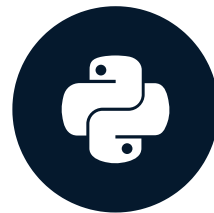


Left join

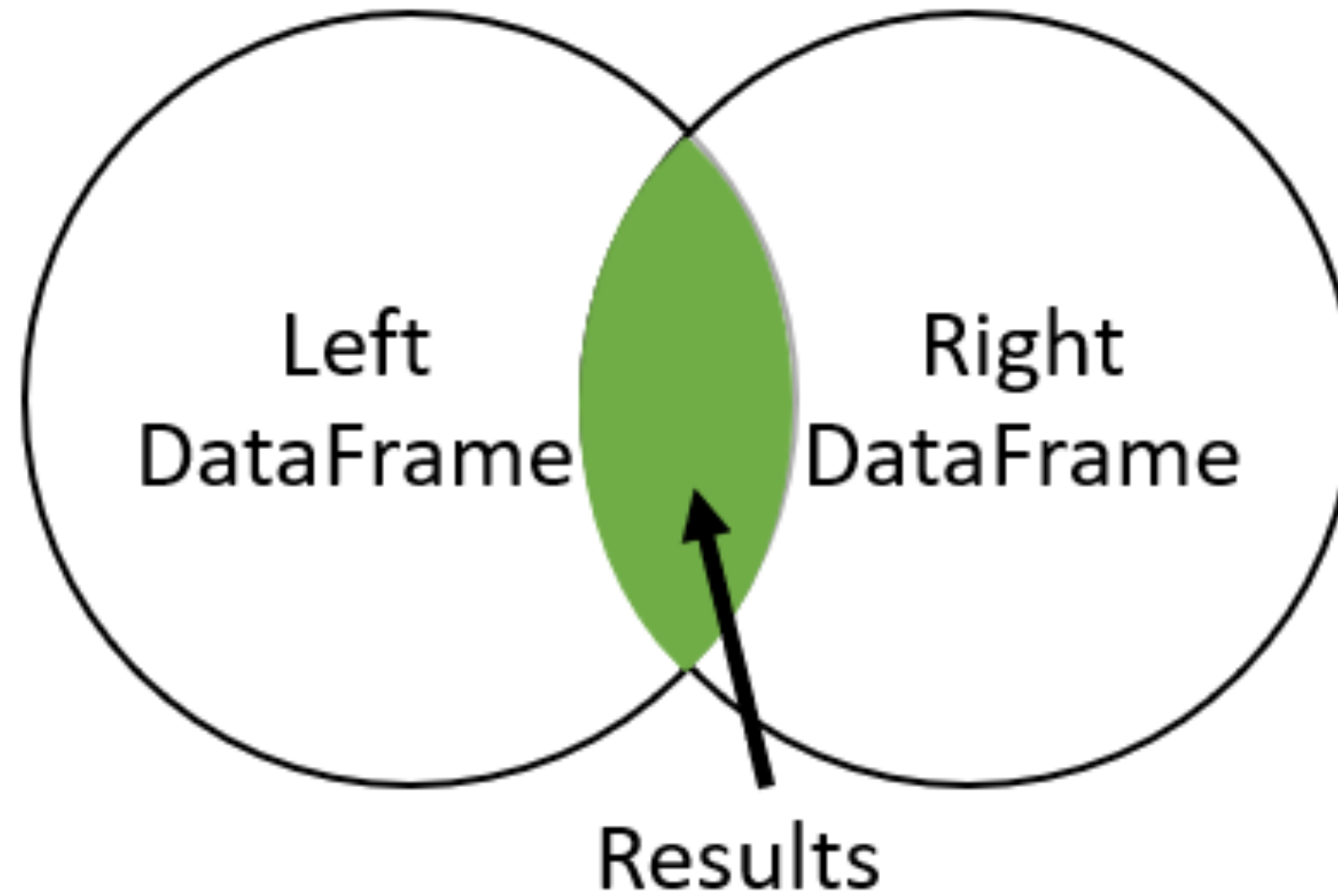
JOINING DATA WITH PANDAS



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Instructor

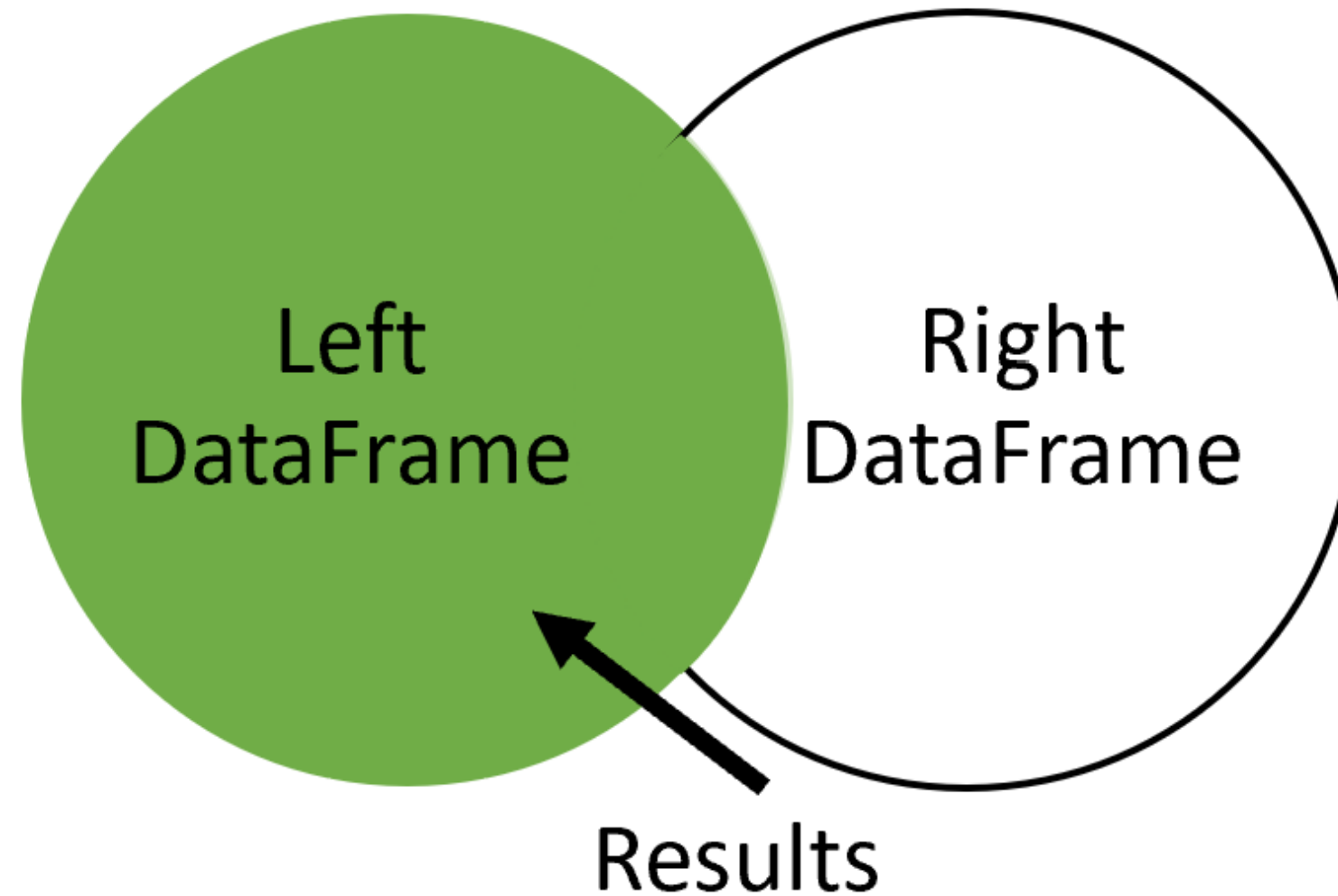
Quick review

Inner Join



Left join

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

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...

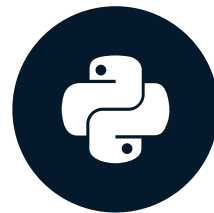
Number of rows returned

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

```
(4805, 5)
```

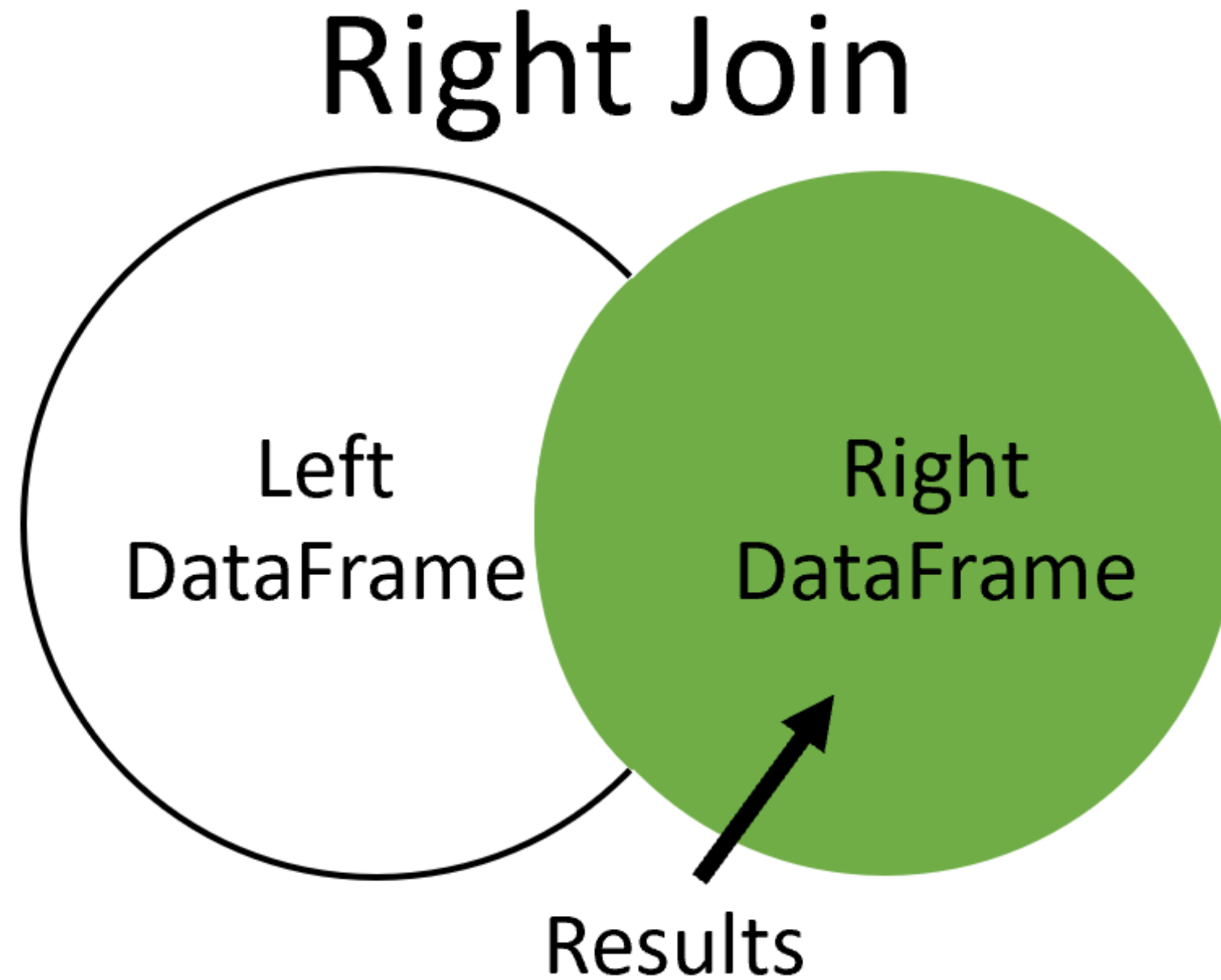

Other joins

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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

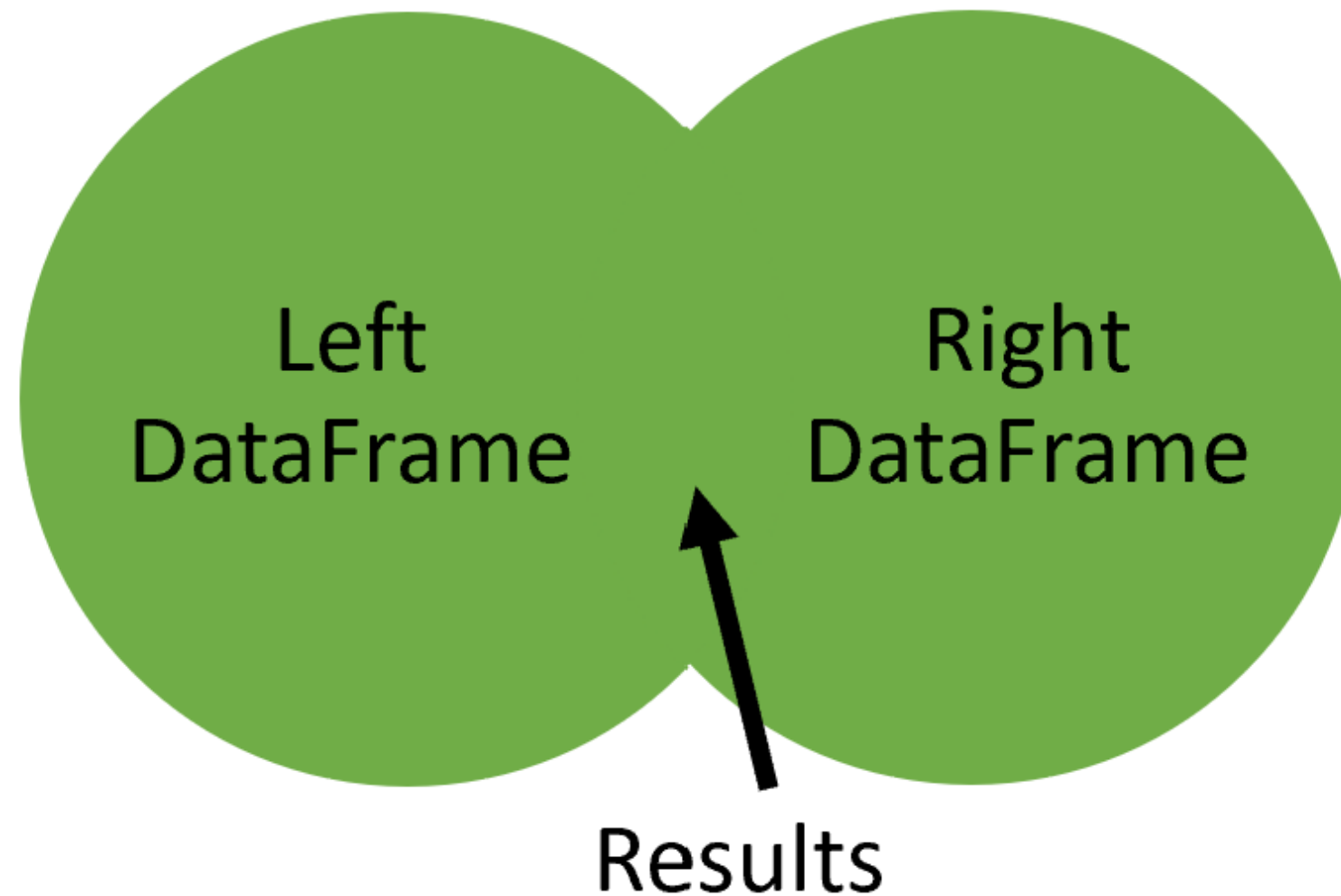
Merge with right join

```
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



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

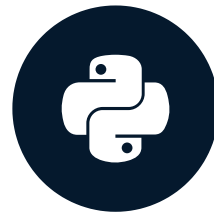
Merge with outer join

```
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

Merging a table to itself

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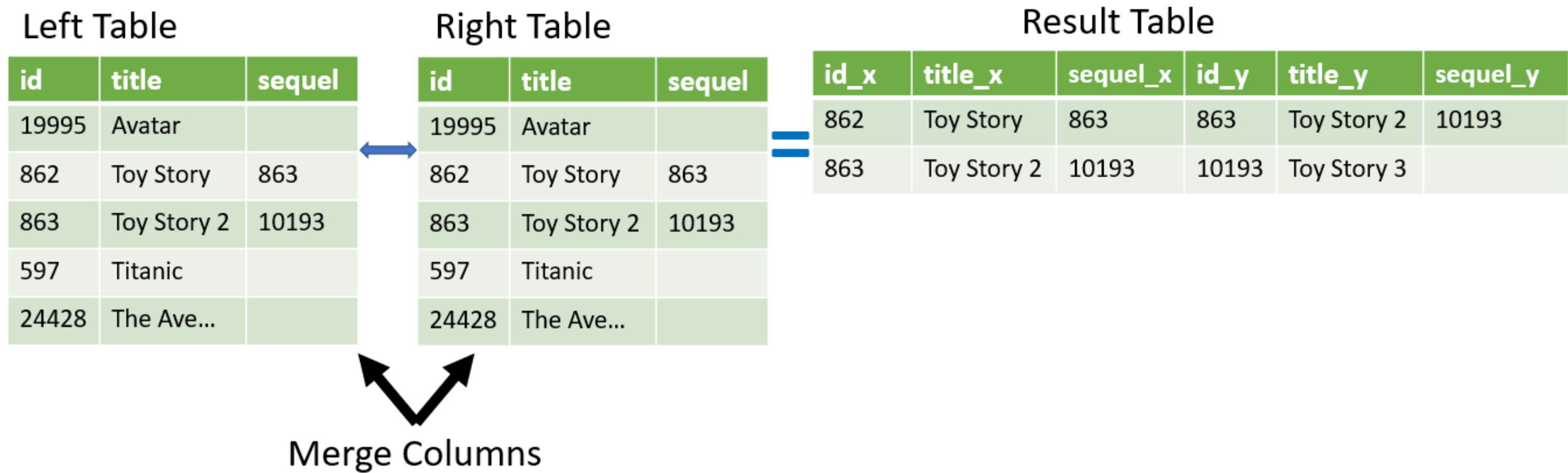
Sequel movie data

```
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



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

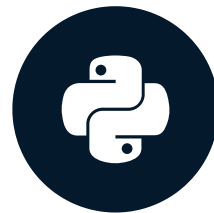
When to merge at table to itself

Common situations:

- Hierarchical relationships
- Sequential relationships
- Graph data

Merging on indexes

JOINING DATA WITH PANDAS



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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...

Multindex 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

Multindex 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