# Project:

# Task 1: Instructions

Inspect the international debt data.

* Read the line of code provided for you, which connects you to the international\_debt database.
* Select all of the columns from the international\_debt table and limit the output to the first 10 rows.

**1. The World Bank's international debt data**

It's not that we humans only take debts to manage our necessities. A country may also take debt to manage its economy. For example, infrastructure spending is one costly ingredient required for a country's citizens to lead comfortable lives. [The World Bank](https://www.worldbank.org/) is the organization that provides debt to countries.

In this notebook, we are going to analyze international debt data collected by The World Bank. The dataset contains information about the amount of debt (in USD) owed by developing countries across several categories. We are going to find the answers to questions like:

* What is the total amount of debt that is owed by the countries listed in the dataset?
* Which country owns the maximum amount of debt and what does that amount look like?
* What is the average amount of debt owed by countries across different debt indicators?



The first line of code connects us to the international\_debt database where the table international\_debt is residing. Let's first SELECT *all* of the columns from the international\_debt table. Also, we'll limit the output to the first ten rows to keep the output clean.

ANSWER :

In [37]:

%%sql

postgresql:///international\_debt

​

SELECT \*

FROM international\_debt

LIMIT 10;

10 rows affected.

Out[37]:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **country\_name** | **country\_code** | **indicator\_name** | **indicator\_code** | **debt** |
| Afghanistan | AFG | Disbursements on external debt, long-term (DIS, current US$) | DT.DIS.DLXF.CD | 72894453.700000003 |
| Afghanistan | AFG | Interest payments on external debt, long-term (INT, current US$) | DT.INT.DLXF.CD | 53239440.100000001 |
| Afghanistan | AFG | PPG, bilateral (AMT, current US$) | DT.AMT.BLAT.CD | 61739336.899999999 |
| Afghanistan | AFG | PPG, bilateral (DIS, current US$) | DT.DIS.BLAT.CD | 49114729.399999999 |
| Afghanistan | AFG | PPG, bilateral (INT, current US$) | DT.INT.BLAT.CD | 39903620.100000001 |
| Afghanistan | AFG | PPG, multilateral (AMT, current US$) | DT.AMT.MLAT.CD | 39107845 |
| Afghanistan | AFG | PPG, multilateral (DIS, current US$) | DT.DIS.MLAT.CD | 23779724.300000001 |
| Afghanistan | AFG | PPG, multilateral (INT, current US$) | DT.INT.MLAT.CD | 13335820 |
| Afghanistan | AFG | PPG, official creditors (AMT, current US$) | DT.AMT.OFFT.CD | 100847181.900000006 |
| Afghanistan | AFG | PPG, official creditors (DIS, current US$) | DT.DIS.OFFT.CD | 72894453.700000003 |

# Task 2: Instructions

Find the number of distinct countries.

* Use the DISTINCT clause and the COUNT() function in pair on the country\_name column.
* Alias the resulting column as total\_distinct\_countries.

**2. Finding the number of distinct countries**

From the first ten rows, we can see the amount of debt owed by *Afghanistan* in the different debt indicators. But we do not know the number of different countries we have on the table. There are repetitions in the country names because a country is most likely to have debt in more than one debt indicator.

Without a count of unique countries, we will not be able to perform our statistical analyses holistically. In this section, we are going to extract the number of unique countries present in the table.

ANSWER:

In [39]:

**%%sql**

**SELECT**

**COUNT(DISTINCT country\_name) AS total\_distinct\_countries**

**FROM international\_debt;**

**\* postgresql:///international\_debt**

**1 rows affected.**

Out[39]:

|  |
| --- |
| **total\_distinct\_countries** |
| 124 |

# Task 3: Instructions

Extract the unique debt indicators in the table.

* Use the DISTINCT clause on the indicator\_code column.
* Alias the resulting column as distinct\_debt\_indicators.
* Order the results by distinct\_debt\_indicators.

**3. Finding out the distinct debt indicators**

We can see there are a total of 124 countries present on the table. As we saw in the first section, there is a column called indicator\_name that briefly specifies the purpose of taking the debt. Just beside that column, there is another column called indicator\_code which symbolizes the category of these debts. Knowing about these various debt indicators will help us to understand the areas in which a country can possibly be indebted to.

ANSWER:

In [41]:

**%%**sql

SELECT

DISTINCT indicator\_code AS distinct\_debt\_indicators

FROM international\_debt

ORDER BY distinct\_debt\_indicators;

\* postgresql:///international\_debt

25 rows affected

Out[41]:

|  |
| --- |
| **distinct\_debt\_indicators** |
| DT.AMT.BLAT.CD |
| DT.AMT.DLXF.CD |
| DT.AMT.DPNG.CD |
| DT.AMT.MLAT.CD |
| DT.AMT.OFFT.CD |
| DT.AMT.PBND.CD |
| DT.AMT.PCBK.CD |
| DT.AMT.PROP.CD |
| DT.AMT.PRVT.CD |
| DT.DIS.BLAT.CD |
| DT.DIS.DLXF.CD |
| DT.DIS.MLAT.CD |
| DT.DIS.OFFT.CD |
| DT.DIS.PCBK.CD |
| DT.DIS.PROP.CD |
| DT.DIS.PRVT.CD |
| DT.INT.BLAT.CD |
| DT.INT.DLXF.CD |
| DT.INT.DPNG.CD |
| DT.INT.MLAT.CD |
| DT.INT.OFFT.CD |
| DT.INT.PBND.CD |
| DT.INT.PCBK.CD |
| DT.INT.PROP.CD |
| DT.INT.PRVT.CD |

# Task 4: Instructions

Find out the total amount of debt as reflected in the table.

* Use the built-in SUM function on the debt column, then divide it by 1000000 and round the result to 2 decimal places so that the output is fathomable.
* Alias the resulting column as total\_debt.

**4. Totaling the amount of debt owed by the countries**

As mentioned earlier, the financial debt of a particular country represents its economic state. But if we were to project this on an overall global scale, how will we approach it?

Let's switch gears from the debt indicators now and find out the total amount of debt (in USD) that is owed by the different countries. This will give us a sense of how the overall economy of the entire world is holding up.

ANSWER:

In [43]:

**%%**sql

SELECT

ROUND(SUM(debt)**/**1000000, 2) AS total\_debt

FROM international\_debt;

\* postgresql:///international\_debt

1 rows affected.

Out[43]:

|  |
| --- |
| **total\_debt** |
| 3079734.49 |

# Task 5: Instructions

Find out the country owing to the highest debt.

* Select the country\_name and debt columns, then apply the SUM function on the debt column.
* Alias the column resulted from the summation as total\_debt.
* GROUP the results BY country\_name and ORDER them BY the new alias total\_debt in a descending manner.
* LIMIT the number of rows to be one.

## 5. Country with the highest debt

"Human beings cannot comprehend very large or very small numbers. It would be useful for us to acknowledge that fact." - [Daniel Kahneman](https://en.wikipedia.org/wiki/Daniel_Kahneman). That is more than 3 million ***million*** USD, an amount which is really hard for us to fathom.

Now that we have the exact total of the amounts of debt owed by several countries, let's now find out the country that owns the highest amount of debt along with the amount. **Note** that this debt is the sum of different debts owed by a country across several categories. This will help to understand more about the country in terms of its socio-economic scenarios. We can also find out the category in which the country owns its highest debt. But we will leave that for now.

ANSWER:

In [45]:

**%%**sql

SELECT

country\_name ,

SUM(debt) **as** total\_debt

FROM international\_debt

GROUP BY country\_name

ORDER BY total\_debt DESC

Limit 1;

\* postgresql:///international\_debt

1 rows affected.

RESULT:

Out[45]:

|  |  |
| --- | --- |
| **country\_name** | **total\_debt** |
| China | 285793494734.200001568 |

# Task 6: Instructions

Determine the average amount of debt owed across the categories.

* Select indicator\_code aliased as debt\_indicator, then select indicator\_name and debt.
* Apply an aggregate function on the debt column to average out its values and alias it as average\_debt.
* Group the results by the newly created debt\_indicator and already present indicator\_name columns.
* Sort the output with respect to the average\_debt column in a descending manner and limit the results to ten.

## 6. Average amount of debt across indicators

So, it was China. A more in-depth breakdown of China's debts can be found [here](https://datatopics.worldbank.org/debt/ids/country/CHN).

We now have a brief overview of the dataset and a few of its summary statistics. We already have an idea of the different debt indicators in which the countries owe their debts. We can dig even further to find out on an average how much debt a country owes? This will give us a better sense of the distribution of the amount of debt across different indicators.

ANSWER:

In [47]:

**%%**sql

SELECT

indicator\_code AS debt\_indicator,

indicator\_name,

AVG(debt) AS average\_debt

FROM international\_debt

GROUP BY debt\_indicator, indicator\_name

ORDER BY average\_debt DESC

LIMIT 10;

\* postgresql:///international\_debt

10 rows affected.

RESULT:

Out[47]:

|  |  |  |
| --- | --- | --- |
| **debt\_indicator** | **indicator\_name** | **average\_debt** |
| DT.AMT.DLXF.CD | Principal repayments on external debt, long-term (AMT, current US$) | 5904868401.499193612 |
| DT.AMT.DPNG.CD | Principal repayments on external debt, private nonguaranteed (PNG) (AMT, current US$) | 5161194333.812658349 |
| DT.DIS.DLXF.CD | Disbursements on external debt, long-term (DIS, current US$) | 2152041216.890243888 |
| DT.DIS.OFFT.CD | PPG, official creditors (DIS, current US$) | 1958983452.859836046 |
| DT.AMT.PRVT.CD | PPG, private creditors (AMT, current US$) | 1803694101.963265321 |
| DT.INT.DLXF.CD | Interest payments on external debt, long-term (INT, current US$) | 1644024067.650806481 |
| DT.DIS.BLAT.CD | PPG, bilateral (DIS, current US$) | 1223139290.398230108 |
| DT.INT.DPNG.CD | Interest payments on external debt, private nonguaranteed (PNG) (INT, current US$) | 1220410844.421518983 |
| DT.AMT.OFFT.CD | PPG, official creditors (AMT, current US$) | 1191187963.083064523 |
| DT.AMT.PBND.CD | PPG, bonds (AMT, current US$) | 1082623947.653623188 |

# Task 7: Instructions

Find out the country with the highest amount of principal repayments.

* Select the country\_name and indicator\_name columns.
* Add a WHERE clause to filter out the maximum debt in DT.AMT.DLXF.CD category.

## 7. The highest amount of principal repayments

We can see that the indicator DT.AMT.DLXF.CD tops the chart of average debt. This category includes repayment of long term debts. Countries take on long-term debt to acquire immediate capital. More information about this category can be found [here](https://datacatalog.worldbank.org/principal-repayments-external-debt-long-term-amt-current-us-0).

An interesting observation in the above finding is that there is a huge difference in the amounts of the indicators after the second one. This indicates that the first two indicators might be the most severe categories in which the countries owe their debts.

We can investigate this a bit more so as to find out which country owes the highest amount of debt in the category of long term debts (DT.AMT.DLXF.CD). Since not all the countries suffer from the same kind of economic disturbances, this finding will allow us to understand that particular country's economic condition a bit more specifically.

ANSWER:

In [49]:

**%%**sql

SELECT

country\_name,

indicator\_name

FROM international\_debt

WHERE debt = (SELECT

MAX(debt)

FROM international\_debt

WHERE indicator\_code='DT.AMT.DLXF.CD');

\* postgresql:///international\_debt

1 rows affected.

RESULT:

Out[49]:

|  |  |
| --- | --- |
| **country\_name** | **indicator\_name** |
| China | Principal repayments on external debt, long-term (AMT, current US$) |

# Task 8: Instructions

Find out the debt indicator that appears most frequently.

* Select the indicator\_code column, then separately apply an aggregate function to count its values. Alias the column resulting from the counting as indicator\_count.
* Group the results by indicator\_code and order them first by the newly created indicator\_count column then the indicator\_code column, both in a descending manner.
* Limit the resulting number of rows to 20.

## 8. The most common debt indicator

China has the highest amount of debt in the long-term debt (DT.AMT.DLXF.CD) category. This is verified by [The World Bank](https://data.worldbank.org/indicator/DT.AMT.DLXF.CD?end=2018&most_recent_value_desc=true). It is often a good idea to verify our analyses like this since it validates that our investigations are correct.

We saw that long-term debt is the topmost category when it comes to the average amount of debt. But is it the most common indicator in which the countries owe their debt? Let's find that out.

ANSWER:

In [51]:

**%%**sql

SELECT

indicator\_code,

COUNT(indicator\_code) AS indicator\_count

FROM international\_debt

GROUP BY indicator\_code

ORDER BY indicator\_count DESC, indicator\_code DESC

LIMIT 20;

\* postgresql:///international\_debt

20 rows affected.

RESULT:

Out[51]:

|  |  |
| --- | --- |
| **indicator\_code** | **indicator\_count** |
| DT.INT.OFFT.CD | 124 |
| DT.INT.MLAT.CD | 124 |
| DT.INT.DLXF.CD | 124 |
| DT.AMT.OFFT.CD | 124 |
| DT.AMT.MLAT.CD | 124 |
| DT.AMT.DLXF.CD | 124 |
| DT.DIS.DLXF.CD | 123 |
| DT.INT.BLAT.CD | 122 |
| DT.DIS.OFFT.CD | 122 |
| DT.AMT.BLAT.CD | 122 |
| DT.DIS.MLAT.CD | 120 |
| DT.DIS.BLAT.CD | 113 |
| DT.INT.PRVT.CD | 98 |
| DT.AMT.PRVT.CD | 98 |
| DT.INT.PCBK.CD | 84 |
| DT.AMT.PCBK.CD | 84 |
| DT.INT.DPNG.CD | 79 |
| DT.AMT.DPNG.CD | 79 |
| DT.INT.PBND.CD | 69 |
| DT.AMT.PBND.CD | 69 |

# Task 9: Instructions

Find out the debt indicators for which a country owes its highest debt.

* Select the country\_name, indicator\_code and debt columns, and apply an aggregate function to take the maximum of debt. Alias the result as maximum\_debt.
* Group the results by country\_name and indicator\_code.
* Order the results by maximum\_debt in a descending manner.
* Limit the output to 10.

**9. Other viable debt issues and conclusion**

There are a total of six debt indicators in which all the countries listed in our dataset have taken debt. The indicator DT.AMT.DLXF.CD is also there in the list. So, this gives us a clue that all these countries are suffering from a common economic issue. But that is not the end of the story, a part of the story rather.

Let's change tracks from debt\_indicators now and focus on the amount of debt again. Let's find out the maximum amount of debt across the indicators along with the respective country names. With this, we will be in a position to identify the other plausible economic issues a country might be going through. By the end of this section, we will have found out the debt indicators in which a country owes its highest debt.

In this notebook, we took a look at debt owed by countries across the globe. We extracted a few summary statistics from the data and unraveled some interesting facts and figures. We also validated our findings to make sure the investigations are correct.

ANSWER:

In [53]:

**%%**sql

SELECT

country\_name,

indicator\_code,

MAX(debt) AS maximum\_debt

FROM international\_debt

GROUP BY country\_name, indicator\_code

ORDER BY maximum\_debt DESC

LIMIT 10;

\* postgresql:///international\_debt

10 rows affected.

RESULT:

Out[53]:

|  |  |  |
| --- | --- | --- |
| **country\_name** | **indicator\_code** | **maximum\_debt** |
| China | DT.AMT.DLXF.CD | 96218620835.699996948 |
| Brazil | DT.AMT.DLXF.CD | 90041840304.100006104 |
| China | DT.AMT.DPNG.CD | 72392986213.800003052 |
| Russian Federation | DT.AMT.DLXF.CD | 66589761833.5 |
| Turkey | DT.AMT.DLXF.CD | 51555031005.800003052 |
| South Asia | DT.AMT.DLXF.CD | 48756295898.199996948 |
| Brazil | DT.AMT.PRVT.CD | 43598697498.599998474 |
| Russian Federation | DT.AMT.DPNG.CD | 42800154974.900001526 |
| Brazil | DT.AMT.DPNG.CD | 41831444053.300003052 |
| Least developed countries: UN classification | DT.DIS.DLXF.CD | 40160766261.599998474 |