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A Dataiku and Snowflake Introduction to Data Science

Overview

Duration: 3

Duration: 1

This Snowflake Quickstart introduces you to the basics of using Snowflake together with Dataiku Cloud as part of a Data Science project. We'll be highlighting some of the well-integrated functionalities between the two technologies. It is designed specifically for use with the [Snowflake free 30-day trial](#), and the Dataiku Cloud free trial version via Snowflake's Partner Connect.

The Use Case: Recent advancements in generative AI have made it easy to apply for jobs. But be careful! Scammers have also been known to create fake job applications in the hopes of stealing personal information. Let's see if you — with Dataiku & Snowflake's help — can spot a real job posting from a fake one!

aside positive

About the data:

The data for this quickstart comes from a Kaggle dataset of ~18000 job descriptions, out of which about 800 are fake. These are fairly simple datasets, once you have completed the lab you could consider enriching the project with additional data.

Prerequisites

- Use of the Snowflake free 30-day trial environment
- Basic knowledge of SQL, and database concepts and objects

What You'll Learn

The exercises in this lab will walk you through the steps to:

- Create databases, tables, views, and warehouses in Snowflake
- Use Snowflake's "Partner Connect" to seamlessly create a Dataiku DSS Cloud trial
- Create a Data Science project in Dataiku and perform analysis on data via Dataiku within Snowflake
- Use both visual and code tools
- Create, run, and evaluate simple Machine Learning models in Dataiku
- How at each step of the data science process you can utilise Dataiku and Snowflake in tandem to accelerate your team

What We're Going To Build

We will build a project that uses input datasets from Snowflake. We'll build a data science pipeline by applying data transformations, building a machine learning model, and deploying it to Dataiku's Flow. We will then see how you can score the model against fresh data from Snowflake and automate.

Prepare Your Lab Environment

Duration: 5

- If you haven't already, register for a [Snowflake free 30-day trial](#) The rest of the sections in this lab assume you are using a new Snowflake account created by registering for a trial.

aside negative

Note: Please ensure that you use the **same email address** for both your Snowflake and Dataiku sign up

- **Region** - Although not a requirement we'd suggest you select the region that is physically closest to you for this lab
- **Cloud Provider** - Although not a requirement we'd suggest you select [AWS](#) for this lab
- **Snowflake edition** - We suggest you select [select the Enterprise edition](#) so you can leverage some advanced capabilities that are not available in the Standard Edition.

After activation, you will create a [username](#) and [password](#). Write down these credentials. **Bookmark this URL for easy, future access.**

aside negative

About the screen captures, sample code, and environment:

Screen captures in this lab depict examples and results that may slightly vary from what you may see when you complete the exercises.

The Snowflake User Interface

Duration: 10

Logging Into the Snowflake User Interface (UI)

Open a browser window and enter the URL of your Snowflake 30-day trial environment. You should see the login screen below. Enter your unique credentials to log in.



Sign in to Snowflake

Username

Password

[Forgot password](#)

[Sign in](#)

We process your personal information according to our
[Privacy Notice](#)

Close any Welcome Boxes and Tutorials

You may see "welcome" and "helper" boxes in the UI when you log in for the first time. Close them by clicking on **Skip for now** in the bottom right corner in the screenshot below.

Welcome to Snowflake! How do you want to start?



Explore tutorials with sample data

Browse worksheets to query and load sample data:



TastyBytes

Query data from a fictional global food truck business



TCP-H Benchmarking

Measure query performance

OR



Load data into Snowflake

You can load data from any of the following:

- Local files
- External cloud providers
- 3rd party connectors (20+ providers)

[Start](#)

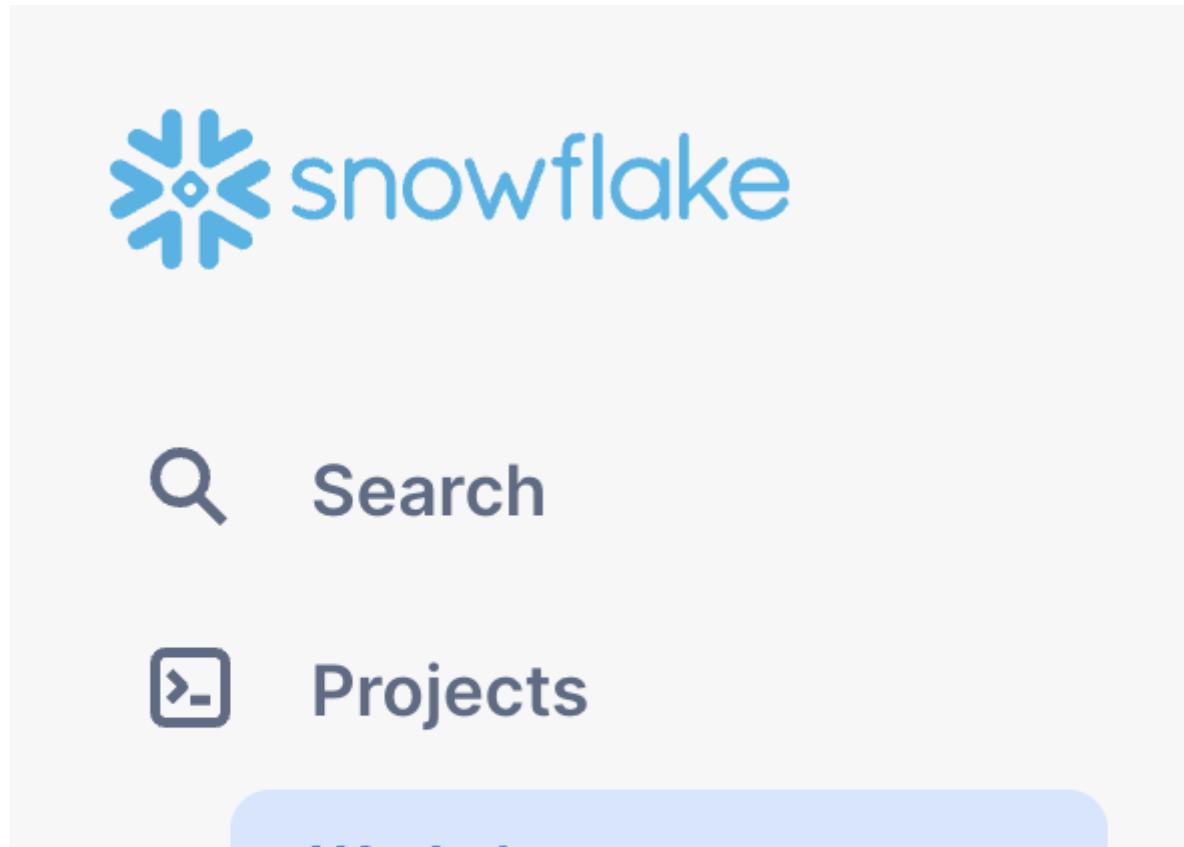
[Start](#)

[Skip for now](#)

Navigating the Snowflake UI

First let's get you acquainted with Snowflake! This section covers the basic components of the user interface to help you orient yourself. We will move left to right in the top of the UI.

The main menu on the left allows you to switch between the different areas of Snowflake:



worksheets

Streamlit

Dashboards

App Packages



Data



Data Products



Monitoring



Admin

The **Databases** tab shows information about the databases you have created or have privileges to access. You can create, clone, drop, or transfer ownership of databases as well as load data (limited) in the UI. Notice several databases already exist in your environment. However, we will not be using these in this lab.

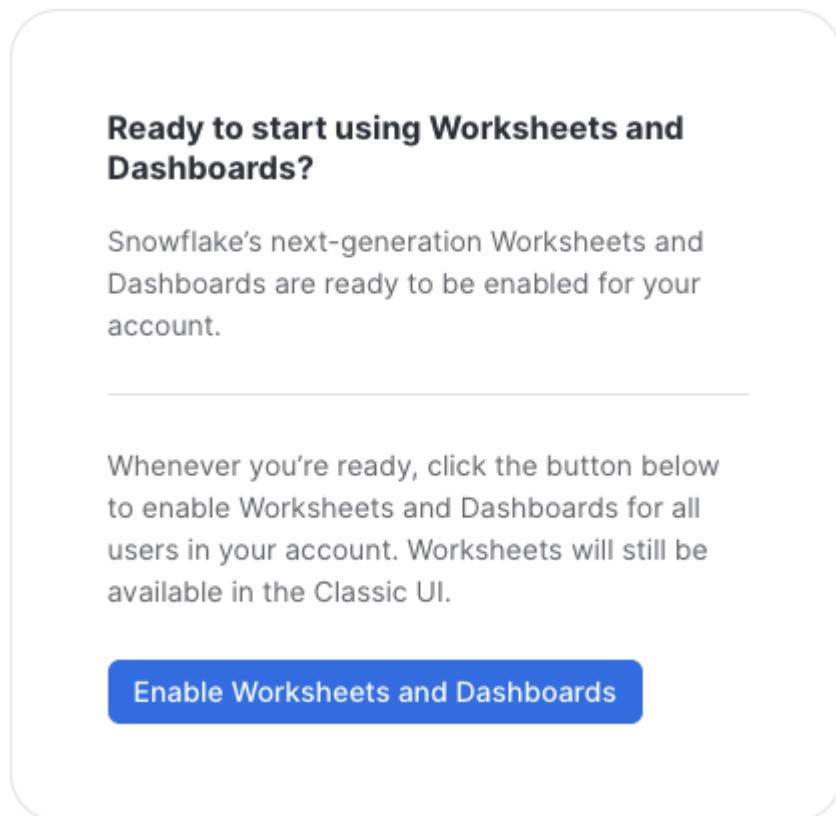
The screenshot shows the Snowflake UI with the 'Databases' tab selected. On the left, there's a sidebar with navigation links: Search, Projects, Data (with 'Databases' highlighted), Data Products, Monitoring, and Admin. The main area has a search bar at the top. Below it, the 'Databases' section displays two entries:

NAME ↑	SOURCE	OWNER	CREATED	...
SNOWFLAKE	Share	—	32 minutes ago	...
SNOWFLAKE_SAMPLE_DA...	Share	ACCOUNTADMIN	32 minutes ago	...

The **Worksheets** tab provides an interface for submitting code queries, performing DDL and DML operations and viewing results as your queries/operations complete.

In the left pane is the database objects browser which enables users to explore all databases, schemas, tables, and views accessible by the role selected for a worksheet. The bottom pane will show results of queries and operations.

If this is the first time you've used Snowsight, you might be prompted to enable it.

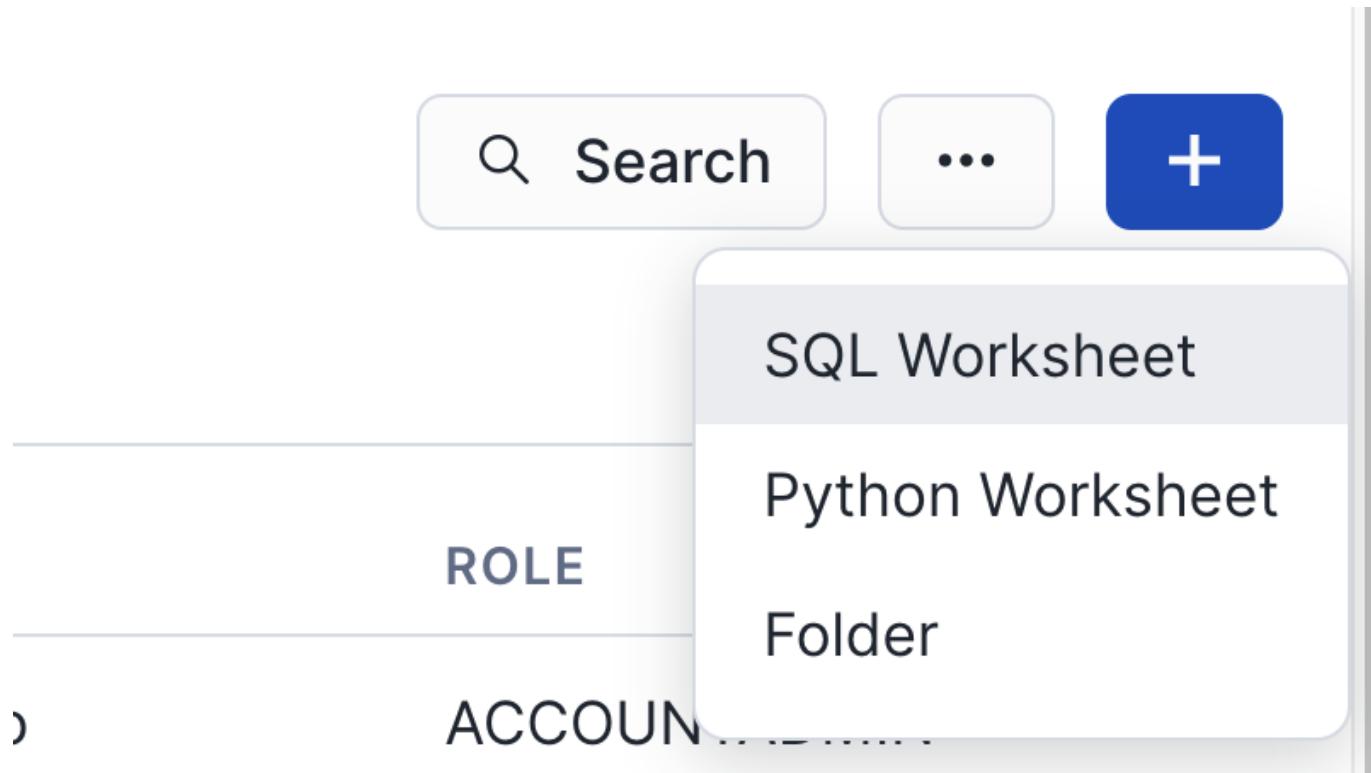


The screenshot shows the 'Worksheets' page in the Snowflake interface. On the left, there is a sidebar with navigation links: Search, Projects (with 'Worksheets' selected), Streamlit, Dashboards, App Packages, Data, Data Products, Monitoring, and Admin. The main content area has a header 'Worksheets' with a search bar and a '+' button. Below the header, there are tabs for 'Recent', 'Shared with me', 'My Worksheets', and 'Folders'. The 'Recent' tab is selected. A table lists the following worksheets:

TITLE	TYPE	VIEWED	UPDATED	ROLE
Load sample data with SQL ...	SQL	—	32 minutes ago	ACCOUNTADMIN
Load sample data with Pyth...	Python	—	32 minutes ago	ACCOUNTADMIN
[Template] Adding a user a...	SQL	—	32 minutes ago	ACCOUNTADMIN
Getting Started Tutorials	Folder	—	32 minutes ago	—
Sample queries on TPC-...	SQL	—	32 minutes ago	ACCOUNTADMIN

As you can see, there have already some worksheets been prepared for you to work with the demo data in the databases that we saw before. However, we are not going to use these existing worksheets now.

Instead, we are going to create a new one. For that, please click on the blue **+** Button in the top right corner.



Select **SQL Worksheet** from the menu and a new worksheet will be created and shown.

The screenshot shows the Dataiku interface with the 'Worksheets' tab selected. A new worksheet titled 'Job Postings' has been created and is displayed on the right side of the screen. The worksheet contains a single query:

```
1 select :datebucket(created), count(1) from table group by 1
```

Rename the newly created worksheet to **Job Postings** by clicking on the worksheet name and typing **Job Postings** and pressing 'Enter'

The screenshot shows the Dataiku interface with the 'Job Postings' worksheet renamed. The worksheet content is visible on the right side of the screen:

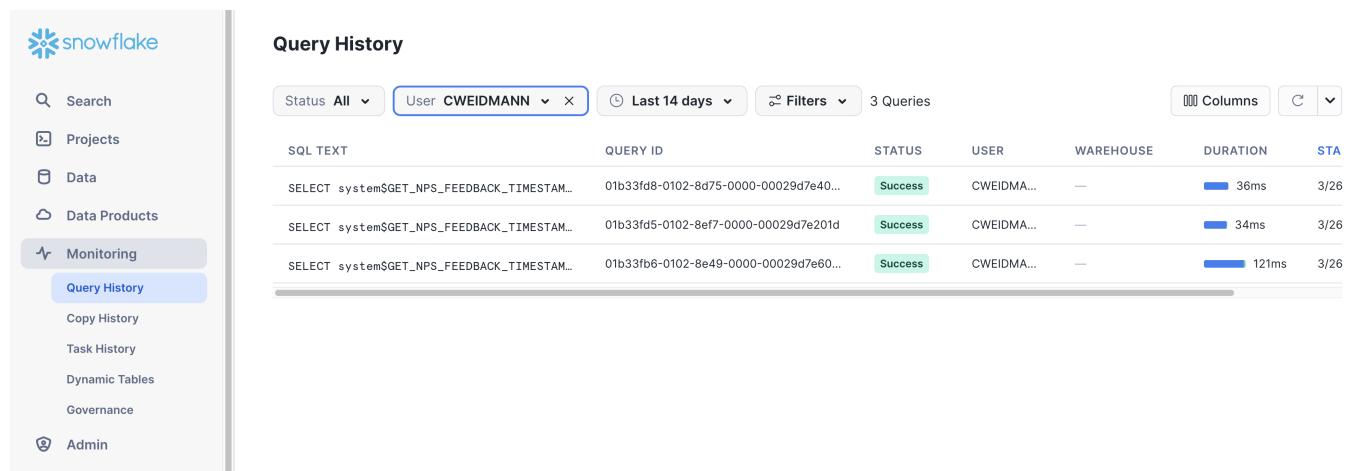
```
1 select :datebucket(created), count(1) from table group by 1
```

aside positive

Worksheets vs the UI

Much of the configurations in this lab will be executed via this pre-written SQL in the Worksheet in order to save time. These configurations could also be done via the UI in a less technical manner but would take more time.

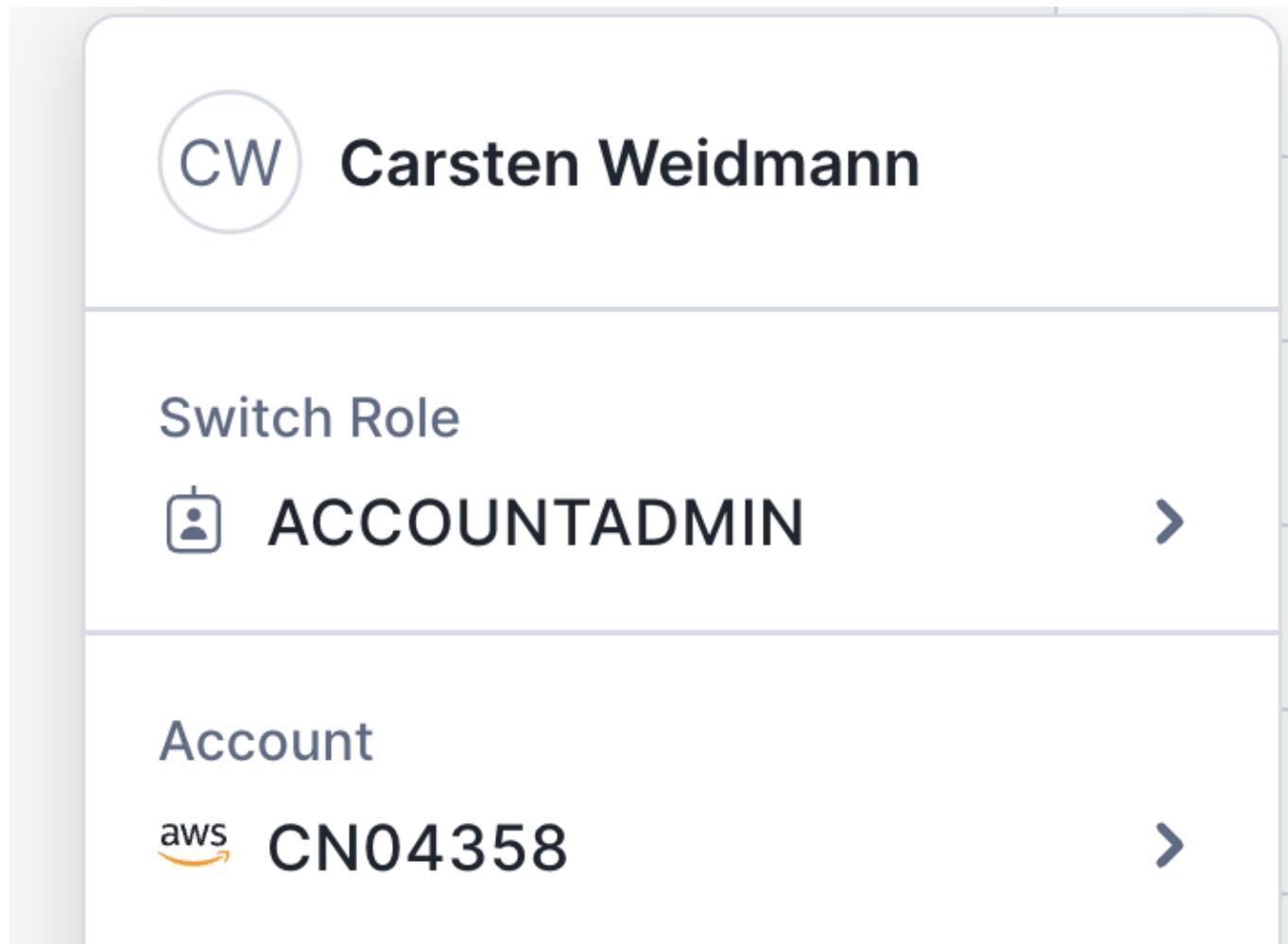
The **History** tab allows you to view the details of all queries executed in the last 14 days in the Snowflake account (click on a Query ID to drill into the query for more detail).



The screenshot shows the Snowflake Query History interface. On the left is a sidebar with navigation links: Search, Projects, Data, Data Products, Monitoring (which is selected), Query History (which is highlighted in blue), Copy History, Task History, Dynamic Tables, Governance, and Admin. The main area is titled "Query History" and displays three rows of query logs. Each row includes the SQL text, Query ID, Status (all three are Success), User (CWEIDMANN), Warehouse (—), Duration (36ms, 34ms, 121ms), and a "STA" column. The "STA" column contains small blue bars representing the duration of each query.

SQL TEXT	QUERY ID	STATUS	USER	WAREHOUSE	DURATION	STA
SELECT system\$GET_NPS_FEEDBACK_TIMESTAMP...	01b33fd8-0102-8d75-0000-00029d7e40...	Success	CWEIDMA...	—	36ms	3/26
SELECT system\$GET_NPS_FEEDBACK_TIMESTAMP...	01b33fd5-0102-8ef7-0000-00029d7e201d	Success	CWEIDMA...	—	34ms	3/26
SELECT system\$GET_NPS_FEEDBACK_TIMESTAMP...	01b33fb6-0102-8e49-0000-00029d7e60...	Success	CWEIDMA...	—	121ms	3/26

If you click on the bottom left of the UI where your username appears, you will see that you can change your password, roles, or preferences. Snowflake has several system defined roles. You are currently in the default role of SYSADMIN. We will change this in the next part of the lab.



The screenshot shows the user profile page for Carsten Weidmann. It features a circular profile picture with initials "CW". The name "Carsten Weidmann" is displayed prominently. Below this, there is a "Switch Role" button with a person icon and the text "ACCOUNTADMIN >". Further down, there is an "Account" section with an AWS logo and the identifier "CN04358 >".

The screenshot shows a mobile application's navigation menu and a user profile section. The menu items include:

- My profile (with a person icon)
- Support (with a gear icon)
- Client download (with a downward arrow icon)
- Documentation (with a book icon)
- Privacy notice (with an eye icon)
- Sign Out (with a left arrow icon)

Below the menu is a user profile card:

Carsten Weidm...
ACCOUNTADMIN

aside negative

SYSADMIN

For most of this lab you will remain in the SYSADMIN (aka System Administrator) role which has privileges to create warehouses and databases and other objects in an account. In a real-world environment, you would use different roles for the tasks in this lab, and assign the roles to your users. More on access control in Snowflake is in towards the end of this lab and also in our [documentation](#)

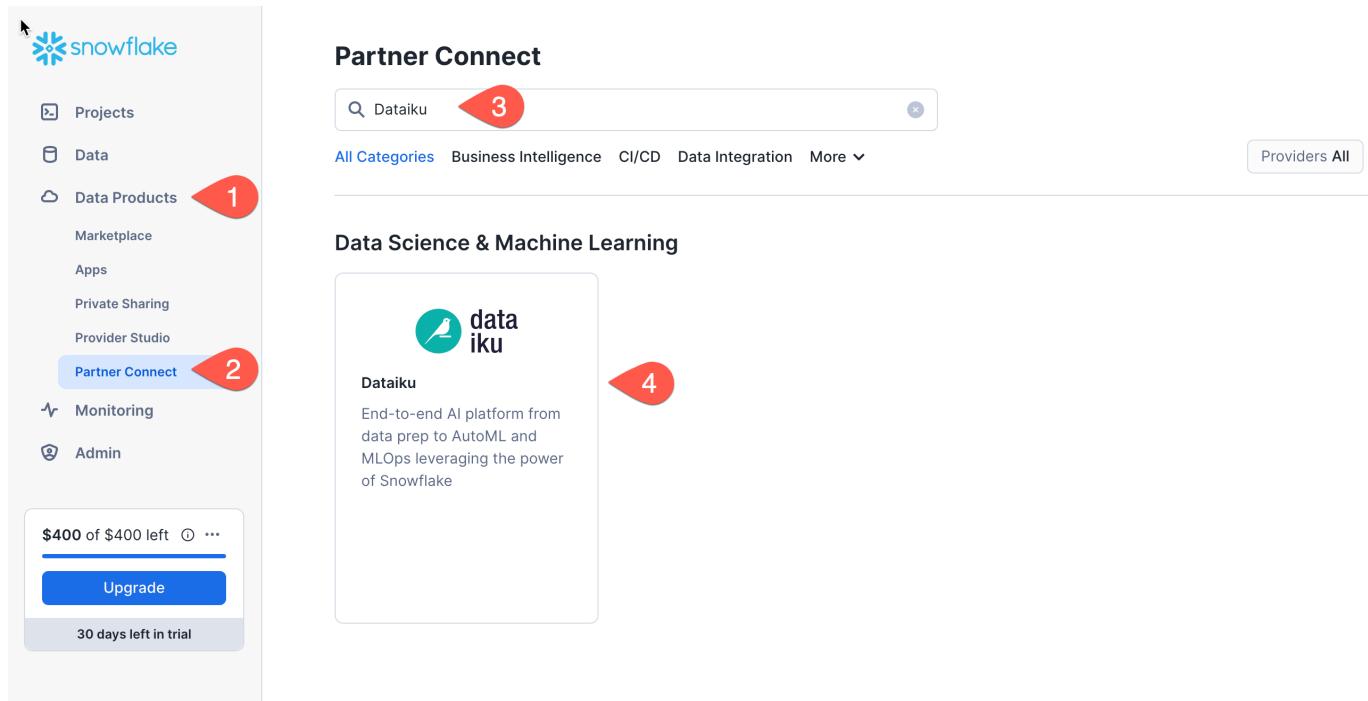
Prepare Dataiku Trial Account Via Snowflake Partner Connect

Duration: 10

Create Dataiku trial via Partner Connect

At the top right of the page, confirm that your current role is **ACCOUNTADMIN**, by clicking on your profile on the top right.

1. Click on **Data Products** on the left-hand menu
2. Click on **Partner Connect**
3. Search for Dataiku
4. Click on the **Dataiku** tile



aside negative Depending on which screen you are on you may not see the full menu as above but hovering over the Data Products (Cloud) icon will show the options

This will automatically create the connection parameters required for Dataiku to connect to Snowflake. Snowflake will create a dedicated database, warehouse, system user, system password and system role, with the intention of those being used by the Dataiku account.

For this lab we'd like to use the **PC_DATAIKU_USER** to connect from Dataiku to Snowflake, and use the **PC_DATAIKU_WH** when performing activities within Dataiku that are pushed down into Snowflake.

This is to show that a Data Science team working on Dataiku and by extension on Snowflake can work completely independently from the Data Engineering team that works on loading data into Snowflake using different roles and warehouses.

Connect to Dataiku

Dataiku requires the following information to create your new trial account: first name, last name, and email address.

In order to configure the connection with Snowflake, the following objects will be created in your Snowflake account:

Database	PC_DATAIKU_DB
Warehouse	PC_DATAIKU_WH (X-Small)
System User	PC_DATAIKU_USER
System Password	Autogenerated & Randomized
System Role	PC_DATAIKU_ROLE Role PUBLIC will be granted to the PC_DATAIKU_ROLE Role PC_DATAIKU_ROLE will be granted to the SYSADMIN role

Optional Grant ▾

By clicking on connect you are instructing Snowflake to create the above objects and provide all of the above information to Dataiku. Dataiku's processing of this information, and your use of Dataiku, are governed solely by Dataiku's [Terms of Use](#) and Dataiku's [Privacy Policy](#) and not your agreement with Snowflake.

Please contact [Snowflake Support](#) if you have questions about connecting with Dataiku

[Close](#)

[Connect](#)

Note that the user password (which is autogenerated by Snowflake and never displayed), along with all of the other Snowflake connection parameters, are passed to the Dataiku server so that they will automatically be used for the Dataiku connection for this lab. **DO NOT CHANGE THESE.**

1. Click [Connect](#)
2. You will get a pop-ip which tells you your partner account has been created. Click on [Activate](#)

aside negative

Informational Note:

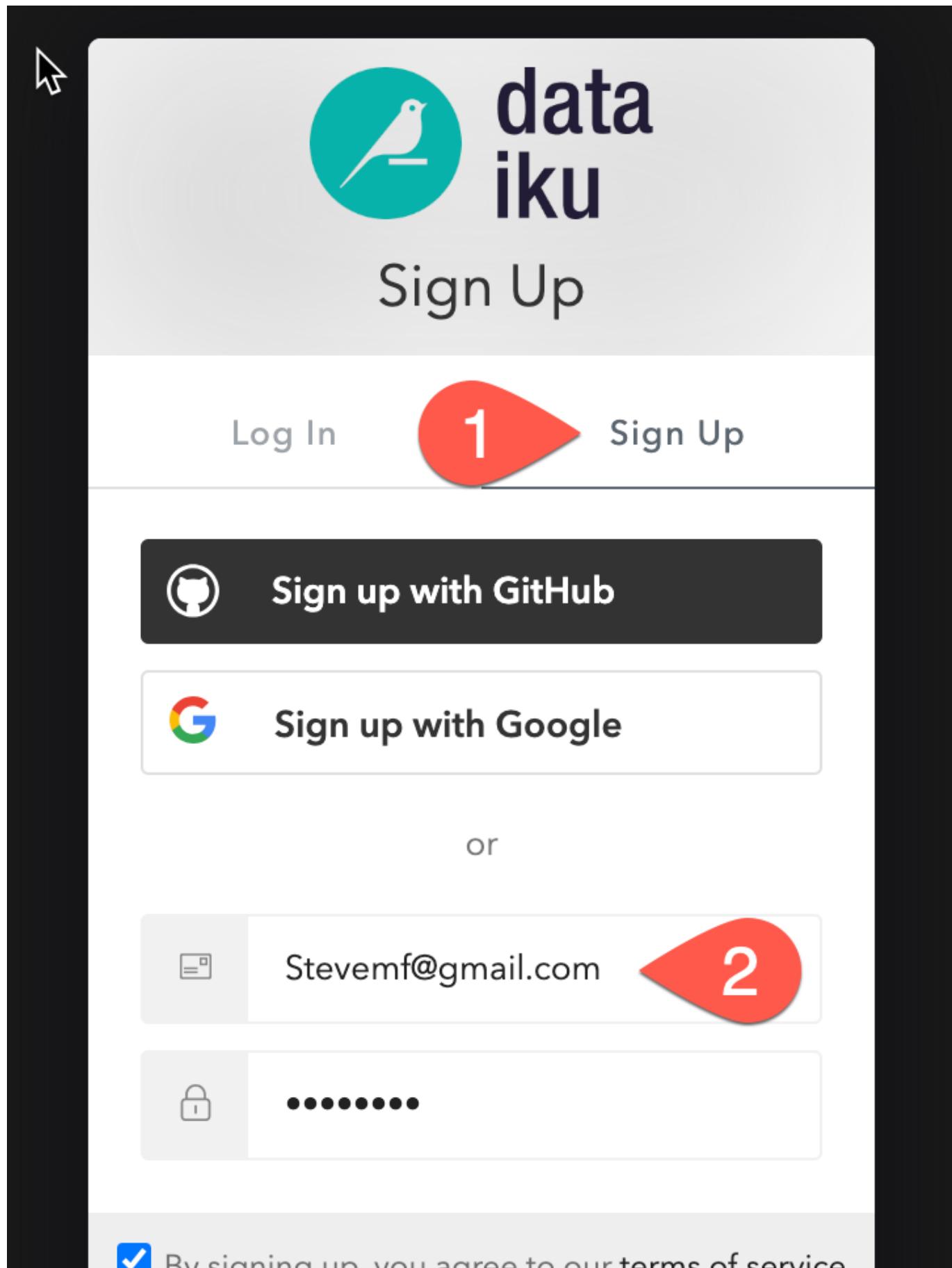
If you are using a different Snowflake account than the one created at the start, you may get a screen asking for your email details. Click on 'Go to Preferences' and populate with your email details

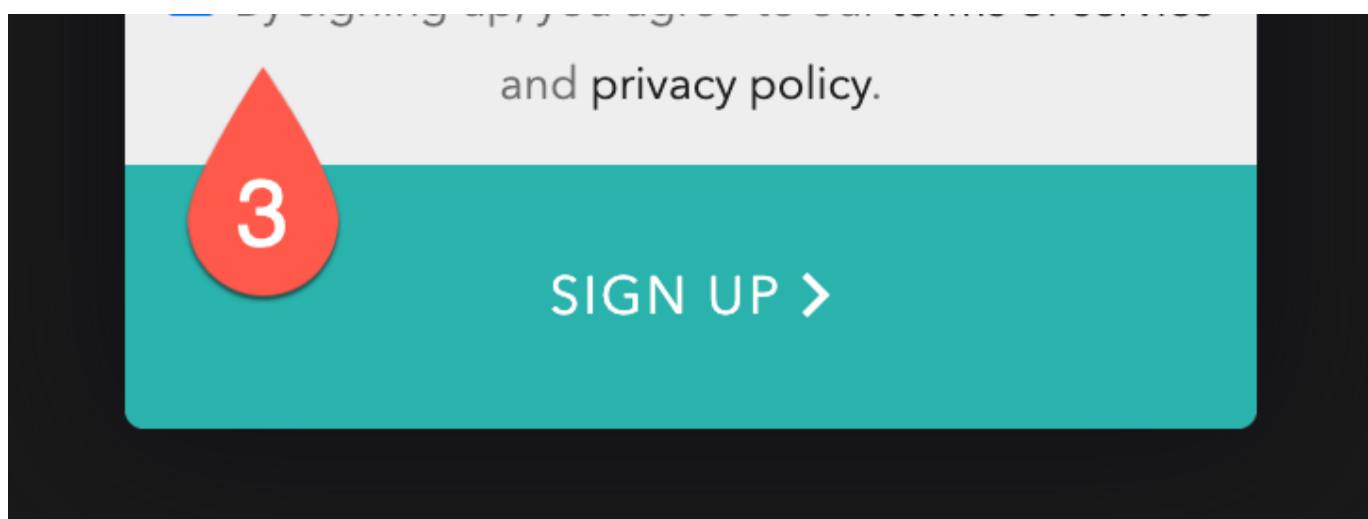
This will launch a new page that will redirect you to a launch page from Dataiku.

Here, you will have two options:

1. Login with an existing Dataiku username
2. Sign up for a new Dataiku account

We assume that you're new to Dataiku, so ensure the "Sign Up" box is selected, and sign up with either GitHub, Google or your email address and your new password. Click sign up.





When using your email address, ensure your password fits the following criteria:

1. At least 8 characters in length
2. Should contain: Lower case letters (a-z) Upper case letters (A-Z) Numbers (i.e. 0-9)

You should have received an email from Dataiku to the email you have signed up with. Activate your Dataiku account via the email sent.

Review Dataiku Setup

Upon clicking on the activation link, please briefly review the Terms of Service of Dataiku Cloud. In order to do so, please scroll down to the bottom of the page. Click on **I AGREE** and then click on **NEXT**.

1 ————— 2

LEGAL TERMS INFORMATION



Welcome to Dataiku Cloud

To continue using the service, scroll down and accept the terms of service.

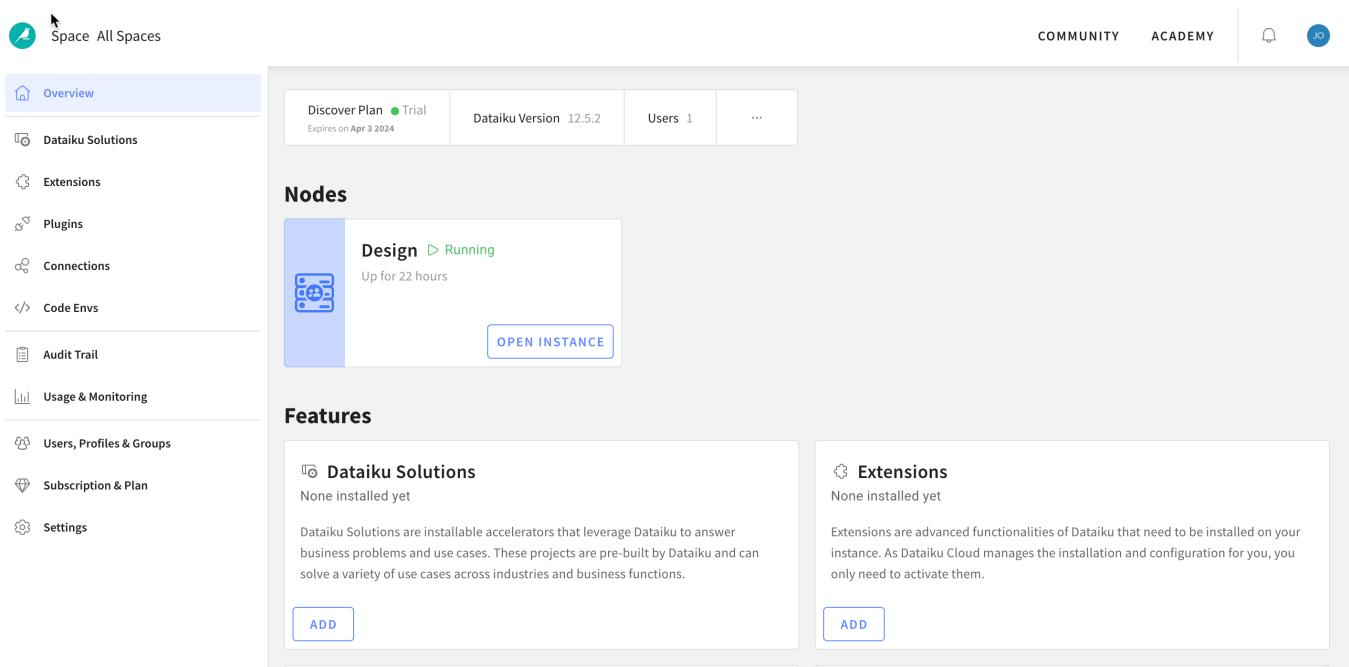
Expand Contract [Download](#)

I understand and agree to Dataiku Cloud Terms

NEXT

Complete your sign up some information about yourself and then click on **Start**.

You will be redirected to the Dataiku Cloud Launchpad site. Click **GOT IT!** to continue.



The screenshot shows the Dataiku Cloud Launchpad interface. On the left, there's a sidebar with navigation links: Overview, Dataiku Solutions, Extensions, Plugins, Connections, Code Envs, Audit Trail, Usage & Monitoring, Users, Profiles & Groups, Subscription & Plan, and Settings. The main area displays the following information:

- Discover Plan:** Trial, Expires on Apr 3 2024
- Dataiku Version:** 12.5.2
- Users:** 1
- Nodes:** Design (Running, Up for 22 hours), with an **OPEN INSTANCE** button.
- Features:**
 - Dataiku Solutions:** None installed yet. Description: Dataiku Solutions are installable accelerators that leverage Dataiku to answer business problems and use cases. These projects are pre-built by Dataiku and can solve a variety of use cases across industries and business functions. An **ADD** button is available.
 - Extensions:** None installed yet. Description: Extensions are advanced functionalities of Dataiku that need to be installed on your instance. As Dataiku Cloud manages the installation and configuration for you, you only need to activate them. An **ADD** button is available.

This is the Cloud administration console where you can perform tasks such as inviting other users to collaborate, add plugin extensions, install industry solutions to accelerate projects as well as access community and academy resources to help your learning journey.

aside negative NOTE: It may take several minutes for your instance to Dataiku to start up the first time, during this time you will not be able to add the extension as described below. You can always come back to this task later if time doesn't allow now

It's beyond the scope of this course to cover these but for this lab we would like to enable a few of the AI Assistants so lets do that now.

1. Click on **Extensions** on the left menu
2. Select **+ ADD AN EXTENSION**
3. Find **AI Services** and click on it

In the AI Services Extension screen perform the following tasks:

1. Agree to the terms and services
2. Select **Enable AI Prepare**
3. Select **Enable AI Explain**
4. Click **ADD**
5. Click on **Go Back To Space**

 NEW AI SERVICES EXTENSION**Dataiku AI Terms of Use**

To enable these services you must first agree to the [Dataiku AI Services Terms of Use](#).

1

- I have read and agree to the Dataiku AI Services Terms of Use

AI Prepare 

Usage of this feature is governed by the [Dataiku AI Services Terms of Use](#). Metadata about processed dataset (and, optionally, sample data) is sent to Dataiku and third-party services.

2

- Enable AI Prepare
- Send sample values
- Send diagnostic data

AI Explain 

Usage of this feature is governed by the [Dataiku AI Services Terms of Use](#). Metadata about processed datasets and recipes is sent to Dataiku and third-party services.

3

- Enable AI Explain
- Send diagnostic data

AI Code Assistant 

At least one LLM Mesh connection is required - to load the available connections your instance must be running. Your code is not sent to Dataiku. Your code may be sent to third-parties according to the LLM chosen below.

- Enable AI Code Assistant

4

 ADD

You've now successfully set up your Dataiku trial account via Snowflake's Partner Connect. We are now ready to continue with the lab. For this, move back to your Snowflake browser.

Preparing And Exploring The Data In Snowflake

Duration: 20

Analysing the data using Snowsight

Now that we've done some preparation work, let's do some primarily data analysis on our data. For this we will use Snowsight, the SQL Worksheets replacement, which is designed to support data analyst activities.

Snowflake recently released the next generation of its analytics UI — **Snowsight**. On top of a redesigned interface, there are many improvements for analysts, data engineers, and business users. With Snowsight, it is easier and faster to write queries and get results and collaboration with others through sharing makes it

easier to explore and visualize data across your organization. Snowsight includes many features and enhancements, including:

- **Fast query writing:** Includes smart autocomplete for query syntax keywords or listing values that match table/column names, data filters and quick access to Snowflake documentation for specific functions.
- **Interactive query results:** View summary statistics about the data that has been returned by their query, using histograms of the distribution to identify outliers and anomalies.
- **Attractive data visualizations:** Quickly analyze data without requiring an external analytics/visualization tool, with automatic chart generation and drag-and-drop interface for creating dashboards.
- **Sharing and collaboration:** Share queries, worksheets, visualizations and dashboards securely among teams.
- **Schema browser:** Search instantly across databases and schemas accessible by the current session role for tables, views, and columns whose names contain a specified string. Pin tables for quick reference to see column names and data types.

For more information on using Snowsight, see the [documentation](#).

Let's run some preliminary analysis on the two tables that we'll focus on. For this, we will select **Worksheets** under **Projects** in the top left corner.

The screenshot shows the Snowflake interface with the 'Worksheets' tab selected in the sidebar. The main area displays a list of recent worksheets, each with a preview icon, title, type, view count, update time, and role. A message at the top asks if the user has finished loading data into Snowflake, with 'Continue' and 'X' buttons.

TITLE	TYPE	VIEWED	UPDATED	ROLE
Job Postings	SQL	—	20 minutes ago	ACCOUNTADMIN
Load sample data with ...	SQL	—	53 minutes ago	ACCOUNTADMIN
Load sample data with ...	Python	—	53 minutes ago	ACCOUNTADMIN
[Template] Adding a us...	SQL	—	53 minutes ago	ACCOUNTADMIN
Getting Started Tutorials	Folder	—	53 minutes ago	—

Data Problem

Sometimes you go through the entire process of building a predictive model and the predictions are quite poor and you trace the issue back to data problems. In other cases, such as this one, the data changes with time and the models go bad.

Preparing the Data for Further Data Analysis and Consumption

Step 1 - Create Schema and Tables

Now let's create the datastructures into which we are going to load the data. We will be using the database that was created when connecting to Dataiku - **PC_DATAIKU_DB**

Copy the statements below into your worksheet and run them there.

```

use warehouse PC_DATAIKU_WH;
use database PC_DATAIKU_DB;
create or replace schema RAW;
use schema RAW;

create or replace table EARNINGS_BY_EDUCATION (
    EDUCATION_LEVEL varchar(100),
    MEDIAN_WEEKLY_EARNINGS_USD decimal(10,2)
);

create or replace table JOB_POSTINGS (
    JOB_ID int,
    TITLE varchar(200),
    LOCATION varchar(200),
    DEPARTMENT varchar(200),
    SALARY_RANGE varchar(20),
    COMPANY_PROFILE varchar(20000),
    DESCRIPTION varchar(20000),
    REQUIREMENTS varchar(20000),
    BENEFITS varchar(20000),
    TELECOMMUTING int,
    HAS_COMPANY_LOGO int,
    HAS_QUESTIONS int,
    EMPLOYMENT_TYPE varchar(200),
    REQUIRED_EXPERIENCE varchar(200),
    REQUIRED_EDUCATION varchar(200),
    INDUSTRY varchar(200),
    FUNCTION varchar(200),
    FRAUDULENT int
);

```

Step 2 - Load Data

The data we want to use is available as csv files. Hence we define a csv file format to make our lives easier

```

create or replace file format csvformat
type = csv
field_delimiter = ','
field Optionally_enclosed_by = '"',
skip_header=1;

```

As we have stored the data we want to load on an external S3 bucket, we need to create an external stage to load that data and also a stage for Dataiku to push Snowpark UDFs to.

```

CREATE OR REPLACE STAGE JOB_DATA
file_format = csvformat
url='s3://dataiku-snowflake-labs/data';

```

```
CREATE or REPLACE STAGE DAIKU_DEFAULT_STAGE;
```

----- List the files in the stage

```
list @JOB_DATA;
```

With that all set, we are ready to load the data.

```
copy into EARNINGS_BY_EDUCATION
from @JOB_DATA/earnings_by_education.csv
on_error='continue';
```

```
copy into JOB_POSTINGS
from @JOB_DATA/job_postings.csv
on_error='continue';
```

Let's a quick look at the data

```
select * from RAW.EARNINGS_BY_EDUCATION limit 10;
```

--
62 | select * from RAW.EARNINGS_BY_EDUCATION limit 10;
63 | --

↳ Results ↵ Chart

	EDUCATION_LEVEL	...	MEDIAN_WEEKLY_EARNINGS_USD
1	Doctorate		1909.00
2	Professional		1924.00
3	Master's Degree		1574.00
4	Bachelor's Degree		1334.00
5	Associate Degree		963.00
6	Some College Coursework Completed		899.00
7	High School or equivalent		809.00
8	Some high school coursework		626.00

```
select * from RAW.JOB_POSTINGS limit 10;
```

```

65
66 | select * from RAW.JOB_POSTINGS limit 10;
67

```

↳ Results ~ Chart

	JOB_ID	TITLE	LOCATION	...	DEPARTMENT	SALARY_RANGE	COMPANY_PROFILE
1	1	Marketing Intern	US, NY, New York		Marketing	null	We're Food52, and we're looking for a Marketing Intern to join our team.
2	2	Customer Service - Cloud Video Production	NZ, , Auckland		Success	null	90 Seconds, the video production company, is looking for a Customer Service representative.
3	4	Account Executive - Washington DC	US, DC, Washington		Sales	null	Our passion for improving people's lives drives us to hire Account Executives.
4	5	Bill Review Manager	US, FL, Fort Worth		null	null	SpotSource Solutions is a leading provider of bill review services.
5	6	Accounting Clerk	US, MD,		null	null	null
6	7	Head of Content (m/f)	DE, BE, Berlin		ANDROIDPIT	20000-28000	Founded in 2009, ANDROIDPIT is a leading technology news website.
7	8	Lead Guest Service Specialist	US, CA, San Francisco		null	null	Airenvys mission is to provide exceptional guest service.
8	9	HP BSM SME	US, FL, Pensacola		null	null	Solutions3 is a well-established IT solutions provider.
9	10	Customer Service Associate - Part Time	US, AZ, Phoenix		null	null	Novitex Enterprise Solutions is a leading provider of customer service solutions.
10	12	Talent Sourcer (6 months fixed-term contract)	GB, LND, London		HR	null	Want to build a 21st-century company? We're looking for a Talent Sourcer.

Step 3 - Prepare Data for Analytics with Dataiku

With the data loaded into our `raw` stage, we want to prepare a table that joins the two sources into one, which we will then use in our workflow in Dataiku.

Let's start by switching to the Public schema as the Dataiku connection created from Partner Connect has permissions on that.

```
use schema PUBLIC;
```

And now on to the new table

```
create or replace table JOBS_POSTINGS_JOINED as
select
    j.JOB_ID as JOB_ID,
    j.TITLE as TITLE,
    j.LOCATION as LOCATION,
    j.DEPARTMENT as DEPARTMENT,
    j.SALARY_RANGE as SALARY_RANGE,
    e.MEDIAN_WEEKLY_EARNINGS_USD as MEDIAN_WEEKLY_EARNINGS_USD,
    j.COMPANY_PROFILE as COMPANY_PROFILE,
    j.DESCRIPTION as DESCRIPTION,
    j.REQUIREMENTS as REQUIREMENTS,
    j.BENEFITS as BENEFITS,
    j.TELECOMMUTING as TELECOMMUTING,
    j.HAS_COMPANY_LOGO as HAS_COMPANY_LOGO,
    j.HAS_QUESTIONS as HAS_QUESTIONS,
    j.EMPLOYMENT_TYPE as EMPLOYMENT_TYPE,
    j.REQUIRED_EXPERIENCE as REQUIRED_EXPERIENCE,
    j.REQUIRED_EDUCATION as REQUIRED_EDUCATION,
    j.INDUSTRY as INDUSTRY,
    j.FUNCTION as FUNCTION,
    j.FRAUDULENT as FRAUDULENT
```

```
from RAW.JOB_POSTINGS j left join RAW.EARNINGS_BY_EDUCATION e on
j.REQUIRED_EDUCATION = e.EDUCATION_LEVEL;
```

Your data should now look like this

```
select * from PUBLIC.JOB_POSTINGS_JOINED;
```

	JOB_ID	TITLE	LOCATION	DEPARTMENT	SALARY_RANGE	MEDIAN_WEEKLY_EARNINGS_USD	COMPANY
1	4	Account Executive - Washington DC	US, DC, Washington	Sales	null	1334.00	Our passion
2	5	Bill Review Manager	US, FL, Fort Worth	null	null	1334.00	SpotSource
3	7	Head of Content (m/f)	DE, BE, Berlin	ANDROIDPIT	20000-28000	1574.00	Founded in
4	10	Customer Service Associate - Part Time	US, AZ, Phoenix	null	null	809.00	Novitex En
5	13	Applications Developer, Digital	US, CT, Stamford	null	null	1334.00	Novitex En
6	15	Account Executive - Sydney	AU, NSW, Sydney	Sales	null	1334.00	Adthena is
7	16	VP of Sales - Vault Dragon	SG, 01, Singapore	Sales	120000-150000	1334.00	Jungle Ven
8	22	Front End Developer	NZ, N, Auckland	null	null	1574.00	Frustrated
9	23	Engagement Manager	AE, ,	Engagement	null	1334.00	Upstream :)
10	28	HAAD/DHA Licensed Doctors Opening in UAE	AE, AZ, Abudhabi	Medical	null	1574.00	We the Me
11	30	Customer Service Associate	CA, ON, Toronto	null	null	809.00	Novitex En
12	31	Customer Service Technical Specialist	US, MA, Waltham	null	null	809.00	Novitex En
13	36	English Teacher Abroad	US, NY, Saint Bonaventure	null	null	1334.00	We help te
14	37	Graduates: English Teacher Abroad	US, NY, Yonkers	null	null	1334.00	We help te
15	90	PROJECT MANAGER	US, NY, Manhattan	null	null	1334.00	we do

Step 4 - Grant Dataiku Access to Data

As a last step before heading over to Dataiku, we need to make sure that it can read the data we just loaded and joined. (Note: You wouldn't typically grant ALL like this but we are in isolated trial accounts)

```
grant ALL on all schemas in database PC_DATAIKU_DB to role
PC_Dataiku_role;
grant ALL privileges on database PC_DATAIKU_DB to role PC_Dataiku_role;
grant ALL on all stages in database PC_DATAIKU_DB to role PC_Dataiku_role;
```

aside positive

Snowflake Compute vs Other Warehouses

Many of the warehouse/compute capabilities we just covered, like being able to create, scale up and out, and auto-suspend/resume warehouses are things that are simple in Snowflake and can be done in seconds. Yet for on-premise data warehouses these capabilities are very difficult (or impossible) to do as they require significant physical hardware, over-provisioning of hardware for workload spikes, significant configuration work, and more challenges. Even other cloud data warehouses cannot scale up and down like Snowflake without significantly more configuration work and time.

aside negative

Warning - Watch Your Spend!

During or after this lab you should *NOT* do the following without good reason or you may burn through your \$400 of free credits more quickly than desired:

- Disable auto-suspend. If auto-suspend is disabled, your warehouses will continue to run and consume credits even when not being utilized.
- Use a warehouse size that is excessive given the workload. The larger the warehouse, the more credits are consumed.

We are going to use the virtual warehouse **PC_DATAIKU_WH** for our Dataiku work. However, we are first going to slightly increase the size of the warehouse to increase the compute power it contains.

On the top right corner of your worksheet, click on the warehouse name. In the dialog, click on the three lines on the top right to get to the details page of the warehouses. There, change the size of the **PC_DATAIKU_WH** data warehouse from X-Small to Medium. Then click the "Finish" button.

The screenshot shows the Dataiku interface with the following details:

- Account Admin** is logged in.
- The warehouse **PC_DATAIKU_WH** is selected.
- The current size is set to **Medium**.
- A dropdown menu is open, showing the following size options:
 - X-Small
 - Small
 - Medium** (selected)
 - Large
 - X-Large
 - 2X-Large
 - 3X-Large
 - 4X-Large
 - 5X-Large
 - 6X-Large

Alternatively, you can also run the following command in the worksheet:

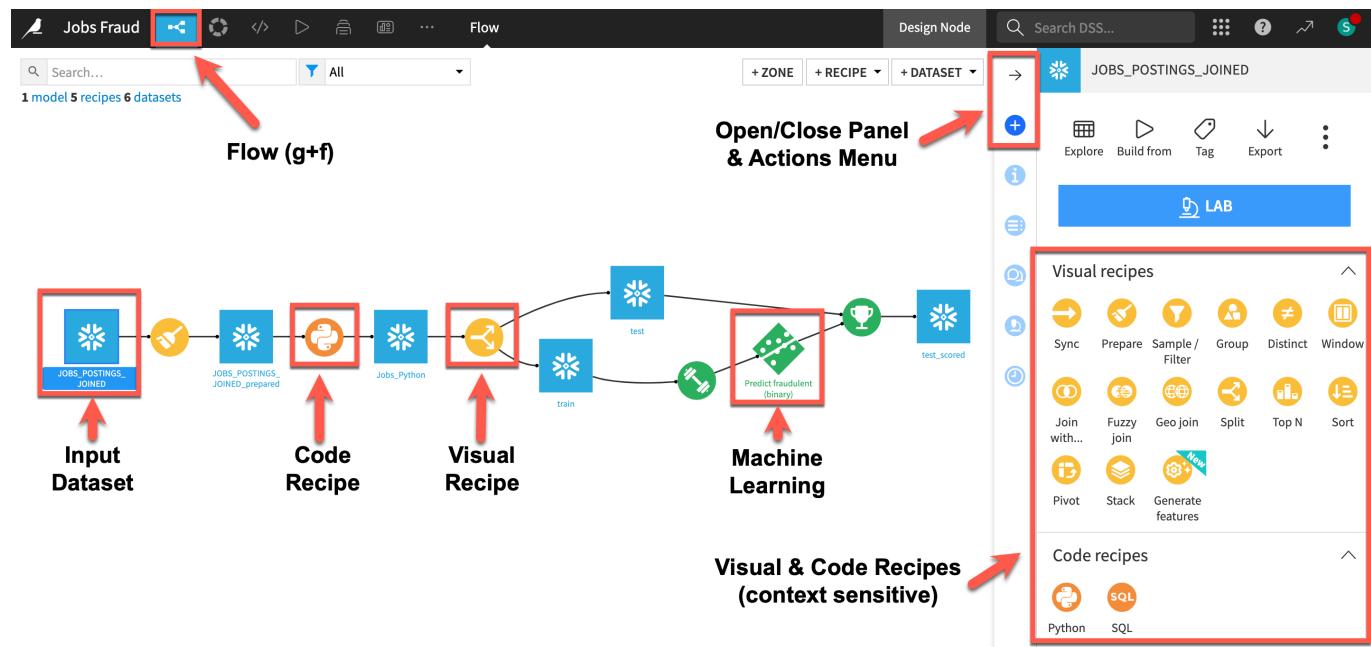
```
alter warehouse PC_DATAIKU_WH set warehouse_size=MEDIUM;
```

Creating And Running A Dataiku Project

Duration: 10

For this module, we will login into the Dataiku hosted trial account and create a Dataiku project.

Here is the project we are going to build along with some annotations to help you understand some key concepts in Dataiku.



- A **dataset** is represented by a blue square with a symbol that depicts the dataset type or connection. The initial datasets (also known as input datasets) are found on the left of the Flow. In this project, the input dataset will be the one we created in the first part of the lab.
- A **recipe** in Dataiku DSS (represented by a circle icon with a symbol that depicts its function) can be either visual or code-based, and it contains the processing logic for transforming datasets.
- **Machine learning processes** are represented by green icons.
- The **Actions Menu** is shown on the right pane and is context sensitive.
- Whatever screen you are currently in you can always return to the main **Flow** by clicking the **Flow** symbol from the top menu (also clicking the project name will take you back to the main Project page).

aside positive You can refer back to this completed project screenshot if you want to check your progress through the lab. (Note though that if you choose to use the SnowparkML plugin your final flow will look a little different)

aside negative **NOTE:** If you didn't setup AI Assistants from the Extensions menu in the earlier Partner Connect lab do it now.

Creating a Dataiku Project

Go back to your Dataiku Cloud instance landing page.

1. Ensure you are on the **Overview** page
2. Click on **OPEN INSTANCE** to get started.

The screenshot shows the Dataiku DSS dashboard. At the top, there's a navigation bar with links like 'Space', 'All Spaces', 'Overview', 'Dataiku Solutions', 'Extensions', 'Plugins', 'Connections', 'Code Envs', 'Audit Trail', and 'Usage & Monitoring'. Below the navigation bar, there's a 'Discover Plan' status bar with a green 'Trial' badge, 'Expires on Apr 3 2024', 'Dataiku Version 12.5.2', 'Users 1', and a '...' button. The main area is divided into 'Nodes' and 'Features'. Under 'Nodes', there's a card for 'Design' which is 'Running' and has been 'Up for 1 day'. There's a blue 'OPEN INSTANCE' button. A red circle labeled '1' is over the status bar, and a red circle labeled '2' is over the 'OPEN INSTANCE' button.

Congratulations you are now using the Dataiku platform! For the remainder of this lab we will be working from this environment which is called the **design node**, its the pre-production environment where teams collaborate to build data products.

Now lets create our first project. There are lots of existing options and accelerators available to us but for this lab we will start with a blank project.

1. Click on the **+ NEW Project** button on the right hand side
2. Select **Blank Project**
3. Give your project a name such as **Jobs Fraud**
4. Click on **Create**

The screenshot shows the Dataiku DSS interface with a 'New project' dialog box open. The dialog box has fields for 'Name' (containing 'Jobs Fraud') and 'Project Key' (containing 'JOBSFRAUD'). It also includes a note about project keys and two buttons: 'CANCEL' and 'CREATE'. A red circle labeled '1' is over the '+ NEW PROJECT' button on the right. A red circle labeled '2' is over the 'Name' input field. A red circle labeled '3' is over the 'CREATE' button.

Success! You've now created a dataiku project.

Click on **Got it!** to minimize the pop-up on **Navigation and help in DSS** and return to the project home screen.

Review the Dataiku DSS page. There are a few things to note from the project landing page on an example project:

- The project name, image associated with the project, collaborators, and optional tags:
- The number and types of objects in the project.
- A description of the project written in markdown, can link specific Dataiku objects (e.g., datasets, saved models, etc.) in the description:

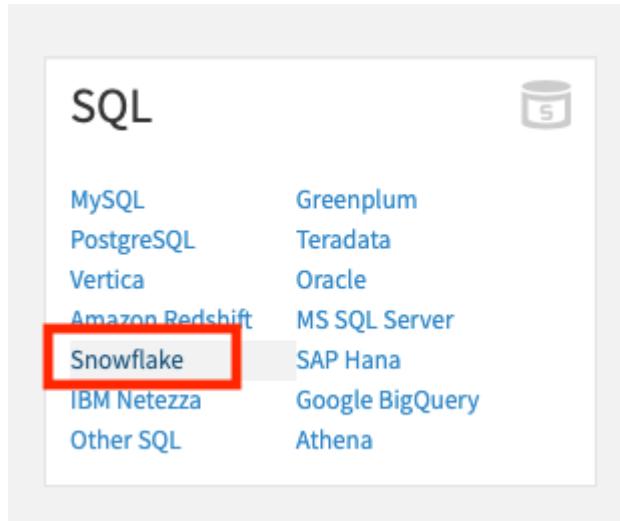
- Summary of project (history is saved in a git log) as well as a Chat function for better collaboration:

Import Datasets

Import the dataset from Snowflake

Click on **+IMPORT YOUR FIRST DATASET**

Under SQL, select **Snowflake**



1. To load the table, select the connection that was just created for us from **Partner Connect**. In the Table section select **Get Tables List**. Dataiku will warn you that this may be long list but we can OK this.

2. Search for and select the **JOBS_POSTINGS_JOINED** table we just created in Snowflake.
3. Then click **TEST TABLE** to test the connection
4. If successful set the **New dataset name** (top right) to **JOBS_POSTINGS_JOINED** and click on **CREATE**.

Connection PC_DATAIKU_DB

Mode Read a database table SQL query

Table JOBS_POSTINGS_JOINED (PC...

Normalize floats & doubles Normalize floating point values (force '42' to '42.0')

Partitioned

Date & Time handling

Unlike the SQL "date" type, DSS "date" type always includes the time and a timezone indication (it is an absolute point in time). DSS can read SQL "date" and "timestamp without timezone" as DSS "date", but you need to indicate in which timezone this data should be read.

Read SQL "timestamp without timezone" as DSS dates

DSS always considers SQL "timestamp with time zone" as valid DSS dates. By enabling this option, "timestamp without timezone" will also be considered as valid DSS dates, understood in the 'Assumed time zone'. You need to "Test table" after changing this.

Read SQL "date" as DSS dates

By enabling this option, SQL "date" (ie, date only, without time) will be parsed as valid DSS dates, understood in the 'Assumed time zone'. You need to "Test table" after changing this.

Assumed time zone Local time zone

For SQL "date" and SQL "timestamp without time zone", when reading them as DSS date, timezone to assign to this timezone-less data

Connection and table OK **CREATE**

Preview

JOB_ID	TITLE	LOCATION	DEPARTMENT	SALARY_RANGE	MEDIAN_WEEKLY_EARNINGS_USD	COMPANY_PROFILE
1	Marketing Intern	US, NY, New York	Marketing	\$1000 - \$1500	\$1250	We're Food52, and we've created a groundbreaking and award
2	Customer Service - Cloud Video Production	NZ, Auckland	Success	\$1000 - \$1500	\$1250	90 Seconds, the world's Cloud Video Production Service. 90 Sec

Return to the flow by clicking on the **flow** icon in the top left (*keyboard shortcut g+f*)

The screenshot shows the Dataiku interface with a dark header bar. On the left, there's a navigation bar with icons for 'Jobs Fraud', a blue highlighted 'Flow' icon, and other standard file operations like back, forward, and search. To the right of the header is a search bar with the placeholder 'Search...', a dropdown menu set to 'All', and three buttons labeled '+ ZONE', '+ RECIPE', and '+ DATASET'. Below the header, a small message '1 dataset' is visible. The main workspace is a light gray area containing a large blue square icon with a white sunburst logo in the center. Below this icon, the text 'JOBS_POSTINGS_JOINED' is displayed in a large, light blue font.

Double click on the **JOBS_POSTINGS_JOINED** dataset

The **JOBS_POSTINGS_JOINED** table contains data on a location and day basis about the number and types of cases (Active, Confirmed, Deaths, Recovered) that day.

Dataiku reads a sample of 10000 rows by default. The sampling method can be changed under [Configure Sample](#) but for this lab we can leave it as the default:

Dataiku automatically detects data type and meaning of each column. The status bar shows how much of the data is valid (green), invalid (red), and missing (grey). You can view column Stats (data quality, distributions) by clicking [Quick Column Stats](#) button on the right:

Click the **close** button when you are finished

Cleaning The Data With The Prepare Recipe

Duration: 20

After exploring our data we are going to perform some transformation steps to clean the data and generate new features.

aside positive There are two really important concepts happening in this lab:

Firstly The data stays in Snowflake. We work on a configurable sample of the data in memory, our dataset is quite small but it might not be and by working on a sample in memory we avoid unnecessary movement of data out of Snowflake.

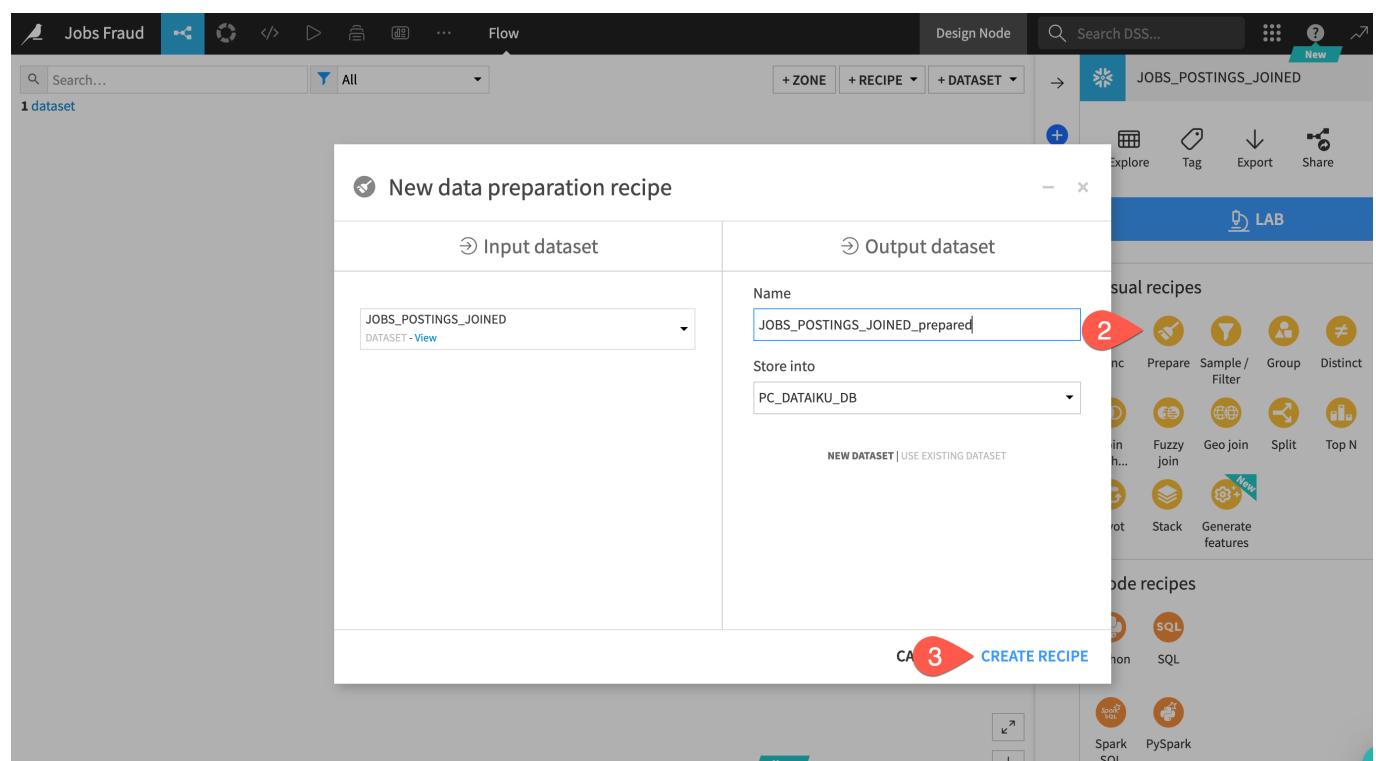
Secondly When you run the transformations you build in this section you may notice beneath the **RUN** button Dataiku specified the engine as **In-database**. Dataiku will always try to use the most efficient engine for any job and in this case it sees we are working on Snowflake data and will therefore push down to the Snowflake Virtual Warehouse that was created when we set up through Partner Connect.

The ability of Dataiku to minimise data movement and push the code to where the data lives gives great benefits in terms of performance, costs and governance.

Dataiku terms these transformation steps as **Recipes** and they may be visual (UI) or code based (a variety of editors, notebooks and IDE's are available).

Lets start with a visual recipe called the **Prepare** recipe. You can think of this recipe like a toolbox with lots of different tools for a variety of data transformation tasks. You build a series of transformation steps and check their effect on a sample of the data before pushing them to the full dataset.

1. Select your dataset from the flow (remember you can use the **g+f** keyboard shortcut)
2. After highlighting the dataset by clicking on it once go to the right hand actions menu select the **Prepare** recipe from the Visual Recipes list
3. You can leave the defaults and click on **CREATE RECIPE**



Location Column

Looking at our data we can see the location column has a lot of information contained within it that could make useful features for our model however in its current comma separated string format it is not that useful. Lets use the **Split** processor to pull out the location information into their own columns.

1. Click on the **+ ADD A NEW STEP** button on the left
2. You can use the search window to find the split processor
3. Select the **Split Column** processor.

The screenshot shows the Dataiku Processor library interface. A search bar at the top right contains the text "split". Below it, a list of processors is shown, with the "Split column" processor highlighted and numbered 3. To the left, a sidebar lists various processor categories like Data cleansing, Strings, Math / Numbers, etc. A tooltip for the "Split column" processor provides examples and options for splitting columns based on delimiters.

A new step is added to script on the left. We now need to populate the fields so Dataiku knows how we'd like to apply the split.

1. For the column we want to enter **location**
2. It's comma separated so the delimiter will be **,**
3. We can leave the prefix as the default
4. Select the **Truncate** option
5. Since there are three comma separated location values change the columns to keep to **3**
6. As you fill in the values you can see the effects live in the blue columns which is a great way of understanding the impact of the changes you are making and if it is the desired outcome.

The screenshot shows the Dataiku Script step configuration for the "compute_JOBS_POSTINGS_JOINED_prepared" job. The "Step preview on sample" section shows the results of the "Split LOCATION on ,". The configuration parameters are highlighted with red numbers:

- 1**: Column: LOCATION
- 2**: Delimiter: ,
- 3**: Output columns prefix: LOCATION_
- 4**: Truncate checked
- 5**: Max nb. columns to keep: 3
- 6**: The resulting table preview showing three columns: LOCATION, LOCATION_0, LOCATION_1, and LOCATION_2.

JOB_ID	TITLE	LOCATION	LOCATION_0	LOCATION_1	LOCATION_2
1	Marketing Intern	US, NY, New York	US	NY	New York
2	Customer Service - Cloud Video Production	NZ,, Auckland	NZ		Auckland
3	Commissioning Machinery Assistant (CMA)	US, IA, Wever	US	IA	Wever
4	Account Executive - Washington DC	US, DC, Washington	US	DC	Washington
5	Bill Review Manager	US, FL, Fort Worth	US	FL	Fort Worth
6	Accounting Clerk	US, MD,	US	MD	
7	Head of Content (m/f)	DE, BE, Berlin	DE	BE	Berlin
8	Lead Guest Service Specialist	US, CA, San Francisco	US	CA	San Francisco
9	HP BSM SME	US, FL, Pensacola	US	FL	Pensacola
10	Customer Service Associate - Part Time	US, AZ, Phoenix	US	AZ	Phoenix
11	ASP.net Developer Job opportunity at United State...	US, NJ, Jersey City	US	NJ	Jersey City
12	Talent Sourcer (6 months fixed-term contract)	GB, LND, London	GB	LND	London
13	Applications Developer, Digital	US, CT, Stamford	US	CT	Stamford
14	Installers	US, FL, Orlando	US	FL	Orlando
15	Account Executive - Sydney	AU, NSW, Sydney	AU	NSW	Sydney

aside positive In addition to **g+f** one of the other most useful keyboard shortcuts is **c** when your are in the Explore tab. This allows you to search and scroll to a particular column. Very useful for wider datasets. Take a look at the [Documentation](#) for more.

Splitting the column was useful but lets make the column names a little more human readable. We can use the rename processor for this. Select the **Rename** processor just like you did for Split and then click on **+Add Renaming** and rename location_0 to country. Repeat for location_1 and location_2 changing them to state and city respectively. The step should look like this

Rename 3 columns

10000 SQL

Renamings

⋮	LOCATION_0	→	COUNTRY	trash
⋮	LOCATION_1	→	STATE	trash
⋮	LOCATION_2	→	CITY	trash

+ ADD RENAMING

+ ADD MASS RENAMINGS

X i ? ?

aside positive You could also achieve this by right clicking on the column name and selecting **rename**. When you right click on a column Dataiku makes suggestions on the most common transformations based on the type of data in the column.

Text Columns

Next we have a number of text columns. When building a machine learning model there are a number of techniques we can use to work with text data, we are going to simplify the text and use the Normalise feature which transforms to lowercase, removes punctuation and accents and performs Unicode NFD normalization (Café -> cafe).

We could search for the processor we want and configure it like before but since we are new to Dataiku lets use the AI Prepare assistant to help us out this time. We can describe the steps we want and allow the AI Assistant to look through the 100+ processors and configure them to our requirements.

1. Click on **AI PREPARE** button on the left side of the screen
2. In the text box paste in the following prompt and then click on **GENERATE**

normalize text for the columns COMPANY_PROFILE, DESCRIPTION, REQUIREMENTS, BENEFITS.
dont create a new column, update in place

The AI Assistant generates the 4 steps for us and documents them to make the results are easy to review for everyone using the data preparation job

Now we have normalized the text in those columns we might consider creating a new feature based on the length. Our theory might be that scammers will focus on the salary and buzzwords to get people to apply and are less likely to populate the job description and company background.

Again if we know the processor we want we can just search and use it directly. In our case as we're new to Dataiku let's use the AI Prepare assistant to help us out.

1. Click on **AI PREPARE** button on the left side of the screen
2. In the text box paste in the following prompt and then click on **GENERATE**

calculate the length of the columns COMPANY_PROFILE, DESCRIPTION, REQUIREMENTS, BENEFITS.
write them to new columns with the prefix LENGTH_

If your script now matches the below screenshot go ahead and click on the green **RUN** button at the bottom of the script.

The screenshot shows the Dataiku Data Preparation interface. On the left, there's a sidebar with a yellow 'AI PREPARE' button. The main area shows a script titled 'compute_JOBS_POSTINGS_JOINED_prepared'. It contains two AI-generated steps:

- Step 1:** 'Normalize text for the columns COMPANY_PROFILE, DESCRIPTION, REQUIREMENTS, BENEFITS. dont create a new column, update in place'. This step has a preview showing sample rows of text being normalized.
- Step 2:** 'Calculate the length of the columns COMPANY_PROFILE, DESCRIPTION, REQUIREMENTS, BENEFITS. write them to new columns with the prefix LENGTH_'. This step also has a preview showing sample rows with added length columns.

Below the steps is a preview table showing the transformed data. The columns are:

COMPANY_PROFILE	LENGTH_COMPANY_PRO...	DESCRIPTION	LENGTH_DESCRIPTI...
we re food52 and we ve created a groundbreaking ...	863	food52 a fast growing james beard award winning ...	889
90 seconds the worlds cloud video production serv...	1255	organised focused vibrant awesome do you have a ...	2028
valor services provides workforce solutions that m...	865	our client located in houston is actively seeking an ...	348
our passion for improving quality of life through ge...	599	the company esri environmental systems research i...	2567
spotsource solutions llc is a global human capital ...	1594	job title itemization review managerlocation fort w...	1407
Founded in 2009 the fonpit ag rose with its internati...	0	job overviewapex is an environmental consulting fi...	3368
airenvy s mission is to provide lucrative yet hassle f...	871	your responsibilities manage the english speaking ...	430
solutions3 is a woman owned small business whos...	1010	who is airenvy hey there we are seasoned entrepre...	2439
novitex enterprise solutions formerly pitney bowes...	1329	implementation configuration testing training on h...	75
want to build a 21st century financial service we re ...	671	the customer service associate will be based in ph...	1196
novitex enterprise solutions formerly pitney bowes...	0	position url 86fd830a95a64e2b30ceed829e63fd384...	2795
growing event production company providing stati...	308	transferwise is the clever new way to move money ...	1145
adthena is the uk s leading competitive intelligence...	671	the applications developer digital will develop or p...	1704
	345	event industry installers needed orlando fl near flo...	763
	423	are you interested in a satisfying and financially re...	972

At the bottom right, there's a green 'RUN' button.

aside negative Using AI Assistants in this way can be a very powerful tool but it is important to review the generated steps to ensure that it achieves your aims accurately.

Feature Engineering With Snowpark

Duration: 12

In addition to a wide number of visual tools to enable to the low/no coder Dataiku also provides rich and familiar toolsets and language support for coders.

In this section we will put ourselves in the shoes of a data scientist that is collaborating on the project. Whilst they can get value from tools like the Prepare recipe they may be looking for full code experience so in this section we will use the built-in support in Dataiku for notebooks and IDE's

Lets use a Jupyter notebook to create a Snowpark for Python function to extract the minimum salary range

When using Dataiku's SaaS option from Partner Connect the setup is done for us automatically and we checked that in our earlier lab where we set up the AI Services. If for any reason you skipped that step earlier then return to your browser tab with **Dataiku Launchpad** open (if you have shut this just go to **Launchpad** and check that **Snowpark** is enabled under the **Extensions**

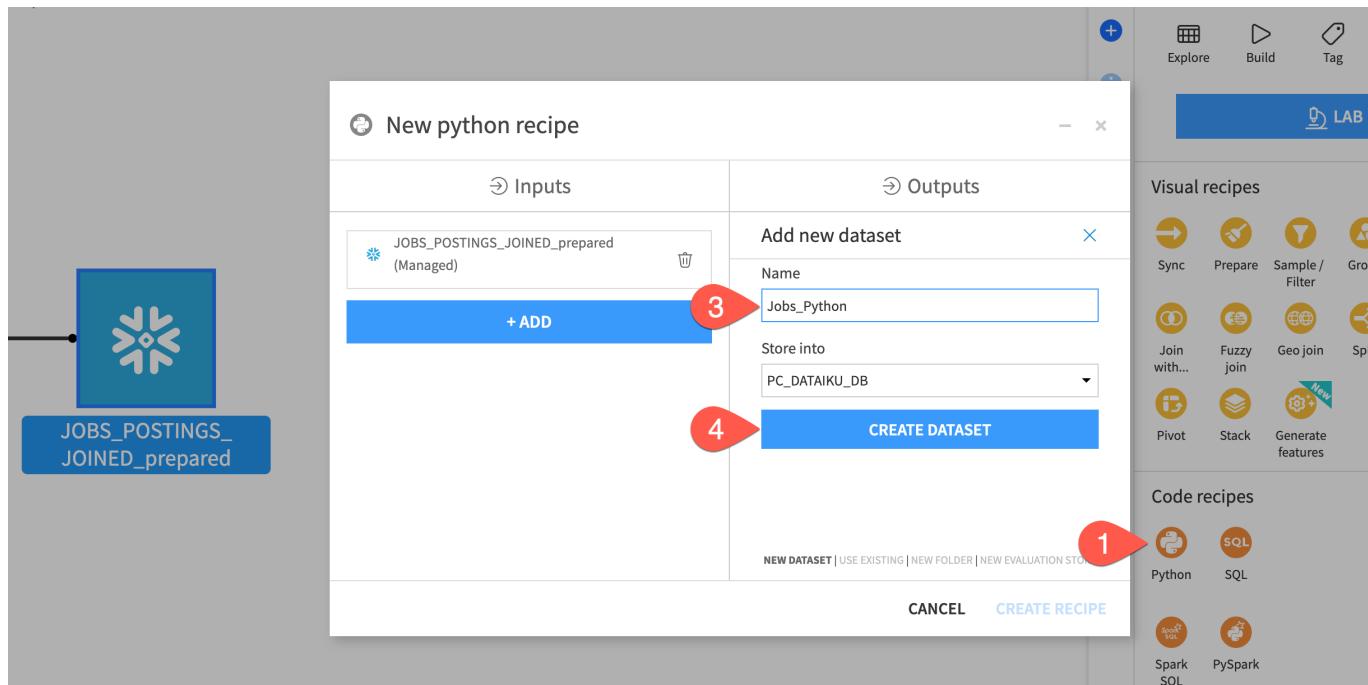
The screenshot shows the Dataiku Launchpad interface. The left sidebar has a 'Space Labs' dropdown, a '+ ADD A SPACE' button, and links for Overview, Dataiku Solutions, Extensions (which is highlighted), Plugins, Connections, Code Envs, and Audit Trail. The main content area is titled 'EXTENSIONS' and shows a list of extensions: 'Snowpark' and 'AI Services'. Both extensions have a blue toggle switch indicating they are enabled. There are also three-dot menus next to each extension entry.

Snowpark code

aside positive **Integrations**: Much like in our last chapter here we are using Dataiku's deep integrations with Snowflake to work on data in the most efficient way. Our data scientist can use the tools they are most familiar with in Dataiku whilst also collaborating on the project with non-coding colleagues and even packaging custom code-based functions in a visual interface to expose complex tasks to less technical users. The data is loaded into a Snowpark Python DataFrame and when we execute our code we push the computation to Snowpark.

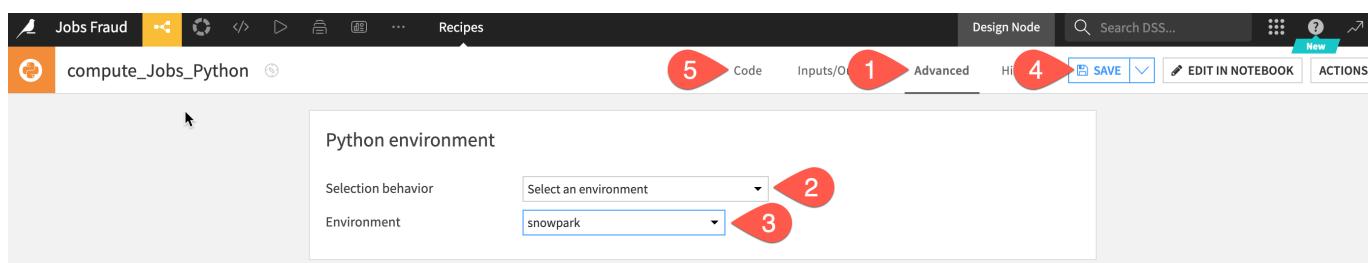
Lets create our Python code recipe:

1. From the flow select the output dataset from our prepare recipe and then from the actions menu on the right select **Python** from the code recipes section.
2. In the **Outputs** section click **+ ADD**
3. Let's name our new output dataset **Jobs_Python**
4. Click **Create Dataset**
5. Click **CREATE RECIPE**



We need to set a code environment that has the correct packages in. Fortunately that has been created for us, we just need to select it for this recipe.

1. Click on the **Advanced** tab at the top of the screen
2. Under the Python Env. section change the **Selection behaviour** to **Select an environment**
3. In the **Environment** drop down select the **snowpark** code environment.
4. Click **Save**
5. Select **Code** tab to return to the main editor



A Note on Code Environments: Dataiku uses the concept of code environments to address the problem of managing dependencies and versions when writing code in R and Python. Code environments provide a number of benefits such as **Isolation and Reproducibility** of results. When using Snowpark for Python from Dataiku you will use a code environment that includes the Snowpark library as well as other packages you wish to use. In our lab, to make things easy, we are using a default Snowpark code environment which just contains just the minimum required libraries but once you have completed the lab and wish to explore further you can create your own code environments.

In addition to selecting an appropriate code environment there are just a couple of extra lines of code to add to your DSS recipe to start using Snowpark for Python

Helpfully we can use one of the many code samples available to us.

1. Delete the automatically generated python starter code
2. Click on the **{CODE SAMPLES}** button

3. Search for Snowpark
4. Select the **Read and write datasets with Snowpark** option
5. Click **+ INSERT**

The screenshot shows the Dataiku interface with the job 'compute_Jobs_Python'. On the left, there are sections for 'Inputs' and 'Outputs'. In the main area, a code editor displays a sample script for reading and writing datasets with Snowpark. The script includes imports for Dataiku and Snowpark, reads a dataset from Dataiku, and writes it to a Snowpark DataFrame. A 'TODO' comment is present for replacing the output computation. The code editor has a 'VALIDATE' and 'RUN' button at the bottom.

You now have some starter Snowpark code with the correct input and output dataset names.

We could carry on using the default code editor if we wish but we also have the option to use notebooks or IDE's so lets go ahead and use the in-built Jupyter notebook for the next part.

1. Click on **EDIT IN NOTEBOOK** option in the top-right. We are going to use the Dataiku package and some Snowpark functions so lets add that now and feel free to separate into cells if you wish. Add the following two lines at the start of your code:

```
#add these two lines at the start of your code
import dataiku
from snowflake.snowpark.functions import *
```

Now lets take a simple example of feature engineering in code. **Delete** the section that reads:

```
# TODO: Replace this part by your actual code that computes the output, as
a Snowpark dataframe
# For this sample code, simply copy input to output
output_dataset_df = input_dataset_df
```

Lets replace that deleted section with our Snowpark for Python code to generate a new feature called **min_salary**

```
#strip minimum salary from the given range
output_dataset_df = input_dataset_df.withColumn("MIN_SALARY",
split(col("SALARY_RANGE"), lit('-'))[0])
```

aside positive Of course this is a very simple piece of feature engineering and our data scientist could go much further but it demonstrates how our code first users can easily work alongside their colleagues

Your code should now look similar to this (don't worry if you haven't separated your code into cells)

```
In [21]: #add these two lines at the start of your code
import dataiku
from snowflake.snowpark.functions import *
from dataiku.snowpark import DkuSnowpark

In [22]: # Create the DSS wrapper around Snowpark
dku_snowpark = DkuSnowpark()

In [23]: # Read inputs
input_dataset = dataiku.Dataset("JOBS_POSTINGS_JOINED_prepared")
input_dataset_df = dku_snowpark.get_dataframe(input_dataset)

In [24]: #strip minimum salary from the given range
output_dataset_df = input_dataset_df.withColumn("MIN_SALARY",
split(col("SALARY_RANGE"), lit('-'))[0])

In [25]: # Write outputs
output_dataset = dataiku.Dataset("Jobs_Python")
dku_snowpark.write_with_schema(output_dataset, output_dataset_df)
```

1. Run your cell(s) to make sure your code is correct
2. Click the **SAVE BACK TO RECIPE** button near the top of the screen
3. From the default code editor click **RUN**

Split The Dataset

Duration: 5

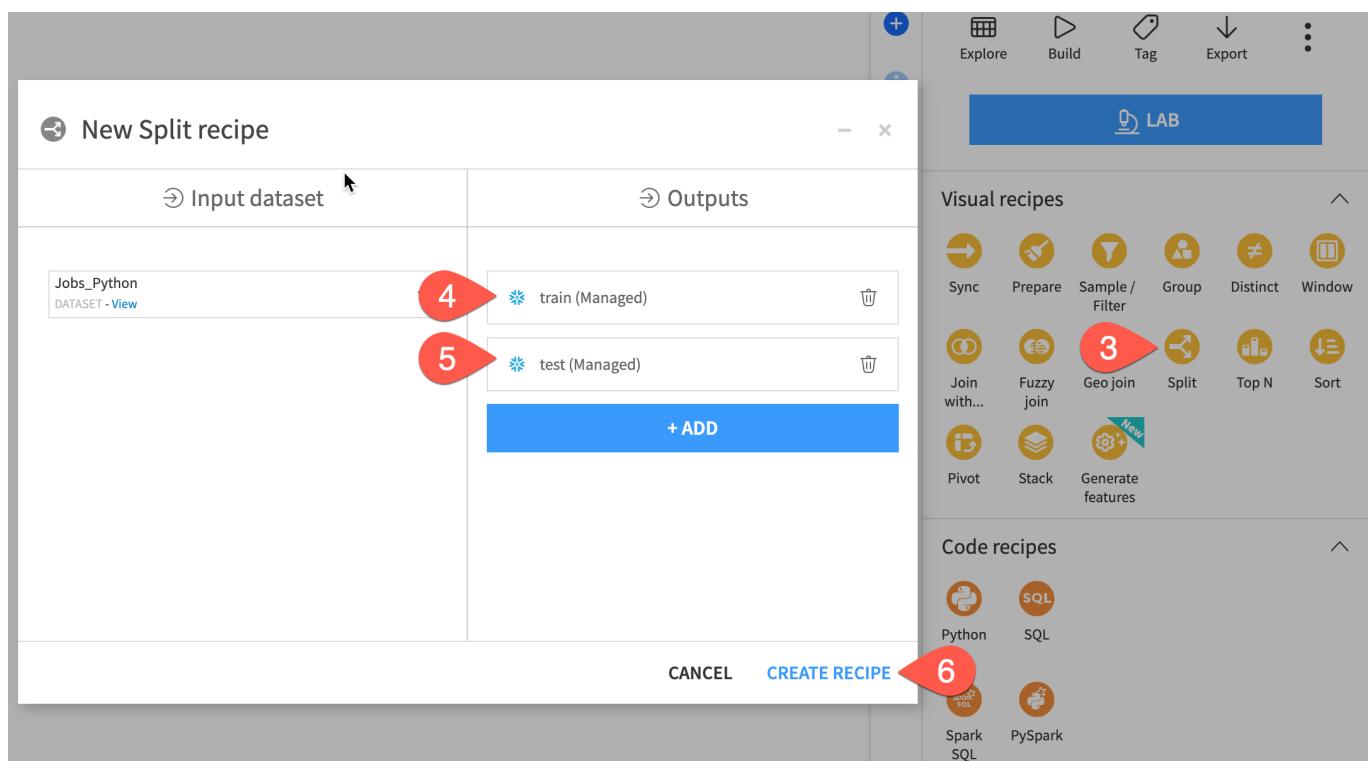
aside positive For the remainder of this lab we will be using Dataiku's Visual ML interface to design, train & test our model. This is the best option for most circumstances, however if you are specifically interested in trying out Snowflakes SnowparkML library then you could, of course, write that code from Dataiku as we just saw with the Python recipe but, even better, Dataiku provides a UI via a plugin so non-coders can use it. If you wish to develop your model using that plugin then jump to the optional chapter on the SnowparkML plugin near the end of this guide

One advantage of an end-to-end platform like Dataiku is that data preparation can be done in the same tool as machine learning. For example, before building a model, you may wish to create a holdout set. Let's do this with a visual recipe.

Steps

1. From the Flow, click the **Jobs_Python** dataset once to select it.

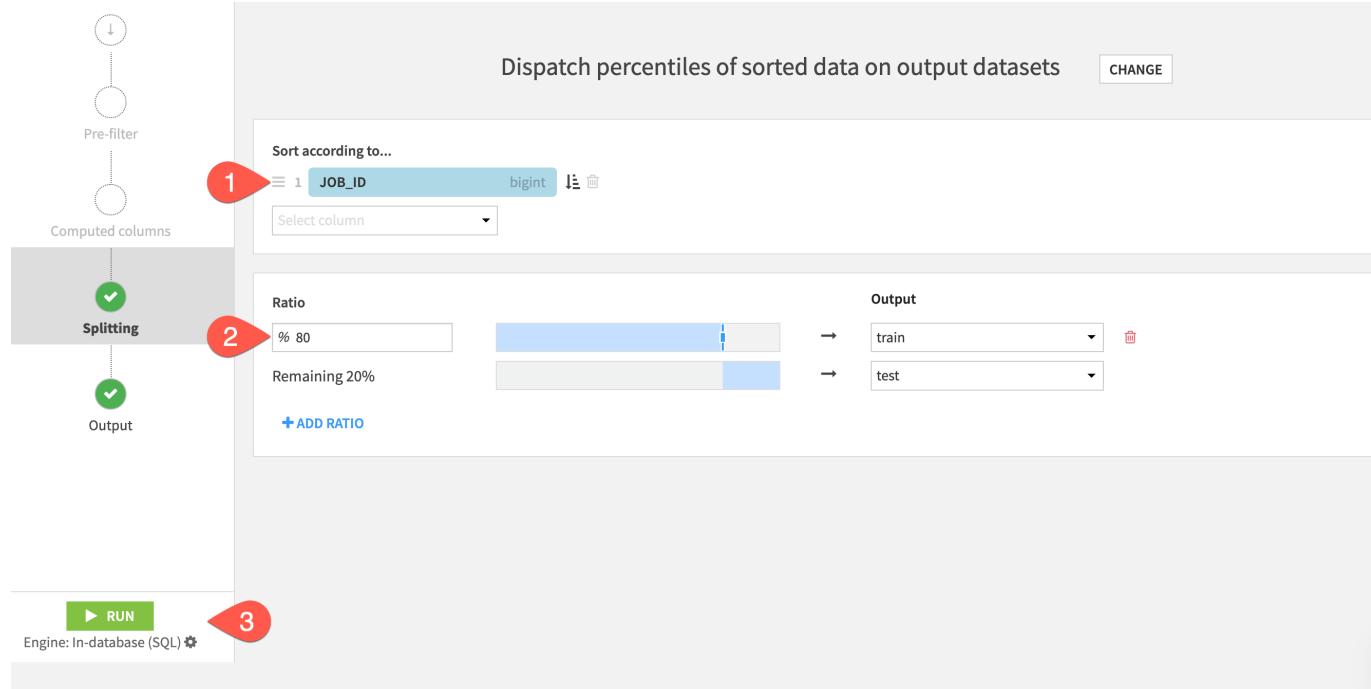
2. Open the Actions tab on the right.
3. Select the Split recipe from the menu of visual recipes.
4. Click **+ Add**; name the output **train**; and click Create Dataset.
5. Click **+ Add** again; name the second output **test**; and click Create Dataset.
6. Once you have defined both output datasets, click **Create Recipe**.



Define a split method

On the Splitting step of the recipe, choose **Dispatch percentiles of sorted data** as the splitting method.

1. Set to sort according to **JOB_ID**
2. Set the ratio of 80 % to the **train** dataset, and the remaining 20% to the **test** dataset.
3. Click the green Run at the bottom left to build these two output datasets.



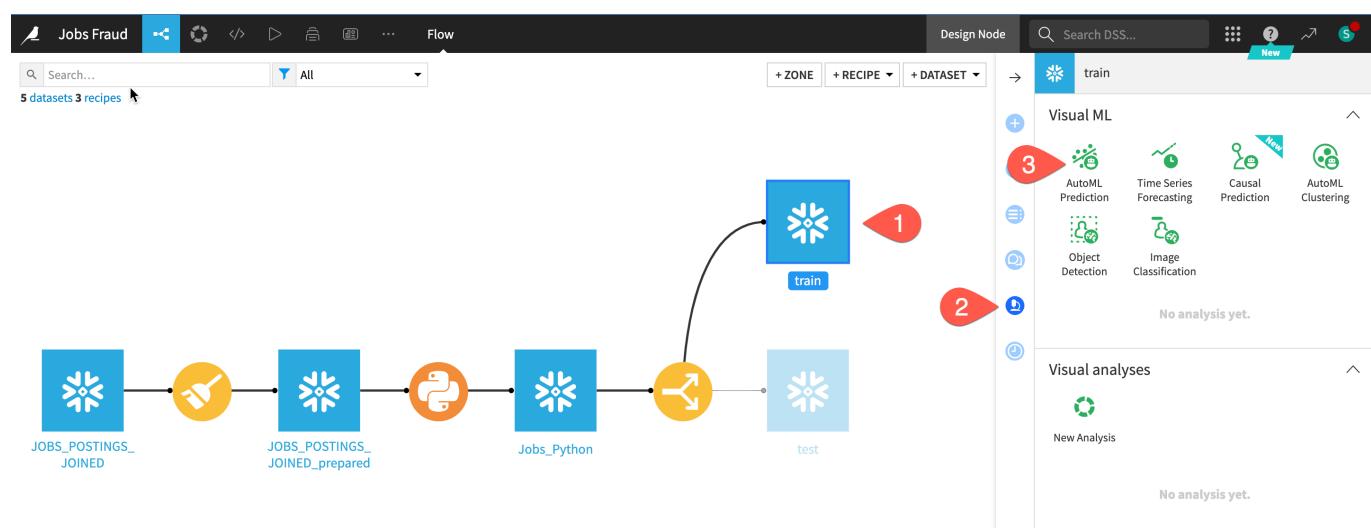
When the job finishes, navigate back to the Flow (g + f) to see your progress.

Train A Model

Duration: 5

The first step is to define the basic parameters of the machine learning task at hand.

1. Select the train dataset.
2. In the Actions tab, click on the Lab button. Alternatively, navigate to the Lab tab of the right side panel (shown below).
3. Among the menu of visual ML tasks, choose AutoML Prediction.



Now you just need to choose the target variable and which kind of models you want to build.

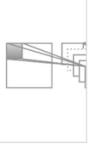
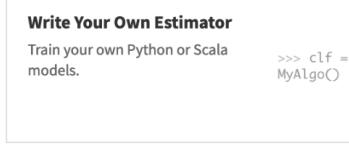
1. Choose **FRAUDULENT** as the target variable on which to create the prediction model.
2. Click Create, keeping the default setting of Quick Prototypes.

Create prediction model on **fraudulent**  1

AutoML Let Dataiku create your models.

- Quick Prototypes** Get some models, generic and quick. 
- In-memory**
- Interpretable Models for Business Analysts** Start with decision tree and simple linear models. 
- High Performance Models** Be patient and get even more accurate models. 

Expert Have full control over the creation of your models.

- Deep Learning** Create the architecture of your deep learning models and train them. 
- Choose Algorithms** Select the algorithms and the hyper parameters to use in cross-validation. 
- Write Your Own Estimator** Train your own Python or Scala models. 

Name your analysis **CREATE**  2

Train models with the default design

Based on the characteristics of the input training data, Dataiku has automatically prepared the design of the model. But no models have been trained yet!

1. Before adjusting the design, click Train to start a model training session.
2. Click Train again to confirm.

Quick modeling of fraudulent on train  1

dict fraudulent (Binary classification)  DESIGN  RESULT  TRAIN  2

Training models

2 models will be trained on 19 features
An estimated total of 37 estimators will be evaluated.

Session Name & Description

Name	Optional, appended to names. Defaults to session number.
Description	Optional, set as model description

Train & test
New train and test sets will be computed according to your settings

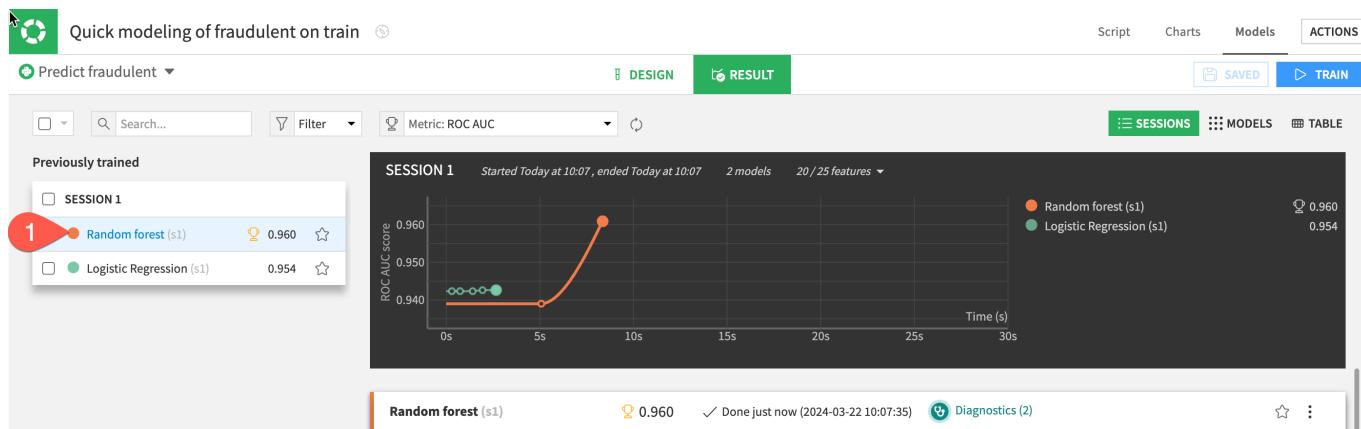
x CANCEL **▶ TRAIN**

Inspect The Results

Duration: 10

Once your models have finished training, let's see how Dataiku did.

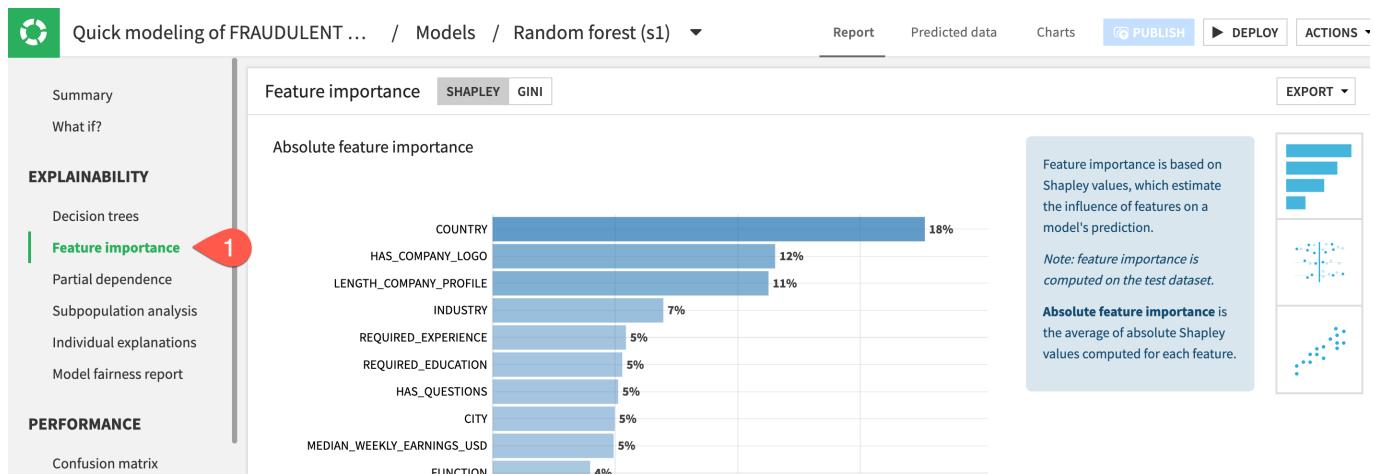
1. While in the Result tab, click on the Random forest model in Session 1 on the left hand side of the screen to open a detailed model report.



Check Model Explainability - Feature Importance

One important aspect of a model is the ability to understand its predictions. The Explainability section of the report includes many tools for doing so.

1. In the Explainability section on the left, click to open the **Feature importance** panel to see an estimate of the influence of a feature on the predictions.



Check Model Explainability - Confusion Matrix

A useful tool to evaluate and compare classification models is the confusion matrix. This compares the actual values of the target variable to our models predictions broken down into where the model got it right (true positives & true negatives) and where it got it wrong (false positives & false negatives).

1. In the Performance section on the left, click to open the **Confusion Matrix** panel

The screenshot shows the Dataiku DSS interface for a model named 'Random forest (s1)'. On the left, there's a sidebar with sections like 'EXPLAINABILITY', 'PERFORMANCE', and 'MODEL INFORMATION'. The 'PERFORMANCE' section is currently selected, with a red circle and the number '1' highlighting the 'Confusion matrix' link. The main content area displays a 'Confusion matrix' table and a horizontal bar chart showing Accuracy (97%), Precision (67%), Recall (64%), and F1-Score (66%). To the right, there's a detailed description of the F1 Score, metrics definitions, and cost matrix calculations.

	Predicted 1	Predicted 0	Total
Actually 1	76	42	118
Actually 0	38	2753	2791
Total	114	2795	2909

Cost matrix

If model predicts 1 and value is 1 the gain is 1 × 76 = 76.00
but value is 0 the gain is -0.3 × 38 = -11.40

Model predicts and value is 0 the gain is 0 × 2753 = 0.00

Check Model Explainability - What If?

What if analyses can be a useful exercise to help both data scientists and business analysts get a sense for what a model will predict, given different input values. You can use the drop-down menus and sliders to adjust the values, type in your own, or even choose to ignore features to simulate a situation with missing values. On the right, you can review the new prediction based on your inputs.

1. Click on the **What If?** to open the panel.

The screenshot shows the 'What if?' panel for the same 'Random forest (s1)' model. The left sidebar has the 'What if?' section selected. The main area shows a 'What if?' configuration with dropdowns for 'INDUSTRY' (Information Technol.), 'CITY' (London), and other variables like 'LENGTH_COMPANY_PROFILE' (sliders from 562 to 6034), 'HAS_COMPANY_LOGO' (0 to 1), 'LOCATION' (GB, LND, London), 'STATE' (CA), and 'COUNTRY'. To the right, it displays the 'Prediction for FRAUDULENT: 0', the 'Probability for 1: 17.56%', and a stacked bar chart showing the probability distribution across three categories. Below that, it shows the 'Most influential features for FRAUDULENT (ICE)' with a slider set to 'ON', and a bar chart for 'DEPARTMENT', 'STATE', and 'COUNTRY'.

Check Model Information

Alongside the results, you'll also want to be sure how exactly the model was trained.

1. In the Model Information section, click to open the Features panel to check which features were included in the model, which were rejected (such as the text features), and how they were handled.

2. When finished, at the top of the model report, click on Models to return to the Result home.

The screenshot shows the Dataiku interface with the following details:

- Top Bar:** Shows 'Jobs Fraud' as the project, 'Visual Analyses' as the workspace, and various navigation icons.
- Title Bar:** Displays 'Quick modeling of FRAUDULENT on t' and 'Models / Random forest (s1)'.
- Left Sidebar:**
 - PERFORMANCE:** Confusion matrix, Decision chart, Lift charts, Calibration curve, ROC & PR curves, Density chart, Metrics and assertions, Stress test center, Model error analysis.
 - MODEL INFORMATION:** Data preparation, **Features** (highlighted with a red box and arrow 1), Algorithm, Hyperparameter optimization.
- Content Area:** Titled 'Features' under 'Input features'. It lists 27 input features with their types and encodings:

Feature	Type	Category	Encoding
LOCATION	Input	A Category	Dummy encoding
REQUIREMENTS	Rejected	I Text	
JOB_ID	Rejected	# Numeric	
REQUIRED_EDUCATION	Input	A Category	Dummy encoding
STATE	Input	A Category	Dummy encoding
HAS QUESTIONS	Input	# Numeric	Avg-std rescaling
COUNTRY	Input	A Category	Dummy encoding
REQUIRED_EXPERIENCE	Input	A Category	Dummy encoding
DESCRIPTION	Rejected	I Text	
COMPANY PROFILE	Rejected	I Text	
MEDIAN_WEEKLY_EARNINGS_USD	Input	# Numeric	Avg-std rescaling

aside positive There are many more features to better understand your model. Feel free to explore them as time permits

Iterate On The Model Training Design (optional)

Duration: 10

aside positive This chapter is optional in the lab for timing reasons but would be a standard part of real world model development. Feel free to cover it now if you have time or return to it later to improve your model

Thus far, Dataiku has produced quick prototypes. From these baseline models, you can work on iteratively adjusting the design, training new sessions of models, and evaluating the results.

1. Switch to the **Design** tab at the top center of the screen.

The screenshot shows the Dataiku interface with the following details:

- Top Bar:** Shows 'Quick modeling of fraudulent on train' and various actions like 'Script', 'Charts', 'Models', 'SAVED', 'TRAIN', and a '+' icon.
- Content Area:**
 - BASIC:** Target (highlighted with a red box and arrow 1).
 - FEATURES:** Target / Test Set, Metrics, Debugging.
 - MODELING:** Algorithms, Hyperparameters.
 - Target Section:** Prediction type: Two-class classification, Target: fraudulent.
 - Partitioned models:** Partitioning: Not available: input dataset is not partitioned.
 - Target classes:** Proportions of classes in the guess sample: 0% (blue) and 96% (grey).

Tour the Design tab

From the Design tab, you have full control over the design of a model training session. Take a quick tour of the available options. Some examples include:

1. In the **Train / Test Set** panel, you could apply a k-fold cross validation strategy.
2. In the **Feature reduction** panel, you could apply a reduction method like Principal Component Analysis.
3. In the **Algorithms** panel, you could select different machine learning algorithms or import custom Python models.

The screenshot shows the Dataiku interface with the following details:

- Project Title:** Quick modeling of fraudulent on train
- Tab:** DESIGN (highlighted in green)
- Panel:** Algorithms (highlighted in green)
- Algorithm Selected:** Random Forest (ON)
- Random Forest Settings:**
 - Number of trees: 100
 - Feature sampling strategy: Default
 - Maximum depth of tree: 6, 15
 - Minimum samples per leaf: 1
- Sidebar Sections:**
 - BASIC:** Target, Train / Test Set (marked with 1), Metrics, Debugging
 - FEATURES:** Features handling, Feature generation, Feature reduction (marked with 2)
 - MODELING:** Algorithms (marked with 3), Hyperparameters, Model Overrides
- Top Bar:** Script, Charts, Models, ACTIONS, SAVED, TRAIN

Reduce the number of features

Instead of adding complexity, let's simplify the model by including only the most important features. Having fewer features could hurt the model's predictive performance, but it may bring other benefits, such as greater interpretability, faster training times, and reduced maintenance costs.

1. In the **Design** tab, navigate to the **Features handling** panel on the left.
2. Click the box at the top left of the feature list to select all.
3. For the role, click **Reject** to de-select all features.
4. Turn on the three most influential features according to the Feature importance chart seen earlier: **COUNTRY, HAS_COMPANY_LOGO, LENGTH_COMPANY_PROFILE**.

The screenshot shows the Dataiku DSS interface with the 'DESIGN' tab selected. On the left, the 'FEATURES' section is expanded, and the 'Features handling' sub-section is highlighted with a red arrow labeled '1'. In the main panel, under 'Handling of "HAS_COMPANY_LOGO"', three checkboxes are selected: 'A COUNTRY Dummy encoding', '# LENGTH_COMPANY_PROFILE Avg-std rescaling', and '# HAS_COMPANY_LOGO Avg-std rescaling'. Each of these selected checkboxes has its 'ON' toggle switch highlighted with a red box and a red arrow labeled '2'. To the right, there are sections for 'Role' (set to 'Input'), 'Variable type' (set to '# Numerical'), 'Numerical handling' (set to 'Keeping as a regular numeric'), 'Rescaling' (set to 'Standard rescaling'), 'Make derived feats.' (unchecked), 'Distribution' (showing stats like Min: 0, Max: 1, Mean: 0.79890, etc.), and 'Missing values' (set to 'Impute ...').

aside positive Your top three features may be slightly different. Feel free to choose these three or the three most important from your own results.

Train a second session

Once you have just the top three features in the model design, you can kick off another training session.

1. Click the blue **Train** button near the top right to start the next session.
2. Click **Train** once more to confirm.

The screenshot shows the Dataiku DSS interface with the 'DESIGN' tab selected. A modal dialog box titled 'Training models' is open. It displays the message: '2 models will be trained on 3 features. An estimated total of 37 estimators will be evaluated.' Below this, there are fields for 'Session Name & Description' (Name: 'Optional, appended to names. Defaults to session number.', Description: 'Optional, set as model description') and 'Train & test' (Train (11391 rows) and test (2913 rows) sets computed on 2023/07/24-12:58 will be used., Drop existing sets, recompute new ones). At the bottom of the dialog are 'CANCEL' and 'TRAIN' buttons, with the 'TRAIN' button highlighted with a red box and a red arrow labeled '2'. The background shows the feature handling settings from the previous screenshot.

aside negative In reality our results from both training runs are suspiciously high and would merit further investigation. Indeed if you click on the diagnostics that Dataiku helpfully runs for each training session you can see a warning for an imbalanced dataset. If you switch the metric to F1 (which is a better metric for imbalanced datasets) you will see a significant drop in score. There are many ways Dataiku can help, for example with the **class rebalancing** sampling method. It is beyond the scope of this course but read up in our documentation or blogs or take one of the more

advanced Dataiku Academy ML courses to understand how Dataiku ML Diagnostics can help you identify and troubleshoot potential issues and suggest possible improvements as you build your model.

Apply A Model To Generate Predictions On New Data

Duration: 8

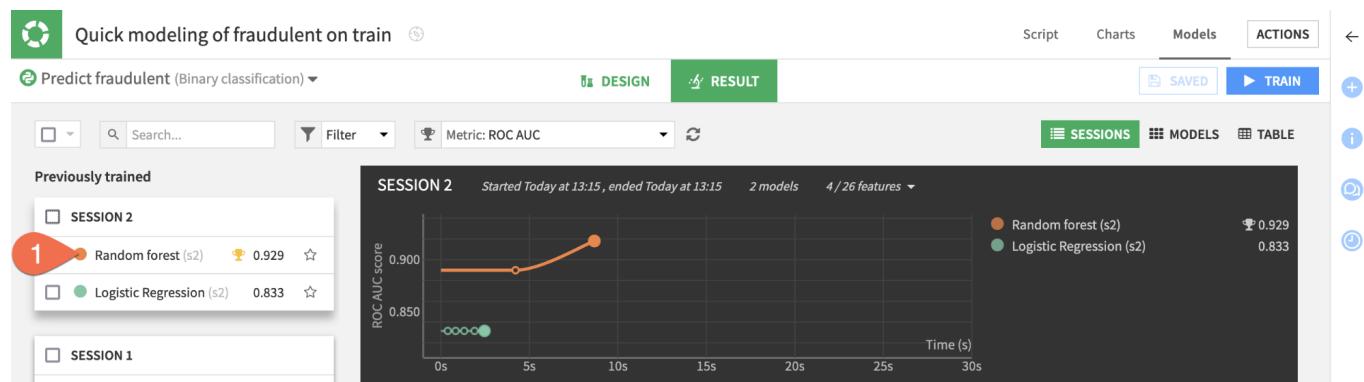
Up until now, the models you've trained are present only in the Lab, a space for experimental prototyping and analysis. You can't actually use any of these models until you have added them to the Flow, where your actual project pipeline of datasets and recipes lives. Let's do that now!

Choose a model to deploy

Many factors could impact the choice of which model to deploy. For many use cases, the model's performance is not the only deciding factor.

Compared to the larger model, the simple model with three features cost about 4 hundredths of a point in performance. For some use cases, this may be a huge amount, but in others it may be a bargain for a model that is more interpretable, cheaper to train, and easier to maintain. Since performance is not too important in this tutorial, let's choose the simpler option.

1. From the Result tab, click the Random forest (s2) to open the model report of the simpler random forest model from Session 2.



Now you just need to deploy this model from the Lab to the Flow.

1. Click **Deploy** near the top right.
2. Click **Create** to confirm.

Random forest (s2) (1)

ROC AUC: 0.929

Model

- Model ID
- Model type
- Target
- Classes
- Backend
- Algorithm
- Trained on
- Columns

Deploy prediction model

No existing training recipe matches this prediction type, target & ML backend.
You can deploy this model as a new training recipe.

Train dataset: train
Model name: Predict fraudulent (binary)

ADVANCED CANCEL CREATE (2)

Score Data

You now have two green objects in the Flow that you can use to generate predictions on new data: a training recipe and a saved model object.

1. From the Flow single click on the diamond-shaped saved model to select it
2. From the Actions menu select the **Score** recipe
3. For the **Input Dataset** select the **test** dataset
4. Click **CREATE RECIPE**

Score a dataset

Input dataset	Output dataset
Input dataset: test (3)	Name: test_scored Store into: PC_DATAIKU_DB
Prediction Model: Predict FRAUDULENT (binary)	CREATE RECIPE (4)

Code recipes
Python

Apply model on data to
Score (2)

Evaluate model on already
Evaluate

Flow Zones
Move Share

1. From the Score recipe you can leave the defaults but make sure that Snowflake Java UDF is selected as the engine. If it isn't click on the gear cog and select it. When you are done click **RUN**

The screenshot shows the Dataiku DSS interface for a scoring job named "score_test". The top navigation bar includes "Settings" (underlined), "Input / Output", and "Advanced". The main configuration area is divided into two sections: "Threshold" and "Output".

Threshold:

- Threshold: Use threshold from the current version of the model (0.625)
- Override the threshold from the model

Output:

- Output probabilities: output probabilities for each class in addition to the prediction
- Input columns to include: avoid copying the whole input dataset to the output
- Output model metadata: output model metadata (id, version, fullId and prediction time)

At the bottom left is a green "RUN" button with a play icon. To its right, a status message says "Engine: In Database (Snowflake with Java UDF)" followed by a gear icon. A red callout bubble with the number "1" points to this message.

aside positive You may notice the `Java UDF` part of that engine. This is one of a number of places that Dataiku embeds Snowpark Java UDFs into the product for the best integration and performance. From your perspective as a user Dataiku will take care of the details and it simply means the task at hand runs faster

Inspect the scored data

Compare the schemas of the test and test_scored datasets.

1. When the job finishes, click Explore dataset `test_scored`.
2. Scroll to the right, and note the addition of three new columns: `proba_0`, `proba_1`, and `prediction`.
3. Navigate back to the Flow to see the scored dataset in the pipeline.

EMPLOYMENT_T...	REQUIRED_EXPERIENCE	REQUIRED_EDUCATION	INDUSTRY	FUNCTION	FRAUDULENT	MIN_SALARY	proba_0	proba_1	prediction
string Text	string Text	string Text	string Text	string Text	bigint Integer	string Integer	double Decimal	double Decimal	string Integer
Full-time	Internship		Computer Software	Marketing	0	2	0.9504244908780922	0.04957550912190779	0
Full-time	Mid-Senior level	Bachelor's Degree	Computer Software	Sales	0		0.8744034415178371	0.12559655848216286	0
Full-time			Research		0	960000	0.7316990953742548	0.2683009046257452	0
Full-time		Bachelor's Degree	Legal Services	Customer Service	0	20000	0.9337496931388684	0.0662503068611315	0
Full-time			Apparel & Fashion	Art/Creative	0	50000	0.6908461390746412	0.30915386092535874	0
Full-time	Mid-Senior level	Bachelor's Degree	Computer Software	Project Managem...	0	55000	0.8369663206622409	0.1630336793377517	0
Full-time	Entry level		Civic & Social Organization	Other	0		0.8631068501632438	0.13689314983675616	0
Full-time			Internet		0		0.9197243862018294	0.08027561379817055	0
Full-time	Associate	High School or equivalent	Marketing and Advertising	Sales	0		0.8449919425240151	0.15500805747598484	0
Full-time	Entry level	High School or equivalent	Hospital & Health Care	Health Care Provi...	0		0.8558107031133593	0.1441892968864078	0
Full-time	Associate		Public Relations and Commun...	Public Relations	0	50	0.7922241607748858	0.20777583922511425	0
Full-time	Mid-Senior level		Real Estate	Management	0		0.31179192056023	0.68820807943977	1
							0.8065197582284976	0.1934802417715024	0

aside positive How well was the model able to identify the fake job postings in the test dataset? That is a task for the Evaluate recipe, which you will encounter in other learning resources.

Document The Flow (optional)

aside positive This chapter is optional in the lab for timing reasons but documenting your project along with other capabilities in Dataiku like automatic generation of model documentation is important in MLOps)

Dataiku can generate explanations of project Flows. The feature leverages a Large Language Model (LLM) to do this.

- On the Flow screen open the Flow Actions menu
- Select Explain Flow

It is possible to adjust the generated explanations for language, purpose and length. Apply the following and then set the generated text as the project description.

- Language: English
- Purpose: Business
- Length: Medium

Explain "Job Applications"

Language	<input type="button" value="English"/>	
Purpose	<input type="button" value="Business oriented explanation of the ou"/>	
Length	<input type="button" value="Medium"/>	
REGENERATE <i>AI-generated results may be incorrect. Please exercise caution.</i>		
dataset, "JOB_POSTINGS", contains a variety of information about job postings, such as job title, location, company profile, job description, requirements, benefits, and more.		
The first step in the flow is data preparation. The location data is split into separate columns for country, state, and city to provide more granular geographical information. The text data in the company profile, job description, requirements, and benefits columns are simplified and normalized to make them easier to analyze. Additionally, the length of the company profile and job description are calculated and added as new columns, which could be useful for further analysis or feature engineering.		
After the data preparation, the dataset is processed through a Python recipe. This could involve a variety of operations, such as data cleaning, feature engineering, or exploratory data analysis.		
The dataset is then split, likely into a training set and a test set. This is a common step in machine learning workflows, where the training set is used to train a predictive model, and the test set is used to evaluate the model's performance on unseen data.		
The training set is used in a prediction training recipe, which trains a predictive model. The		

USE AS PROJECT DESCRIPTION **CLOSE**

Using Snowpark ML Plugin (optional)

Snowflake recently released a collection of python APIs enabling efficient ML model development directly in Snowflake. You can, of course, use this library directly from Dataiku in a code recipe but we also provide a free to use plugin to provide a UI.

There are a few steps you need to take to install the plugin and prepare the data.

Install the plugin

1. Return the Dataiku Cloud launchpad (<https://launchpad-dku.app.dataiku.io>)
2. In the **Plugins** section select **+ ADD A PLUGIN**
3. Search for and install the Visual SnowparkML plugin

Data pre-processing

When using the plugin there are a few additional pre-processing steps necessary that we don't need to do when using Dataiku's standard Visual ML interface. Firstly we would need to make sure that all the column names are in uppercase but fortunately in our dataset that is already the case. Secondly we need to make sure that any columns of type **int** that have missing values are converted to **doubles**

1. Click once on the **Jobs_Python** dataset in the flow to select it and then choose the **Prepare** recipe from the Actions menu, just like we did earlier in the lab
2. There are a number of columns of type **int** with missing values. Change these to doubles by clicking on the datatype under the column name and selecting it.
3. Click **RUN**

SnowparkML Plugin

Now we have performed our preprocessing select the output dataset and then the plugin from the **Actions** menu (Note: You may need to scroll down to find the plugins, they are below the code and LLM recipes)

There are a number of output fields to fill:

1. Set an output dataset name for the **Train Dataset Output**
2. Set an output dataset name for the **Test Dataset Output**
3. Set a name for **Model Folder** where the MLflow experiment tracking data and trained models will be stored
4. Optionally you can set a folder for the final best model but we can leave this blank

Plugin recipe "Visual SnowparkML"

Inputs	Outputs
Input Dataset ? Jobs_Python_prepared (Managed) CHANGE	Train Dataset Output ? training (Managed) CHANGE
	Test Dataset Output ? testdata (Managed) CHANGE

[CANCEL](#) [CREATE](#)

Now we can set the details of our training run.

1. Give the final model a name
2. Set the target column to **Fraudulent**
3. This is a **Two-class classification** problem
4. The ratio can be set to **0.8** for the standard 80/20 split and a random seed can also be set.

You can now set your Metrics, Features, Algos and more for your training session. Just click **RUN** at the bottom left when you are happy with your setup

The screenshot shows the 'Train Machine Learning Models on Snowpark' configuration page. It includes sections for Requirements, Model Name, Target, Train / Test Set, and Metrics. The Model Name section has 'Final Model Name' set to 'jobs_model'. The Target section has 'Target column' set to 'FRAUDULENT' and 'Prediction type' set to 'Two-class classification'. The Train / Test Set section has 'Train ratio' set to '0.8' and 'Random seed' set to '42'. The Metrics section is partially visible at the bottom.

Congratulations. You are using SnowparkML from a UI! You can explore your model from the **MLflow** green diamond in the **Flow** looking at explainability and performance measures, model comparisons and much more.

Conclusions And Resources

Duration: 3

Congratulations on completing this introductory lab exercise! Congratulations! You've mastered the Snowflake basics and you've taken your first steps toward data cleansing, feature engineering and training machine learning models with Dataiku.

You have seen how Dataiku's deep integrations with Snowflake can allow teams with different skill sets get the most out of their data at every stage of the machine learning lifecycle.

We encourage you to continue with your free trial and continue to refine your models and by using some of the more advanced capabilities not covered in this lab.

What You Learned:

- How to create stages, databases, tables, views, and virtual warehouses.
- How to load structured and semi-structured data.

- How to perform analytical queries on data in Snowflake, including joins between tables.
- How to create a Dataiku trial account through Partner Connect
- How to use both Visual and Code Recipes to explore and transform data
- How to train, explore and understand a machine learning model

Related Resources

- Join the [Snowflake Community](#)
- Join the [Dataiku Community](#)
- Sign up for [Snowflake University](#)
- Join the [Dataiku Academy](#)