																																																																								

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

Explanation	Screenshot
<p>196. 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>197. 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 3rd 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>198. In SAP Data Warehouse Cloud navigate to the Data Integration Monitor.</p>	
<p>199. 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>200. 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>201. Refresh the page and wait until the Status changes to Available.</p>	<table border="1"> <thead> <tr> <th data-bbox="514 1347 742 1374">Data Access</th><th data-bbox="742 1347 971 1374">Refresh Frequency</th><th data-bbox="971 1347 1199 1374">Status</th><th data-bbox="1199 1347 1475 1374">Latest Update</th></tr> </thead> <tbody> <tr> <td data-bbox="514 1374 742 1402">Replicated</td><td data-bbox="742 1374 971 1402">None</td><td data-bbox="971 1374 1199 1402">Available</td><td data-bbox="1199 1374 1475 1402">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>202. 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															
203. 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.																
204. The Logs screen gives you an overview of all past and currently running replications.	 <table border="1"> <caption>Logs (1)</caption> <thead> <tr> <th>Start</th> <th>Run Time</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>Nov 26, 2020 14:37:31</td> <td>0:00:04</td> <td>Completed</td> </tr> </tbody> </table> <table border="1"> <caption>Messages (2)</caption> <thead> <tr> <th>Time Stamp</th> <th>Severity</th> <th>Message</th> </tr> </thead> <tbody> <tr> <td>Nov 26, 2020 14:37:31</td> <td>Information</td> <td>Start batch replication for table 'Product_Attributes_003'</td> </tr> <tr> <td>Nov 26, 2020 14:37:35</td> <td>Information</td> <td>Batch replication for table 'Product_Attributes_003' started successfully</td> </tr> </tbody> </table>	Start	Run Time	Status	Nov 26, 2020 14:37:31	0:00:04	Completed	Time Stamp	Severity	Message	Nov 26, 2020 14:37:31	Information	Start batch replication for table 'Product_Attributes_003'	Nov 26, 2020 14:37:35	Information	Batch replication for table 'Product_Attributes_003' started successfully
Start	Run Time	Status														
Nov 26, 2020 14:37:31	0:00:04	Completed														
Time Stamp	Severity	Message														
Nov 26, 2020 14:37:31	Information	Start batch replication for table 'Product_Attributes_003'														
Nov 26, 2020 14:37:35	Information	Batch replication for table 'Product_Attributes_003' started successfully														
205. 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 a 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
206. 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 for the View Persistence Monitor. At the top, there are tabs: 'Remote Table Monitor', 'View Persistence Monitor' (which is selected), and 'Data Flow Monitor'. Below the tabs is a search bar and a refresh button. The main area is titled 'Persisted Views (0)'. A table with columns 'Name', 'Data Access', 'Last Updated', 'Used In-Memory (MB)', 'Used Disk (MB)', and 'Status' is present. At the bottom of the table, it says 'No Data'.</p>
207. From the dialog select the Products view.	 <p>The screenshot shows a modal dialog titled 'Select View to Persist'. It contains a table with columns 'Name', 'Technical Name', 'Type', 'Created By', and 'Changed On'. There are three rows: 'Products' (Technical Name: Products, Type: DWC_VIEW, Created By: SAPTechED ANA365_001, Changed On: Nov 18, 2020 10:56), 'Product Reviews' (Technical Name: Prod_Rev2, Type: DWC_VIEW, Created By: SAPTechED ANA365_001, Changed On: Nov 18, 2020 14:29), and 'Sales Data' (Technical Name: Sales_Data, Type: DWC_VIEW, Created By: SAPTechED ANA365_001, Changed On: Nov 18, 2020 15:06). At the bottom right of the dialog are 'Ok' and 'Cancel' buttons.</p>
208. 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 has a table with columns 'Name', 'Data Access', 'Last Updated', 'Used In-Memory (MB)', 'Used Disk (MB)', and 'Status'. One row is shown: 'Products' (Data Access: Virtual, Last Updated: Nov 18, 2020 10:56, Used In-Memory (MB): 0, Used Disk (MB): 0, Status: Loading).</p>
209. Hit Refresh until the status changes to Available.	 <p>The screenshot shows the 'View Persistence' monitor. It has a search bar and a refresh button. Below is a table with columns 'Used In-Memory (MB)', 'Used Disk (MB)', and 'Status'. The data is: 'Used In-Memory (MB)': 0.14, 'Used Disk (MB)': 0.05, 'Status': Available.</p>
210. 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 & 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, ... hope you enjoyed it!</p>

www.sap.com/contactsap

© 2020 SAP SE or an SAP affiliate company. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company.

The information contained herein may be changed without prior notice. Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.

These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP SE or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP SE's or its affiliated companies' strategy and possible future developments, products, and/or platform directions and functionality are all subject to change and may be changed by SAP SE or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, and they should not be relied upon in making purchasing decisions.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies. See www.sap.com/copyright for additional trademark information and notices.