

In [1]:

```
import pandas as pd
import numpy as np
#pd.set_option('max_columns', 120)
#pd.set_option('max_colwidth', 5000)

import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
plt.rcParams['figure.figsize'] = (12,8)
```

In [2]:

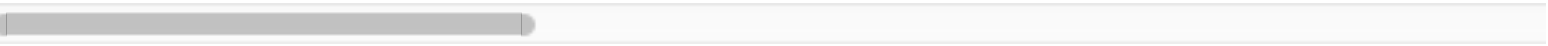
```
filtered_loans = pd.read_csv('filtered_loans_2007_test1.csv')
#drop_cols = ['last_credit_pull_d','title']
#filtered_loans = filtered_loans.drop(drop_cols,axis=1)
print(filtered_loans.shape)
filtered_loans.head()
```

(39239, 22)

Out[2]:

| | loan_amnt | term | installment | grade | emp_length | home_ownership | annual_inc | verificati |
|---|-----------|-----------|-------------|-------|------------|----------------|------------|------------|
| 0 | 5000 | 36 months | 162.87 | B | 10+ years | RENT | 24000.0 | |
| 1 | 2500 | 60 months | 59.83 | C | < 1 year | RENT | 30000.0 | Sour |
| 2 | 2400 | 36 months | 84.33 | C | 10+ years | RENT | 12252.0 | N |
| 3 | 10000 | 36 months | 339.31 | C | 10+ years | RENT | 49200.0 | Sour |
| 4 | 5000 | 36 months | 156.46 | A | 3 years | RENT | 36000.0 | Sour |

5 rows × 22 columns



In [3]:

```
null_counts = filtered_loans.isnull().sum()
print("Number of null values in each column:\n{}".format(null_counts))
```

Number of null values in each column:

| | |
|----------------------|-------|
| loan_amnt | 0 |
| term | 0 |
| installment | 0 |
| grade | 0 |
| emp_length | 1057 |
| home_ownership | 0 |
| annual_inc | 0 |
| verification_status | 0 |
| loan_status | 0 |
| purpose | 0 |
| addr_state | 0 |
| dti | 0 |
| delinq_2yrs | 0 |
| earliest_cr_line | 0 |
| inq_last_6mths | 0 |
| open_acc | 0 |
| pub_rec | 0 |
| revol_bal | 0 |
| revol_util | 50 |
| total_acc | 0 |
| pub_rec_bankruptcies | 697 |
| fico_average | 0 |
| dtype: | int64 |

In [4]:

```
filtered_loans
```

Out[4]:

| | loan_amnt | term | installment | grade | emp_length | home_ownership | annual_inc | veri |
|---|-----------|-----------|-------------|-------|------------|----------------|------------|------|
| 0 | 5000 | 36 months | 162.87 | B | 10+ years | RENT | 24000.00 | |
| 1 | 2500 | 60 months | 59.83 | C | < 1 year | RENT | 30000.00 | |
| 2 | 2400 | 36 months | 84.33 | C | 10+ years | RENT | 12252.00 | |
| 3 | 10000 | 36 months | 339.31 | C | 10+ years | RENT | 49200.00 | |
| 4 | 5000 | 36 months | 156.46 | A | 3 years | RENT | 36000.00 | |
| 5 | 7000 | 60 months | 170.08 | C | 8 years | RENT | 47004.00 | |
| 6 | 3000 | 36 months | 109.43 | E | 9 years | RENT | 48000.00 | |

| | | | | | | | |
|-------|-------|-----------|--------|-----|-----------|----------|-----------|
| 7 | 5600 | months | 152.39 | F | 4 years | OWN | 40000.00 |
| 8 | 5375 | 60 months | 121.45 | B | < 1 year | RENT | 15000.00 |
| 9 | 6500 | 60 months | 153.45 | C | 5 years | OWN | 72000.00 |
| 10 | 12000 | 36 months | 402.54 | B | 10+ years | OWN | 75000.00 |
| 11 | 9000 | 36 months | 305.38 | C | < 1 year | RENT | 30000.00 |
| 12 | 3000 | 36 months | 96.68 | B | 3 years | RENT | 15000.00 |
| 13 | 10000 | 36 months | 325.74 | B | 3 years | RENT | 100000.00 |
| 14 | 1000 | 36 months | 35.31 | D | < 1 year | RENT | 28000.00 |
| 15 | 10000 | 36 months | 347.98 | C | 4 years | RENT | 42000.00 |
| 16 | 3600 | 36 months | 109.57 | A | 10+ years | MORTGAGE | 110000.00 |
| 17 | 6000 | 36 months | 198.46 | B | 1 year | MORTGAGE | 84000.00 |
| 18 | 9200 | 36 months | 280.01 | A | 6 years | RENT | 77385.19 |
| 19 | 20250 | 60 months | 484.63 | C | 3 years | RENT | 43370.00 |
| 20 | 21000 | 36 months | 701.73 | B | 10+ years | RENT | 105000.00 |
| 21 | 10000 | 36 months | 330.76 | B | 10+ years | OWN | 50000.00 |
| 22 | 10000 | 36 months | 330.76 | B | 5 years | RENT | 50000.00 |
| 23 | 6000 | 36 months | 198.46 | B | 1 year | RENT | 76000.00 |
| 24 | 15000 | 36 months | 483.38 | B | 2 years | MORTGAGE | 92000.00 |
| 25 | 15000 | 36 months | 514.64 | C | 9 years | RENT | 60000.00 |
| 26 | 5000 | 60 months | 123.65 | D | 2 years | RENT | 50004.00 |
| 27 | 4000 | 36 months | 132.31 | B | 10+ years | MORTGAGE | 106000.00 |
| 28 | 8500 | 36 months | 281.15 | B | < 1 year | RENT | 25000.00 |
| 29 | 4375 | 36 months | 136.11 | A | 7 years | MORTGAGE | 17108.00 |
| ... | ... | ... | ... | ... | ... | ... | ... |
| 39209 | 12000 | 36 months | 401.37 | D | 9 years | OWN | 75000.00 |

| | | | | | | | |
|-------|-------|-----------|--------|---|----------|----------|-----------|
| 39210 | 20000 | 36 months | 678.08 | E | 6 years | MORTGAGE | 145000.00 |
| 39211 | 1200 | 36 months | 39.60 | C | < 1 year | RENT | 20000.00 |
| 39212 | 12250 | 36 months | 398.69 | C | 3 years | RENT | 60000.00 |
| 39213 | 2700 | 36 months | 94.88 | F | 1 year | RENT | 52200.00 |
| 39214 | 5000 | 36 months | 159.03 | B | 1 year | MORTGAGE | 250000.00 |
| 39215 | 3500 | 36 months | 112.87 | B | < 1 year | RENT | 13500.00 |
| 39216 | 5000 | 36 months | 155.38 | A | 8 years | MORTGAGE | 150000.00 |
| 39217 | 5000 | 36 months | 155.38 | A | 7 years | MORTGAGE | 95000.00 |
| 39218 | 25000 | 36 months | 813.65 | C | 2 years | RENT | 48000.00 |
| 39219 | 10000 | 36 months | 323.98 | C | < 1 year | RENT | 27376.00 |
| 39220 | 5000 | 36 months | 159.03 | B | 1 year | RENT | 73000.00 |
| 39221 | 5100 | 36 months | 160.72 | A | 4 years | RENT | 32000.00 |
| 39222 | 5400 | 36 months | 168.60 | A | < 1 year | RENT | 8000.00 |
| 39223 | 5300 | 36 months | 167.02 | A | 7 years | MORTGAGE | 74000.00 |
| 39224 | 5000 | 36 months | 164.23 | C | 1 year | OWN | 30000.00 |
| 39225 | 3000 | 36 months | 97.20 | C | 2 years | MORTGAGE | 200000.00 |
| 39226 | 3000 | 36 months | 94.98 | B | < 1 year | MORTGAGE | 25000.00 |
| 39227 | 5000 | 36 months | 155.38 | A | 8 years | MORTGAGE | 120000.00 |
| 39228 | 5000 | 36 months | 156.84 | A | < 1 year | MORTGAGE | 180000.00 |
| 39229 | 5000 | 36 months | 159.77 | B | 2 years | MORTGAGE | 180000.00 |
| 39230 | 5000 | 36 months | 161.25 | B | 4 years | MORTGAGE | 48000.00 |
| 39231 | 5000 | 36 months | 164.23 | C | < 1 year | OWN | 80000.00 |
| 39232 | 5000 | 36 months | 155.38 | A | 1 year | OWN | 85000.00 |
| 39233 | 5000 | 36 months | 158.30 | B | 5 years | MORTGAGE | 75000.00 |
| | | 36 months | | | | | |

| | | | | | | | |
|--------------|------|--------------|--------|---|----------|----------|-----------|
| 39234 | 2500 | months | 78.42 | A | 4 years | MORTGAGE | 110000.00 |
| 39235 | 8500 | 36 months | 275.38 | C | 3 years | RENT | 18000.00 |
| 39236 | 5000 | 36 months | 156.84 | A | < 1 year | MORTGAGE | 100000.00 |
| 39237 | 5000 | 36 months | 155.38 | A | < 1 year | MORTGAGE | 200000.00 |
| 39238 | 7500 | 36 months | 255.43 | E | < 1 year | OWN | 22000.00 |

39239 rows × 22 columns

In [5]:

```
filtered_loans.mean()
```

Out[5]:

```
loan_amnt      11134.730115
installment    323.273499
annual_inc     68884.323399
loan_status    0.855934
dti            13.293984
delinq_2yrs    0.146563
inq_last_6mths 0.870359
open_acc       9.286501
pub_rec        0.055404
revol_bal      13329.338898
revol_util     0.487377
total_acc      22.072428
pub_rec_bankruptcies 0.043459
fico_average    717.000765
dtype: float64
```

In [6]:

```
filtered_loans.fillna(filtered_loans.mean(), inplace=True)
```

In [7]:

```
null_counts = filtered_loans.isnull().sum()  
print("Number of null values in each column:\n{}".format(null_counts))
```

Number of null values in each column:

| | |
|----------------------|-------|
| loan_amnt | 0 |
| term | 0 |
| installment | 0 |
| grade | 0 |
| emp_length | 1057 |
| home_ownership | 0 |
| annual_inc | 0 |
| verification_status | 0 |
| loan_status | 0 |
| purpose | 0 |
| addr_state | 0 |
| dti | 0 |
| delinq_2yrs | 0 |
| earliest_cr_line | 0 |
| inq_last_6mths | 0 |
| open_acc | 0 |
| pub_rec | 0 |
| revol_bal | 0 |
| revol_util | 0 |
| total_acc | 0 |
| pub_rec_bankruptcies | 0 |
| fico_average | 0 |
| dtype: | int64 |

In []: