Dynamics 365 Customer Insights

Lab 7 Advanced Topics

Contents

Approximate Time - 120 mins

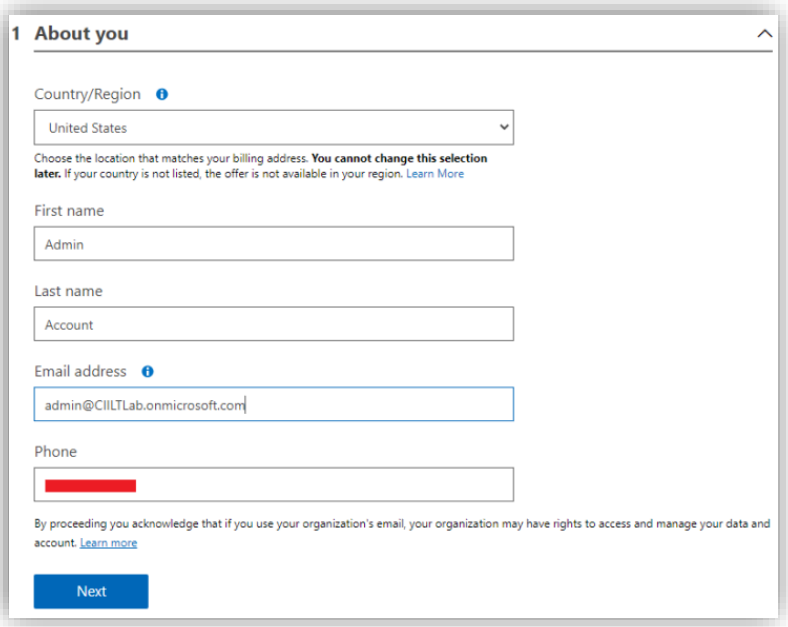
Exercise 1 - Setup an Azure Trial

You'll need an Azure trial account trial for this lab. The trial provides a $200 credit for 30 days to use any services within Azure that are not free. In our case we will need this for the Machine Learning Model integration with Customer Insights.

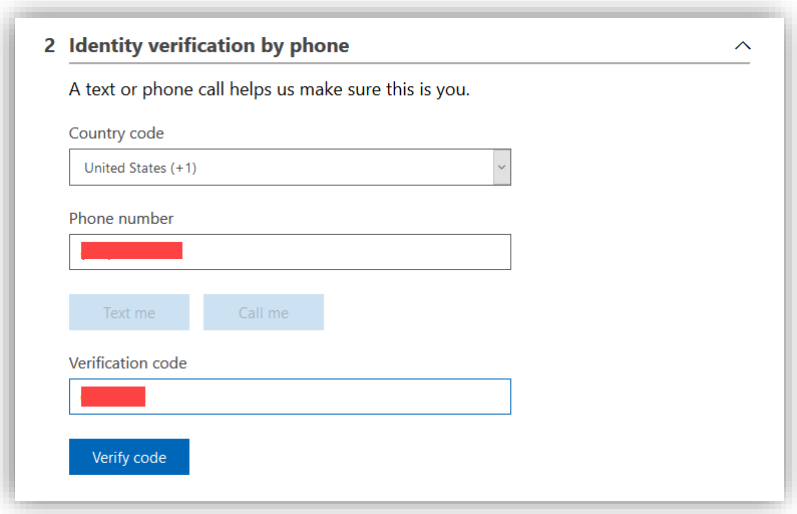
Note: Please be aware that as part of this process you will have to provide a credit card. This is ONLY for verification purposes and there will be no charges on the card. If you exceed the $200 credit before the end of the 30 days, you will simply no longer have access to any service that requires payment.

If you have previously signed up for Azure or an Azure Trial with a credit card, use a credit card you have not previously used as that will trigger Azure to not allow you to sign up for a trial.

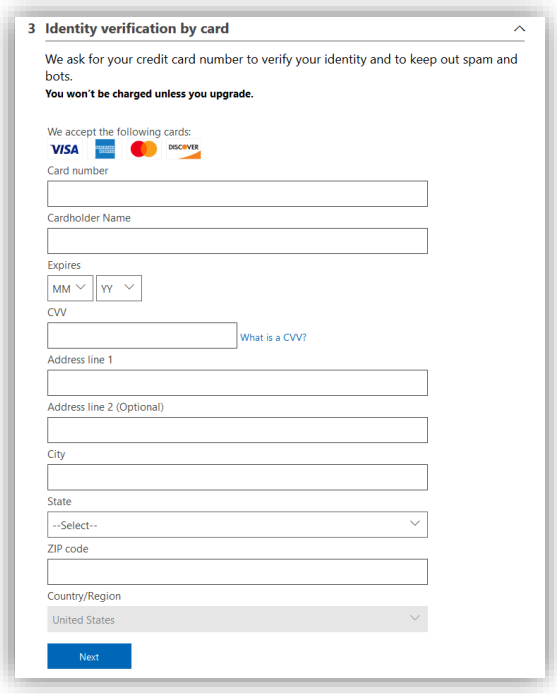
1. To begin, connect to **https://aka.ms/citryazure** and provide your info before clicking **Next**



2. Next you will be prompted to enter a phone number to receive a verification code via text or phone call. Enter your phone number and click on **Text me** or **Call me**. When you get the code enter it in the box and click **verify code.**



3. You will now need to enter credit card information to verify your identity and keep spam bots from creating accounts. You will not be charged unless you upgrade your subscription to a paid subscription.



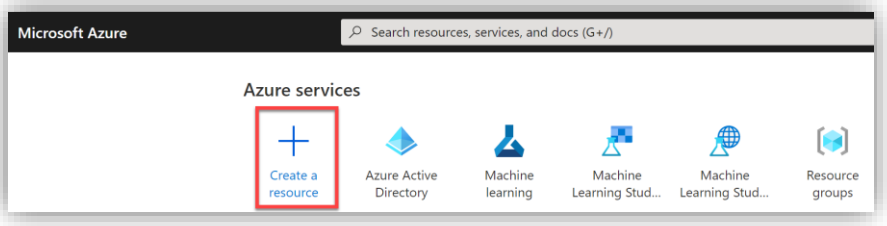
4. Finally, simply check the agreement box (read the agreements first of course), and click **Sign up.** Once complete you will get a **Welcome to Azure screen**

Exercise 2 - Integrating Azure ML Studio with Customer Insights

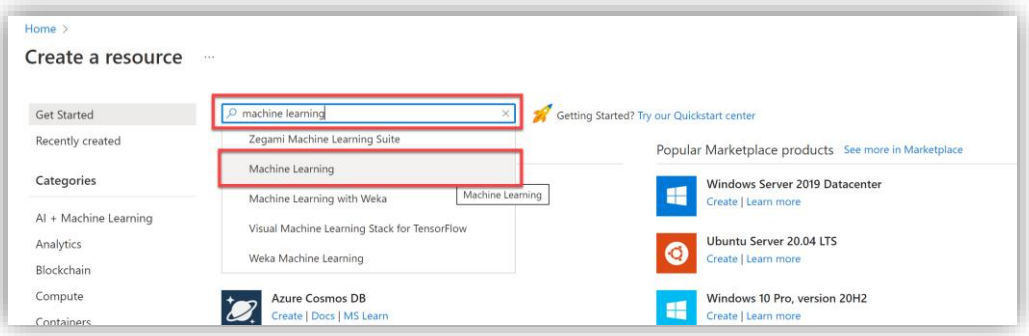
Task 1 – Create Azure ML Studio Workspace and Build Model

1. Go to the Azure portal: https://portal.azure.com

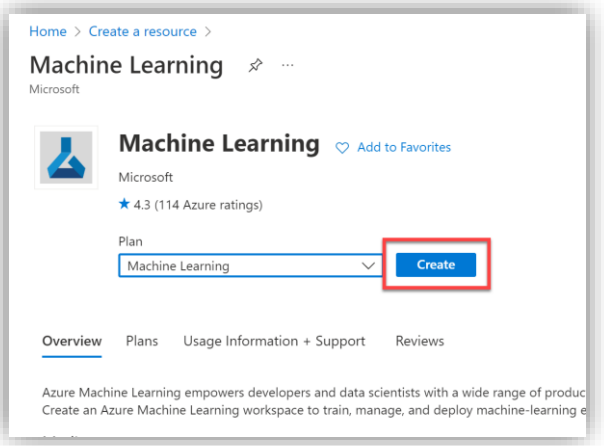
2. Click **+ Create a resource**



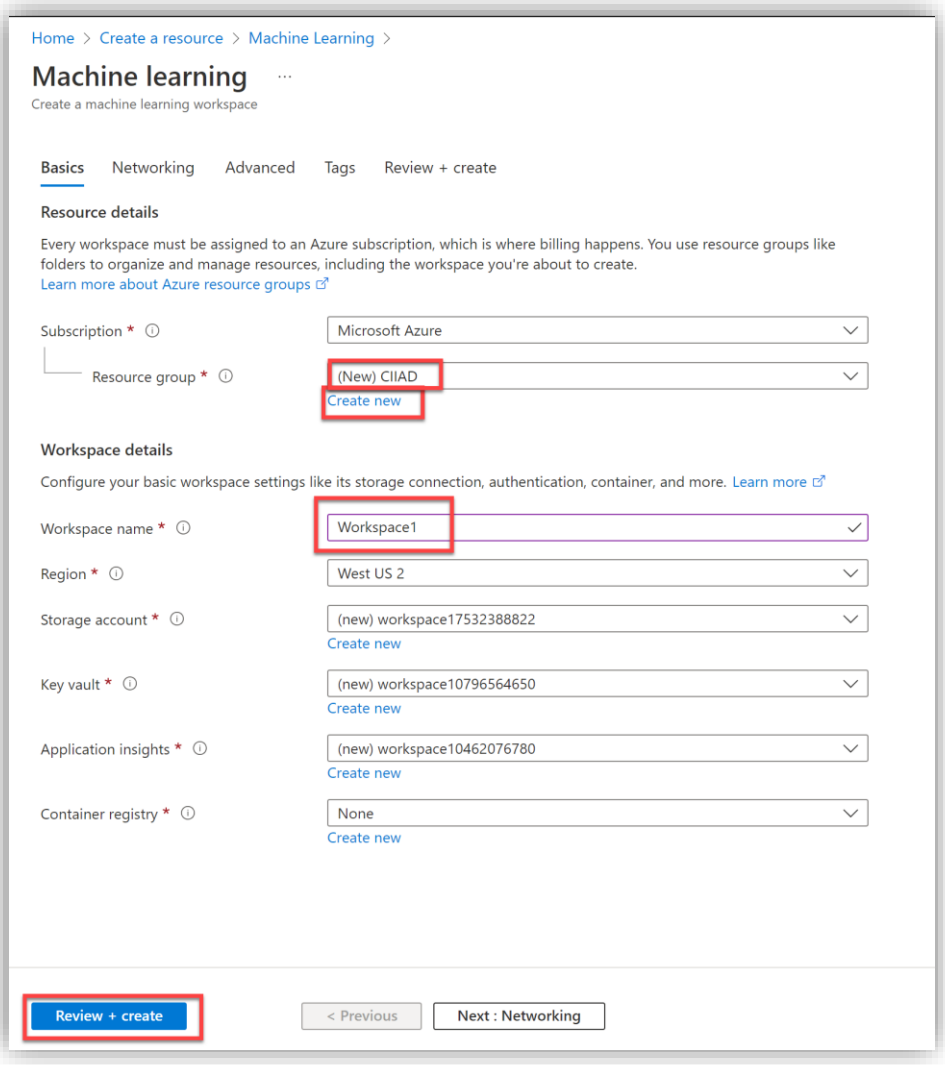
3. Search for and select **Machine Learning**



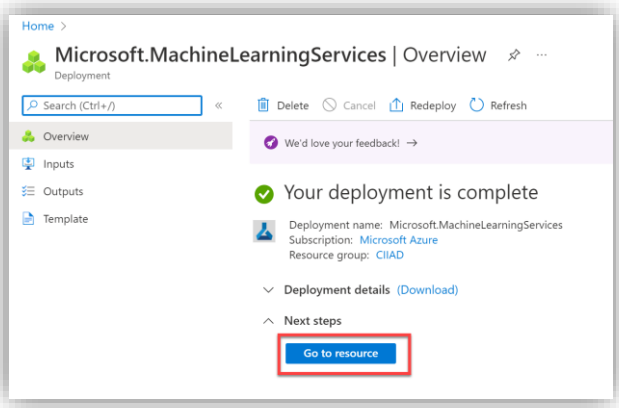
4. Click **Create**



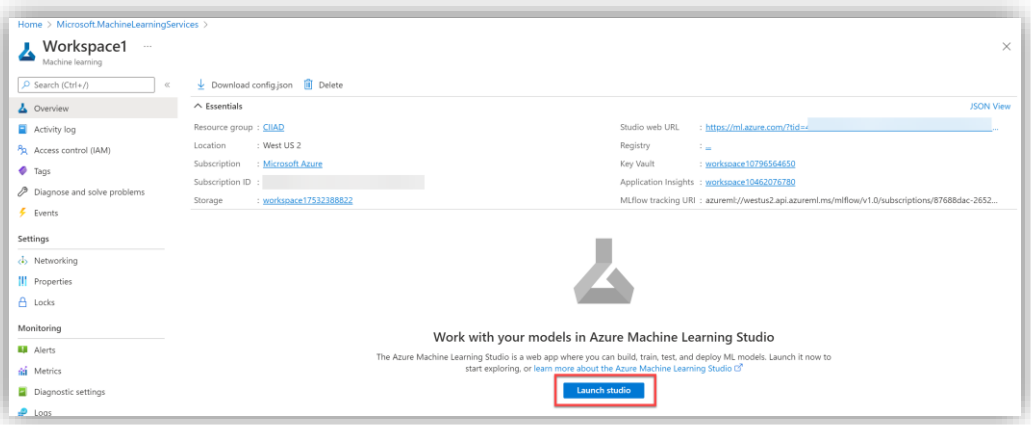
5. Under **Resource Group**, click **Create new** and then name it. Name the workspace and select a region near you. Click **Review + Create**



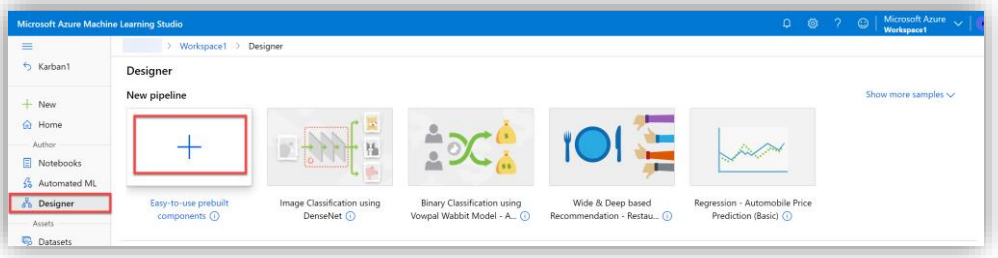
6. Select **Go to resource** after the deployment is complete



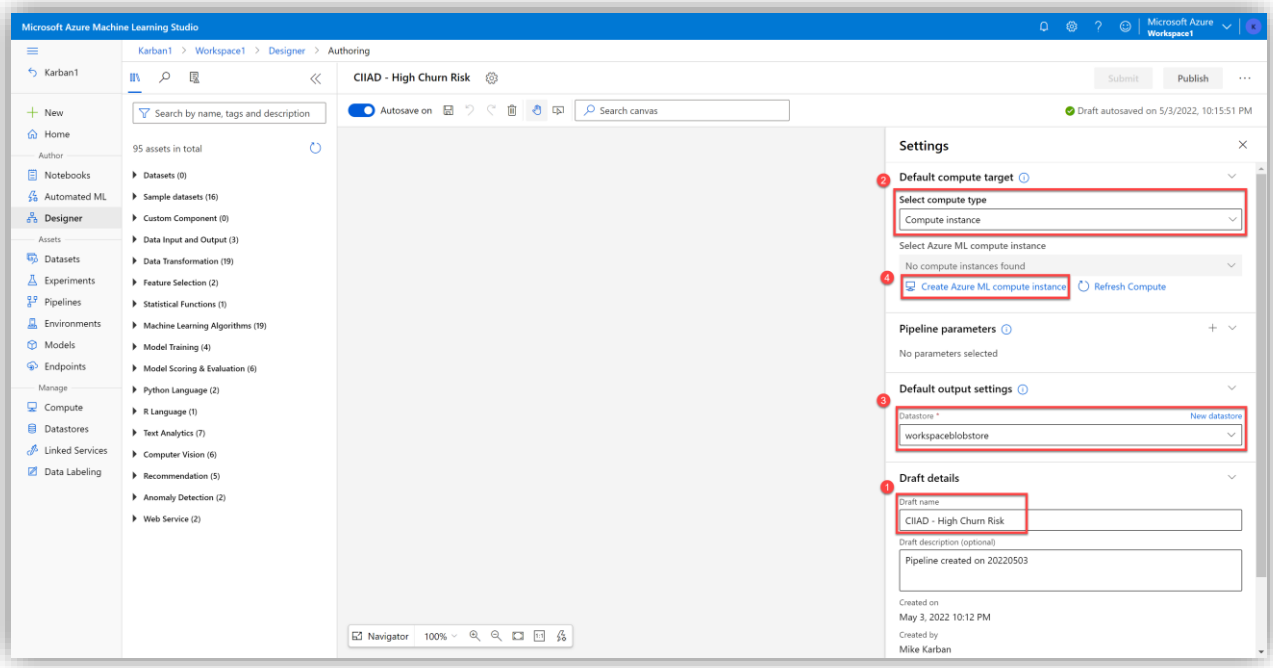
7. Click **Launch studio**



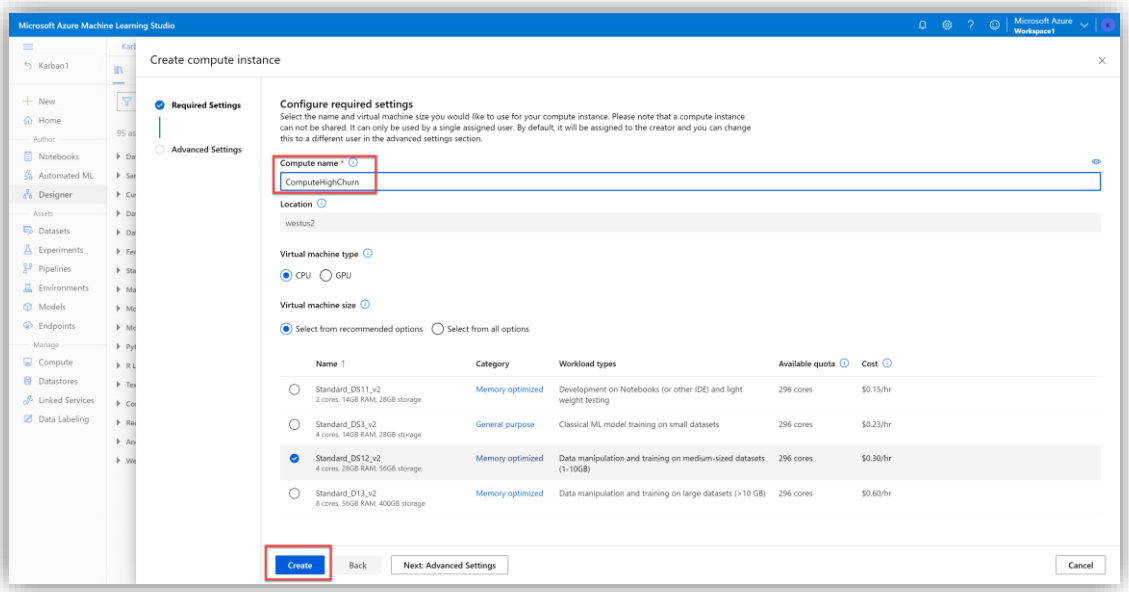
8. Select **Designer** on the left and then the **+** under **New pipeline (Easy-to-use prebuilt components)**



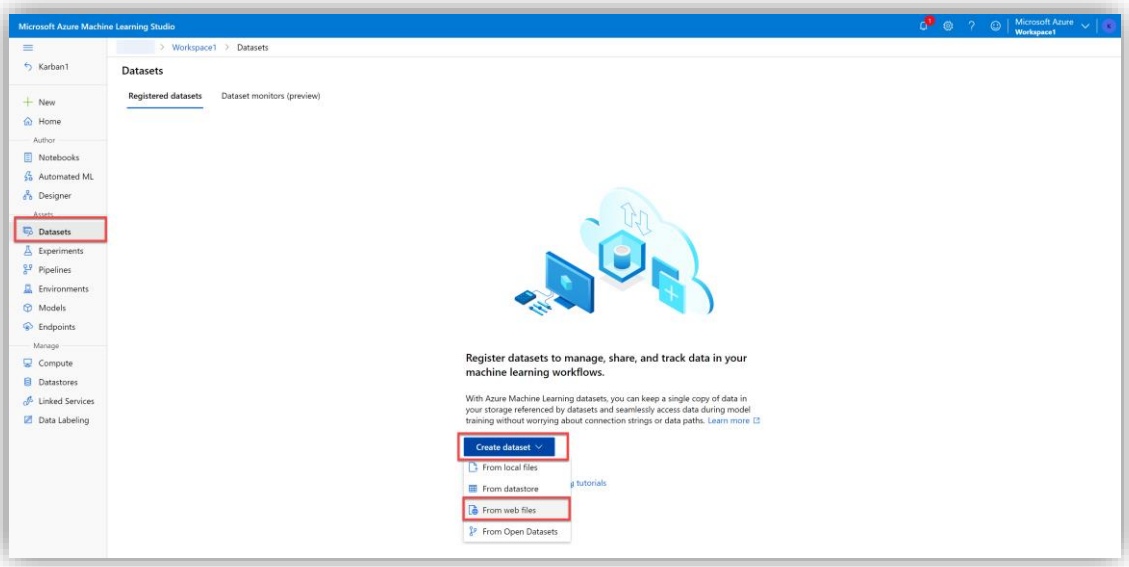
9. Add a **name** under **Draft details**, select the **compute type as Compute instance**, select **workspaceblobstore as the Datastore** and then click **Create Azure ML compute instance**



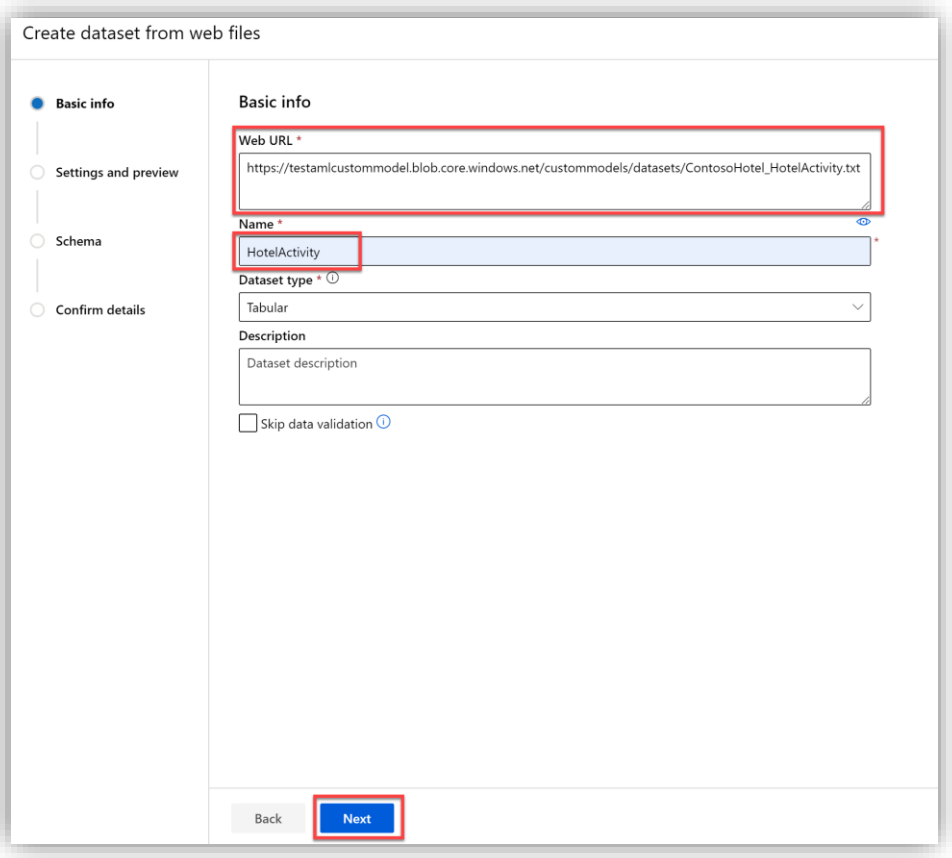
10. Add a **Compute name**, leave the defaults and click **Create**



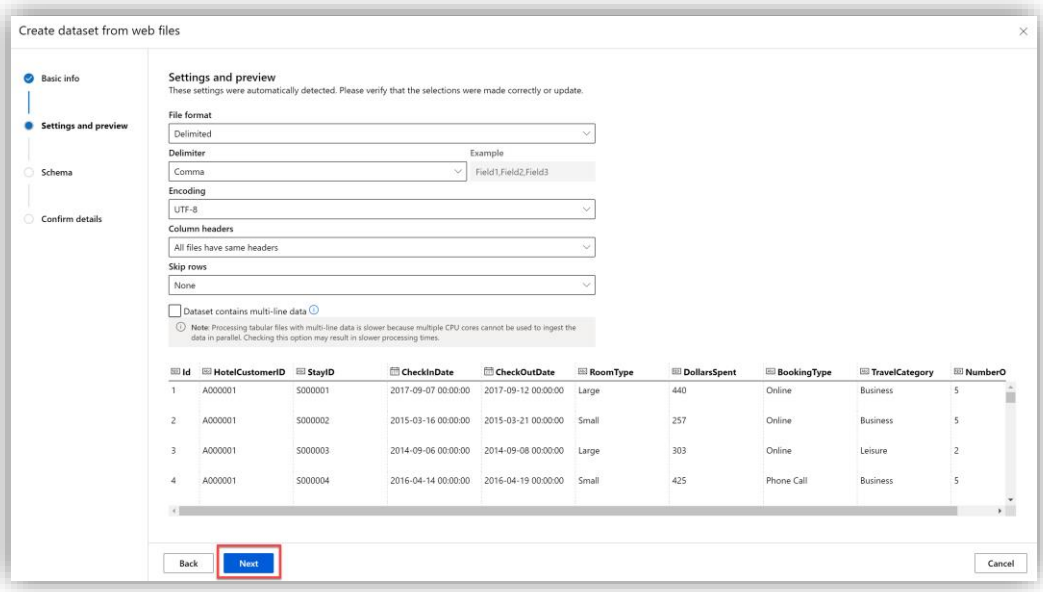
11. Now create the datasets. On the left under **Assets**, select **Datasets** and then **Create dataset -> From web files**



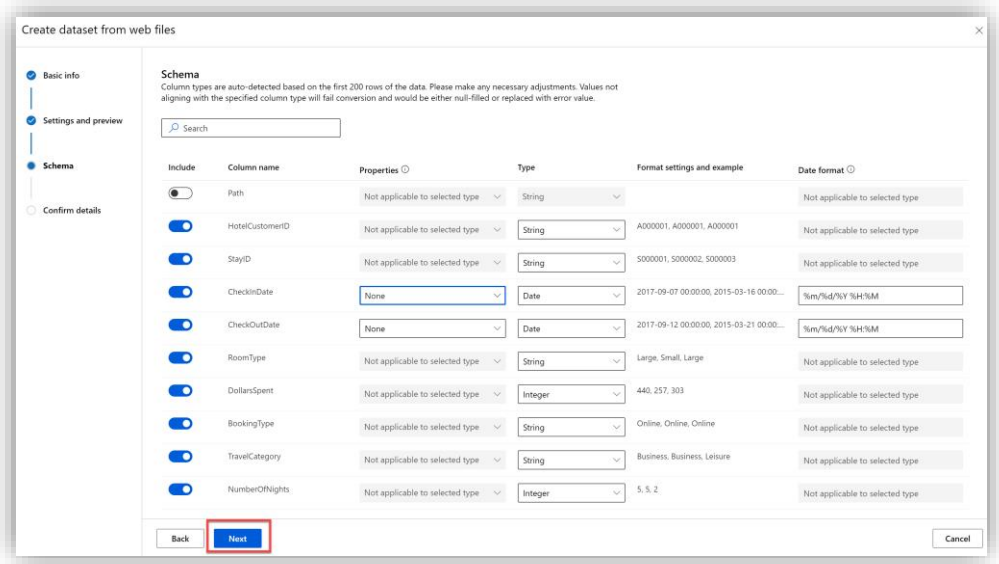
12. For the first dataset, name it **HotelActivity** and use the web URL: https://testamlcustommodel.blob.core.windows.net/custommodels/datasets/ContosoHotel_HotelActivity.txt

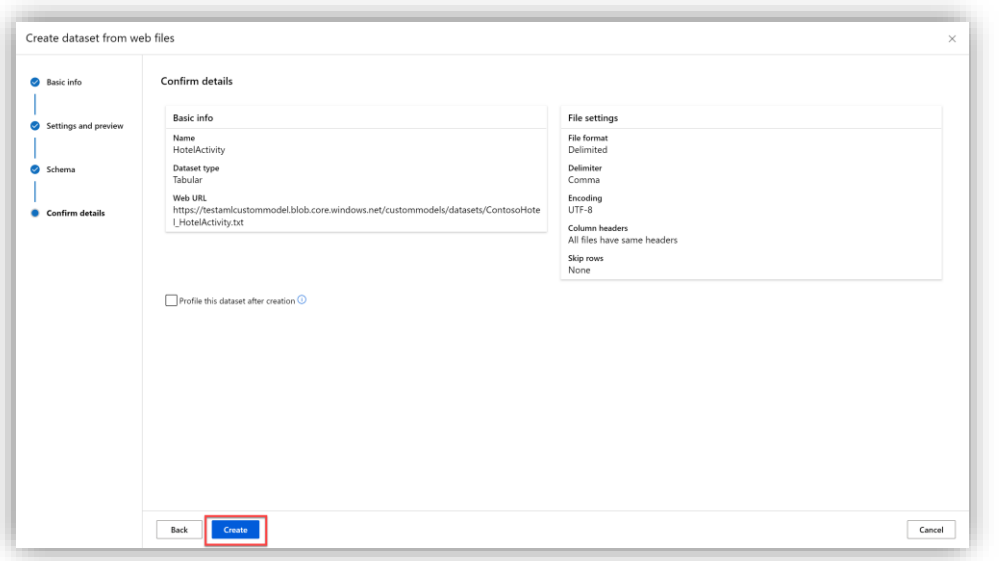


13. Click **Next**. Leave the defaults and then click **Next** again.



14. Leave the defaults again and select **Next**. Click **Create** on the confirm details step

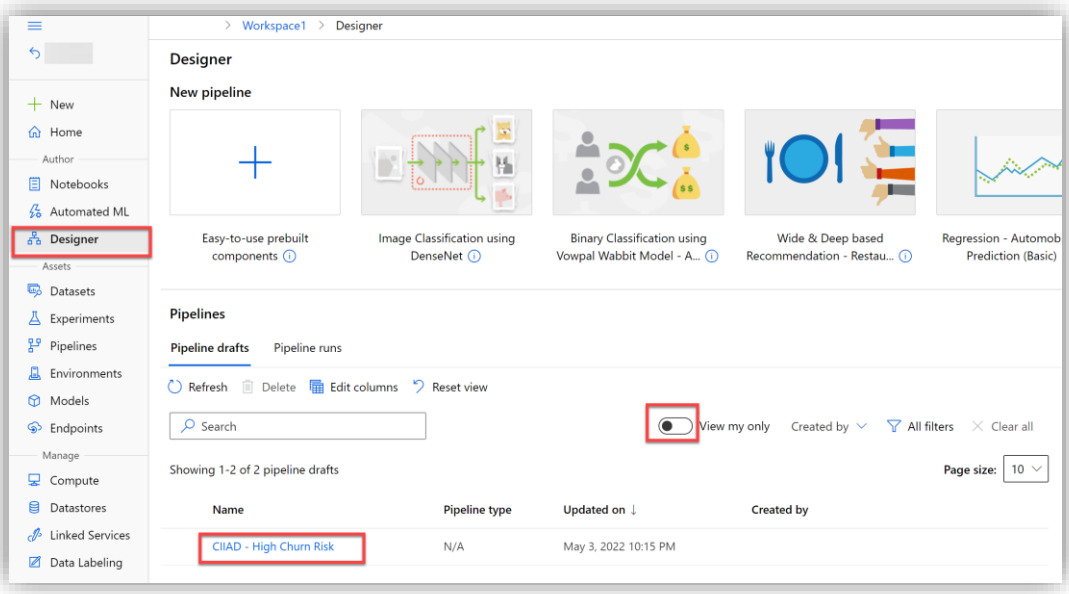




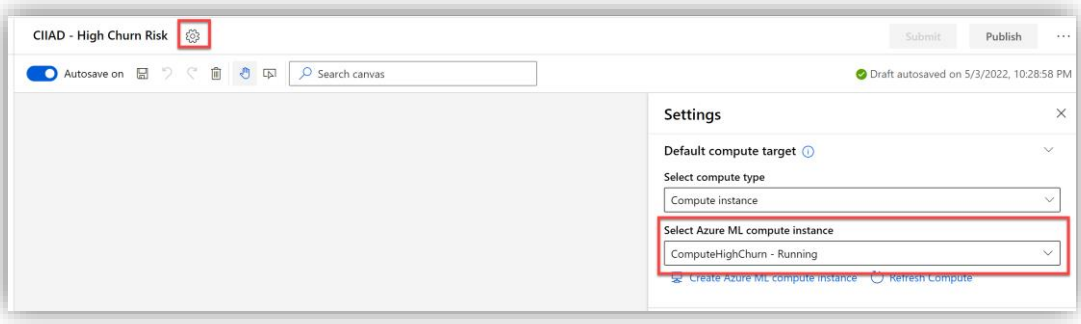
15. Repeat steps 11-14 to create 2 more datasets:

- Name: **Customers** | URL: https://testamlcustommodel.blob.core.windows.net/custommodels/datasets/Customer.csv
- Name: **ServiceUsage** | URL: https://testamlcustommodel.blob.core.windows.net/custommodels/datasets/ContosoHotel_ServiceUsage.txt

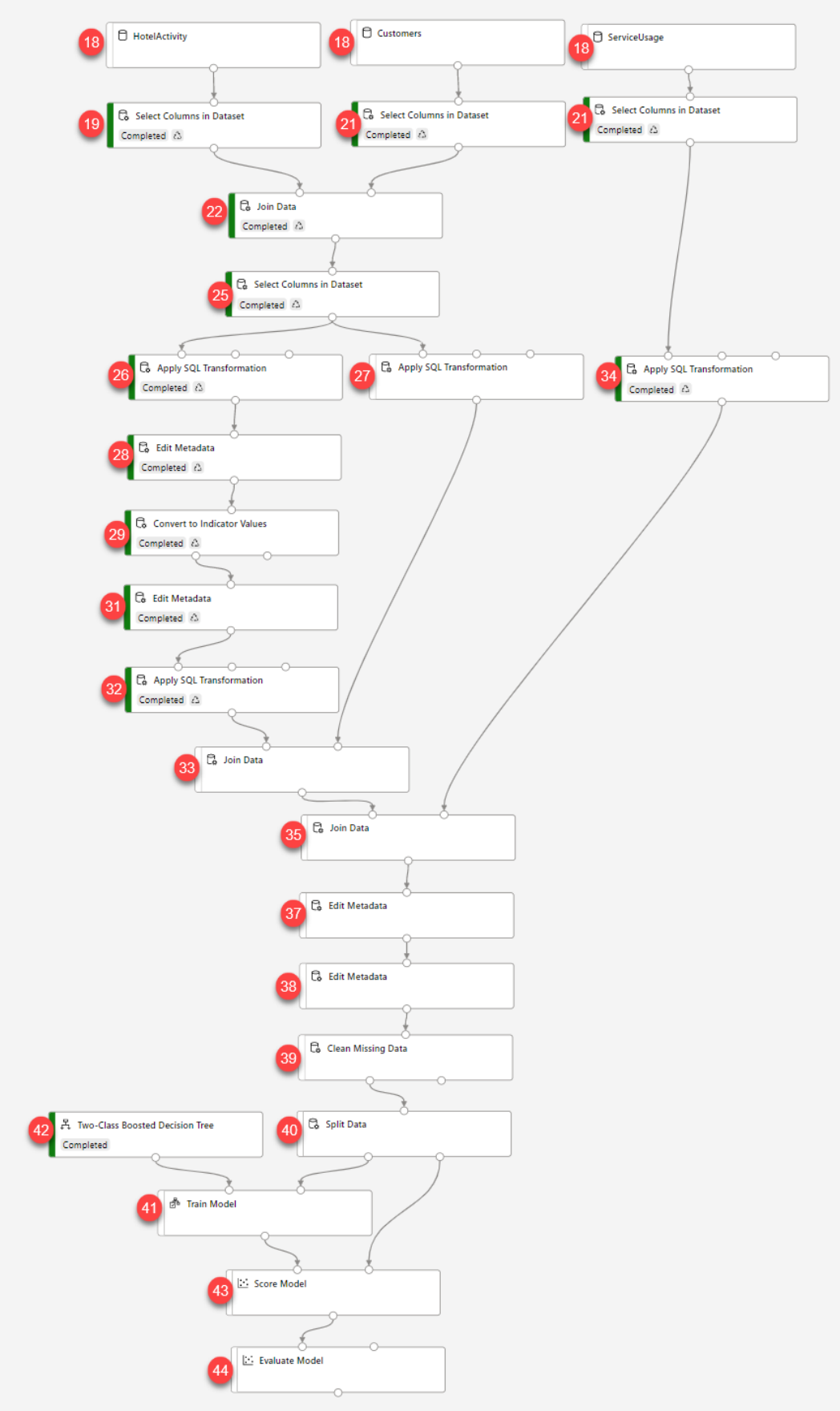
16. Click **Designer** on the left and then the Pipeline you created earlier. (if you don't see it listed, move the slider for View my only)



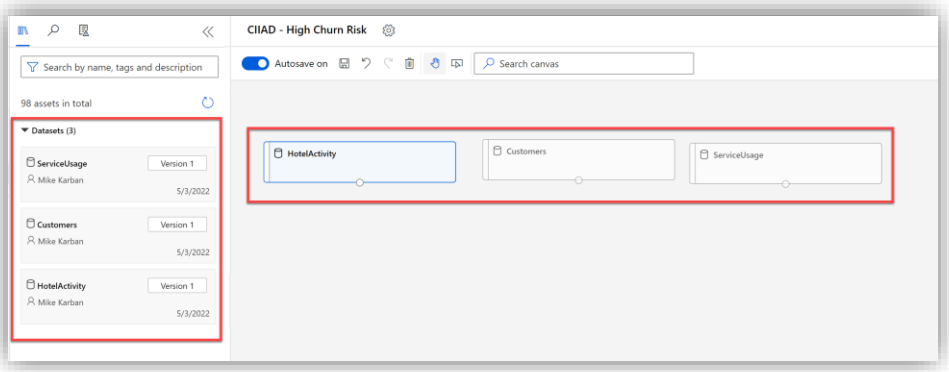
17. Click on the **settings gear** and select the **Azure ML compute instance** you created earlier



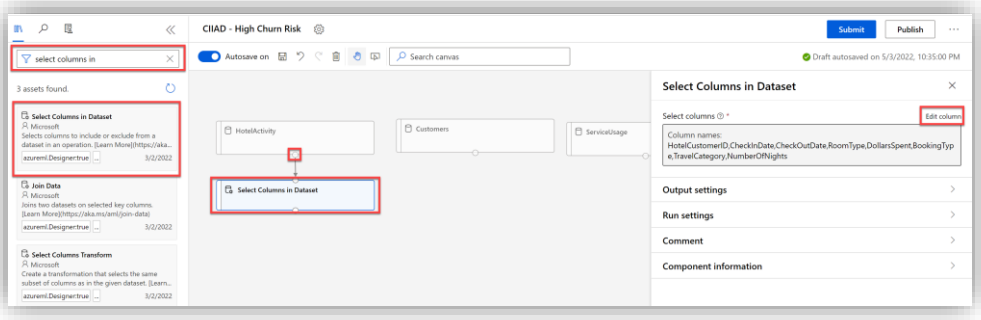
There are a lot of steps needed to create the model and it can be a little difficult to follow, so the next page has a reference diagram with the step numbers next to each component.


18 HotelActivity
18 Customers
18 ServiceUsage
19 Select Columns in Dataset Completed
21 Select Columns in Dataset Completed
21 Select Columns in Dataset Completed
22 Join Data Completed
25 Select Columns in Dataset Completed
26 Apply SQL Transformation Completed
27 Apply SQL Transformation
34 Apply SQL Transformation Completed
28 Edit Metadata Completed
29 Convert to Indicator Values Completed
31 Edit Metadata Completed
32 Apply SQL Transformation Completed
33 Join Data
35 Join Data
37 Edit Metadata
38 Edit Metadata
39 Clean Missing Data
42 Two-Class Boosted Decision Tree Completed
40 Split Data
41 Train Model
43 Score Model
44 Evaluate Model

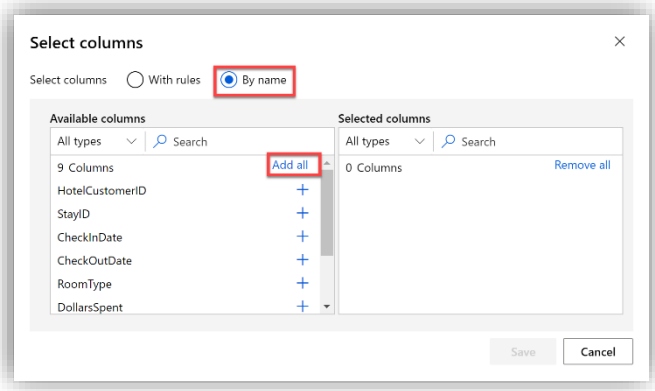
18. Expand **Datasets** in the Asset Library and drag the 3 you just created to the canvas in order from left to right: **HotelActivity**, **Customers** and **ServiceUsage**

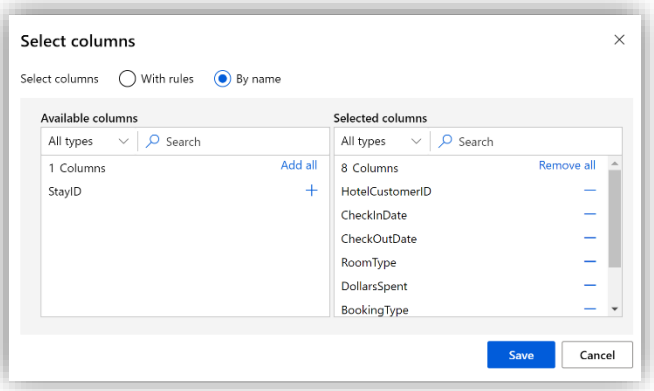


19. Add Select Columns in Dataset under **Hotel Activity** and connect them**. Click Edit column**



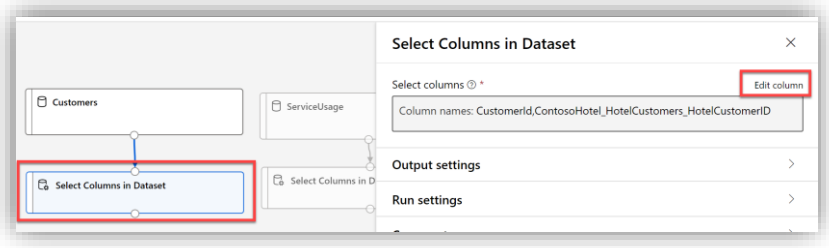
20. Add all of the columns except StayID. The quickest way is to select **By name**, **Add all** and click the **–** next to **StayID** to remove it. You could also click the + next to each column to add individually. Click **Save** when done.

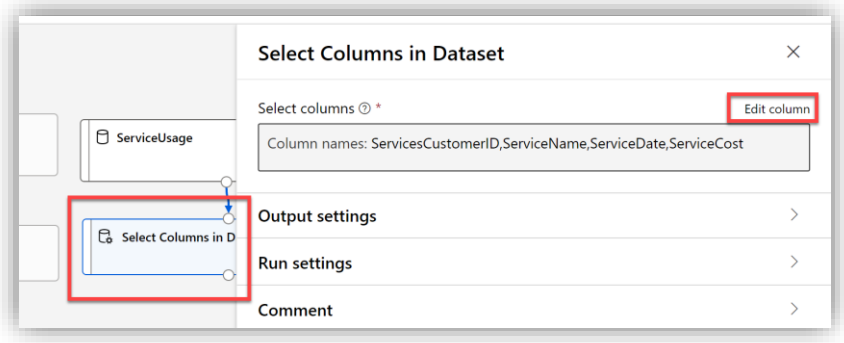




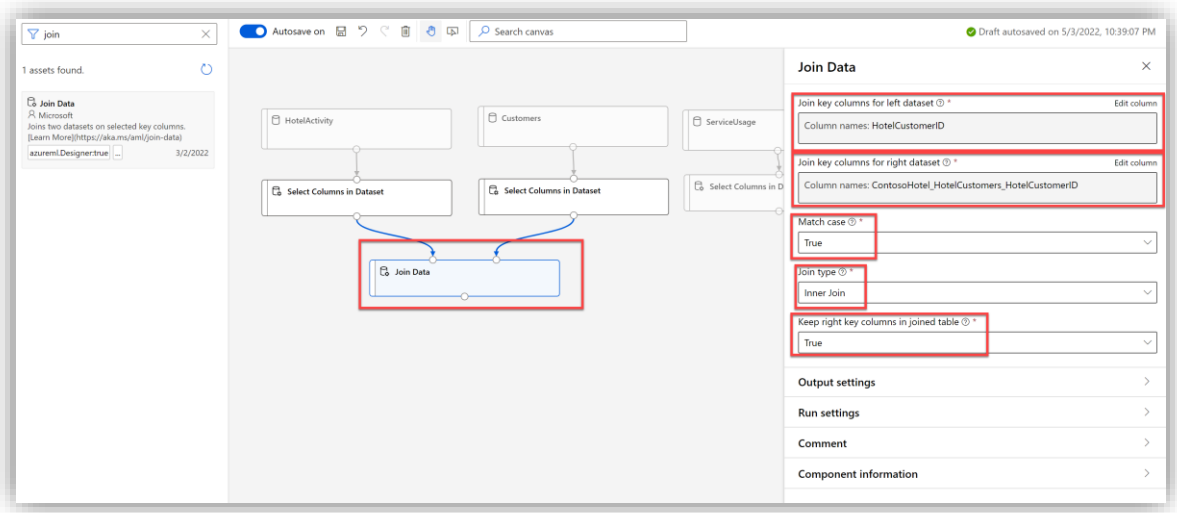
21. Now add a **Select Columns in Dataset** component (like step 19) to the **Customers** and **ServiceUsage** datasets.

- For **Customers**, add the columns: **CustomerID and ContosoHotel_HotelCustomers_HotelCustomerID**
- For **ServiceUsage**, add the columns: **ServiceCustomerID, ServiceName, ServiceCost and ServiceDate.**

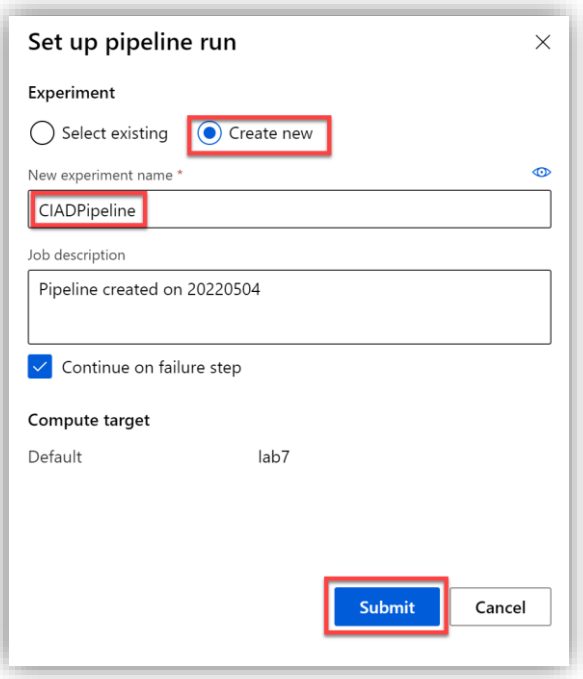




22. Add **Join Data**, connect it and change the settings as shown. **HotelCustomerID** for the left dataset join key columns and **ContosoHotelCustomers_HotelCustomerID** for the right dataset.

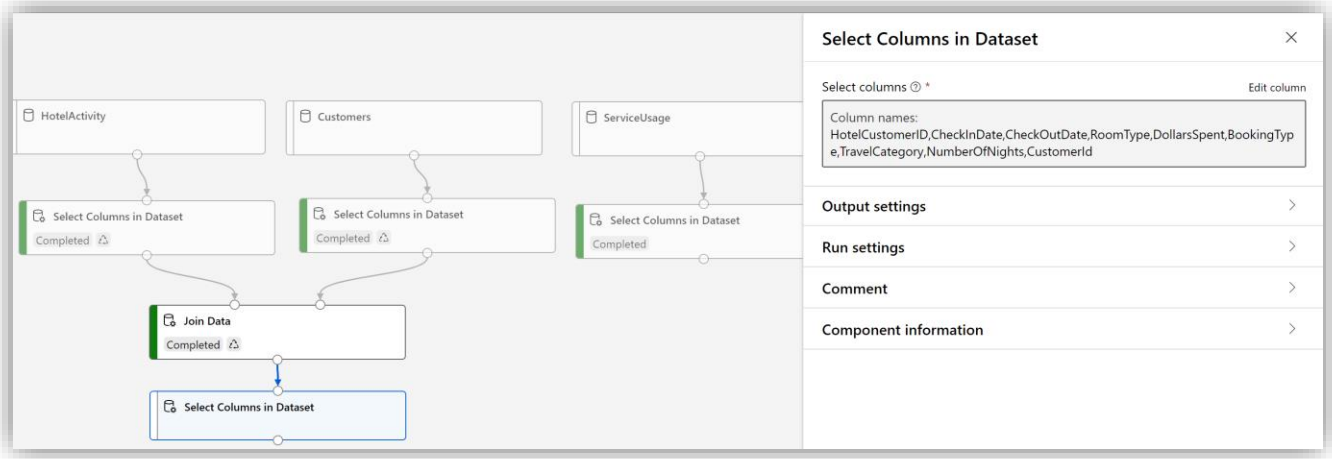


23. You need to process all the steps thus far, in order to use the outputs in future steps, so you'll need to submit now to process. Click **Submit** in the top right, select **Create new experiment** and name it (e.g. CIADPipeline). Click **Submit**



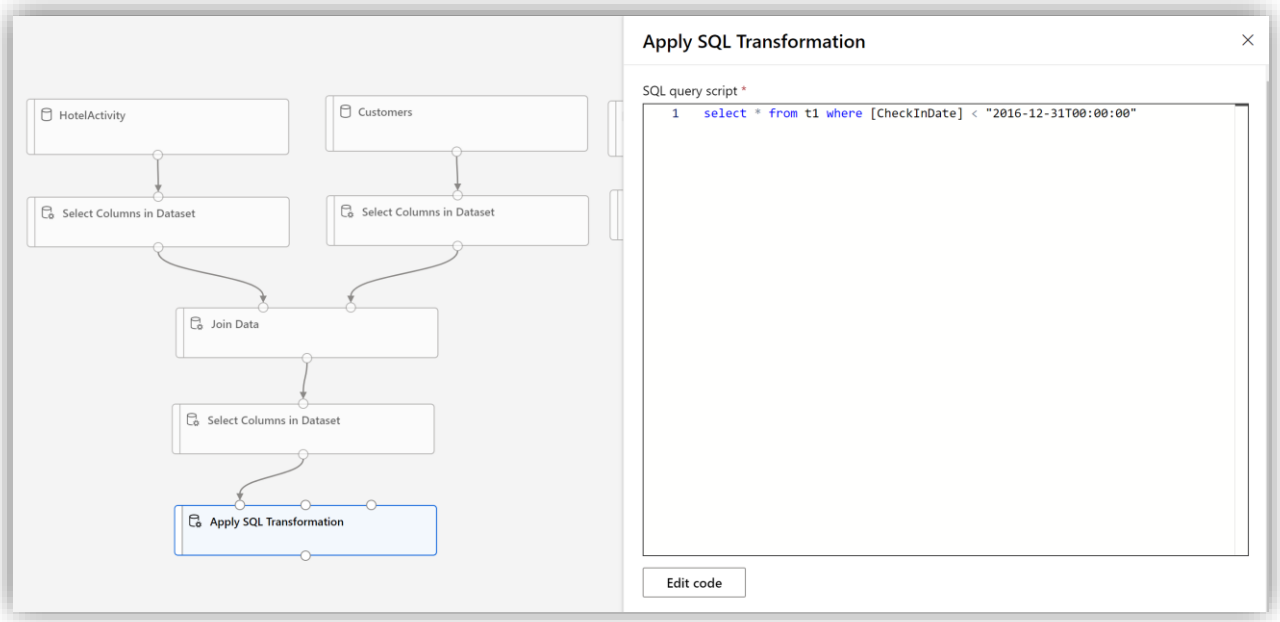
24. After it has completed running, continue to the next step

25. Add **Select Columns in Dataset** and connect to **Join Data**. Edit columns and select the following (All columns except ContosoHotel_HotelCustomers_HotelCustomerID): **HotelCustomerID, CheckInDate, CheckOutDate, RoomType, DollarsSpent, BookingType, TravelCategory, NumberOfNights, CustomerId**



26. Add **Apply SQL Transformation** under connect **Join Data** to the left side. Add the following **SQL query script** to filter the data:

```
select * from t1 where [CheckInDate] < "2016-12-31T00:00:00"
```

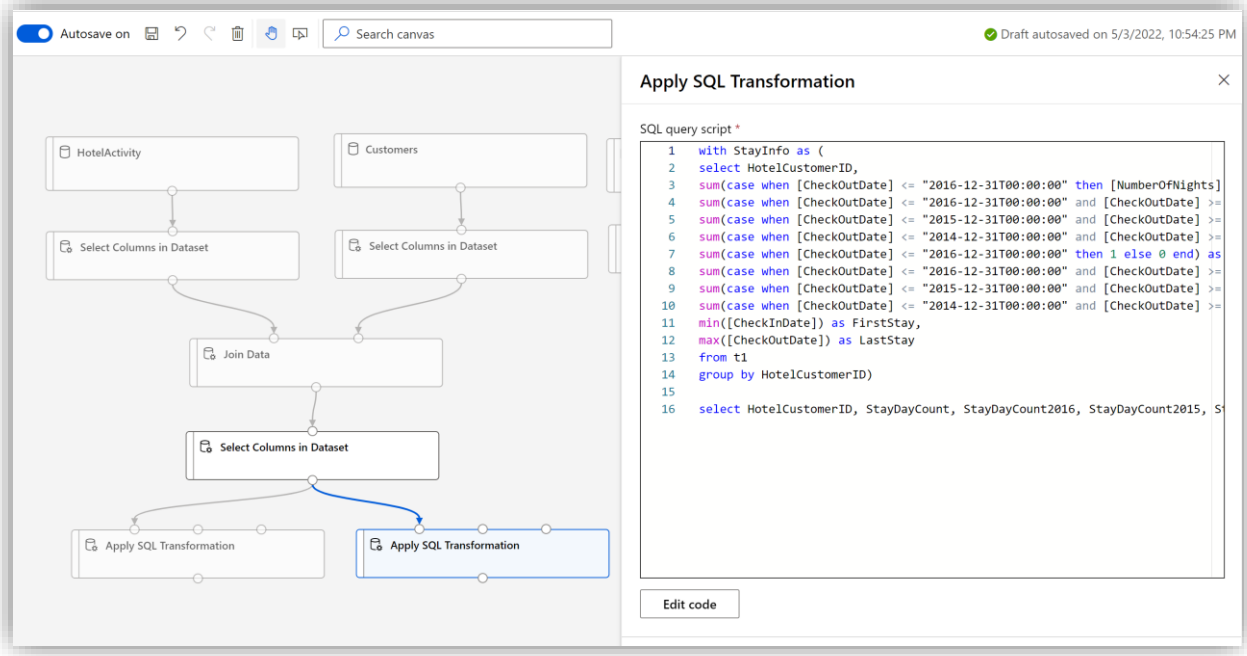


27. Add **Apply SQL Transformation** to the right of the one you just did and connect it's left side to the same **Select Columns in Dataset**. Enter the following **SQL query script** (note it continues onto the next page):

```
with StayInfo as (
select HotelCustomerID,
sum(case when [CheckOutDate] <= "2016-12-
31T00:00:00" then [NumberOfNights] else 0 end) as StayDayCount,
sum(case when [CheckOutDate] <= "2016-12-31T00:00:00" and [CheckOutDate] >= "2015-01-
01T00:00:00" then [NumberOfNights] else 0 end) as StayDayCount2016,
sum(case when [CheckOutDate] <= "2015-12-31T00:00:00" and [CheckOutDate] >= "2014-01-
01T00:00:00" then [NumberOfNights] else 0 end) as StayDayCount2015,
sum(case when [CheckOutDate] <= "2014-12-31T00:00:00" and [CheckOutDate] >= "2013-01-
01T00:00:00" then [NumberOfNights] else 0 end) as StayDayCount2014,
sum(case when [CheckOutDate] <= "2016-12-31T00:00:00" then 1 else 0 end) as StayCount,
sum(case when [CheckOutDate] <= "2016-12-31T00:00:00" and [CheckOutDate] >= "2015-01-
01T00:00:00" then 1 else 0 end) as StayCount2016,
sum(case when [CheckOutDate] <= "2015-12-31T00:00:00" and [CheckOutDate] >= "2014-01-
01T00:00:00" then 1 else 0 end) as StayCount2015,
sum(case when [CheckOutDate] <= "2014-12-31T00:00:00" and [CheckOutDate] >= "2013-01-
01T00:00:00" then 1 else 0 end) as StayCount2014,
min([CheckInDate]) as FirstStay,
max([CheckOutDate]) as LastStay
from t1
```

```
group by HotelCustomerID)

select HotelCustomerID, StayDayCount, StayDayCount2016, StayDayCount2015, StayDayCount2014, StayCount,
 StayCount2016, StayCount2015, StayCount2014, julianday("2016-12-
31T00:00:00") - julianday(FirstStay) as UsageTenure, case when LastStay > "2016-12-
31T00:00:00" then 0 else 1 end as Label from StayInfo;
```

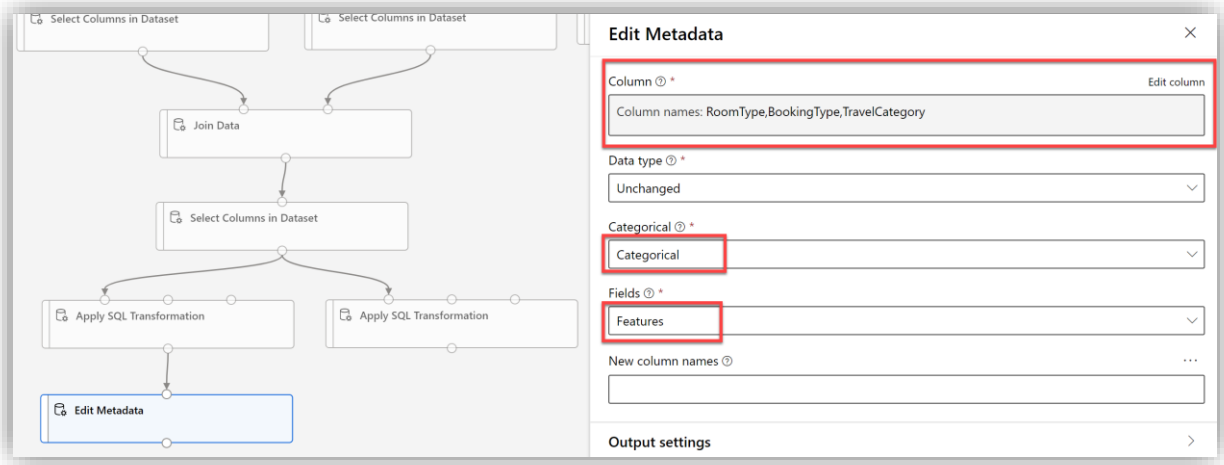


28. Add **Edit Metdata** under the **SQL Transformation** on the left and change these settings:

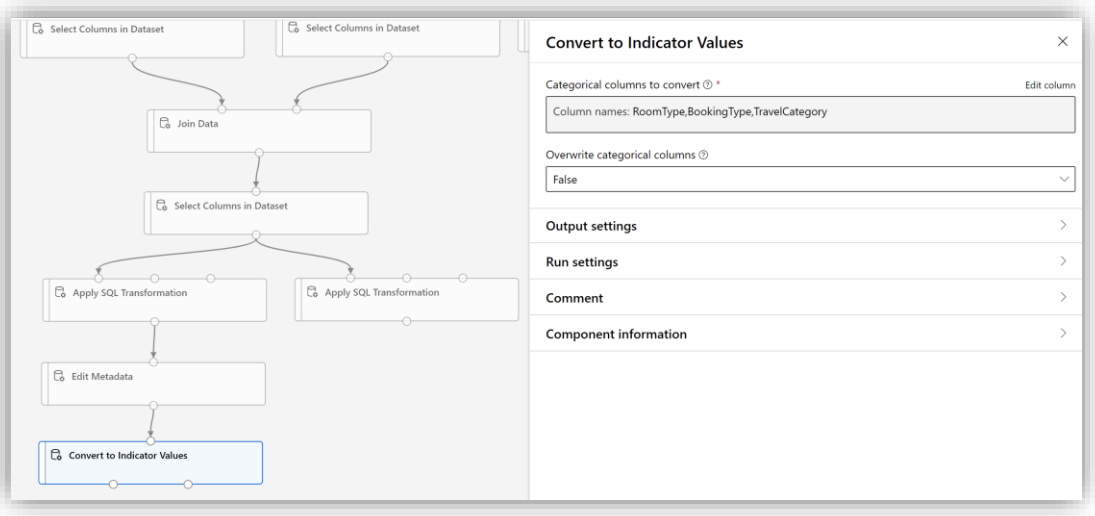
Columns: **RoomType, BookingType, TravelCategory**

Categorical: **Categorical**

Fields: **Features**

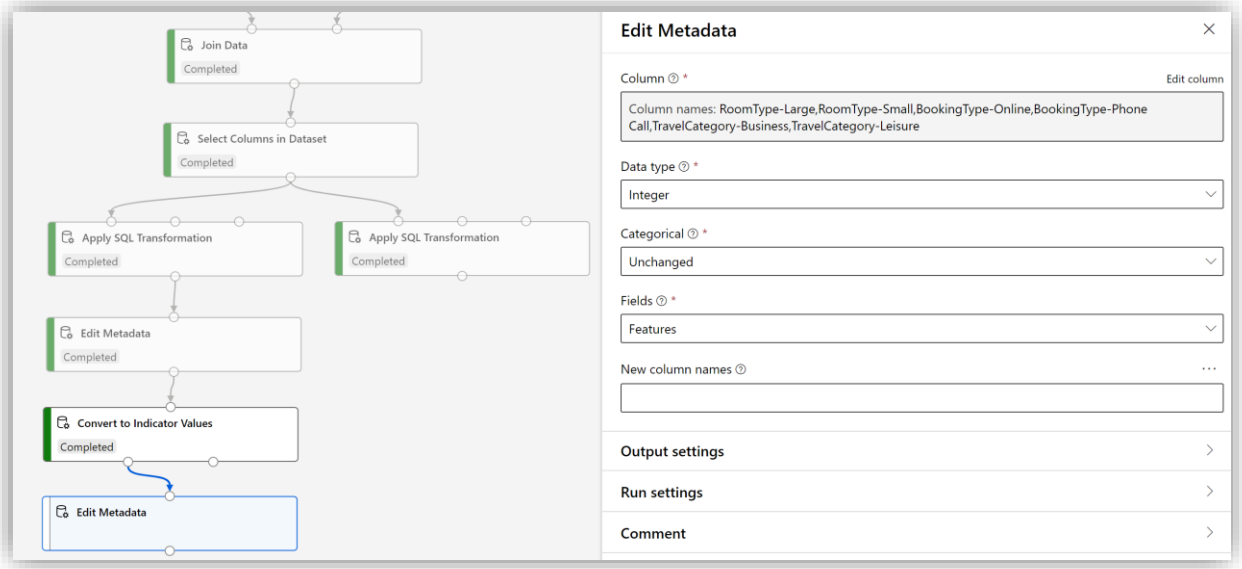


29. Add **Convert to Indicator Values** under **Edit Metadata** and add the **Categorical columns to convert**: **RoomType, BookingType, TravelCategory**



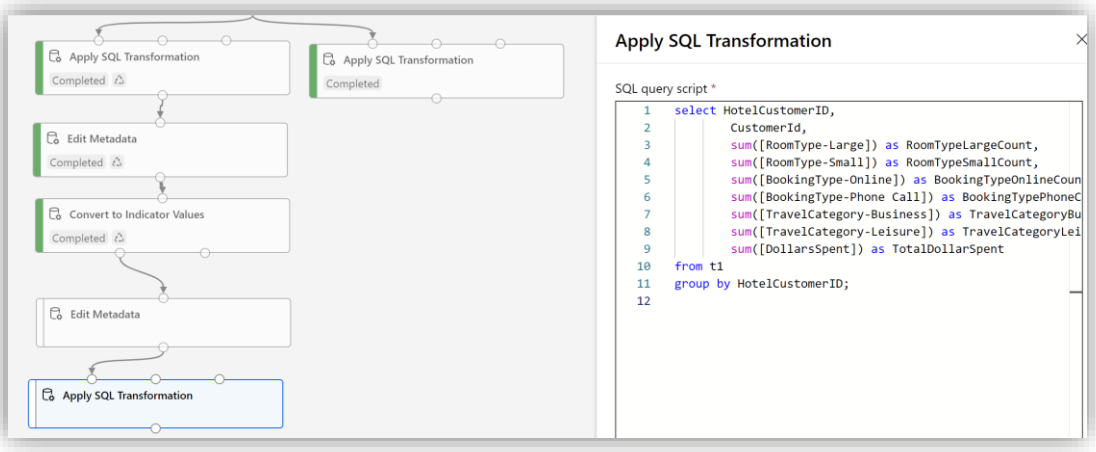
30. Before moving to the next step, it must be run/submitted again to get the latest steps up to date. Click **Submit** and **Submit** again. This will use the existing pipeline that you ran last time. Move to the next step when it is completed.

31. Add **Edit Metadata** and connect to **Convert Indicator Values**. Change the following settings: **Data type – Integer**, **Fields – Features** and add these columns**: RoomType-Large,RoomType-Small,BookingType-Online,BookingType-Phone Call,TravelCategory-Business,TravelCategory-Leisure**

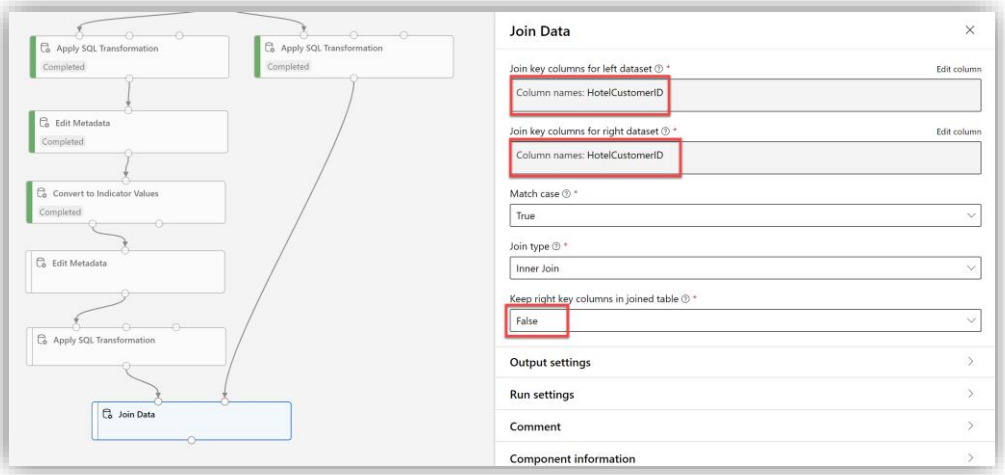


32. Add **Apply SQL Transformation** and connect the left side to **Edit Metadata**. **Add this SQL query script:**

```
select HotelCustomerID,
        CustomerId,
        sum([RoomType-Large]) as RoomTypeLargeCount,
        sum([RoomType-Small]) as RoomTypeSmallCount,
        sum([BookingType-Online]) as BookingTypeOnlineCount,
        sum([BookingType-Phone Call]) as BookingTypePhoneCallCount,
        sum([TravelCategory-Business]) as TravelCategoryBusinessCount,
        sum([TravelCategory-Leisure]) as TravelCategoryLeisureCount,
        sum([DollarsSpent]) as TotalDollarSpent
from t1
group by HotelCustomerID;
```



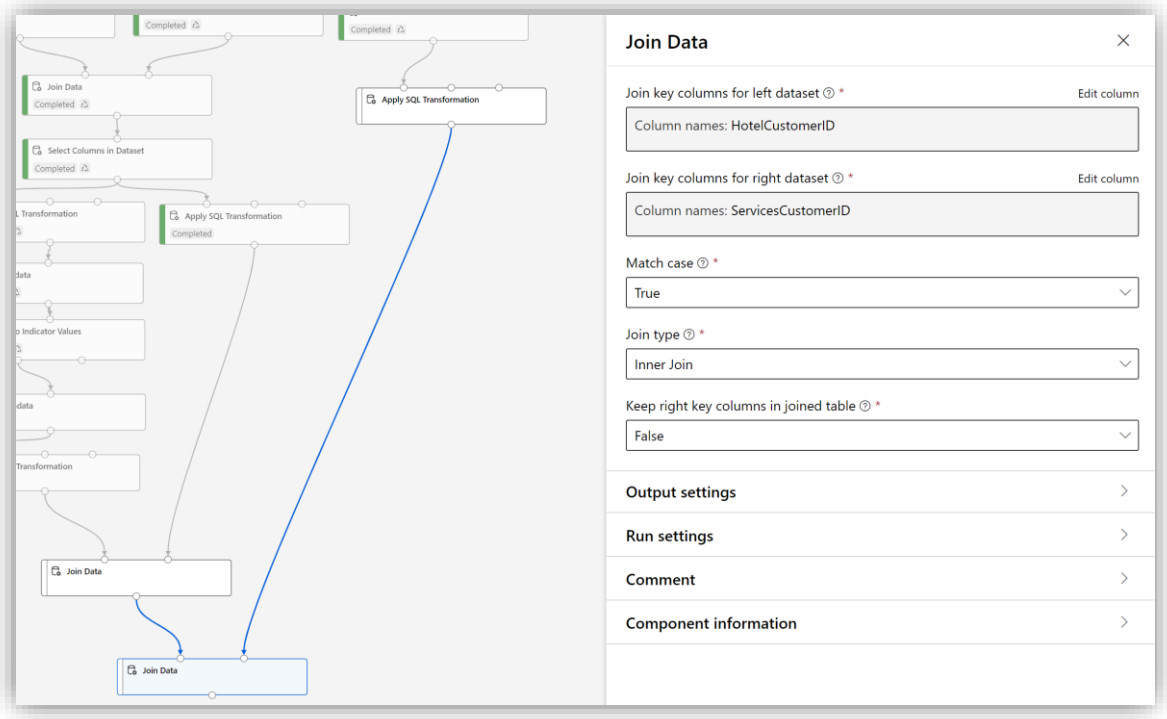
33. Add **Join Data** and connect to the **SQL Transformation** you just created and the **SQL Transformation** from step 27. Join key column for **left dataset is HotelCustomerID** and Join key column for **right dataset is HotelCustomerID**. Set **Keep right key columns in joined table to False**



34. Add **SQL Transformation** to **Select Columns in Dataset** under **ServiceUsage** in the top right. Connect to the **left side** and use this **SQL query script:**

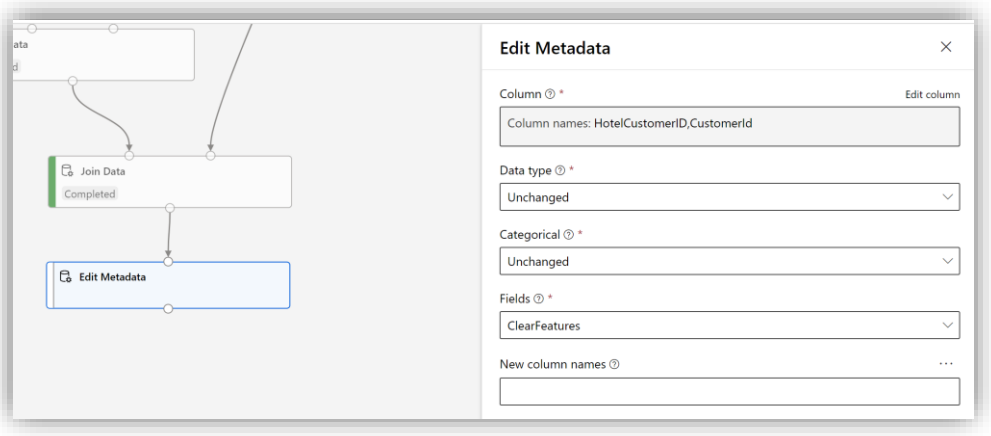
```
select ServicesCustomerID,
sum(case when ServiceName='concierge' then ServiceCost else 0 end) as ConciergeUsage,
sum(case when ServiceName='courier' then ServiceCost else 0 end) as CourierUsage,
sum(case when ServiceName='dry_cleaning' then ServiceCost else 0 end) as DryCleaningUsage,
sum(case when ServiceName='gym' then ServiceCost else 0 end) as GymUsage,
sum(case when ServiceName='phone' then ServiceCost else 0 end) as PhoneUsage,
sum(case when ServiceName='restaurant' then ServiceCost else 0 end) as RestaurantUsage,
sum(case when ServiceName='spa' then ServiceCost else 0 end) as SpaUsage,
sum(case when ServiceName='television' then ServiceCost else 0 end) as TelevisionUsage,
sum(case when ServiceName='wifi' then ServiceCost else 0 end) as WifiUsage
from t1 where ServiceDate < "2016-12-31T00:00:00"
group by ServicesCustomerID;
```

35. Add **Join Data** and connect it to the **Join Data in step 33** and the **SQL Transformation from step 34.** Join key column for **left dataset is HotelCustomerID** and Join key column for **right dataset is ServicesCustomerID**. Set **Keep right key columns in joined table to False.**

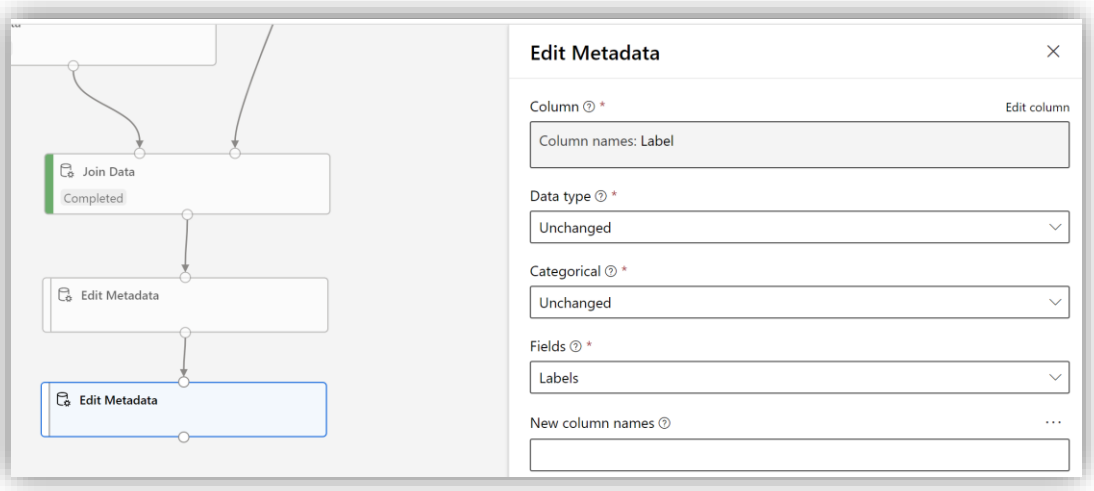


36. Before moving to the next step, it must be run/submitted again to get the latest steps up to date. Click **Submit** and **Submit** again. This will use the existing pipeline that you ran last time. Move to the next step when it is completed.

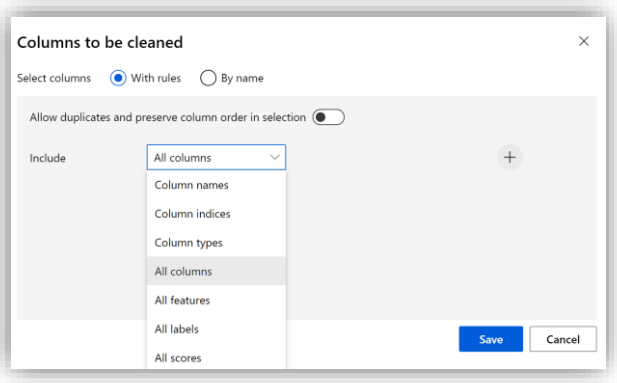
37. Add **Edit Metadata** and connect to **Join Data from step 35**. Add the columns: **HotelCustomerID** and **CustomerID** and change **Fields to ClearFeatures**.

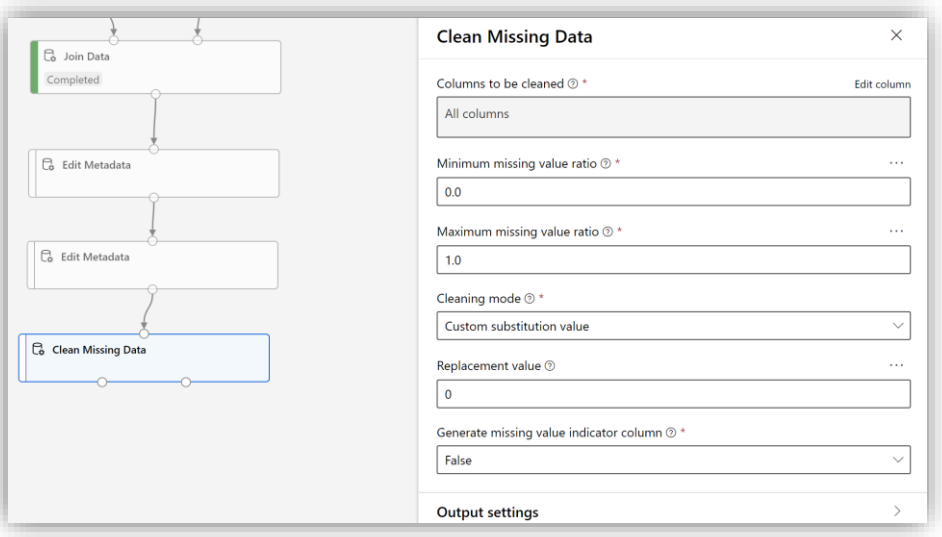


38. Add another **Edit Metadata** step with the following settings**: Column – Label**, **Fields – Labels**

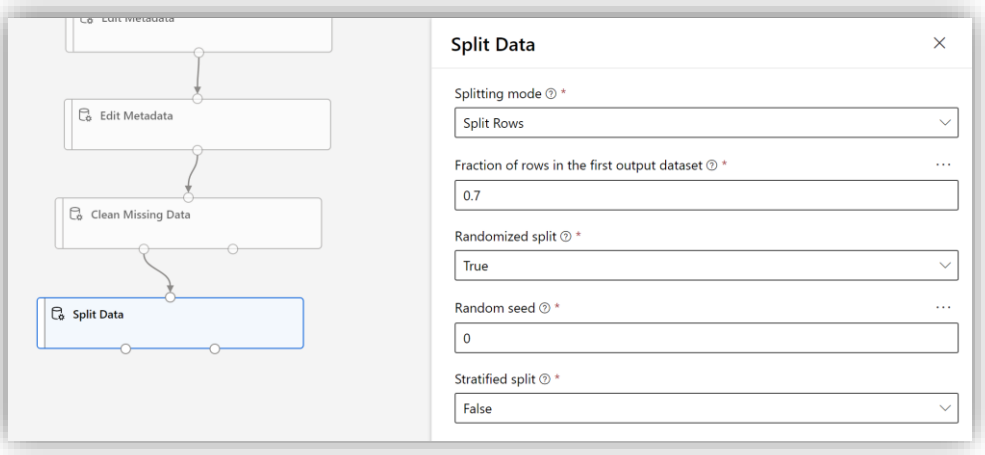


39. Add **Clean Missing Data** and **add All columns as Columns** to be cleaned. When you click Edit column, leave the selection as **With Rules** and select **All columns** from the **Include** dropdown. Leave the defaults for everything else

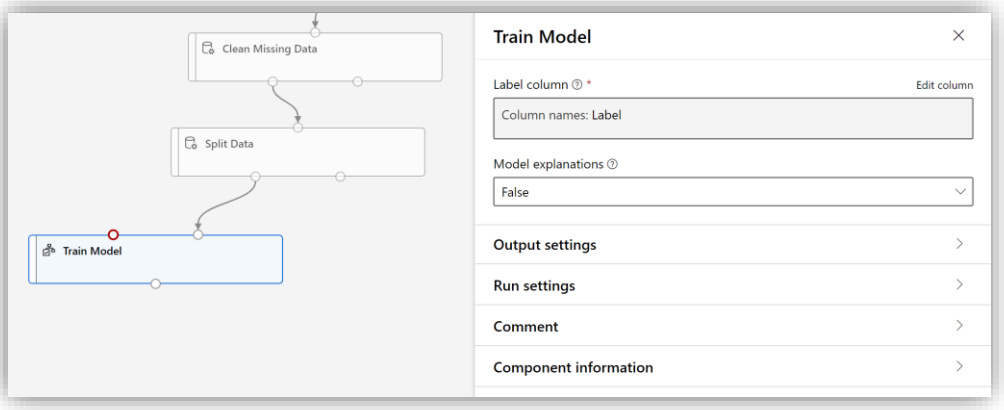




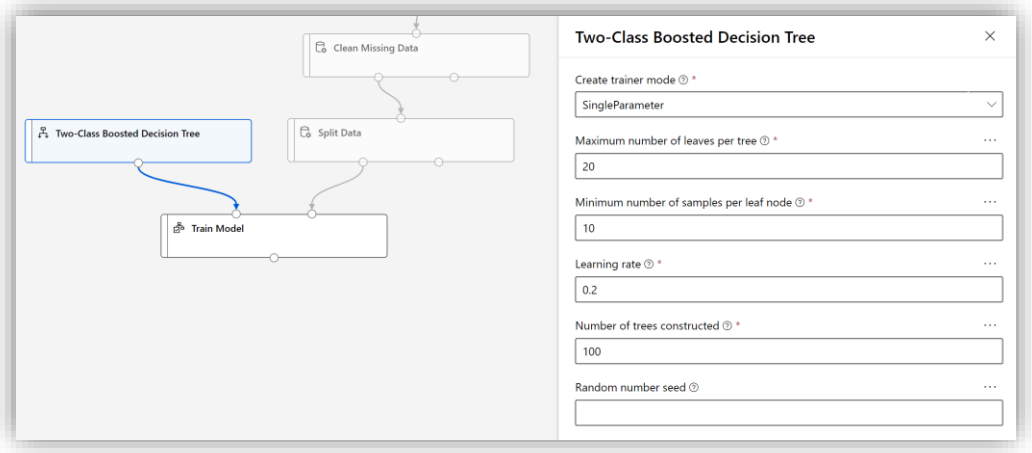
40. Add **Split Data**. Change the **Fraction of rows in the first output dataset to 0.7**



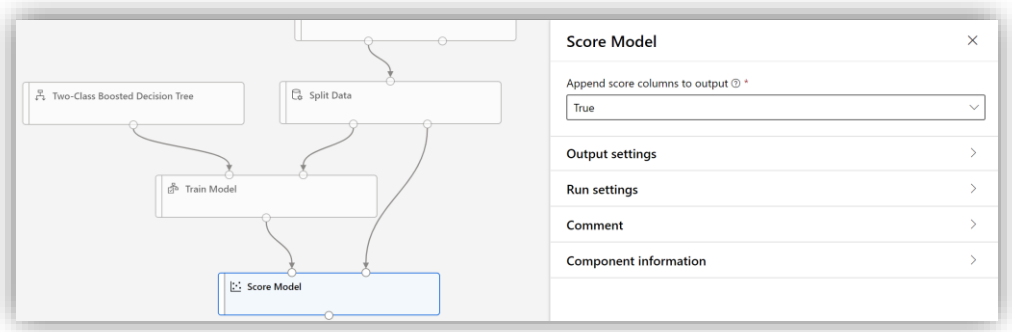
41. Add **Train Model** and connect **Split Data to the right side**. **Select Label as the column name.**



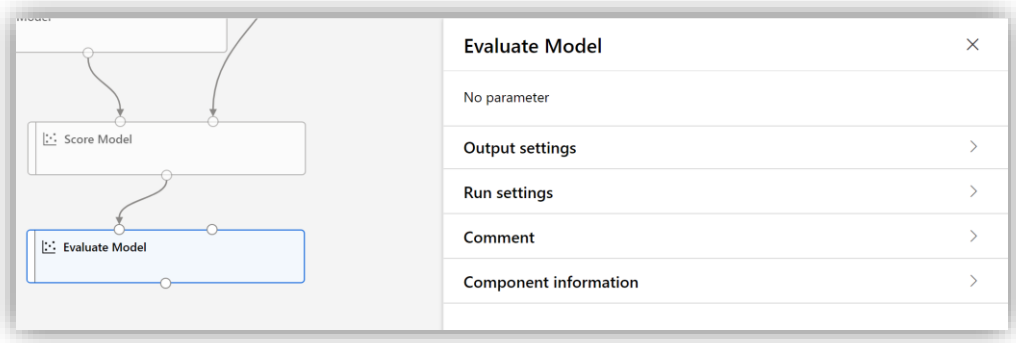
42. Add **Two-Class Boosted Decision Tree** and connect to the **left side of Train Model**. Leave the default settings



43. Add **Score Model** and connect **Train Model** to the left and the **right of Split Data to the right**



44. Add **Evaluate Model**

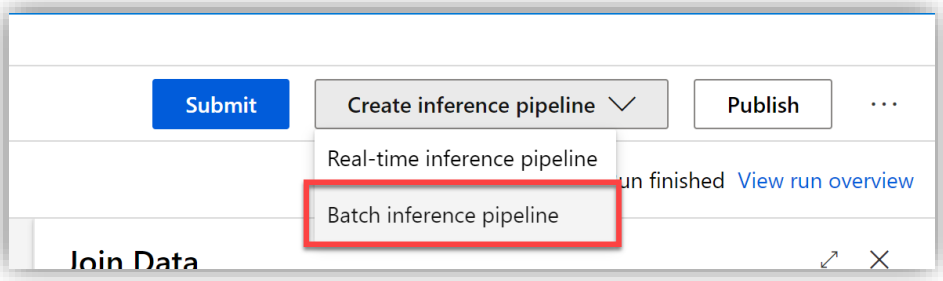


45. All the steps are complete! Click Submit to run. Keep Existing experiment and click Submit again

46. After it is finished running, move to the next step

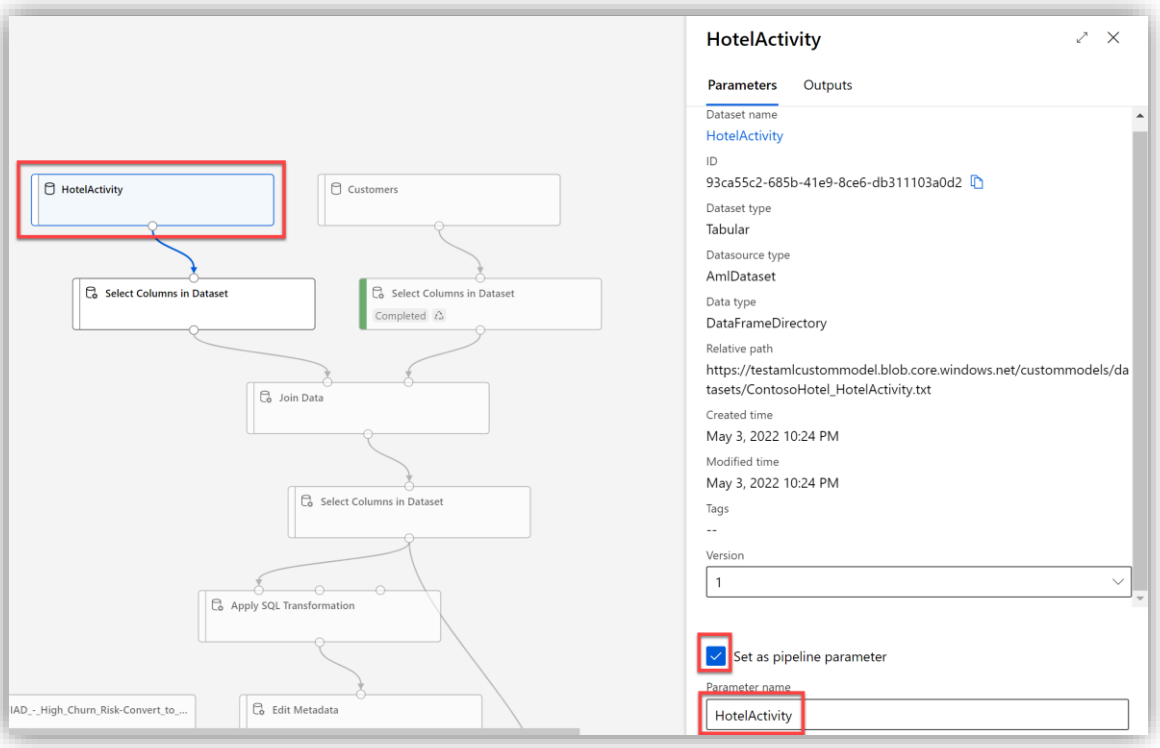
Task 2 - Create Inference Pipeline in order to connect to Customer Insights.

1. Go to **Create inference pipeline and select Batch Inference pipeline**



2. In this step, we'll parameterize the 3 datasets so that we can pass in new data from Customer Insights for making predictions.

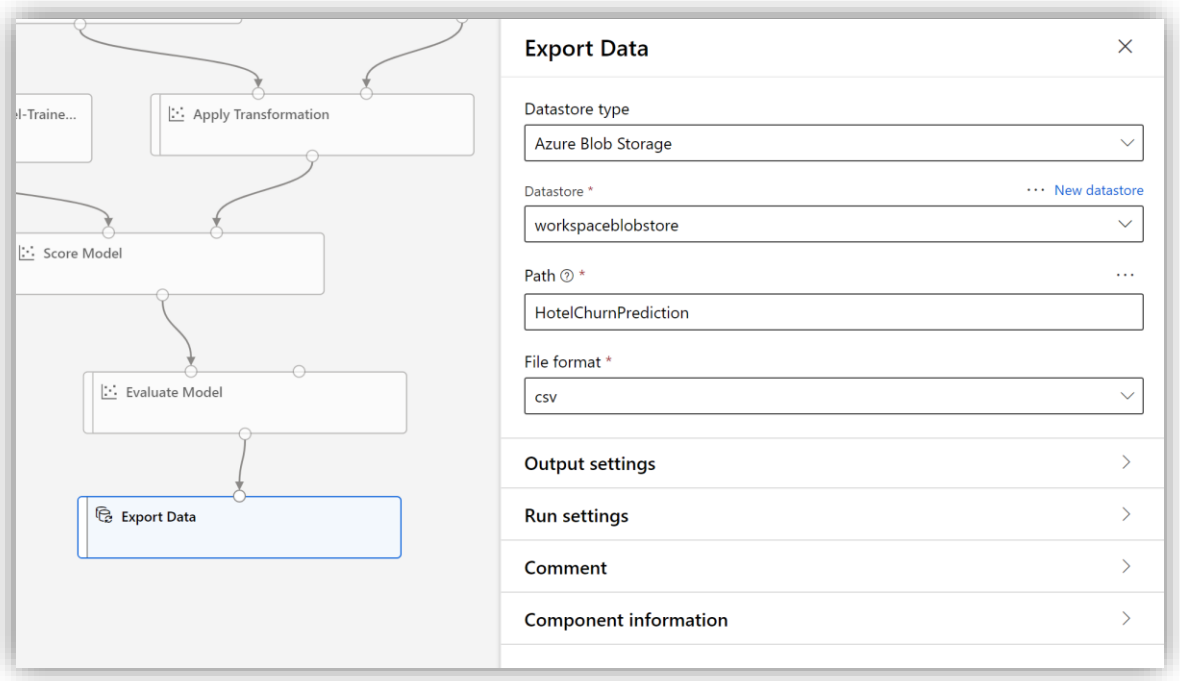
   Select the **HotelActivity** dataset node, and check the *Set as pipeline parameter* checkbox in the **Parameters** tab of the right side pane. Enter a **Parameter name**, for example, **HotelActivity**, to represent the selected dataset. Repeat for the **Customers** and **ServiceUsage** datasets.



3. Add the **Export Data** module to your Batch inference pipeline. This module allows us to get our predicted results into Customer Insights. Connect the bottom of the **Score Model** module to the **Export Data** module.

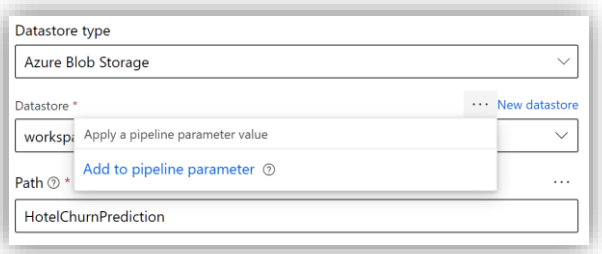
   Click on the Export Data module to open the side pane. Make the following changes:

   - **Datastore type**: Select *Azure Blob Storage*
   - **Datastore**: Select *workspaceblobstore*
   - **Path**: Enter a name for your predictions output. E.g. *HotelChurnPrediction*
   - **File format**: Select *csv*

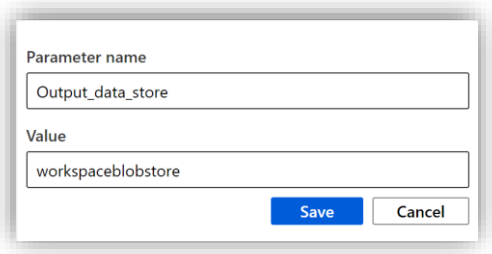


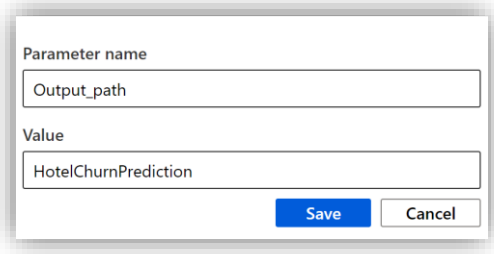
4. Now parameterize the Export Data module so that our predictions can be imported and used within Customer Insights.

   Click on the Export Data module to open the side pane and then click on the ellipses on top of the datastore dropdown.



5. Click on Add to pipeline parameter. Enter a name in the **Parameter Name** textbox that you can easily identify in Customer Insights. Click Save. Repeat for the Path field.





6. **Submit** the batch inference pipeline. Once it has completed successfully, click on **Publish** to open the published pipeline dialog. Select **Create new** and enter a name for your endpoint. Enter a name that you can easily identify later on.
Click on **Publish** to publish your batch inference pipeline endpoint. It is now discoverable in Customer Insights!

Task 3 – Integrate Contoso Hotel data with Contoso Coffee

Here, you will break the data silos between Contoso Hotel and Contoso Coffee and ingest the Contoso Hotel data into Customer Insights instance.

1. Ingest Hotel Data

NOTE: The datasource **Must** be named **ContosoHotel** or this lab will not work. The name must match what the model is looking for and it looks for ContosoHotel

Datasource	EntityName	CSV Location
ContosoHotel	HotelActivity	https://aka.ms/ciadhotelactivity
ContosoHotel	HotelCustomers	https://aka.ms/ciadhotelcustomers
ContosoHotel	ServiceUsage	https://aka.ms/ciadserviceusage

2. All are CSVs and you should transform each table via the **Tranform Table -> Use First Row as Headers** menu option like we did back in Module 1.

- For **HotelActivity** set the following column types

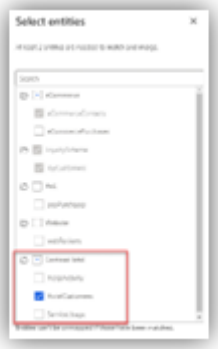
Column Heading	New Data Type
DollarsSpent	WholeNumber
NumberOfNights	WholeNumber

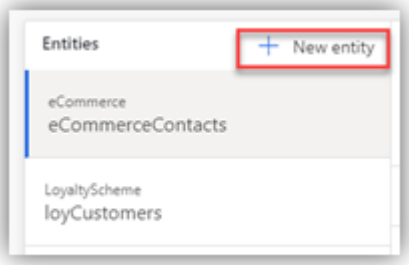
- For **ServiceUsage** set the following column types

Column Heading	New Data Type
ServiceCost	WholeNumber
ServiceID	WholeNumber

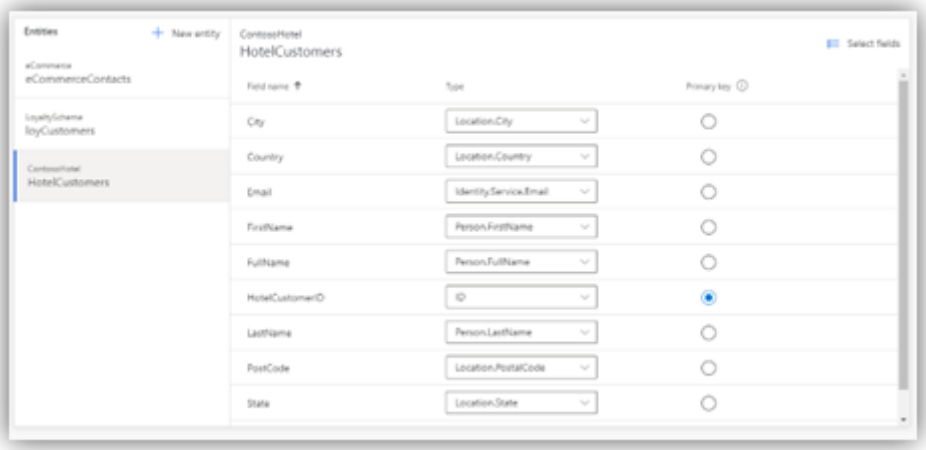
3. Now we need to go through the Unify process, first we'll Map the HotelCustomers Entity. Click on **Data -> Unify -> Map** in the left-hand menu

4. Click on **New Entity** and check the **HotelCustomers e**ntity, then press **Done**



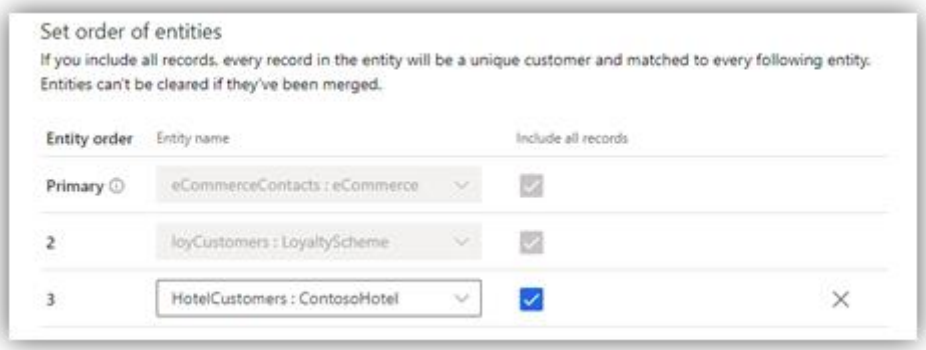


5. Click on **HotelCustomers** in the entity list and confirm that **HotelCustomerID** is the Primary Key

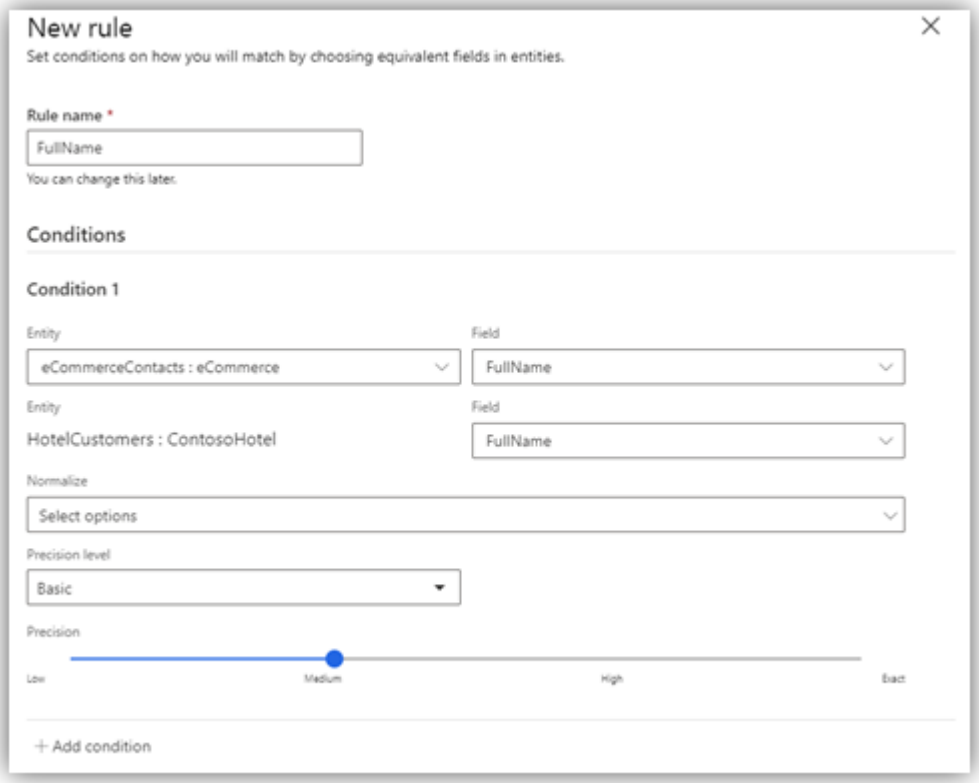


6. Click **Save**. We now need to add **HotelCustomers** to our match rules. Click on the **Match** tab**.**

7. To add the HotelCustomers click on the **Edit** Edit button on the top of the Match Order grid, then select **Add entity** and add **HotelCustomers : ContosoHotel**, selecting **Include all records** before clicking **Done**.



8. Now we'll need to add a new match rule for **HotelCustomers** with our **eCommerceContacts** on **FullName**. Click the **Create new rule** button and configure a new rule as shown and click **Done**.



9. Click **Save** and then **Run**

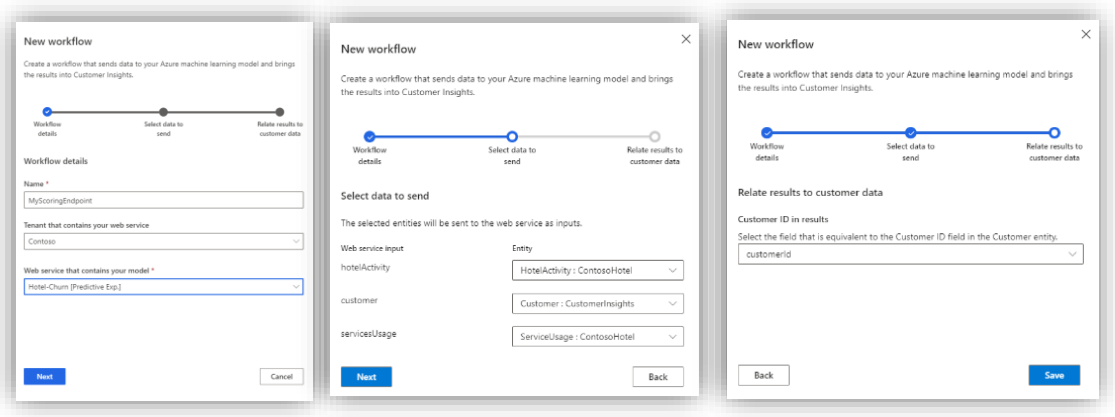
Observe that only 7.5% (approximately, your numbers may be slightly different) of Customers matched between Contso Coffee and Hotel. This is expected since the two are different companies entirely! Improving the match score is out of scope, but CI provides the tools to help improve the match.

10. Finally you can click the **Merge** tab**.** Everything here is setup as we need it so just click **Run** to complete the process. Once the Merge is done running, which can take some time, you can

Task 4 – Create a Scoring workflow

1. Go back to your Customer Insights environment and in the left-hand menu click on **Intelligence** and then **Custom Models.**

2. Click the **New Workflow** button and create your workflow like the below steps show. For Tenant that contains your web service, make sure you choose your own tenant (in place of Contoso in Screenshot).

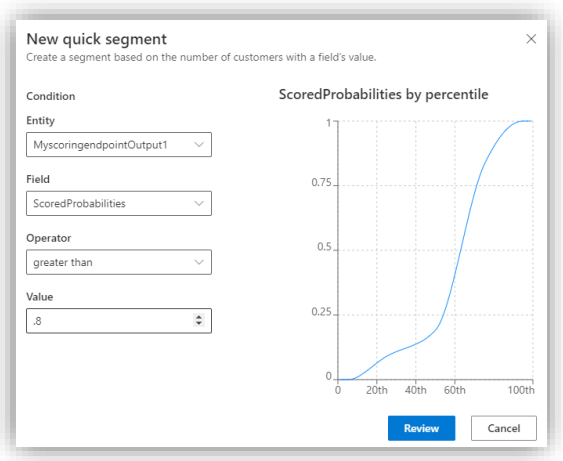


3. Click on **Save** then **Done.**
4. Now **Run/Refresh** the workflow.

Task 5 – Setup a Segment of High Churn-risk hotel customers

1. Open the **Segments** section from the left-hand menu. We will manually create a new dynamic segment, click **New** in the top menu bar. You'll notice there is now an **Intelligence** options in the **New -> Create From** section. Choose the new **Intelligence** option.

2. Select your scoring endpoint and setup the segment like this.



3. Click Review and name your new Segment like as **Name:** HighRiskForChurnHotelCustomers, **Display name:** High Risk For Churn Hotel Customers
4. Click **Save**

Exercise 4 - API

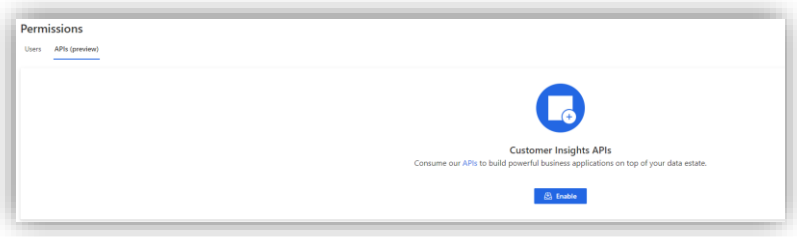
Task 1 - Enable APIs in Customer Insights environment

1. To use APIs, you need to enable API feature in your environment.

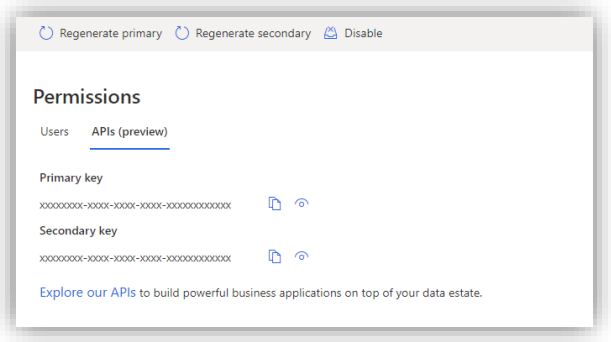
2. Go to https://home.ci.ai.dynamics.com/ and log in.

3. Navigate to **Security** under the **Admin** section.

4. Switch to **APIs** tab and click the **Enable** button.



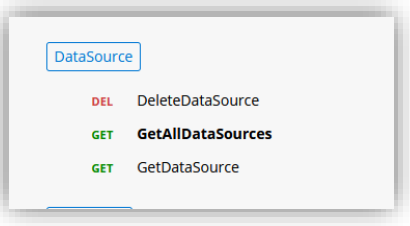
5. You can find the subscription keys and option to regenerate them whenever necessary for security. These keys need to be passed as headers with any request we make to the APIs. They help in validating the subscription and monitoring the usage. Any Customer Insights user can use these keys to make requests.



Task 2 - Get the list of data sources via API

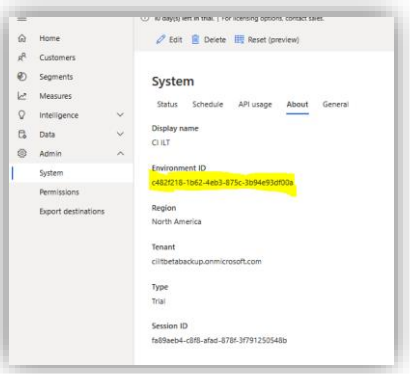
1. Click on **Explore our APIs** link in **APIs(preview)** window.

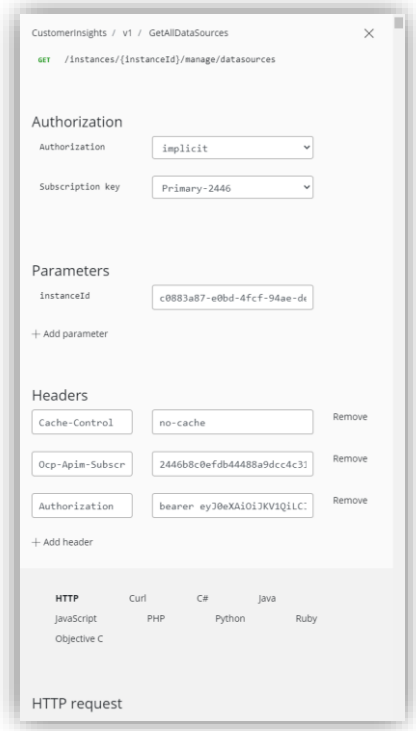
2. Select **GetAllDataSources** API call under **DataSource** list and click on **Try it** button.



3. In the side panel that opens, select the drop-down labeled **Authorization** and choose **implicit**. This should automatically fill the Authorizationheader with a bearer token. Your subscription key will be automatically populated.

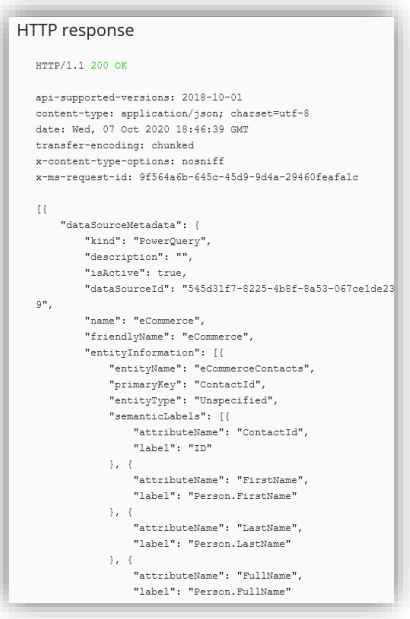
4. Go back to your Customer Insights environment and copy your environment/instance ID within Admin->System->About and paste it under parameters beside **instanceId.**





5. Scroll to the bottom of the panel, and click the **Send** button

6. The HTTP response will soon appear below.



7. You can look at all the data sources that are in your environment in the HTTP response.

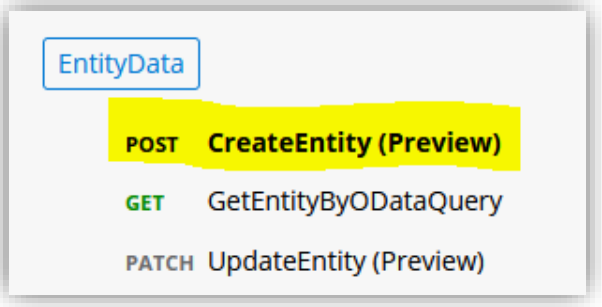
Task 3 - Real-time Ingestion via API

Say Abbie Moss has purchased a coffee machine in store just now, we can have the POS system use the APIs in the background to record that purchase data and send it to Customer Insights right away to have it readily available instead of waiting to get it until next refresh. Let's see how to do this with developer APIs with in Customer Insights.

1. Open your Customer Insights environment.

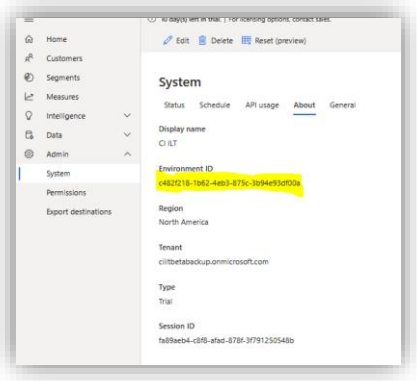
2. Click on **Explore our APIs** link in **APIs(preview)** window with in **Permissions** tab.

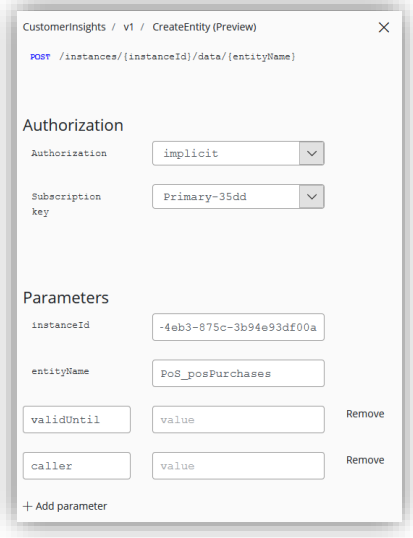
3. Select **CreateEntity** API call under **DataSource** list and click on **Try it** button.



4. In the side panel that opens, select the drop-down labeled **Authorization** and choose **implicit**. This should automatically fill the Authorizationheader with a bearer token. Your subscription key will be automatically populated.

5. Go back to your Customer Insights environment and copy your environment/instance ID within Admin->System->About and paste it under parameters beside **instanceId.** Enter the entity name as **POS_posPurchases.** (If you have used different name for the entity, make sure to add it this way: DatasourceName_EntityName.)

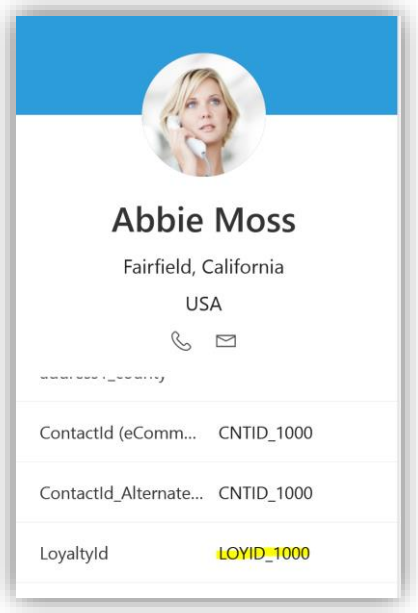




6. With in body, you need to give a JSON payload with the values for all the columns with in your entity. Copy the below JSON and make sure to use a unique value for **PurchaseId** column everytime you try to ingest as it is the primary key in posPurchases entity.

```
{
    "LoyaltyId": "LOYID_1001",
    "PurchaseId": "PID_1uu00000",
    "ProductId": "ProdID_1000",
    "PurchasedOn": "2020-10-14T00:00:00Z",
    "TotalPrice": 151,
    "RewardPointsAdded": 75,
    "ActivityTypeDisplay": "POS Purchase",
    "Subject": "Purchased a product In-Store"
}
```

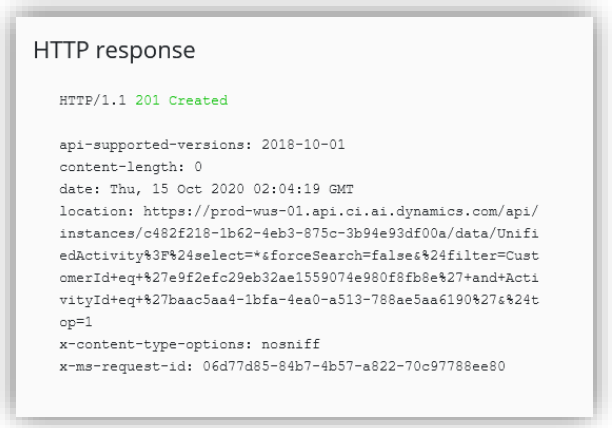
7. For **LoyaltyId** value, go to Customers page and search for **Abbie Moss** and choose the LoyaltyId value as below and paste it in the payload in place of sample ID LOYID_1001.



8. Change the date to today's date for **PurchasedOn** in this format **YYYY-MM-DDT00:00:00Z.** For example., 2020-10-21T00:00:00Z

9. Scroll to the bottom of the panel, and click the **Send** button

10. The HTTP response will soon appear below.



11. You can go to Customers page in Customer Insights environment and search for **Abbie Moss** to find this new activity in the timeline.