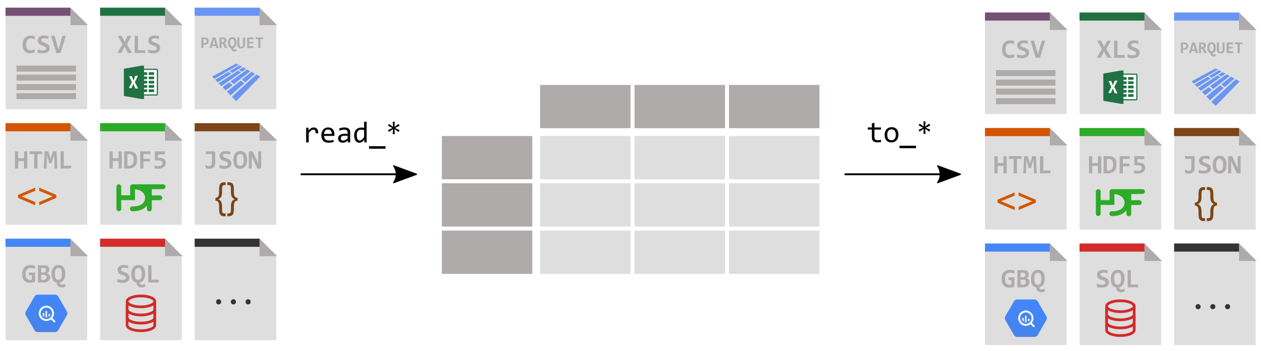
```
In [1]: import pandas as pd
```

Data used for this tutorial:

Titanic data

How do I read and write tabular data?



I want to analyze the Titanic passenger data, available as a CSV file.

```
In [2]: titanic = pd.read_csv("data/titanic.csv")
```

pandas provides the `read_csv()` function to read data stored as a csv file into a pandas `DataFrame`. pandas supports many different file formats or data sources out of the box (csv, excel, sql, json, parquet, …), each of them with the prefix `read_*`.

Make sure to always have a check on the data after reading in the data. When displaying a `DataFrame`, the first and last 5 rows will be shown by default:

```
In [3]: titanic
Out[3]:
     PassengerId  Survived  Pclass  ...     Fare Cabin  Embarked
0              1         0       3  ...   7.2500   NaN         S
1              2         1       1  ...  71.2833   C85         C
2              3         1       3  ...   7.9250   NaN         S
3              4         1       1  ...  53.1000  C123         S
4              5         0       3  ...   8.0500   NaN         S
..           ...       ...     ...  ...      ...   ...       ...
886          887         0       2  ...  13.0000   NaN         S
887          888         1       1  ...  30.0000   B42         S
888          889         0       3  ...  23.4500   NaN         S
889          890         1       1  ...  30.0000  C148         C
890          891         0       3  ...   7.7500   NaN         Q

[891 rows x 12 columns]
```

I want to see the first 8 rows of a pandas DataFrame.

```
In [4]: titanic.head(8)
Out[4]:
   PassengerId  Survived  Pclass  ...     Fare Cabin  Embarked
0            1         0       3  ...   7.2500   NaN         S
1            2         1       1  ...  71.2833   C85         C
2            3         1       3  ...   7.9250   NaN         S
3            4         1       1  ...  53.1000  C123         S
4            5         0       3  ...   8.0500   NaN         S
5            6         0       3  ...   8.4583   NaN         Q
6            7         0       1  ...  51.8625   E46         S
7            8         0       3  ...  21.0750   NaN         S

[8 rows x 12 columns]
```

To see the first N rows of a `DataFrame`, use the `head()` method with the required number of rows (in this case 8) as argument.

Note

Interested in the last N rows instead? pandas also provides a `tail()` method. For example, `titanic.tail(10)` will return the last 10 rows of the DataFrame.

A check on how pandas interpreted each of the column data types can be done by requesting the pandas `dtypes` attribute:

```
In [5]: titanic.dtypes
Out[5]:
PassengerId      int64
Survived         int64
Pclass           int64
Name            object
Sex             object
Age            float64
SibSp            int64
Parch            int64
Ticket          object
Fare           float64
Cabin           object
Embarked        object
dtype: object
```

For each of the columns, the used data type is enlisted. The data types in this `DataFrame` are integers (`int64`), floats (`float64`) and strings (`object`).

Note

When asking for the `dtypes`, no brackets are used! `dtypes` is an attribute of a `DataFrame` and `Series`. Attributes of a `DataFrame` or `Series` do not need brackets. Attributes represent a characteristic of a `DataFrame`/`Series`, whereas methods (which require brackets) *do* something with the `DataFrame`/`Series` as introduced in the first tutorial.

My colleague requested the Titanic data as a spreadsheet.

```
In [6]: titanic.to_excel("titanic.xlsx", sheet_name="passengers", index=False)
```

Whereas `read_*` functions are used to read data to pandas, the `to_*` methods are used to store data. The `to_excel()` method stores the data as an excel file. In the example here, the `sheet_name` is named *passengers* instead of the default *Sheet1*. By setting `index=False` the row index labels are not saved in the spreadsheet.

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```
In [7]: titanic = pd.read_excel("titanic.xlsx", sheet_name="passengers")
```

```
In [8]: titanic.head()
Out[8]:
   PassengerId  Survived  Pclass  ...     Fare Cabin  Embarked
0            1         0       3  ...   7.2500   NaN         S
1            2         1       1  ...  71.2833   C85         C
2            3         1       3  ...   7.9250   NaN         S
3            4         1       1  ...  53.1000  C123         S
4            5         0       3  ...   8.0500   NaN         S

[5 rows x 12 columns]
```

I'm interested in a technical summary of a `DataFrame`

```
In [9]: titanic.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    int64  
 3   Name         891 non-null    object 
 4   Sex          891 non-null    object 
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64  
 7   Parch        891 non-null    int64  
 8   Ticket       891 non-null    object 
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object 
 11  Embarked     889 non-null    object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

The method `info()` provides technical information about a `DataFrame`, so let's explain the output in more detail:

- It is indeed a `DataFrame`.
- There are 891 entries, i.e. 891 rows.
- Each row has a row label (aka the `index`) with values ranging from 0 to 890.
- The table has 12 columns. Most columns have a value for each of the rows (all 891 values are `non-null`). Some columns do have missing values and less than 891 `non-null` values.
- The columns `Name`, `Sex`, `Cabin` and `Embarked` consists of textual data (strings, aka `object`). The other columns are numerical data with some of them whole numbers (aka `integer`) and others are real numbers (aka `float`).
- The kind of data (characters, integers,…) in the different columns are summarized by listing the `dtypes`.
- The approximate amount of RAM used to hold the DataFrame is provided as well.

REMEMBER

- Getting data in to pandas from many different file formats or data sources is supported by `read_*` functions.
- Exporting data out of pandas is provided by different `to_*` methods.
- The `head`/`tail`/`info` methods and the `dtypes` attribute are convenient for a first check.

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To user guide

For a complete overview of the input and output possibilities from and to pandas, see the user guide section about reader and writer functions.

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What kind of data does pandas handle?

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How do I select a subset of a `DataFrame`?