In [57]:
```
#CTa-HW04-PyCitySchools
```

In [58]:
```
#import libraries to use
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [59]:
```
#read in files
school_data = pd.read_csv('Resources/schools_complete.csv')

student_data = pd.read_csv('Resources/students_complete.csv')
```

In [60]:
```
#shows first 5 lines in school data
school_data.head()
```

Out[60]:

	School ID	name	type	size	budget
0	0	Huang High School	District	2917	1910635
1	1	Figueroa High School	District	2949	1884411
2	2	Shelton High School	Charter	1761	1056600
3	3	Hernandez High School	District	4635	3022020
4	4	Griffin High School	Charter	1468	917500

In [61]:
```
#shows first 5 lines in student data
student_data.head()
```

Out[61]:

	Student ID	name	gender	grade	school	reading_score	math_score
0	0	Paul Bradley	M	9th	Huang High School	66	79
1	1	Victor Smith	M	12th	Huang High School	94	61
2	2	Kevin Rodriguez	M	12th	Huang High School	90	60
3	3	Dr. Richard Scott	M	12th	Huang High School	67	58
4	4	Bonnie Ray	F	9th	Huang High School	97	84

In [62]:
```
#District Summary Calculations
school_total = len(school_data)
student_total = len(student_data)
budget_total = school_data['budget'].sum()
avgmath_score = student_data['math_score'].mean()
avgread_score = student_data['reading_score'].mean()

pass_math_count = student_data[student_data.math_score >=70]
pass_math_total = len(pass_math_count)
pass_math_percent =(pass_math_total / student_total)*100

pass_read_count = student_data[student_data.reading_score >=70]
pass_read_total = len(pass_read_count)
pass_read_percent =(pass_read_total / student_total)*100

overall_pass_rate= ((pass_read_percent + pass_math_percent)/2)
```

In [63]:
```
#Display District Summary Calculations
print("Total_Schools = ", school_total)
print("Total_Students = ", student_total)
print("Total_Budget = ", budget_total)
print("Avg_Math_Score = ", avgmath_score)
print("Avg_Read_Score = ", avgread_score)
print("%_Pass_Math = ", pass_math_percent)
print("%_Pass_Read = ", pass_read_percent)
print("Overall_Pass_Rate = ", overall_pass_rate)
```

```
Total_Schools =  15
Total_Students =  39170
Total_Budget =  24649428
Avg_Math_Score =  78.98537145774827
Avg_Read_Score =  81.87784018381414
%_Pass_Math =  74.9808526933878
%_Pass_Read =  85.80546336482001
Overall_Pass_Rate =  80.39315802910392
```

In [64]:
```
#Convert district summary data into a dataframe (table)
district_summary = pd.DataFrame({'Total_Schools': [school_total],'Total_Studen
ts': [student_total],
                                 'Total_Budget': [budget_total], 'Avg_Math_Sco
re': [avgmath_score],
                                 'Avg_Read_Score': [avgread_score], '%_Pass_Ma
th': [pass_math_percent],
                                 '%_Pass_Read': [pass_read_percent], 'Overall_
Pass_Rate': [overall_pass_rate]
                                })
```

In [65]:
```
#Order district summary data into a specific order in the table and round data
 to 2 decimal places
district_summary = district_summary[['Total_Schools','Total_Students','Total_B
udget', 'Avg_Math_Score',
                                     'Avg_Read_Score', '%_Pass_Math', '%_Pass_
Read', 'Overall_Pass_Rate']]

district_summary = district_summary.round(2)

district_summary = district_summary
```

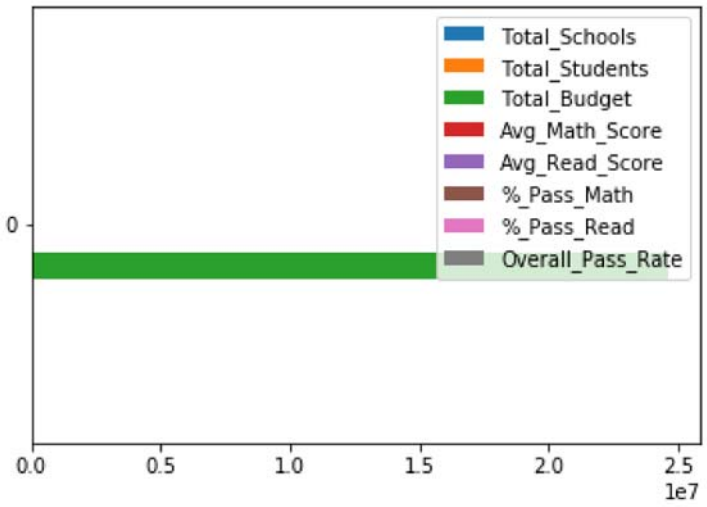
In [66]:
```
#Display completed District Summary table
district_summary_df = pd.DataFrame(district_summary)
district_summary_df
```

Out[66]:

	Total_Schools	Total_Students	Total_Budget	Avg_Math_Score	Avg_Read_Score	%_I
0	15	39170	24649428	78.99	81.88	74.9

In [67]:
```
#Plot the District Summary data on a bar graph
%matplotlib inline
district_summary_df.plot(kind='barh')
```

Out[67]: <matplotlib.axes._subplots.AxesSubplot at 0x2993f511668>



In [68]:
```
#Take out only fields in school data needed for School Summary
subset_school = school_data[['name','type','budget']]
subset_school.reset_index(inplace=True)
subset_school
```

Out[68]:

	index	name	type	budget
0	0	Huang High School	District	1910635
1	1	Figueroa High School	District	1884411
2	2	Shelton High School	Charter	1056600
3	3	Hernandez High School	District	3022020
4	4	Griffin High School	Charter	917500
5	5	Wilson High School	Charter	1319574
6	6	Cabrera High School	Charter	1081356
7	7	Bailey High School	District	3124928
8	8	Holden High School	Charter	248087
9	9	Pena High School	Charter	585858
10	10	Wright High School	Charter	1049400
11	11	Rodriguez High School	District	2547363
12	12	Johnson High School	District	3094650
13	13	Ford High School	District	1763916
14	14	Thomas High School	Charter	1043130

In [69]:
```
#Rename columns in school data from name to school to merge data later
subset_school_summary = subset_school.rename(columns={'name':'school_name', 't
ype':'school_type', 'budget':'school_budget'})
subset_school_summary
```

Out[69]:

	index	school_name	school_type	school_budget
0	0	Huang High School	District	1910635
1	1	Figueroa High School	District	1884411
2	2	Shelton High School	Charter	1056600
3	3	Hernandez High School	District	3022020
4	4	Griffin High School	Charter	917500
5	5	Wilson High School	Charter	1319574
6	6	Cabrera High School	Charter	1081356
7	7	Bailey High School	District	3124928
8	8	Holden High School	Charter	248087
9	9	Pena High School	Charter	585858
10	10	Wright High School	Charter	1049400
11	11	Rodriguez High School	District	2547363
12	12	Johnson High School	District	3094650
13	13	Ford High School	District	1763916
14	14	Thomas High School	Charter	1043130

In [70]:
```
#School Summary Calculations
sch_stu_total = student_data['school'].value_counts()
sch_per_budget = school_data.groupby('name').budget.sum()
sch_stu_avgmath = student_data.groupby('school').math_score.mean()
sch_stu_avgread = student_data.groupby('school').reading_score.mean()

sch_pass_math_count = student_data[student_data.math_score >=70]
sch_pass_math_total = sch_pass_math_count.groupby("school")['Student ID'].coun
t()
sch_pass_math_percent =(sch_pass_math_total / sch_stu_total)*100

sch_pass_read_count = student_data[student_data.reading_score >=70]
sch_pass_read_total = sch_pass_read_count.groupby("school")['Student ID'].coun
t()
sch_pass_read_percent =(sch_pass_read_total / sch_stu_total)*100

grp_overall_pass_rate= ((sch_pass_read_percent + sch_pass_math_percent)/2)
```

In [71]:
```
#Display School Summary Calculations
print("Total_Students_By_School = ", sch_stu_total)
print("")
print("Total_Budget_By_School = ", sch_per_budget)
print("")
print("")
print("Avg_Math_Score_By_School = ", sch_stu_avgmath)
print("")
print("")
print("Avg_Read_Score_By_School = ", sch_stu_avgread)
print("")
print("")
print("%_Pass_Math_By_School = ", sch_pass_math_percent)
print("")
print("")
print("%_Pass_Read_By_School = ", sch_pass_read_percent)
print("")
print("")
print("Overall_Pass_Rate_By_School = ", grp_overall_pass_rate)
print("")
print("")
```

```
Total_Students_By_School =  Bailey High School       4976
Johnson High School      4761
Hernandez High School    4635
Rodriguez High School    3999
Figueroa High School     2949
Huang High School        2917
Ford High School         2739
Wilson High School       2283
Cabrera High School      1858
Wright High School       1800
Shelton High School      1761
Thomas High School       1635
Griffin High School      1468
Pena High School          962
Holden High School        427
Name: school, dtype: int64

Total_Budget_By_School =  name
Bailey High School       3124928
Cabrera High School      1081356
Figueroa High School     1884411
Ford High School         1763916
Griffin High School       917500
Hernandez High School    3022020
Holden High School        248087
Huang High School        1910635
Johnson High School      3094650
Pena High School          585858
Rodriguez High School    2547363
Shelton High School      1056600
Thomas High School       1043130
Wilson High School       1319574
Wright High School       1049400
Name: budget, dtype: int64


Avg_Math_Score_By_School =  school
Bailey High School       77.048432
Cabrera High School      83.061895
Figueroa High School     76.711767
Ford High School         77.102592
Griffin High School      83.351499
Hernandez High School    77.289752
Holden High School       83.803279
Huang High School        76.629414
Johnson High School      77.072464
Pena High School         83.839917
Rodriguez High School    76.842711
Shelton High School      83.359455
Thomas High School       83.418349
Wilson High School       83.274201
Wright High School       83.682222
Name: math_score, dtype: float64


Avg_Read_Score_By_School =  school
Bailey High School       81.033963
```

```
Cabrera High School      83.975780
Figueroa High School     81.158020
Ford High School         80.746258
Griffin High School      83.816757
Hernandez High School    80.934412
Holden High School       83.814988
Huang High School        81.182722
Johnson High School      80.966394
Pena High School         84.044699
Rodriguez High School    80.744686
Shelton High School      83.725724
Thomas High School       83.848930
Wilson High School       83.989488
Wright High School       83.955000
Name: reading_score, dtype: float64


%_Pass_Math_By_School =  Bailey High School       66.680064
Cabrera High School      94.133477
Figueroa High School     65.988471
Ford High School         68.309602
Griffin High School      93.392371
Hernandez High School    66.752967
Holden High School       92.505855
Huang High School        65.683922
Johnson High School      66.057551
Pena High School         94.594595
Rodriguez High School    66.366592
Shelton High School      93.867121
Thomas High School       93.272171
Wilson High School       93.867718
Wright High School       93.333333
dtype: float64


%_Pass_Read_By_School =  Bailey High School       81.933280
Cabrera High School      97.039828
Figueroa High School     80.739234
Ford High School         79.299014
Griffin High School      97.138965
Hernandez High School    80.862999
Holden High School       96.252927
Huang High School        81.316421
Johnson High School      81.222432
Pena High School         95.945946
Rodriguez High School    80.220055
Shelton High School      95.854628
Thomas High School       97.308869
Wilson High School       96.539641
Wright High School       96.611111
dtype: float64


Overall_Pass_Rate_By_School =  Bailey High School       74.306672
Cabrera High School      95.586652
Figueroa High School     73.363852
Ford High School         73.804308
```

```
Griffin High School      95.265668
Hernandez High School    73.807983
Holden High School       94.379391
Huang High School        73.500171
Johnson High School      73.639992
Pena High School         95.270270
Rodriguez High School    73.293323
Shelton High School      94.860875
Thomas High School       95.290520
Wilson High School       95.203679
Wright High School       94.972222
dtype: float64
```

In [72]:
```
#Create table for school summary and reset index for later use
school_summary = pd.concat([sch_stu_total, sch_per_budget,sch_stu_avgmath,
                            sch_stu_avgread,sch_pass_math_percent,sch_pass_rea
d_percent, grp_overall_pass_rate], axis=1)

school_summary.reset_index(inplace=True)
school_summary
```

Out[72]:

	index	school	budget	math_score	reading_score	0	1	
0	Bailey High School	4976	3124928	77.048432	81.033963	66.680064	81.933280	74.30
1	Cabrera High School	1858	1081356	83.061895	83.975780	94.133477	97.039828	95.58
2	Figueroa High School	2949	1884411	76.711767	81.158020	65.988471	80.739234	73.36
3	Ford High School	2739	1763916	77.102592	80.746258	68.309602	79.299014	73.80
4	Griffin High School	1468	917500	83.351499	83.816757	93.392371	97.138965	95.26
5	Hernandez High School	4635	3022020	77.289752	80.934412	66.752967	80.862999	73.80
6	Holden High School	427	248087	83.803279	83.814988	92.505855	96.252927	94.37
7	Huang High School	2917	1910635	76.629414	81.182722	65.683922	81.316421	73.50
8	Johnson High School	4761	3094650	77.072464	80.966394	66.057551	81.222432	73.63
9	Pena High School	962	585858	83.839917	84.044699	94.594595	95.945946	95.27
10	Rodriguez High School	3999	2547363	76.842711	80.744686	66.366592	80.220055	73.29
11	Shelton High School	1761	1056600	83.359455	83.725724	93.867121	95.854628	94.86
12	Thomas High School	1635	1043130	83.418349	83.848930	93.272171	97.308869	95.29
13	Wilson High School	2283	1319574	83.274201	83.989488	93.867718	96.539641	95.20

	index	school	budget	math_score	reading_score	0	1	
14	Wright High School	1800	1049400	83.682222	83.955000	93.333333	96.611111	94.97

In [73]:
```
#Rename column names
school_summary_final = school_summary.rename(columns={'index':'school_name',
'school':'total_students',
                                                      'budget': 'school_budge
t', 'math_score': 'avg_math_score',
                                                      'reading_score': 'avg_re
ad_score', 0: '%_Pass_Math', 1:'%_Pass_Read',
                                                      2:'Overall_Pass_Rate'})

school_summary_final
```

Out[73]:

	school_name	total_students	school_budget	avg_math_score	avg_read_score	%_P
0	Bailey High School	4976	3124928	77.048432	81.033963	66.6
1	Cabrera High School	1858	1081356	83.061895	83.975780	94.1
2	Figueroa High School	2949	1884411	76.711767	81.158020	65.9
3	Ford High School	2739	1763916	77.102592	80.746258	68.3
4	Griffin High School	1468	917500	83.351499	83.816757	93.3
5	Hernandez High School	4635	3022020	77.289752	80.934412	66.7
6	Holden High School	427	248087	83.803279	83.814988	92.5
7	Huang High School	2917	1910635	76.629414	81.182722	65.6
8	Johnson High School	4761	3094650	77.072464	80.966394	66.0
9	Pena High School	962	585858	83.839917	84.044699	94.5
10	Rodriguez High School	3999	2547363	76.842711	80.744686	66.3
11	Shelton High School	1761	1056600	83.359455	83.725724	93.8
12	Thomas High School	1635	1043130	83.418349	83.848930	93.2
13	Wilson High School	2283	1319574	83.274201	83.989488	93.8
14	Wright High School	1800	1049400	83.682222	83.955000	93.3

In [74]:
```
#Combine subset school summary and school summary final into one table
merged_school_summary = pd.merge(subset_school_summary, school_summary_final,
on="school_name")
merged_school_summary
```

Out[74]:

	index	school_name	school_type	school_budget_x	total_students	school_budget_
0	0	Huang High School	District	1910635	2917	1910635
1	1	Figueroa High School	District	1884411	2949	1884411
2	2	Shelton High School	Charter	1056600	1761	1056600
3	3	Hernandez High School	District	3022020	4635	3022020
4	4	Griffin High School	Charter	917500	1468	917500
5	5	Wilson High School	Charter	1319574	2283	1319574
6	6	Cabrera High School	Charter	1081356	1858	1081356
7	7	Bailey High School	District	3124928	4976	3124928
8	8	Holden High School	Charter	248087	427	248087
9	9	Pena High School	Charter	585858	962	585858
10	10	Wright High School	Charter	1049400	1800	1049400
11	11	Rodriguez High School	District	2547363	3999	2547363
12	12	Johnson High School	District	3094650	4761	3094650
13	13	Ford High School	District	1763916	2739	1763916
14	14	Thomas High School	Charter	1043130	1635	1043130

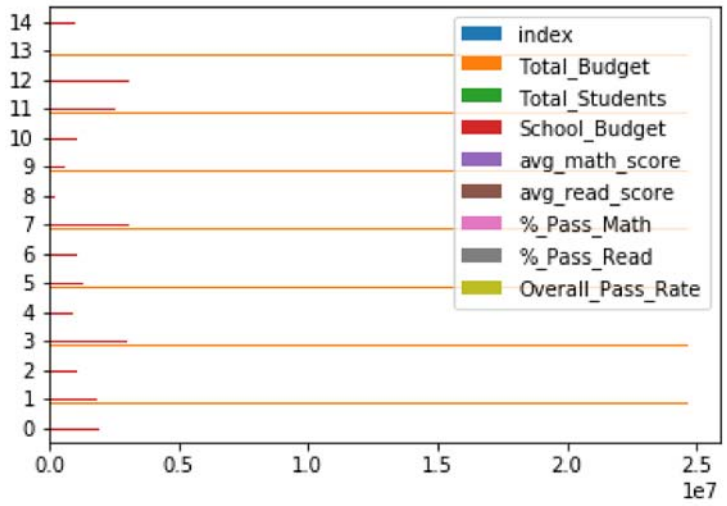
In [75]:
```
#Add total budget and rename columns
merged_school_summary['school_budget_x'] = budget_total

merged_school_summary = merged_school_summary.rename(columns={'school_name':'S
chool_Name', 'school_type':'School_Type',
                                                      'total_students': 'Total
_Students', 'school_budget_x': 'Total_Budget',
                                                      'school_budget_y':'Schoo
l_Budget', 'math_score': 'Avg_Math_Score',
                                                      'reading_score': 'Avg_Re
ad_Score', '%_Pass_Math': '%_Pass_Math',
                                                        '%_Pass_Read':'%_Pass_
Read', 'Overall_Pass_Rate':'Overall_Pass_Rate'})

merged_school_summary
```

Out[75]:

	index	School_Name	School_Type	Total_Budget	Total_Students	School_Budget	av
0	0	Huang High School	District	24649428	2917	1910635	76
1	1	Figueroa High School	District	24649428	2949	1884411	76
2	2	Shelton High School	Charter	24649428	1761	1056600	83
3	3	Hernandez High School	District	24649428	4635	3022020	77
4	4	Griffin High School	Charter	24649428	1468	917500	83
5	5	Wilson High School	Charter	24649428	2283	1319574	83
6	6	Cabrera High School	Charter	24649428	1858	1081356	83
7	7	Bailey High School	District	24649428	4976	3124928	77
8	8	Holden High School	Charter	24649428	427	248087	83
9	9	Pena High School	Charter	24649428	962	585858	83
10	10	Wright High School	Charter	24649428	1800	1049400	83
11	11	Rodriguez High School	District	24649428	3999	2547363	76
12	12	Johnson High School	District	24649428	4761	3094650	77
13	13	Ford High School	District	24649428	2739	1763916	77
14	14	Thomas High School	Charter	24649428	1635	1043130	83

In [76]:
```
#Plot the School Summary data on a bar graph
%matplotlib inline
merged_school_summary.plot(kind='barh')
```

Out[76]: <matplotlib.axes._subplots.AxesSubplot at 0x2993e78f9e8>



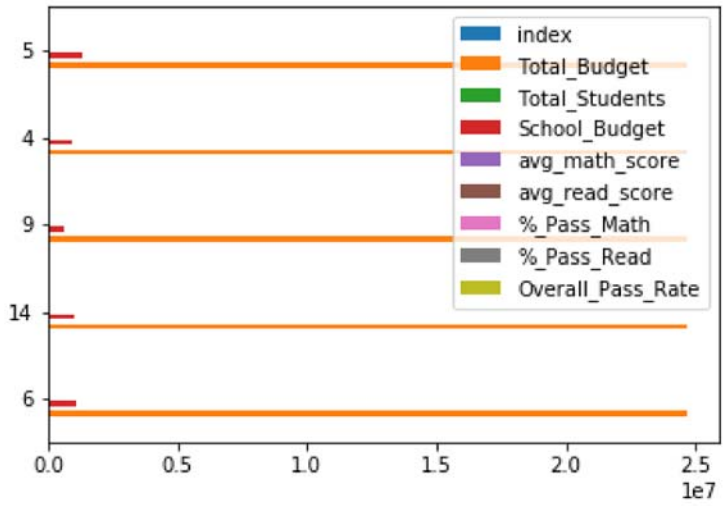
In [77]:
```
#Top Performing Schools By Passing Rate
merged_school_summary.nlargest(5, 'Overall_Pass_Rate')
```

Out[77]:

	index	School_Name	School_Type	Total_Budget	Total_Students	School_Budget	av
6	6	Cabrera High School	Charter	24649428	1858	1081356	83
14	14	Thomas High School	Charter	24649428	1635	1043130	83
9	9	Pena High School	Charter	24649428	962	585858	83
4	4	Griffin High School	Charter	24649428	1468	917500	83
5	5	Wilson High School	Charter	24649428	2283	1319574	83

In [78]:
```
#Plot Top Performing Schools By Passing Rate
%matplotlib inline
merged_school_summary.nlargest(5, 'Overall_Pass_Rate').plot(kind='barh')
```

Out[78]: <matplotlib.axes._subplots.AxesSubplot at 0x2993e8423c8>



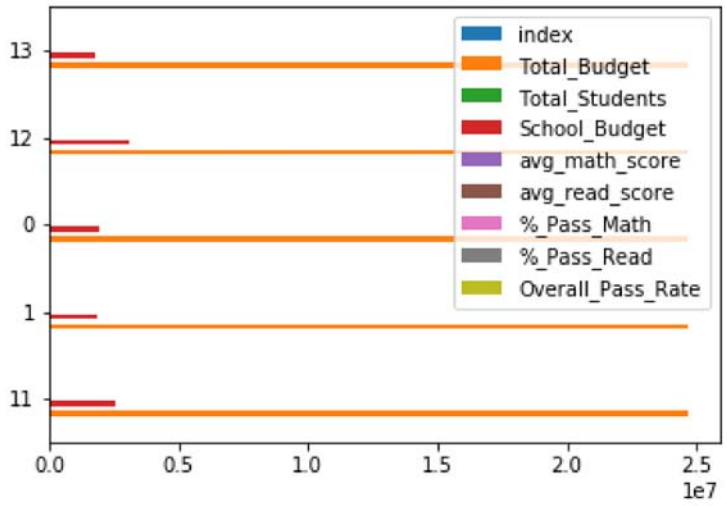
In [79]:
```
#Bottom Performing Schools By Passing Rate
merged_school_summary.nsmallest(5, 'Overall_Pass_Rate')
```

Out[79]:

	index	School_Name	School_Type	Total_Budget	Total_Students	School_Budget	av
11	11	Rodriguez High School	District	24649428	3999	2547363	76
1	1	Figueroa High School	District	24649428	2949	1884411	76
0	0	Huang High School	District	24649428	2917	1910635	76
12	12	Johnson High School	District	24649428	4761	3094650	77
13	13	Ford High School	District	24649428	2739	1763916	77

In [80]:
```
#Plot Bottom Performing Schools By Passing Rate
%matplotlib inline
merged_school_summary.nsmallest(5, 'Overall_Pass_Rate').plot(kind='barh')
```

Out[80]: <matplotlib.axes._subplots.AxesSubplot at 0x29940f3d400>



In [81]:
```
#Math Scores by Grade
stu_grd_avgmath = student_data.groupby(['school', 'grade'])['math_score'].mean
()
stu_grd_avgmath=pd.DataFrame(stu_grd_avgmath)
stu_grd_avgmath
```

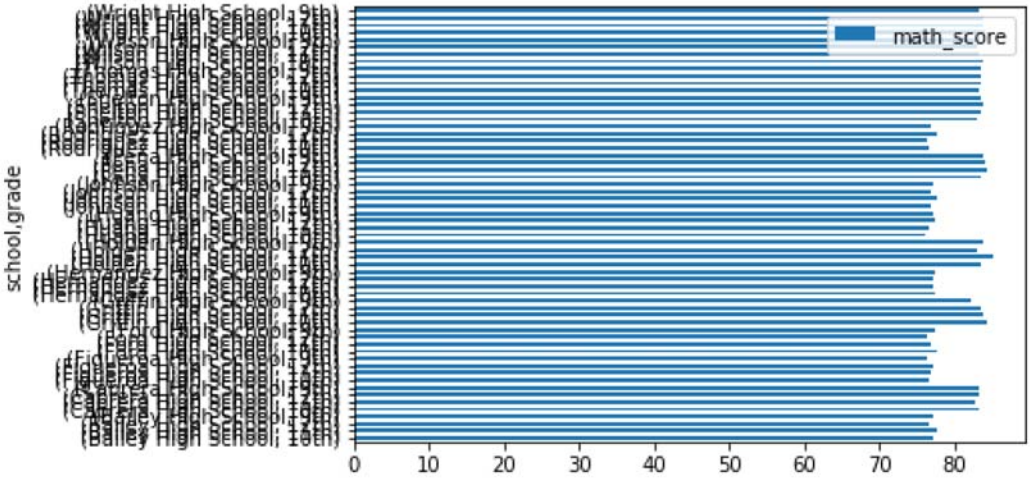
Out[81]:

		math_score
school	**grade**	
Bailey High School	**10th**	76.996772
	11th	77.515588
	12th	76.492218
	9th	77.083676
Cabrera High School	**10th**	83.154506
	11th	82.765560
	12th	83.277487
	9th	83.094697
Figueroa High School	**10th**	76.539974
	11th	76.884344
	12th	77.151369
	9th	76.403037
Ford High School	**10th**	77.672316
	11th	76.918058
	12th	76.179963
	9th	77.361345
Griffin High School	**10th**	84.229064
	11th	83.842105
	12th	83.356164
	9th	82.044010
Hernandez High School	**10th**	77.337408
	11th	77.136029
	12th	77.186567
	9th	77.438495
Holden High School	**10th**	83.429825
	11th	85.000000
	12th	82.855422
	9th	83.787402
Huang High School	**10th**	75.908735
	11th	76.446602
	12th	77.225641

		math_score
school	**grade**	
	9th	77.027251
Johnson High School	**10th**	76.691117
	11th	77.491653
	12th	76.863248
	9th	77.187857
Pena High School	**10th**	83.372000
	11th	84.328125
	12th	84.121547
	9th	83.625455
Rodriguez High School	**10th**	76.612500
	11th	76.395626
	12th	77.690748
	9th	76.859966
Shelton High School	**10th**	82.917411
	11th	83.383495
	12th	83.778976
	9th	83.420755
Thomas High School	**10th**	83.087886
	11th	83.498795
	12th	83.497041
	9th	83.590022
Wilson High School	**10th**	83.724422
	11th	83.195326
	12th	83.035794
	9th	83.085578
Wright High School	**10th**	84.010288
	11th	83.836782
	12th	83.644986
	9th	83.264706

In [82]:
```
#Plot Math Scores by Grade
%matplotlib inline
stu_grd_avgmath.plot(kind='barh')
```

Out[82]: <matplotlib.axes._subplots.AxesSubplot at 0x299410efd30>



In [83]:
```
#Reading Scores by Grade
stu_grd_avgread = student_data.groupby(['school', 'grade'])['reading_score'].m
ean()
stu_grd_avgread = pd.DataFrame(stu_grd_avgread)
stu_grd_avgread
```

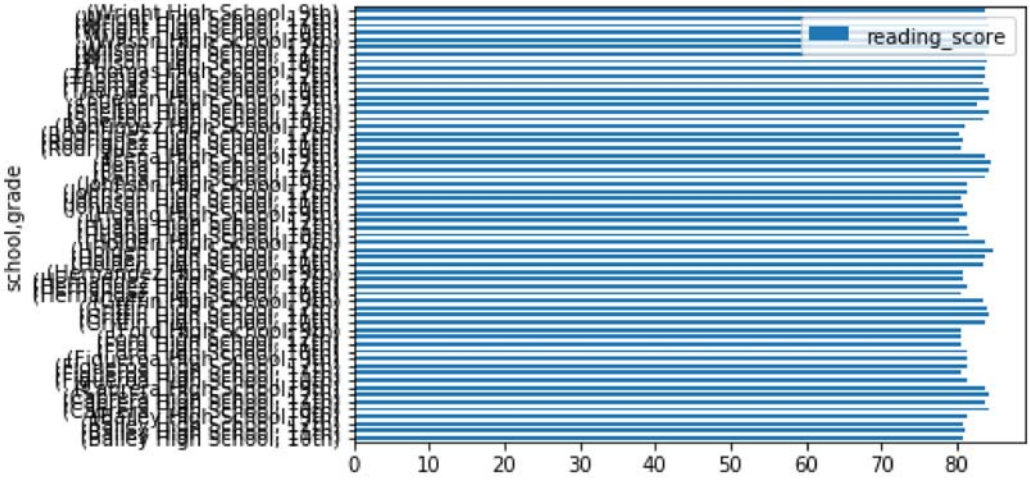
Out[83]:

		reading_score
school	**grade**	
Bailey High School	**10th**	80.907183
	11th	80.945643
	12th	80.912451
	9th	81.303155
Cabrera High School	**10th**	84.253219
	11th	83.788382
	12th	84.287958
	9th	83.676136
Figueroa High School	**10th**	81.408912
	11th	80.640339
	12th	81.384863
	9th	81.198598
Ford High School	**10th**	81.262712
	11th	80.403642
	12th	80.662338
	9th	80.632653
Griffin High School	**10th**	83.706897
	11th	84.288089
	12th	84.013699
	9th	83.369193
Hernandez High School	**10th**	80.660147
	11th	81.396140
	12th	80.857143
	9th	80.866860
Holden High School	**10th**	83.324561
	11th	83.815534
	12th	84.698795
	9th	83.677165
Huang High School	**10th**	81.512386
	11th	81.417476
	12th	80.305983

		reading_score
school	**grade**	
	9th	81.290284
Johnson High School	**10th**	80.773431
	11th	80.616027
	12th	81.227564
	9th	81.260714
Pena High School	**10th**	83.612000
	11th	84.335938
	12th	84.591160
	9th	83.807273
Rodriguez High School	**10th**	80.629808
	11th	80.864811
	12th	80.376426
	9th	80.993127
Shelton High School	**10th**	83.441964
	11th	84.373786
	12th	82.781671
	9th	84.122642
Thomas High School	**10th**	84.254157
	11th	83.585542
	12th	83.831361
	9th	83.728850
Wilson High School	**10th**	84.021452
	11th	83.764608
	12th	84.317673
	9th	83.939778
Wright High School	**10th**	83.812757
	11th	84.156322
	12th	84.073171
	9th	83.833333

In [84]:
```
#Plot Reading Scores by Grade
%matplotlib inline
stu_grd_avgread.plot(kind='barh')
```

Out[84]: <matplotlib.axes._subplots.AxesSubplot at 0x2993e7c0cc0>



In [85]:
```
#Scores By School Spending
merged_school_summary
```

Out[85]:

	index	School_Name	School_Type	Total_Budget	Total_Students	School_Budget	av
0	0	Huang High School	District	24649428	2917	1910635	76
1	1	Figueroa High School	District	24649428	2949	1884411	76
2	2	Shelton High School	Charter	24649428	1761	1056600	83
3	3	Hernandez High School	District	24649428	4635	3022020	77
4	4	Griffin High School	Charter	24649428	1468	917500	83
5	5	Wilson High School	Charter	24649428	2283	1319574	83
6	6	Cabrera High School	Charter	24649428	1858	1081356	83
7	7	Bailey High School	District	24649428	4976	3124928	77
8	8	Holden High School	Charter	24649428	427	248087	83
9	9	Pena High School	Charter	24649428	962	585858	83
10	10	Wright High School	Charter	24649428	1800	1049400	83
11	11	Rodriguez High School	District	24649428	3999	2547363	76
12	12	Johnson High School	District	24649428	4761	3094650	77
13	13	Ford High School	District	24649428	2739	1763916	77
14	14	Thomas High School	Charter	24649428	1635	1043130	83

In [86]:
```
#Calculate Average Spending Ranges (per Student)
avgspend = (sch_per_budget/sch_stu_total)
avgspendbin = (sch_per_budget/sch_stu_total)
```

In [87]:
```
#Create table, reset index, and rename columns
avg_spend_summary = pd.concat([avgspend, avgspendbin], axis=1)

avg_spend_summary.reset_index(inplace=True)

avg_spend_summary=avg_spend_summary.rename(columns={'index':'school_name', 0:
'avg_spend', 1:'avg_spend_bin'})
avg_spend_summary
```

Out[87]:

	school_name	avg_spend	avg_spend_bin
0	Bailey High School	628.0	628.0
1	Cabrera High School	582.0	582.0
2	Figueroa High School	639.0	639.0
3	Ford High School	644.0	644.0
4	Griffin High School	625.0	625.0
5	Hernandez High School	652.0	652.0
6	Holden High School	581.0	581.0
7	Huang High School	655.0	655.0
8	Johnson High School	650.0	650.0
9	Pena High School	609.0	609.0
10	Rodriguez High School	637.0	637.0
11	Shelton High School	600.0	600.0
12	Thomas High School	638.0	638.0
13	Wilson High School	578.0	578.0
14	Wright High School	583.0	583.0

In [88]:
```
#Create Bins to bucket average spending
bins = [500, 550, 600, 650, 700]
avg_spend_summary['avg_spend_bin'] = pd.cut(avg_spend_summary['avg_spend'], bi
ns)
avg_spend_summary
```

Out[88]:

	school_name	avg_spend	avg_spend_bin
0	Bailey High School	628.0	(600, 650]
1	Cabrera High School	582.0	(550, 600]
2	Figueroa High School	639.0	(600, 650]
3	Ford High School	644.0	(600, 650]
4	Griffin High School	625.0	(600, 650]
5	Hernandez High School	652.0	(650, 700]
6	Holden High School	581.0	(550, 600]
7	Huang High School	655.0	(650, 700]
8	Johnson High School	650.0	(600, 650]
9	Pena High School	609.0	(600, 650]
10	Rodriguez High School	637.0	(600, 650]
11	Shelton High School	600.0	(550, 600]
12	Thomas High School	638.0	(600, 650]
13	Wilson High School	578.0	(550, 600]
14	Wright High School	583.0	(550, 600]

In [89]:
```
#Merge and average spending data together with summary data
merged_school_spending = pd.merge(subset_school_summary, avg_spend_summary, on
="school_name")
merged_school_spending
```

Out[89]:

	index	school_name	school_type	school_budget	avg_spend	avg_spend_bin
0	0	Huang High School	District	1910635	655.0	(650, 700]
1	1	Figueroa High School	District	1884411	639.0	(600, 650]
2	2	Shelton High School	Charter	1056600	600.0	(550, 600]
3	3	Hernandez High School	District	3022020	652.0	(650, 700]
4	4	Griffin High School	Charter	917500	625.0	(600, 650]
5	5	Wilson High School	Charter	1319574	578.0	(550, 600]
6	6	Cabrera High School	Charter	1081356	582.0	(550, 600]
7	7	Bailey High School	District	3124928	628.0	(600, 650]
8	8	Holden High School	Charter	248087	581.0	(550, 600]
9	9	Pena High School	Charter	585858	609.0	(600, 650]
10	10	Wright High School	Charter	1049400	583.0	(550, 600]
11	11	Rodriguez High School	District	2547363	637.0	(600, 650]
12	12	Johnson High School	District	3094650	650.0	(600, 650]
13	13	Ford High School	District	1763916	644.0	(600, 650]
14	14	Thomas High School	Charter	1043130	638.0	(600, 650]

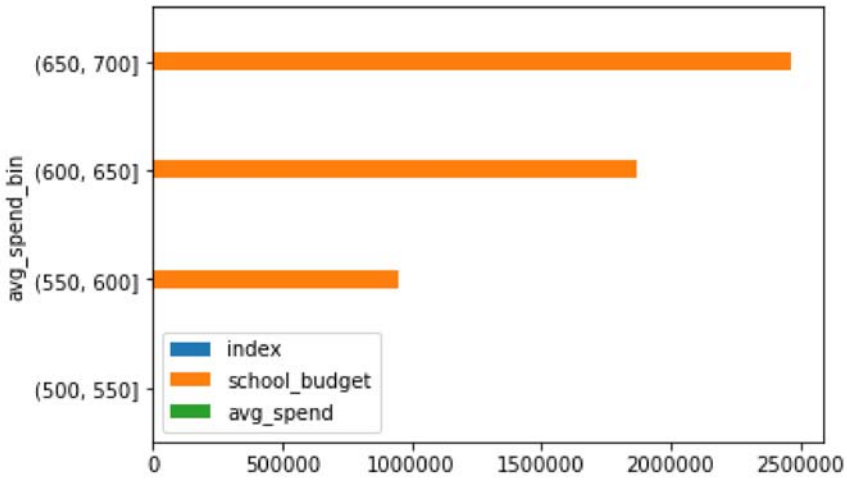
In [90]:
```
#Display Scores by School Spending in Bins
grp_merged_school_spending = merged_school_spending.groupby('avg_spend_bin').mean()
grp_merged_school_spending
```

Out[90]:

	index	school_budget	avg_spend
avg_spend_bin			
(500, 550]	NaN	NaN	NaN
(550, 600]	6.200	951003.4	584.80
(600, 650]	8.875	1870219.5	633.75
(650, 700]	1.500	2466327.5	653.50

In [91]:
```
#Plot Scores by School Spending in Bins
%matplotlib inline
grp_merged_school_spending.plot(kind='barh')
```

Out[91]: <matplotlib.axes._subplots.AxesSubplot at 0x29941527f28>



In [92]:
```
#Take out only fields in school data needed for School Summary
subset_school_2 = school_data[['name','type','size']]
subset_school_2.reset_index(inplace=True)
subset_school_2 = subset_school_2.rename(columns={'name':'school_name', 'type'
:'type', 'size':'size'})
subset_school_2
```

Out[92]:

	index	school_name	type	size
0	0	Huang High School	District	2917
1	1	Figueroa High School	District	2949
2	2	Shelton High School	Charter	1761
3	3	Hernandez High School	District	4635
4	4	Griffin High School	Charter	1468
5	5	Wilson High School	Charter	2283
6	6	Cabrera High School	Charter	1858
7	7	Bailey High School	District	4976
8	8	Holden High School	Charter	427
9	9	Pena High School	Charter	962
10	10	Wright High School	Charter	1800
11	11	Rodriguez High School	District	3999
12	12	Johnson High School	District	4761
13	13	Ford High School	District	2739
14	14	Thomas High School	Charter	1635

In [93]:
```
#Combine subset school 2 and merged school spending to create one table for sc
hool size
merged_school_size = pd.merge(subset_school_2, merged_school_spending, on="sch
ool_name")
merged_school_size
```

Out[93]:

	index_x	school_name	type	size	index_y	school_type	school_budget	avg_spe
0	0	Huang High School	District	2917	0	District	1910635	655.0
1	1	Figueroa High School	District	2949	1	District	1884411	639.0
2	2	Shelton High School	Charter	1761	2	Charter	1056600	600.0
3	3	Hernandez High School	District	4635	3	District	3022020	652.0
4	4	Griffin High School	Charter	1468	4	Charter	917500	625.0
5	5	Wilson High School	Charter	2283	5	Charter	1319574	578.0
6	6	Cabrera High School	Charter	1858	6	Charter	1081356	582.0
7	7	Bailey High School	District	4976	7	District	3124928	628.0
8	8	Holden High School	Charter	427	8	Charter	248087	581.0
9	9	Pena High School	Charter	962	9	Charter	585858	609.0
10	10	Wright High School	Charter	1800	10	Charter	1049400	583.0
11	11	Rodriguez High School	District	3999	11	District	2547363	637.0
12	12	Johnson High School	District	4761	12	District	3094650	650.0
13	13	Ford High School	District	2739	13	District	1763916	644.0
14	14	Thomas High School	Charter	1635	14	Charter	1043130	638.0

In [94]:
```
#Create bins for school size
bins = [100, 1500, 2500, 5000]
group_names = ['Small', 'Medium', 'Large']
merged_school_size['avg_spend_bin'] = pd.cut(merged_school_size['size'], bins,
 labels=group_names)

merged_school_size = merged_school_size.rename(columns={'avg_spend_bin':'Schoo
l_Size'})
```

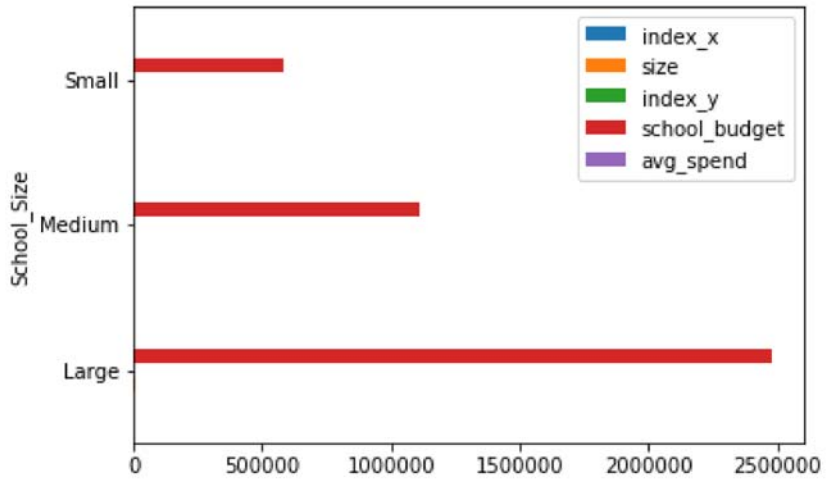
In [95]:
```
#Display Scores by School Size in Bins
grp_merged_school_size = merged_school_size.groupby('School_Size').mean()
grp_merged_school_size
```

Out[95]:

	index_x	size	index_y	school_budget	avg_spend
School_Size					
Large	6.714286	3853.714286	6.714286	2.478275e+06	643.571429
Medium	7.400000	1867.400000	7.400000	1.110012e+06	596.200000
Small	7.000000	952.333333	7.000000	5.838150e+05	605.000000

In [96]:
```
#Plot Scores by School Size in Bins
%matplotlib inline
grp_merged_school_size.plot(kind='barh')
```

Out[96]: <matplotlib.axes._subplots.AxesSubplot at 0x299415f3978>



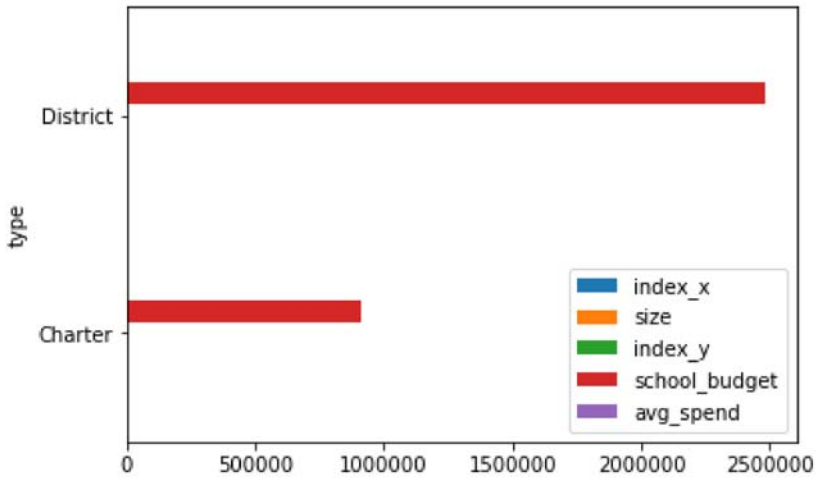
In [97]:
```
#Group by School Type and display it
merged_school_type = merged_school_size.groupby('type').mean()
merged_school_type
```

Out[97]:

	index_x	size	index_y	school_budget	avg_spend
type					
Charter	7.250000	1524.250000	7.250000	9.126881e+05	599.500000
District	6.714286	3853.714286	6.714286	2.478275e+06	643.571429

In [98]:
```
#Plot by School Type and display it
%matplotlib inline
merged_school_type.plot(kind='barh')
```

Out[98]: <matplotlib.axes._subplots.AxesSubplot at 0x2994179b0b8>



In [ ]:

In [ ]: