```
from sqlalchemy import create engine
 In [1]:
          import sqlalchemy as db
          engine = db.create_engine('mysql+mysqlconnector://root:testpass123@localhost:
 In [4]:
 In [5]:
          engine
         Engine(mysql+mysqlconnector://root:***@localhost:3306/sakila)
 Out[5]:
 In [6]:
          connection = engine.connect()
 In [7]:
          connection
         <sqlalchemy.engine.base.Connection at 0x7facb8327490>
          result = engine.execute('SELECT * FROM actor LIMIT 10')
 In [8]:
 In [9]:
          result
         <sqlalchemy.engine.cursor.LegacyCursorResult at 0x7facb8327e80>
 Out[9]:
In [10]:
          first result = result.fetchone()
In [13]:
          first result
Out[13]: (1, 'PENELOPE', 'GUINESS', datetime.datetime(2006, 2, 15, 4, 34, 33))
In [14]:
          type(first result)
Out[14]: sqlalchemy.engine.row.LegacyRow
In [16]:
          result.fetchmany(2)
Out[16]: [(2, 'NICK', 'WAHLBERG', datetime.datetime(2006, 2, 15, 4, 34, 33)),
          (3, 'ED', 'CHASE', datetime.datetime(2006, 2, 15, 4, 34, 33))]
          other_results = result.fetchall()
In [18]:
In [19]:
         type(other_results)
Out[19]: list
In [20]:
          len(other results)
Out[20]: 7
 In [ ]:
 In [ ]:
 In [ ]:
In [23]:
          import pandas as pd
In [43]:
          query = 'SELECT * FROM payment'
```

```
In [45]:
            type(posts df)
           pandas.core.frame.DataFrame
Out[45]:
In [46]:
           posts df
                   payment_id customer_id staff_id rental_id amount payment_date
                                                                                        last_update
Out[46]:
                                                                                         2006-02-15
                                                                           2005-05-25
                0
                             1
                                                   1
                                                          76.0
                                                                   2.99
                                          1
                                                                               11:30:37
                                                                                           22:12:30
                                                                                         2006-02-15
                                                                           2005-05-28
                1
                             2
                                          1
                                                   1
                                                         573.0
                                                                   0.99
                                                                              10:35:23
                                                                                           22:12:30
                                                                            2005-06-15
                                                                                         2006-02-15
                2
                             3
                                          1
                                                   1
                                                         1185.0
                                                                   5.99
                                                                              00:54:12
                                                                                           22:12:30
                                                                            2005-06-15
                                                                                         2006-02-15
                3
                             4
                                          1
                                                   2
                                                         1422.0
                                                                   0.99
                                                                              18:02:53
                                                                                            22:12:30
                                                                            2005-06-15
                                                                                         2006-02-15
                4
                             5
                                          1
                                                   2
                                                         1476.0
                                                                   9.99
                                                                              21:08:46
                                                                                           22:12:30
                                                  ...
                                                             ...
                                                                                                 ...
                            ...
                                                                     ...
                                                                                    ...
                                                                            2005-08-21
                                                                                         2006-02-15
           16044
                        16045
                                        599
                                                   1
                                                       14599.0
                                                                   4.99
                                                                              17:43:42
                                                                                            22:24:12
                                                                            2005-08-21
                                                                                         2006-02-15
           16045
                        16046
                                        599
                                                   1
                                                        14719.0
                                                                   1.99
                                                                               21:41:57
                                                                                            22:24:12
                                                                           2005-08-23
                                                                                         2006-02-15
           16046
                        16047
                                        599
                                                   2
                                                       15590.0
                                                                   8.99
                                                                              06:09:44
                                                                                            22:24:12
                                                                           2005-08-23
                                                                                         2006-02-15
                                                   2
                                                        15719.0
                                                                   2.99
           16047
                        16048
                                        599
                                                                               11:08:46
                                                                                            22:24:13
                                                                           2005-08-23
                                                                                         2006-02-15
                                                   2
           16048
                        16049
                                        599
                                                       15725.0
                                                                   2.99
                                                                               11:25:00
                                                                                           22:24:13
          16049 rows × 7 columns
In [47]:
           posts df.columns
           Index(['payment_id', 'customer_id', 'staff_id', 'rental_id', 'amount',
Out[47]:
                    payment_date', 'last_update'],
                  dtype='object')
In [48]:
           posts_df.dtypes
Out[48]: payment_id
                                        int64
           customer id
                                        int64
           staff id
                                        int64
           rental id
                                      float64
           amount
                                      float64
           payment date
                              datetime64[ns]
           last update
                              datetime64[ns]
           dtype: object
In [49]: | posts_df.head()
              payment_id customer_id staff_id rental_id amount
                                                                      payment_date
                                                                                        last_update
Out[49]:
                                                                                         2006-02-15
                                                                        2005-05-25
           0
                        1
                                     1
                                              1
                                                      76.0
                                                              2.99
                                                                            11:30:37
                                                                                           22:12:30
```

posts df = pd.read sql query(query, engine)

In [44]:

	рау	ment_id cus	tomer_id staff_	_id ren	tal_id	amount	payment_dat	e last_update
	1	2	1	1	573.0	0.99	2005-05-2 10:35:2	
	2	3	1	1	1185.0	5.99	2005-06-1 00:54:1	
	3	4	1	2	1422.0	0.99	2005-06-1 18:02:5	
	4	5	1	2	1476.0	9.99	2005-06-1 21:08:4	
n [50]:	posts	s_df.tail()						
ut[50]:		payment_id	customer_id	staff_id	renta	l_id amo	unt payment_	date last_update
	16044	16045	599	1	1459	99.0 4	1.99 2005-0 17:4	8-21 2006-02-15 3:42 22:24:12
	16045	16046	599	1	147′	19.0	1.99 2005-0 21:4	8-21 2006-02-15 11:57 22:24:12
	16046	16047	599	2	1559	90.0	3.99 2005-0 06:0	8-23 2006-02-15 9:44 22:24:12
	16047	16048	599	2	157	19.0 2	2.99 2005-0 11:0	8-23 2006-02-15 8:46 22:24:13
	16048	16049	599	2	1572	25.0 2	2.99 2005-0 11:2	8-23 2006-02-15 5:00 22:24:13
n [51]:	posts	_df.sample	(5)					
ıt[51]:		payment_id	customer_id s	taff_id	rental_	_id amou	nt payment_d	ate last_update
ut[51]:	7356	payment_id 7357	customer_id s	taff_id 2	rental_ 7658		nt payment_d 2005-07 02:09	-28 2006-02-15
ut[51]:	7356 3942					3.0 2.	2005-07	-28 2006-02-15 0:12 22:15:11 -19 2006-02-15
ut[51]:		7357	272	2	7658	3.0 2. 5.0 2.	99 2005-07 02:09 2005-08	-28 2006-02-15 9:12 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15
ut[51]:	3942	7357 3943	272 145	2	7658 12788	3.0 2. 5.0 2. 1.0 5.	2005-07 02:09 2005-08 00:05 2005-07	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :00 22:13:10
ut[51]:	3942 3229	7357 3943 3230	272 145 120	2 2	7658 12788 400	3.0 2. 5.0 2. 1.0 5.	2005-07 02:09 2005-08 00:05 99 2005-07 00:07	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :200 22:13:10 -10 2006-02-15 -213:20 -19 2006-02-15
n [52]:	3942 3229 3692 882	7357 3943 3230 3693	272 145 120 137 32	2 2 1	7658 12788 400 5804	3.0 2. 5.0 2. 1.0 5.	2005-07 02:09 2005-08 00:05 99 2005-07 00:07 99 2005-07 15:06	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :00 22:13:10 -10 2006-02-15 3:31 22:13:20 -19 2006-02-15
n [52]:	3942 3229 3692 882	7357 3943 3230 3693 883	272 145 120 137 32	2 2 1 1 2	7658 12788 400 5804	3.0 2. 5.0 2. 1.0 5. 1.0 5.	2005-07 02:08 99 2005-08 00:05 99 2005-07 00:07 99 2005-06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :200 22:13:10 -10 2006-02-15 -213:20 -19 2006-02-15
n [52]:	3942 3229 3692 882	7357 3943 3230 3693 883 s_df.describ	272 145 120 137 32	2 2 1 1 2	7658 12788 400 5804 2624	3.0 2. 5.0 2. 1.0 5. 1.0 5.	2005-07 02:08 99 2005-08 00:05 99 2005-07 00:07 99 2005-06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :00 22:13:10 -10 2006-02-15 3:31 22:13:20 -19 2006-02-15 :09 22:12:36
n [52]:	3942 3229 3692 882	7357 3943 3230 3693 883 s_df.describ	272 145 120 137 32 De() customer_id	2 2 1 1 2	7658 12788 400 5804 2624 staff_id	3.0 2. 5.0 2. 1.0 5. 1.0 5. 1.0 5.	2005-07 02:08 99 2005-08 99 2005-07 00:07 99 2005-07 15:06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 22:13:26 -07 2006-02-15 22:13:10 -10 2006-02-15 3:31 22:13:20 -19 2006-02-15 22:13:20 -19 2006-02-15 22:12:36
n [52]:	3942 3229 3692 882 posts	7357 3943 3230 3693 883 s_df.descrik payment_id 16049.00000	272 145 120 137 32 De() customer_id 16049.000000	2 2 1 1 2 16049.	7658 12788 400 5804 2624 staff_id	3.0 2. 5.0 2. 1.0 5. 1.0 5. 1.0 5. 1.0 5. 1.0 5.	99 2005-07 02:09 99 2005-08 00:05 99 2005-07 00:07 99 2005-07 15:06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 22:13:26 -07 2006-02-15 22:13:10 -10 2006-02-15 3:31 22:13:20 -19 2006-02-15 22:13:20 -19 2006-02-15 22:12:36
n [52]:	3942 3229 3692 882 posts count mean	7357 3943 3230 3693 883 s_df.descrik payment_id 16049.00000 8025.00000	272 145 120 137 32 0e() customer_id 16049.000000 297.162689	2 2 1 1 2 16049.	7658 12788 400 5804 2624 staff_id 000000	3.0 2. 5.0 2. 1.0 5. 1.0 5. 1.0 5. 1.0 5. 4632.7	2005-07 02:09 99 2005-08 00:05 99 2005-07 00:07 99 2005-07 15:06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :00 22:13:10 -10 2006-02-15 -2:13:20 -11 2006-02-15 -2:13:20 -12 2006-02-15 -2:13:20 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15 -19 2006-02-15
	3942 3229 3692 882 posts count mean std	7357 3943 3230 3693 883 8_df.describ payment_id 16049.00000 8025.00000 4633.09157	272 145 120 137 32 De () customer_id 16049.000000 297.162689 172.468100	2 2 1 1 2 16049. 1 0 1.	7658 12788 400 5804 2624 staff_id 000000 .497975	3.0 2. 5.0 2. 1.0 5. 1.0 5. 1.0 5. 1.0 5. 4632.7 1.0	2005-07 02:09 99 2005-08 00:05 99 2005-07 00:07 99 2005-07 15:06 99 2005-06 08:22	-28 2006-02-15 22:15:11 -19 2006-02-15 :49 22:13:26 -07 2006-02-15 :200 22:13:10 2-10 2006-02-15 22:13:20 2-10 2006-02-15 22:13:20 2-19 2006-02-15 :09 22:12:36

50% 8025.00000

296.000000

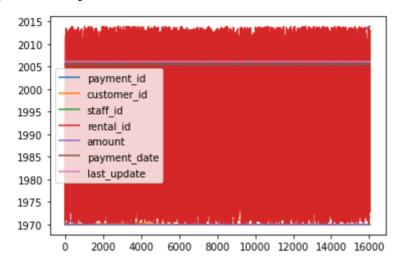
1.000000 8025.500000

3.990000

d	staff_id	I	rental_id	amount
0	2.000000)	12037.250000	4.990000
0	2.000000)	16049.000000	11.990000

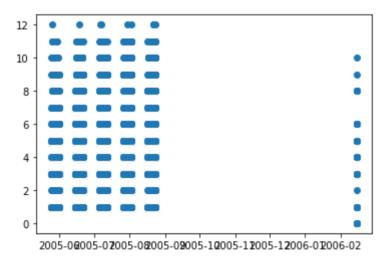
```
In [53]: posts_df.plot()
```

Out[53]: <AxesSubplot:>



```
In [54]: import matplotlib.pyplot as plt
In [55]: x = posts_df['payment_date']
y = posts_df['amount']
In [56]: plt.scatter(x, y)
```

Out[56]: <matplotlib.collections.PathCollection at 0x7facb21fdd60>



```
In [ ]:
```