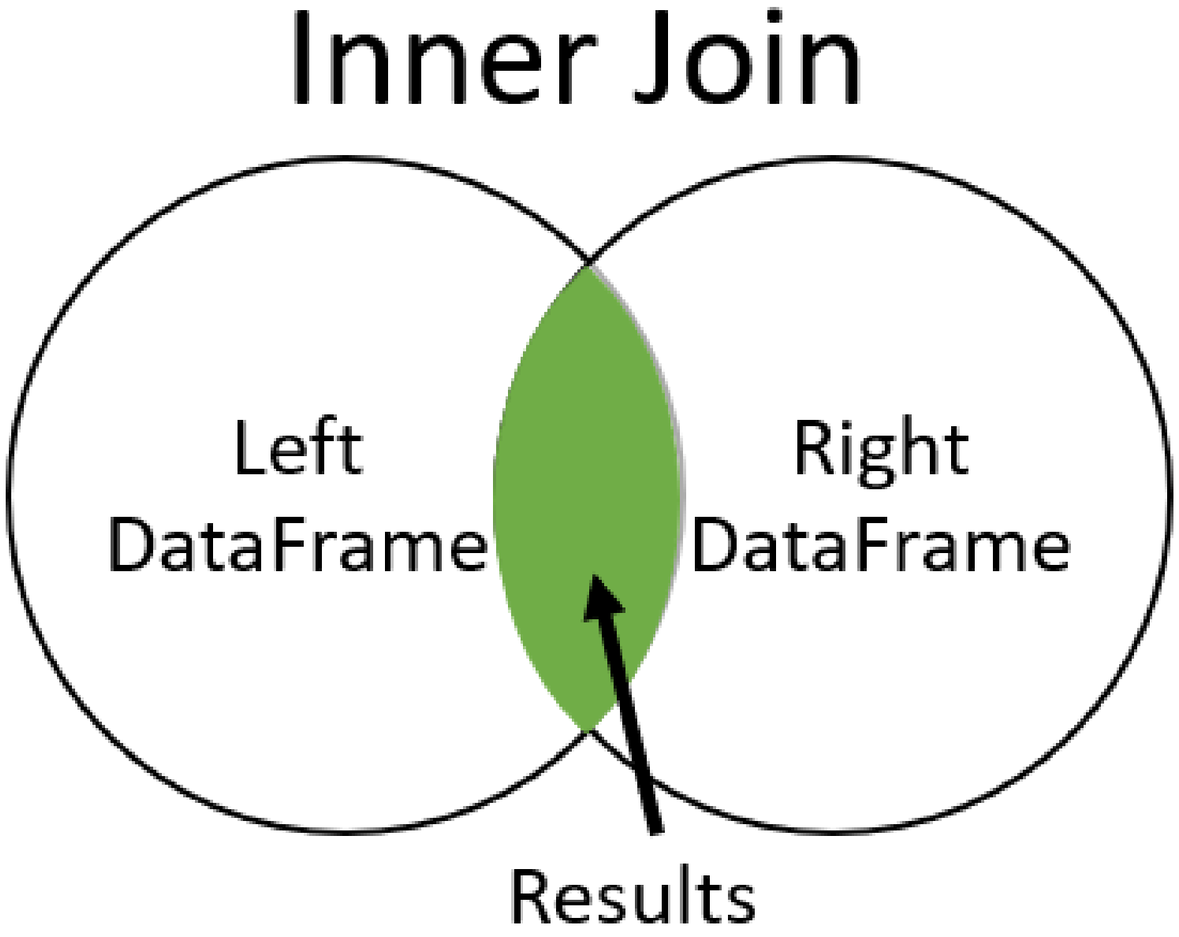
Left join

JOINING DATA WITH PANDAS

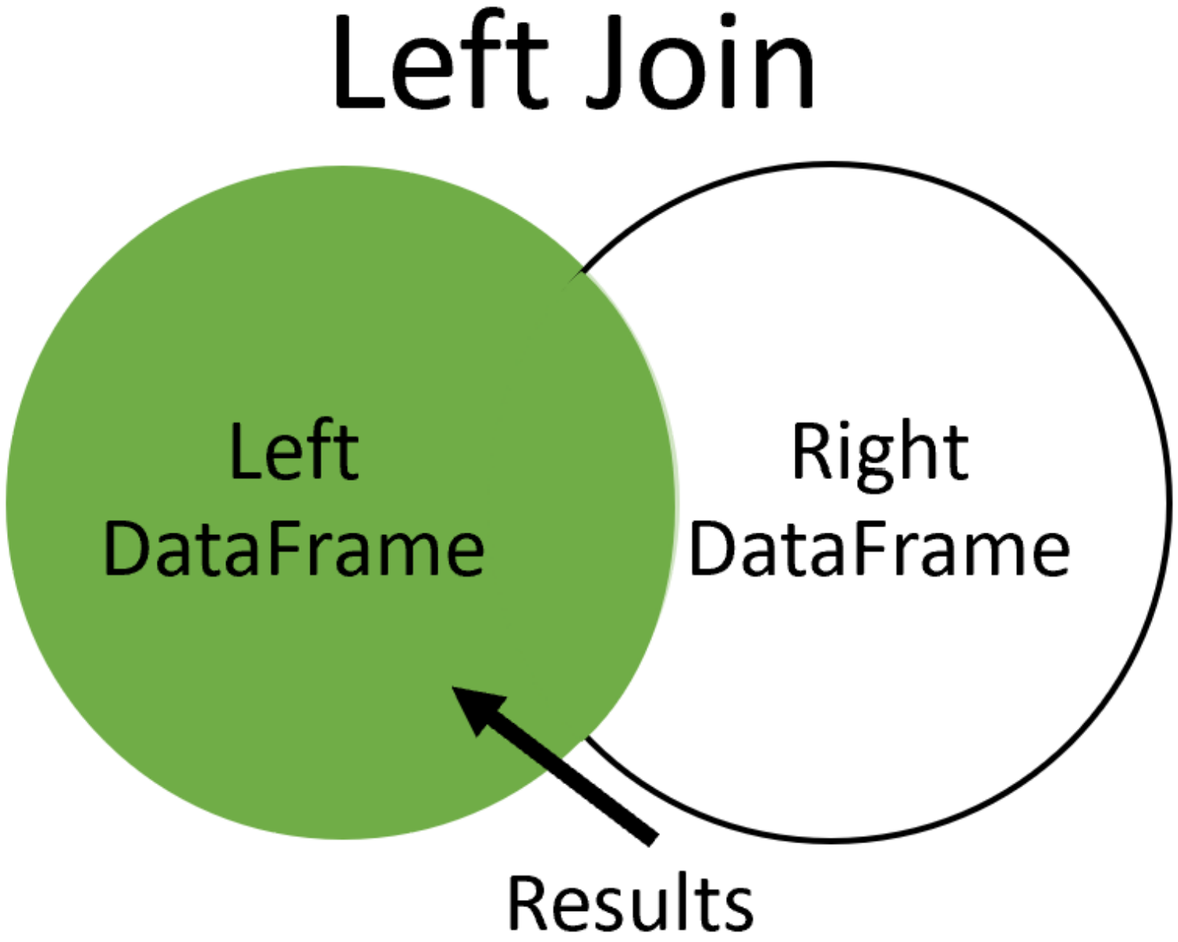
Aaren Stubberfield
Instructor

datacamp

Quick review



Left join



Left join

Left Table

A	B	C
A2	B2	C2
A3	B3	C3
A4	B4	C4

Right Table

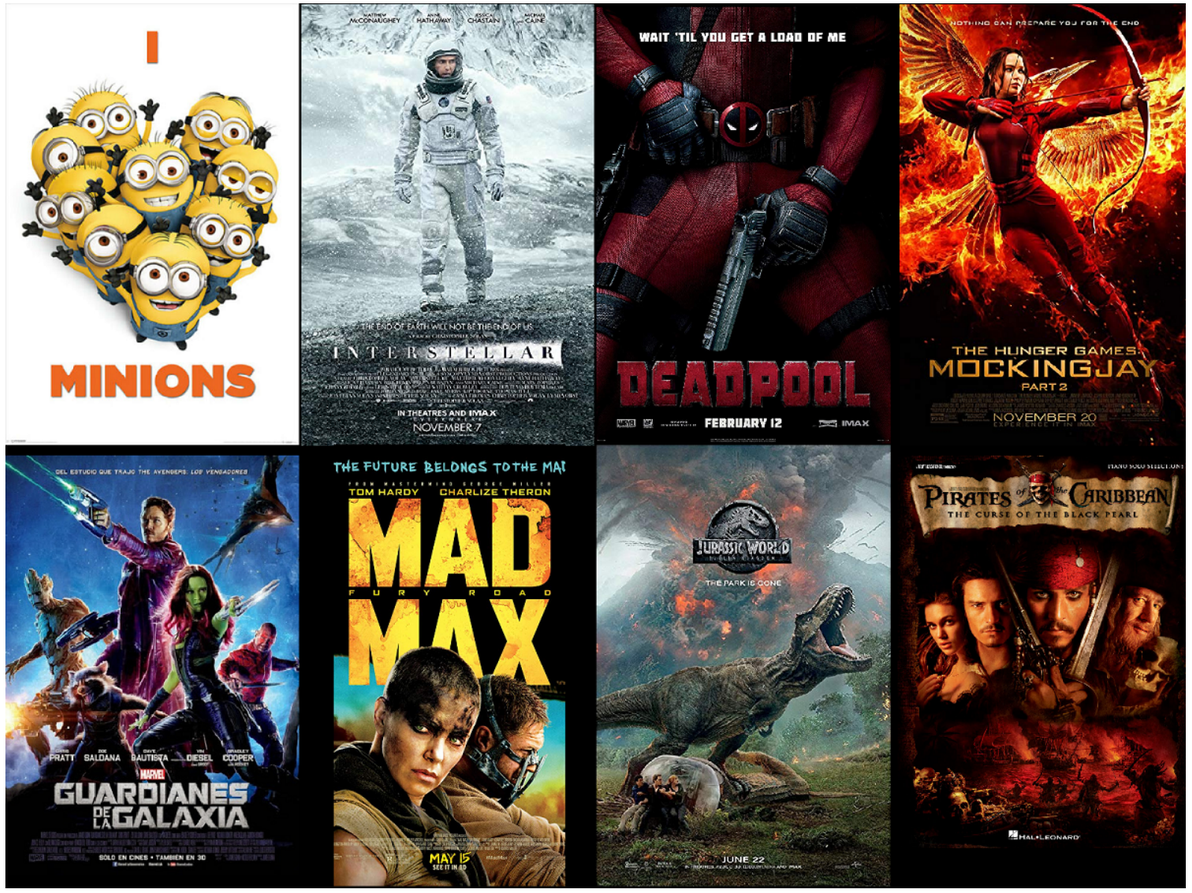
C	D
C1	D1
C2	D2
C4	D4
C5	D5

Result Table

A	B	C	D
A2	B2	C2	D2
A3	B3	C3	
A4	B4	C4	D4

New dataset

THE MOVIE DB



Movies table

```
movies = pd.read_csv('tmdb_movies.csv')
print(movies.head())
print(movies.shape)
```

```
   id     original_title   popularity       release_date
0  257    Oliver Twist     20.415572        2005-09-23
1  14290  Better Luck ...  3.877036         2002-01-12
2  38365  Grown Ups        38.864027        2010-06-24
3  9672   Infamous         3.6808959999...  2006-11-16
4  12819  Alpha and Omega  12.300789        2010-09-17
(4803, 4)
```

Tagline table

```
taglines = pd.read_csv('tmdb_taglines.csv')
print(taglines.head())
print(taglines.shape)
```

```
   id       tagline
0 19995   Enter the World of Pandora.
1 285     At the end of the world, the adventure begins.
2 206647  A Plan No One Escapes
3 49026   The Legend Ends
4 49529   Lost in our world, found in another.
(3955, 2)
```

Merge with left join

```
movies_taglines = movies.merge(taglines, on='id', how='left')
print(movies_taglines.head())
```

```
   id     original_title   popularity       release_date  tagline
0  257    Oliver Twist     20.415572        2005-09-23    NaN
1  14290  Better Luck ...  3.877036         2002-01-12    Never undere...
2  38365  Grown Ups        38.864027        2010-06-24    Boys will be...
3  9672   Infamous         3.6808959999...  2006-11-16    There's more...
4  12819  Alpha and Omega  12.300789        2010-09-17    A Pawsome 3D...
```

Number of rows returned

```
print(movies_taglines.shape)
```

```
(4805, 5)
```

Let's practice!

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Other joins

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Aaren Stubberfield
Instructor

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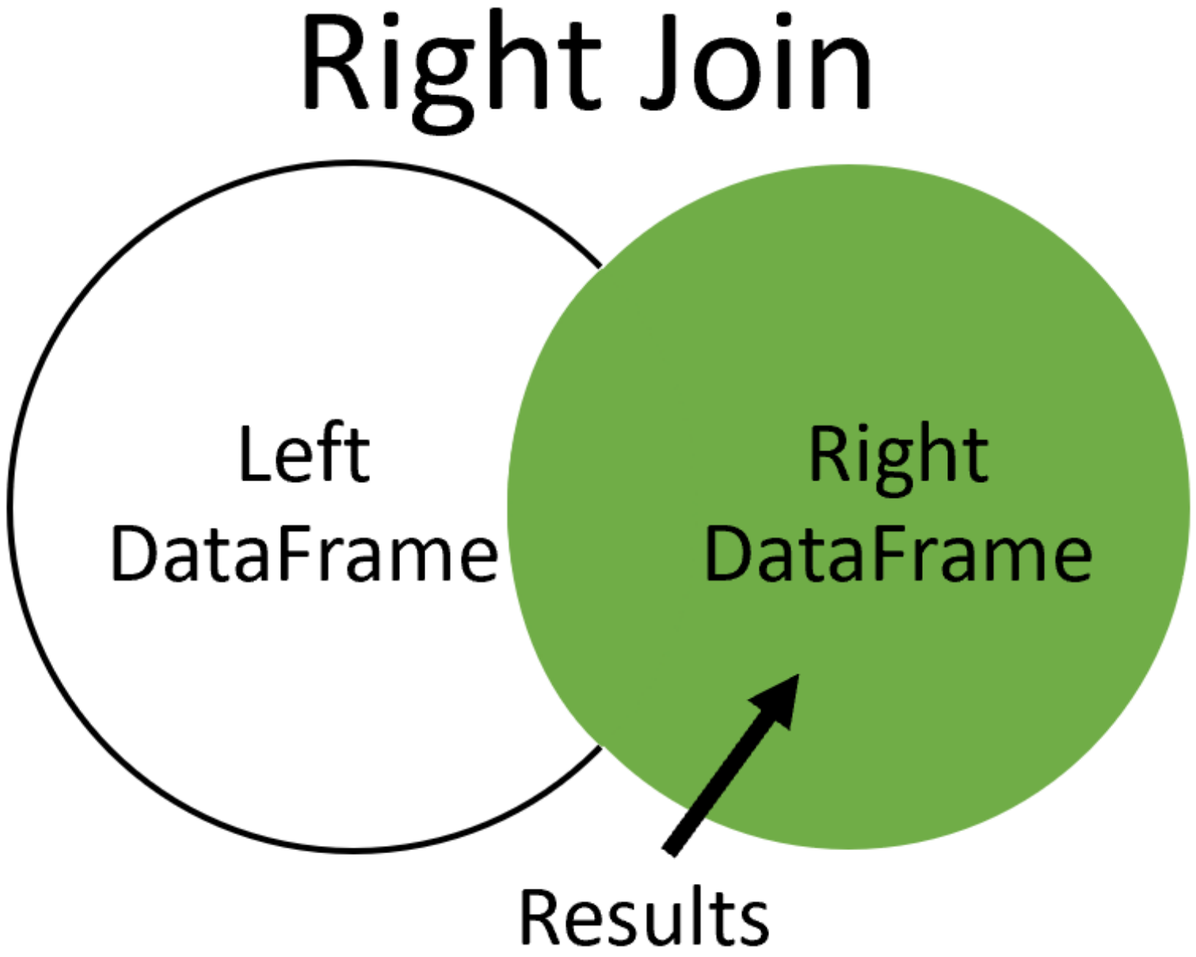
Right join



Right join

Left Table

A	B	C
A2	B2	C2
A3	B3	C3
A4	B4	C4

Right Table

C	D
C1	D1
C2	D2
C4	D4
C5	D5

Result Table

A	B	C	D
		C1	D1
A2	B2	C2	D2
A4	B4	C4	D4
		C5	D5

Looking at data

```
movie_to_genres = pd.read_csv('tmdb_movie_to_genres.csv')
tv_genre = movie_to_genres[movie_to_genres['genre'] == 'TV Movie']
print(tv_genre)
```

```
      movie_id  genre
4998   10947    TV Movie
5994   13187    TV Movie
7443   22488    TV Movie
10061  78814    TV Movie
10790  153397   TV Movie
10835  158150   TV Movie
11096  205321   TV Movie
11282  231617   TV Movie
```

Filtering the data

```
m = movie_to_genres['genre'] == 'TV Movie'
tv_genre = movie_to_genres[m]
print(tv_genre)
```

```
       movie_id  genre
4998   10947     TV Movie
5994   13187     TV Movie
7443   22488     TV Movie
10061  78814     TV Movie
10790  153397    TV Movie
10835  158150    TV Movie
11096  205321    TV Movie
11282  231617    TV Movie
```

Data to merge

```
   id      title             popularity       release_date
0  257     Oliver Twist      20.415572        2005-09-23
1  14290   Better Luck ...   3.877036         2002-01-12
2  38365   Grown Ups         38.864027        2010-06-24
3  9672    Infamous          3.6808959999...  2006-11-16
4  12819   Alpha and Omega   12.300789        2010-09-17
```

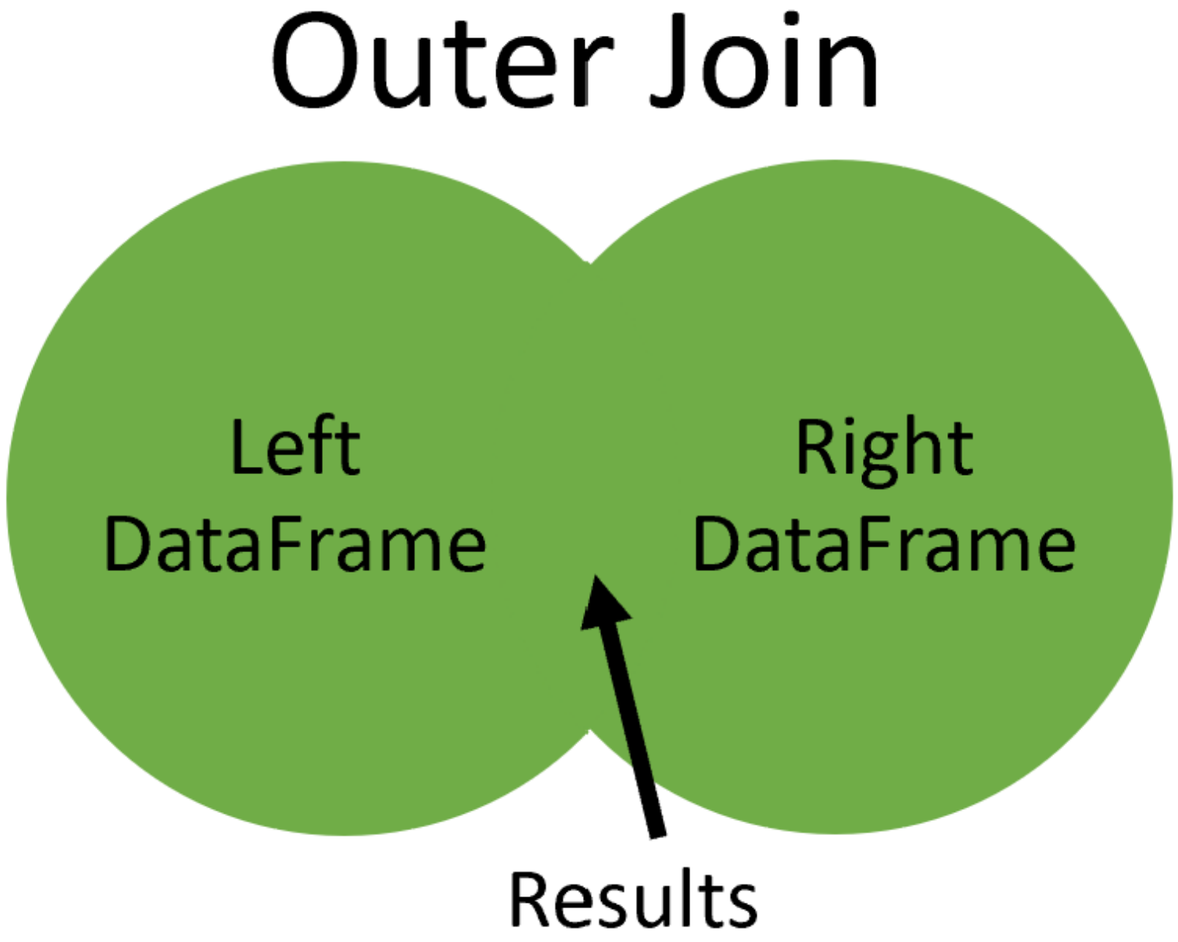
```
       movie_id  genre
4998   10947     TV Movie
5994   13187     TV Movie
7443   22488     TV Movie
10061  78814     TV Movie
10790  153397    TV Movie
```

Merge with right join

```
tv_movies = movies.merge(tv_genre, how='right',
                         left_on='id', right_on='movie_id')
print(tv_movies.head())
```

```
   id      title           popularity  release_date  movie_id  genre
0 153397  Restless        0.812776    2012-12-07    153397    TV Movie
1 10947   High School ...  16.536374   2006-01-20    10947     TV Movie
2 231617  Signed, Seal...  1.444476    2013-10-13    231617    TV Movie
3 78814   We Have Your...  0.102003    2011-11-12    78814     TV Movie
4 158150  How to Fall ...  1.923514    2012-07-21    158150    TV Movie
```

Outer join



Outer join

Left Table

A	B	C
A2	B2	C2
A3	B3	C3
A4	B4	C4

Right Table

C	D
C1	D1
C2	D2
C4	D4
C5	D5

Result Table

A	B	C	D
		C1	D1
A2	B2	C2	D2
A3	B3	C3	
A4	B4	C4	D4
		C5	D5

Datasets for outer join

```
m = movie_to_genres['genre'] == 'Family'
family = movie_to_genres[m].head(3)
```

```
   movie_id  genre
0  12        Family
1  35        Family
2  105       Family
```

```
m = movie_to_genres['genre'] == 'Comedy'
comedy = movie_to_genres[m].head(3)
```

```
   movie_id  genre
0  5         Comedy
1  13        Comedy
2  35        Comedy
```

Merge with outer join

```
family_comedy = family.merge(comedy, on='movie_id', how='outer',
                             suffixes=('_fam', '_com'))
print(family_comedy)
```

```
   movie_id  genre_fam  genre_com
0  12        Family     NaN
1  35        Family     Comedy
2  105       Family     NaN
3  5         NaN        Comedy
4  13        NaN        Comedy
```

Let's practice!

JOINING DATA WITH PANDAS

Merging a table to itself

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Instructor

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Sequel movie data

```
print(sequel.head())
```

```
   id      title          sequel
0 19995   Avatar         NaN
1 862     Toy Story      863
2 863     Toy Story 2    10193
3 597     Titanic        NaN
4 24428   The Avengers   NaN
```

Merging a table to itself

Left Table

id	title	sequel
19995	Avatar	
862	Toy Story	863
863	Toy Story 2	10193
597	Titanic	
24428	The Ave...	

Right Table

id	title	sequel
19995	Avatar	
862	Toy Story	863
863	Toy Story 2	10193
597	Titanic	
24428	The Ave...	

Merge Columns

Result Table

id_x	title_x	sequel_x	id_y	title_y	sequel_y
862	Toy Story	863	863	Toy Story 2	10193
863	Toy Story 2	10193	10193	Toy Story 3	

Merging a table to itself

```
original_sequels = sequels.merge(sequels, left_on='sequel', right_on='id',
                                 suffixes=('_org','_seq'))
print(original_sequels.head())
```

```
   id_org  title_org         sequel_org  id_seq  title_seq         sequel_seq
0  862     Toy Story         863         863     Toy Story 2       10193
1  863     Toy Story 2       10193       10193   Toy Story 3       NaN
2  675     Harry Potter...   767         767     Harry Potter...   NaN
3  121     The Lord of ...   122         122     The Lord of ...   NaN
4  120     The Lord of ...   121         121     The Lord of ...   122
```

Continue format results

```
print(original_sequels[,['title_org','title_seq']].head())
```

```
  title_org         title_seq
0 Toy Story         Toy Story 2
1 Toy Story 2       Toy Story 3
2 Harry Potter...   Harry Potter...
3 The Lord of ...   The Lord of ...
4 The Lord of ...   The Lord of ...
```

Merging a table to itself with left join

```
original_sequels = sequels.merge(sequels, left_on='sequel', right_on='id',
                                 how='left', suffixes=('_org','_seq'))
print(original_sequels.head())
```

```
   id_org  title_org     sequel_org  id_seq  title_seq    sequel_seq
0  19995   Avatar        NaN         NaN     NaN          NaN
1  862     Toy Story     863         863     Toy Story 2  10193
2  863     Toy Story 2   10193       10193   Toy Story 3  NaN
3  597     Titanic       NaN         NaN     NaN          NaN
4  24428   The Avengers  NaN         NaN     NaN          NaN
```

When to merge at table to itself

Common situations:

- Hierarchical relationships
- Sequential relationships
- Graph data

Let's practice!

JOINING DATA WITH PANDAS

Merging on indexes

JOINING DATA WITH PANDAS

Aaren Stubberfield
Instructor

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Table with an index

```
   id     title            popularity  release_date
0  257    Oliver Twist     20.415572   2005-09-23
1  14290  Better Luck ...  3.877036    2002-01-12
2  38365  Grown Ups        38.864027   2010-06-24
3  9672   Infamous         3.680896    2006-11-16
4  12819  Alpha and Omega  12.300789   2010-09-17
```

```
        title            popularity  release_date
id
257     Oliver Twist     20.415572   2005-09-23
14290   Better Luck ...  3.877036    2002-01-12
38365   Grown Ups        38.864027   2010-06-24
9672    Infamous         3.680896    2006-11-16
12819   Alpha and Omega  12.300789   2010-09-17
```

Setting an index

```
movies = pd.read_csv('tmdb_movies.csv', index_col=['id'])
print(movies.head())
```

```
       title             popularity  release_date
id
257    Oliver Twist      20.415572   2005-09-23
14290  Better Luck ...   3.877036    2002-01-12
38365  Grown Ups         38.864027   2010-06-24
9672   Infamous          3.680896    2006-11-16
12819  Alpha and Omega   12.300789   2010-09-17
```

Merge index datasets

```
       title             popularity  release_date
id
257    Oliver Twist      20.415572   2005-09-23
14290  Better Luck ...   3.877036    2002-01-12
38365  Grown Ups         38.864027   2010-06-24
9672   Infamous          3.680896    2006-11-16
```

```
        tagline
id
19995   Enter the Wo...
285     At the end o...
206647  A Plan No On...
49026   The Legend Ends
```

Merging on index

```
movies_taglines = movies.merge(taglines, on='id', how='left')
print(movies_taglines.head())
```

```
       title             popularity  release_date  tagline
id
257    Oliver Twist      20.415572   2005-09-23    NaN
14290  Better Luck ...   3.877036    2002-01-12    Never undere...
38365  Grown Ups         38.864027   2010-06-24    Boys will be...
9672   Infamous          3.680896    2006-11-16    There's more...
12819  Alpha and Omega   12.300789   2010-09-17    A Pawsome 3D...
```

MultiIndex datasets

```
samuel = pd.read_csv('samuel.csv',
                     index_col=['movie_id',
                                'cast_id'])
print(samuel.head())
```

```
                    name
movie_id  cast_id
184       3         Samuel L. Jackson
319       13        Samuel L. Jackson
326       2         Samuel L. Jackson
329       138       Samuel L. Jackson
393       21        Samuel L. Jackson
```

```
casts = pd.read_csv('casts.csv',
                    index_col=['movie_id',
                               'cast_id'])
print(casts.head())
```

```
                    character
movie_id  cast_id
5         22        Jezebel
          23        Diana
          24        Athena
          25        Elspeth
          26        Eva
```

MultiIndex merge

```
samuel_casts = samuel.merge(casts, on=['movie_id','cast_id'])
print(samuel_casts.head())
print(samuel_casts.shape)
```

```
                    name                character
movie_id  cast_id
184       3         Samuel L. Jackson   Ordell Robbie
319       13        Samuel L. Jackson   Big Don
326       2         Samuel L. Jackson   Neville Flynn
329       138       Samuel L. Jackson   Arnold
393       21        Samuel L. Jackson   Rufus
(67, 2)
```

Index merge with left_on and right_on

```
       title             popularity  release_date
id
257    Oliver Twist      20.415572   2005-09-23
14290  Better Luck ...   3.877036    2002-01-12
38365  Grown Ups         38.864027   2010-06-24
9672   Infamous          3.680896    2006-11-16
```

```
           genre
movie_id
5          Crime
5          Comedy
11         Science Fiction
11         Action
```

Index merge with left_on and right_on

```
movies_genres = movies.merge(movie_to_genres, left_on='id', left_index=True,
                             right_on='movie_id', right_index=True)
print(movies_genres.head())
```

```
    id  title       popularity  release_date  genre
5    5  Four Rooms  22.876230   1995-12-09    Crime
5    5  Four Rooms  22.876230   1995-12-09    Comedy
11  11  Star Wars   126.393695  1977-05-25    Science Fiction
11  11  Star Wars   126.393695  1977-05-25    Action
11  11  Star Wars   126.393695  1977-05-25    Adventure
```

Let's practice!

JOINING DATA WITH PANDAS