Module 02

Merging, Joining, and Concatenating

Data Science Developer

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Outline

- Joining Dataframe
  - Inner Join
  - Outer Join
  - Left Join
  - Right Join
- Concatenating Dataframe

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Joining

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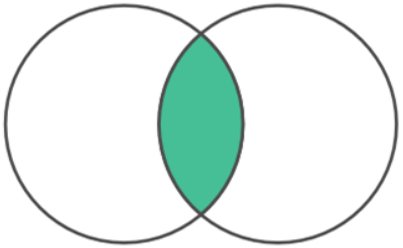
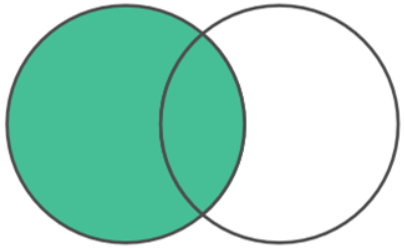
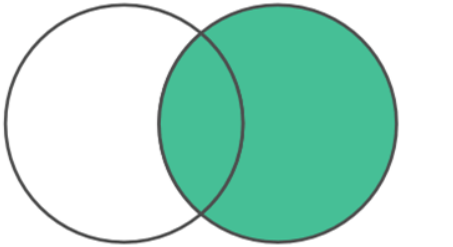
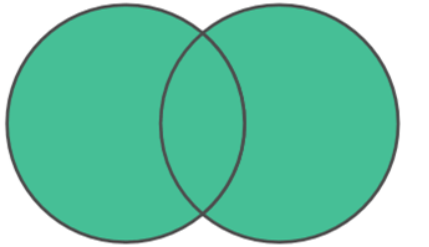
Joining Methods









The **merge** function allows you to merge DataFrames together using a similar logic as merging SQL Tables together.

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Dataframe to join

```
In [14]: left = pd.DataFrame({'key1': ['K0', 'K0', 'K1', 'K2'],
                              'key2': ['K0', 'K1', 'K0', 'K1'],
                                 'A': ['A0', 'A1', 'A2', 'A3'],
                                 'B': ['B0', 'B1', 'B2', 'B3']})

         right = pd.DataFrame({'key1': ['K0', 'K1', 'K1', 'K2'],
                                       'key2': ['K0', 'K0', 'K0', 'K0'],
                                          'C': ['C0', 'C1', 'C2', 'C3'],
                                          'D': ['D0', 'D1', 'D2', 'D3']}
```

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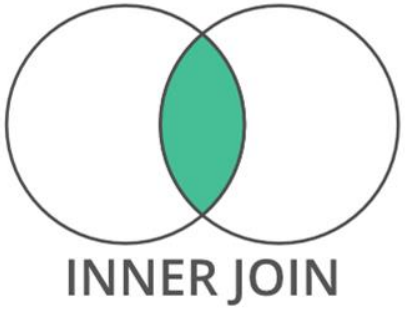
Inner Join and Outer Join

```
In [15]: pd.merge(left, right, on=['key1', 'key2'])
```

Out[15]:

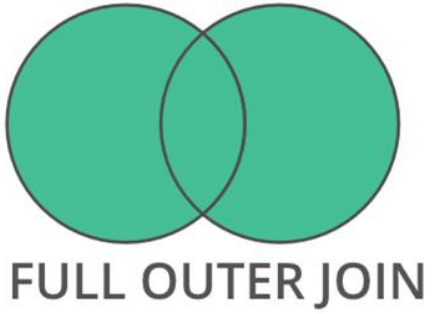
	key1	key2	A	B	C	D
0	K0	K0	A0	B0	C0	D0
1	K1	K0	A2	B2	C1	D1
2	K1	K0	A2	B2	C2	D2




```
In [16]: pd.merge(left, right, how='outer', on=['key1', 'key2'])
```

Out[16]:

	key1	key2	A	B	C	D
0	K0	K0	A0	B0	C0	D0
1	K0	K1	A1	B1	NaN	NaN
2	K1	K0	A2	B2	C1	D1
3	K1	K0	A2	B2	C2	D2
4	K2	K1	A3	B3	NaN	NaN
5	K2	K0	NaN	NaN	C3	D3



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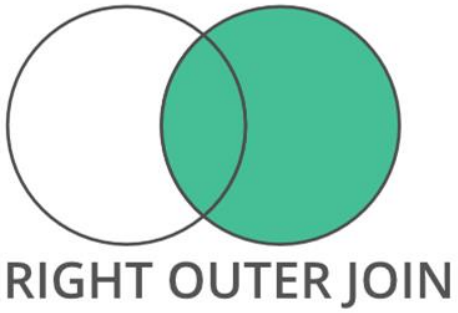
left Join and Right Join

```
In [17]: pd.merge(left, right, how='right', on=['key1', 'key2'])
```

Out[17]:

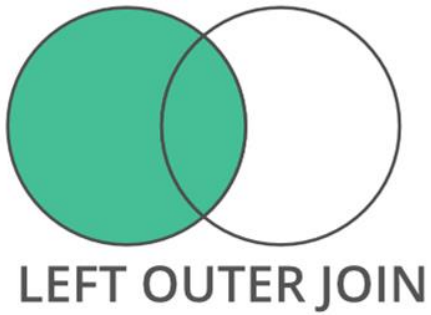
	key1	key2	A	B	C	D
0	K0	K0	A0	B0	C0	D0
1	K1	K0	A2	B2	C1	D1
2	K1	K0	A2	B2	C2	D2
3	K2	K0	NaN	NaN	C3	D3




```
In [18]: pd.merge(left, right, how='left', on=['key1', 'key2'])
```

Out[18]:

	key1	key2	A	B	C	D
0	K0	K0	A0	B0	C0	D0
1	K0	K1	A1	B1	NaN	NaN
2	K1	K0	A2	B2	C1	D1
3	K1	K0	A2	B2	C2	D2
4	K2	K1	A3	B3	NaN	NaN



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Joining by index

```
In [19]: left = pd.DataFrame({'A': ['A0', 'A1', 'A2'],
                              'B': ['B0', 'B1', 'B2']},
                              index=['K0', 'K1', 'K2'])

         right = pd.DataFrame({'C': ['C0', 'C2', 'C3'],
                               'D': ['D0', 'D2', 'D3']},
                               index=['K0', 'K2', 'K3'])
```

```
In [20]: left.join(right)
```

Out[20]:

	A	B	C	D
K0	A0	B0	C0	D0
K1	A1	B1	NaN	NaN
K2	A2	B2	C2	D2

```
In [21]: left.join(right, how='outer')
```

Out[21]:

	A	B	C	D
K0	A0	B0	C0	D0
K1	A1	B1	NaN	NaN
K2	A2	B2	C2	D2
K3	NaN	NaN	C3	D3

Joining is a convenient method for combining the columns of two potentially differently-indexed DataFrames into a single result DataFrame.

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Concatenating

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Create DataFrames

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

```
In [2]: df1 = pd.DataFrame({'A': ['A0', 'A1', 'A2', 'A3'],
                            'B': ['B0', 'B1', 'B2', 'B3'],
                            'C': ['C0', 'C1', 'C2', 'C3'],
                            'D': ['D0', 'D1', 'D2', 'D3']},
                           index=[0, 1, 2, 3])
```

```
In [3]: df2 = pd.DataFrame({'A': ['A4', 'A5', 'A6', 'A7'],
                            'B': ['B4', 'B5', 'B6', 'B7'],
                            'C': ['C4', 'C5', 'C6', 'C7'],
                            'D': ['D4', 'D5', 'D6', 'D7']},
                             index=[4, 5, 6, 7])
```

```
In [4]: df3 = pd.DataFrame({'A': ['A8', 'A9', 'A10', 'A11'],
                            'B': ['B8', 'B9', 'B10', 'B11'],
                            'C': ['C8', 'C9', 'C10', 'C11'],
                            'D': ['D8', 'D9', 'D10', 'D11']},
                           index=[8, 9, 10, 11])
```

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The DataFrames

```
In [5]: df1
```

Out[5]:

	A	B	C	D
0	A0	B0	C0	D0
1	A1	B1	C1	D1
2	A2	B2	C2	D2
3	A3	B3	C3	D3

```
In [6]: df2
```

Out[6]:

	A	B	C	D
4	A4	B4	C4	D4
5	A5	B5	C5	D5
6	A6	B6	C6	D6
7	A7	B7	C7	D7

```
In [7]: df3
```

Out[7]:

	A	B	C	D
8	A8	B8	C8	D8
9	A9	B9	C9	D9
10	A10	B10	C10	D10
11	A11	B11	C11	D11

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Concatenation

Concatenation basically glues together DataFrames. Keep in mind that dimensions should match along the axis you are concatenating on. You can use **pd.concat** and pass in a list of DataFrames to concatenate together:

```
In [8]: pd.concat([df1,df2,df3])
```

Out[8]:

	A	B	C	D
0	A0	B0	C0	D0
1	A1	B1	C1	D1
2	A2	B2	C2	D2
3	A3	B3	C3	D3
4	A4	B4	C4	D4
5	A5	B5	C5	D5
6	A6	B6	C6	D6
7	A7	B7	C7	D7
8	A8	B8	C8	D8
9	A9	B9	C9	D9
10	A10	B10	C10	D10
11	A11	B11	C11	D11

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Concatenation

```
In [9]: pd.concat([df1,df2,df3],axis=1)
```

Out[9]:

	A	B	C	D	A	B	C	D	A	B	C	D
0	A0	B0	C0	D0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	A1	B1	C1	D1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	A2	B2	C2	D2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	A3	B3	C3	D3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	A4	B4	C4	D4	NaN	NaN	NaN	NaN
5	NaN	NaN	NaN	NaN	A5	B5	C5	D5	NaN	NaN	NaN	NaN
6	NaN	NaN	NaN	NaN	A6	B6	C6	D6	NaN	NaN	NaN	NaN
7	NaN	NaN	NaN	NaN	A7	B7	C7	D7	NaN	NaN	NaN	NaN
8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	A8	B8	C8	D8
9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	A9	B9	C9	D9
10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	A10	B10	C10	D10
11	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	A11	B11	C11	D11

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