

CitySearch.java

Background:

We live in a heavily populated area in Northern California. Do you know how many of the cities in the Bay Area are among the 1000 largest cities in the United States? What about states like Kansas, or North Dakota, do they have large cities (top 1000)? I wonder . . .

Assignment:

1. Write the class **City**. The class **City** should be the template for a City, storing the name of the City (String), name of the State the City is in (String), and the population of the City (int). The **City** class should also have a couple **compareTo** methods (perhaps **compareTo(City other)** and **compareToPopulation(City other)**), so that individual cities can be compared (and ordered) by name, or by population. A **toString** method should also be written.
2. Write the class **CitySearch**. This class should have one field, an **ArrayList** of **Cities**. The text file **cities.txt** should be opened and read from, populating the **ArrayList** of **Cities**. Once this is accomplished, the user should be presented with a menu, providing 5 options. The user can choose to: (1) sort the **ArrayList** of **Cities** by name (A to Z for city name, secondarily A to Z for state) using a merge sort, then display the list, (2) sort the **ArrayList** of **Cities** by population (greatest to least) using an insertion sort or selection sort, then display the list, (3) sort the **ArrayList** of **Cities** by population (see (2) above), but show only the Cities in the list that belong to a chosen state, using a linear search (-1 to exit), (4) search the **ArrayList** of **Cities** using a Binary Search algorithm, prompting the user to enter the name and state of the **City** (-1 to exit), or (5) exit the program.
3. The **CitySearch** class should have a **swap** method (swapping two elements in the **ArrayList** of **Cities**), a **loadFile** method (loading the elements from cities.txt into the **ArrayList** of **Cities**), and a **menu** method (providing the user with the 5 options, and picking up user input).
4. The most challenging part of this assignment will likely be the merge sort (option 1 for the user). You may wish to work on the other sort first.
5. The **Prompt** class should be used. You may need to update methods or add methods in the **Prompt** class.
6. The Binary Search (menu item 4) should keep track of the number of times **mid** is calculated (or the number of times the search enters the loop). This count should be printed with each **City** found (or not found). For the Binary Search, you will also need to **sort by name and state first**, before attempting to search by name and state.

See the following pages for a sample run output.

C:\JAVA>java CitySearch

- 1: Display Cities sorted by name
- 2: Display Cities sorted by population
- 3: Display Cities in a given state
- 4: Search for one City by name
- 5: Exit

Please Enter 1 through 5, indicating your choice from the menu above: 1

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+-----+
| List of Cities |
+-----+

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Rank	City	State	Population
1	Abilene	TX	120099
2	Addison	IL	37385
3	Akron	OH	198100
4	Alameda	CA	76419
5	Albany	GA	76185
6	Albany	NY	98424
7	Albany	OR	51583
8	Albuquerque	NM	556495
9	Alexandria	LA	48426
10	Alexandria	VA	148892
11	Alhambra	CA	84577
12	Aliso Viejo	CA	50175
13	Allen	TX	92020
14	Allentown	PA	118577
15	Alpharetta	GA	62298
...			
991	Wylie	TX	44575
992	Wyoming	MI	74100
993	Yakima	WA	93257
994	Yonkers	NY	199766
995	Yorba Linda	CA	67032
996	York	PA	43935
997	Youngstown	OH	65184
998	Yuba City	CA	65416
999	Yucaipa	CA	52536
1000	Yuma	AZ	91923

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- 1: Display Cities sorted by name
- 2: Display Cities sorted by population
- 3: Display Cities in a given state
- 4: Search for one City by name
- 5: Exit

Please Enter 1 through 5, indicating your choice from the menu above: 2

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+-----+
| List of Cities |
+-----+

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Rank	City	State	Population
1	New York	NY	8405837

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2	Los Angeles	CA	3884307
3	Chicago	IL	2718782
4	Houston	TX	2195914
5	Philadelphia	PA	1553165
6	Phoenix	AZ	1513367
7	San Antonio	TX	1409019
8	San Diego	CA	1355896
9	Dallas	TX	1257676
10	San Jose	CA	998537
11	Austin	TX	885400
12	Indianapolis	IN	843393
13	Jacksonville	FL	842583
14	San Francisco	CA	837442
15	Columbus	OH	822553

991	Aventura	FL	37199
992	Martinez	CA	37165
993	Greenfield	WI	37159
994	Apache Junction	AZ	37130
995	Monrovia	CA	37101
996	Weslaco	TX	37093
997	Keizer	OR	37064
998	Spanish Fork	UT	36956
999	Beloit	WI	36888
1000	Panama City	FL	36877

- 1: Display Cities sorted by name
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- 5: Exit

Please Enter 1 through 5, indicating your choice from the menu above: 3

Enter the name of the state(-1 to exit): ga

Rank	City	State	Population
40	Atlanta	GA	447841
110	Columbus	GA	202824
119	Augusta-Richmond	GA	197350
180	Savannah	GA	142772
222	Athens-Clarke	GA	119980
295	Sandy Springs	GA	99770
318	Roswell	GA	94034
343	Macon	GA	89981
389	Johns Creek	GA	82788
436	Albany	GA	76185
464	Warner Robins	GA	72531
560	Alpharetta	GA	62298
608	Marietta	GA	59089
645	Valdosta	GA	56481
687	Smyrna	GA	53438

729	Brookhaven	GA	50603
784	Dunwoody	GA	47591
923	Peachtree Corners	GA	40059

Enter the name of the state(-1 to exit): ia

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| List of Cities |
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Rank	City	State	Population
104	Des Moines	IA	207510
199	Cedar Rapids	IA	128429
283	Davenport	IA	102157
393	Sioux City	IA	82459
468	Iowa City	IA	71591
498	Waterloo	IA	68366
565	Council Bluffs	IA	61969
568	Ames	IA	61792
574	West Des Moines	IA	61255
621	Dubuque	IA	58253
715	Ankeny	IA	51567
876	Urbandale	IA	41776
909	Cedar Falls	IA	40566

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Enter the name of the state(-1 to exit): al

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| List of Cities |
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Rank	City	State	Population
101	Birmingham	AL	212113
111	Montgomery	AL	201332
122	Mobile	AL	194899
126	Huntsville	AL	186254
313	Tuscaloosa	AL	95334
376	Hoover	AL	84126
502	Dothan	AL	68001
615	Auburn	AL	58582
653	Decatur	AL	55816
811	Madison	AL	45799
922	Florence	AL	40059
983	Phenix City	AL	37498

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Enter the name of the state(-1 to exit): ca

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| List of Cities |
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Rank	City	State	Population
2	Los Angeles	CA	3884307

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8	San Diego	CA	1355896
10	San Jose	CA	998537
14	San Francisco	CA	837442
34	Fresno	CA	509924
35	Sacramento	CA	479686
36	Long Beach	CA	469428
45	Oakland	CA	406253
52	Bakersfield	CA	363630
56	Anaheim	CA	345012
57	Santa Ana	CA	334227
59	Riverside	CA	316619
64	Stockton	CA	298118
75	Chula Vista	CA	256780
85	Irvine	CA	236716

868	San Bruno	CA	42443
885	Rohnert Park	CA	41398
893	Brea	CA	40963
900	Morgan Hill	CA	40836
908	Campbell	CA	40584
910	Beaumont	CA	40481
911	La Puente	CA	40435
919	San Gabriel	CA	40275
936	Culver City	CA	39428
940	Calxico	CA	39389
943	La Quinta	CA	39331
958	Stanton	CA	38623
960	Pacific	CA	38606
966	Oakley	CA	38194
969	Montclair	CA	38027
992	Martinez	CA	37165
995	Monrovia	CA	37101

Enter the name of the state(-1 to exit): -1

- 1: Display Cities sorted by name
- 2: Display Cities sorted by population
- 3: Display Cities in a given state
- 4: Search for one City by name
- 5: Exit

Please Enter 1 through 5, indicating your choice from the menu above: 4

Please enter a City and State (City, State) to search for (-1 to exit): el centro, ca

The binary search took 10 steps to find this City.

The City is:
El Centro CA 43363

Please enter a City and State (City, State) to search for (-1 to exit): irvine, ca

The binary search took 10 steps to find this City.

The City is:
Irvine CA 236716

Please enter a City and State (City, State) to search for (-1 to exit): fresno, ca
The binary search took 6 steps to find this City.

The City is:
Fresno CA 509924

Please enter a City and State (City, State) to search for (-1 to exit): tulare, ca
The binary search took 10 steps to find this City.

The City is:
Tulare CA 61170

Please enter a City and State (City, State) to search for (-1 to exit): new york, ny
The binary search took 10 steps to find this City.

The City is:
New York NY 8405837

Please enter a City and State (City, State) to search for (-1 to exit): boston, ma
The binary search took 9 steps to find this City.

The City is:
Boston MA 645966

Please enter a City and State (City, State) to search for (-1 to exit): san jose, ca
The binary search took 9 steps to find this City.

The City is:
San Jose CA 998537

Please enter a City and State (City, State) to search for (-1 to exit): cupertino, ca
The binary search took 10 steps to find this City.

The City is:
Cupertino CA 60189

Please enter a City and State (City, State) to search for (-1 to exit): fred, al
The binary search took 10 steps to determine that this City does not exist in the list.

Please enter a City and State (City, State) to search for (-1 to exit): orem, ut

The binary search took 8 steps to find this City.

The City is:
Orem UT 91648

Please enter a City and State (City, State) to search for (-1 to exit): san antonio, tx

The binary search took 10 steps to find this City.

The City is:
San Antonio TX 1409019

Please enter a City and State (City, State) to search for (-1 to exit): chicago, il

The binary search took 9 steps to find this City.

The City is:
Chicago IL 2718782

Please enter a City and State (City, State) to search for (-1 to exit): seattle, wa

The binary search took 10 steps to find this City.

The City is:
Seattle WA 652405

Please enter a City and State (City, State) to search for (-1 to exit): dallas, tx

The binary search took 10 steps to find this City.

The City is:
Dallas TX 1257676

Please enter a City and State (City, State) to search for (-1 to exit): atlanta, ga

The binary search took 10 steps to find this City.

The City is:
Atlanta GA 447841

Please enter a City and State (City, State) to search for (-1 to exit): cleveland, oh

The binary search took 10 steps to find this City.

The City is:
Cleveland OH 390113

Please enter a City and State (City, State) to search for (-1 to exit): portland, or

The binary search took 7 steps to find this City.

The City is:
Portland OR 609456

Please enter a City and State (City, State) to search for (-1 to exit): -1

- 1: Display Cities sorted by name
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Please Enter 1 through 5, indicating your choice from the menu above: 5

Thanks for reviewing the City Search results!

C:\JAVA>java CitySearch