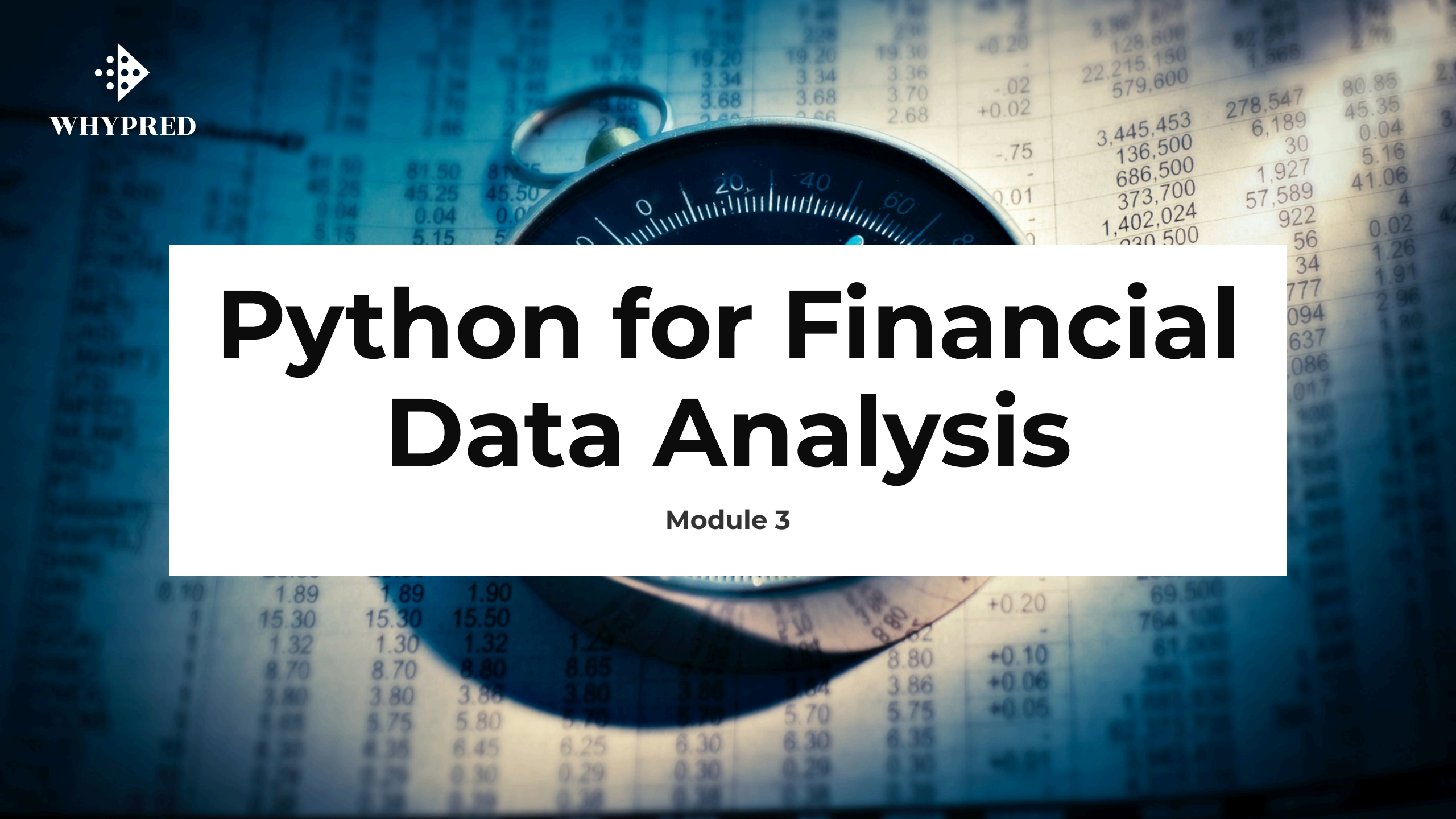
WHYPRED
Python for Financial Data Analysis
Module 3

Session Map

WHYPRED

1 **Recap**

Data storage formats, libraries, dataframes

2 **Time Series Data**

Time is money

3 **Long vs Wide data**

Why it makes a difference

4 **Combing and Transforming Data**

Grouping and custom logic for feature creation, Joins, concatenate, combining different data formats and structures

Course Outline

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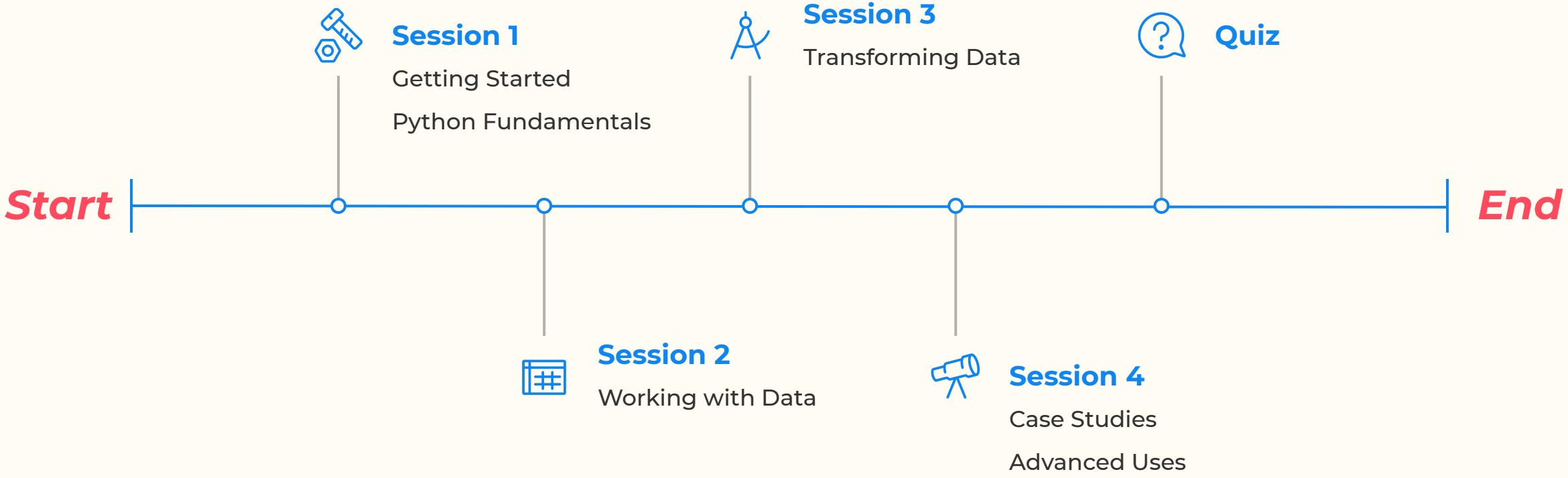

Working with Time Series

Time Series

One common key attribute of financial data is that they are time series data

- They have a time and/or date stamp
- The order of the data is important and needs to be retained
- Often each observation is of the same entity but at different points in time e.g. stock prices
- There are special transformations that can be applied to time series data

Working with Dates/Times

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we use the ***datetime*** library in python :

- Today's date / current timestamp- ***datetime.date.today()***
- Creating date object - ***datetime.date()***
- extracting dates from string- ***datetime.datetime.strptime()***
- converting datetime object back to string - ***date_obj.strftime()***
- we can also use pandas to turn a column into a datetime- ***pd.to_datetime(df['date_str'])***
- You can also set datetimes as your dataframe indices, but this is not recommended

Long vs Wide

Long vs Wide Data

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Long vs Wide Data

- Important concept for financial analysis
- The storage or presentation format of data is not always the best format for financial analysis
- A lot of financial data is presented in "wide" format
- data analysis and plotting tends to work better in long format
- Tidy data paper: **link**
- Untidy data -> ***column headers are values, not variable names***

Long vs Wide Data

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```
##################################################
# Long vs Wide data
# Wide Format:

+------------+---------+---------+---------+
|    Date    | Stock_A | Stock_B | Stock_C |
+------------+---------+---------+---------+
| 2024-01-01 |   100   |   200   |   300   |
| 2024-01-02 |   101   |   202   |   303   |
| 2024-01-03 |   102   |   204   |   306   |
+------------+---------+---------+---------+

##################################################
```

df.melt()

```
##################################################
# Long vs Wide data
# Long Format:
+------------+---------+-------+
|    Date    |  Stock  | Price |
+------------+---------+-------+
| 2024-01-01 | Stock_A |  100  |
| 2024-01-02 | Stock_A |  101  |
| 2024-01-03 | Stock_A |  102  |
| 2024-01-01 | Stock_B |  200  |
| 2024-01-02 | Stock_B |  202  |
| 2024-01-03 | Stock_B |  204  |
| 2024-01-01 | Stock_C |  300  |
| 2024-01-02 | Stock_C |  303  |
| 2024-01-03 | Stock_C |  306  |
+------------+---------+-------+

##################################################
```

Combing and Transforming Data

Combining Data

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Some common functions to collate data :

- different formats - ***pd.read_csv()***, ***pd.read_excel()***, ***pd.read_json()*** , ***from API***
- Concatentate row/column dataframes - ***pd.concat()***
- Join multiple dataframes together on a column- ***pd.merge()***, ***df.join()***

Transforming Data

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We worked with some basic aggregations of data previously such as ***mean()***, ***sum()***, ***std()***, ***median()***

- but there are times when more complex transformations are need such as applying transformations to groups- ***df.groupby() and tranform()***
- rolling calculations for time series - ***rolling()***
- Applying a function row-wise or column-wise- ***apply()***
- using a custom calculation - ***lambda***

Joins

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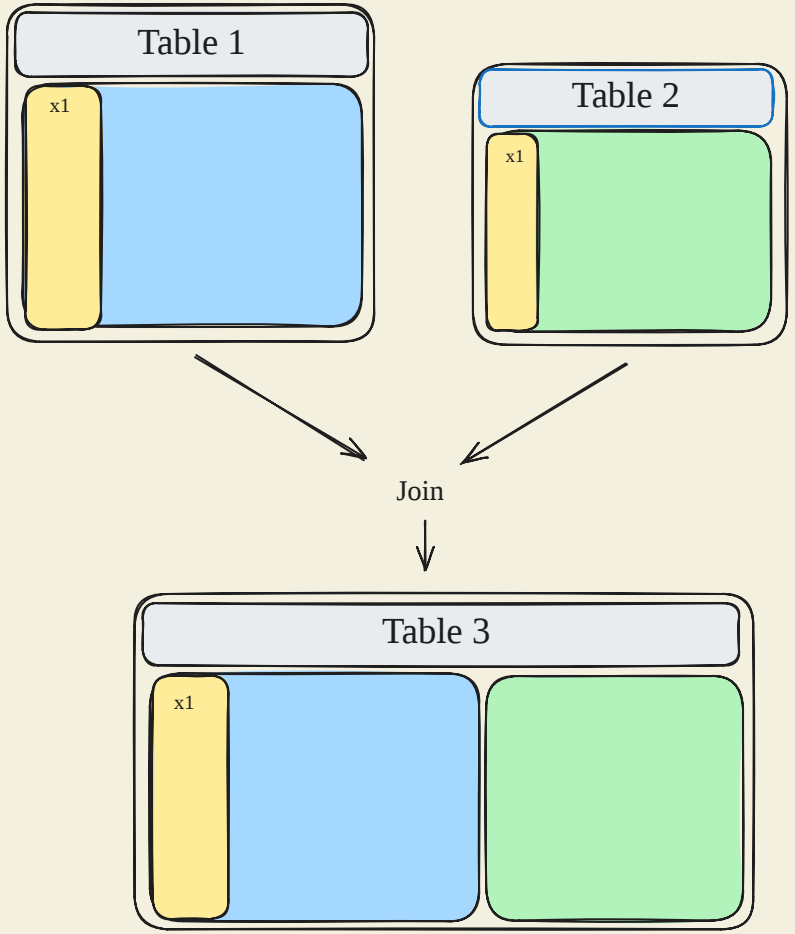

Joins

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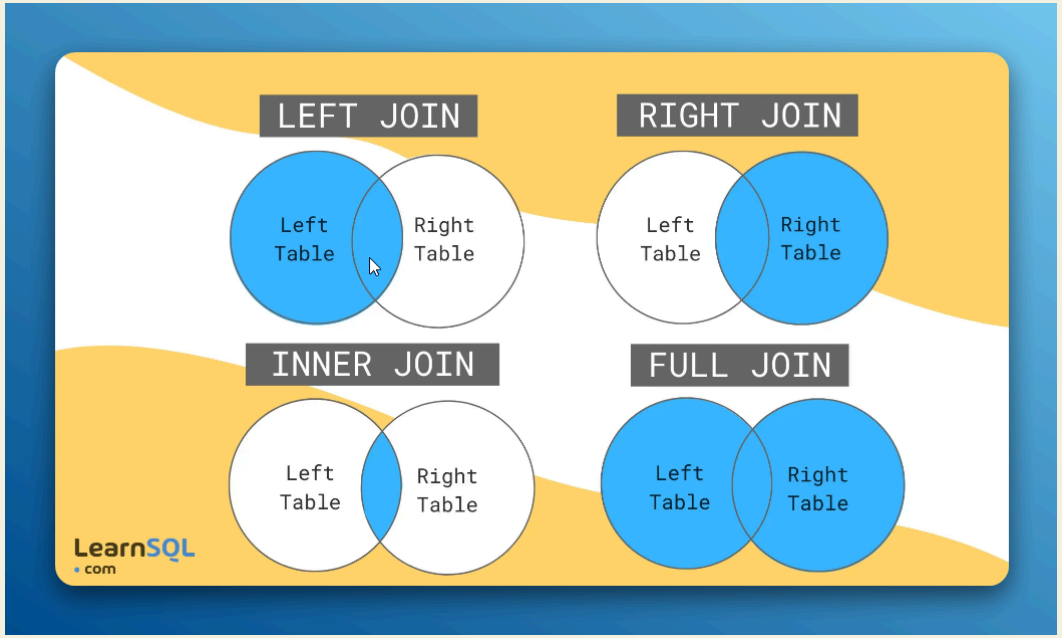

source : https://learnsql.com/blog/learn-and-practice-sql-joins/

Concatenate

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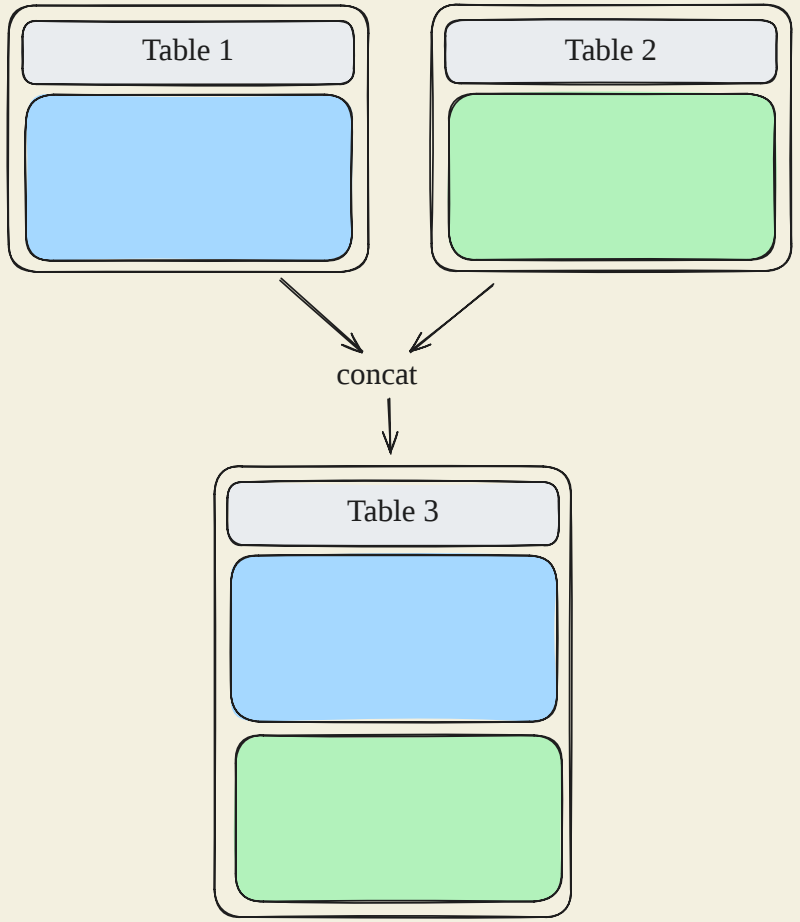

Notebook Exercise

3-1_transforming_data.ipynb

- All notebooks and slides are available ***here***
- Remember Google Colab is a shared cloud service, everyone is looking at the same notebook!
- To prevent accidental changes the notebooks are read only, at the beginning of each exercise make sure you create a copy so that you can edit your own copy!

Notebook Exercise

Functions are reusable chunks code of code that are defined using the ***def*** keyword

e.g. imagine we want to get the average monthly sales of business over 3 months, in python the code might look something like this:

total_sales = 100 + 200 + 300

average_sales = total_sales / 3

But we have to repeat the code for each quarter, solution:

```
def avg_sales(sales_m1, sales_m2, sales_m3):
    result = (sales_m1 + sales_m2 + sales_m3) / 3
    return(result)
```

That's it for module 3!

Disclaimer

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