

**Lab Objectives:** Classes, Searching and Sorting.

---

1. Download the class, `Nation`, from Moodle.

Nations have the following attributes:

- `name`
- `continent`
- `population`
- `surface area`
- `density`

2. Update the class to include the following:

- a. Write a method `calculate_density` which returns the density of a country.
- b. Override the `__lt__` method which determines if the names of two countries are in ascending order or not

3. Create a script which includes the following:

- `bubbleSort()`: takes a list of **Nations** as a parameter, and sorts the Nations according to their continent and name using the Bubble Sort algorithm. The list should be sorted in place, no new lists should be created.
- `searchCountry()`: a recursive binary search function that takes a list of Nations, the name of a Nation to search and the starting and ending index of the list to be searched as parameters. The function should return the index of the Nation with the given id or -1 if the given Nation does not exist in the list.
- `readCountries()`: takes an empty list and a file name as parameters, and using the file data, creates Nation objects and adds them to the list.
- Your script should do the following:
  - Read the data from the `country.txt` into a list.
  - Sort the list according to the names of the Nations (use sort function of Python)
  - Display the sorted list.
  - Input a country name and display the Nation with the given name (or appropriate message if Nation does not exist)
  - Sort the list according to the continent and country name (use bubble sort)
  - Display the sorted list.

## Sample Run:

Nations Sorted according to their Names:

[Country: Brazil  
Continent: America  
Population: 210867954  
Area: 8358140  
Density: 25.22905263611282  
, Country: China  
Continent: Asia  
Population: 1415045928  
Area: 9388211  
Density: 150.7258334947947  
, Country: Egypt  
Continent: Africa  
Population: 99375741  
Area: 995450  
Density: 99.8299673514491  
, Country: France  
Continent: Europe  
Population: 65233271  
Area: 547557  
Density: 119.13512383185677  
, Country: Germany  
Continent: Europe  
Population: 82293457  
Area: 348560  
Density: 236.0955273123709  
, Country: India  
Continent: Asia  
Population: 1354051854  
Area: 2973190  
Density: 455.42055973550293  
, Country: Indonesia  
Continent: Asia  
Population: 266794980  
Area: 1811570  
Density: 147.27279652456156  
, Country: Iran  
Continent: Asia  
Population: 82011735  
Area: 1628550  
Density: 50.35874550980934  
, Country: Italy  
Continent: Europe  
Population: 59290969  
Area: 294140  
Density: 201.57397497790168  
, Country: Japan  
Continent: Asia  
Population: 127185332  
Area: 364555  
Density: 348.8783091714556  
, Country: Mexico  
Continent: America  
Population: 130759074  
Area: 1943950  
Density: 67.26462820545795  
, Country: Nigeria  
Continent: Africa

Population: 195875237  
Area: 910770  
Density: 215.06553465748763  
, Country: Pakistan  
Continent: Asia  
Population: 200813818  
Area: 770880  
Density: 260.49945257368205  
, Country: Russia  
Continent: Asia  
Population: 143964709  
Area: 16376870  
Density: 8.790734065789128  
, Country: Thailand  
Continent: Asia  
Population: 69183173  
Area: 510890  
Density: 135.41696451290883  
, Country: Turkey  
Continent: Europe  
Population: 81916871  
Area: 769630  
Density: 106.43669165703  
, Country: U.K.  
Continent: Europe  
Population: 66573504  
Area: 241930  
Density: 275.1767205389989  
, Country: U.S.  
Continent: America  
Population: 326766748  
Area: 9147420  
Density: 35.72228540943785  
]

Enter the name of the country to search: Turkey  
Country: Turkey  
Continent: Europe  
Density: 106.43669165703

Nations Sorted according to their Continent and Name:

[Country: Egypt  
Continent: Africa  
Population: 99375741  
Area: 995450  
Density: 99.8299673514491  
, Country: Nigeria  
Continent: Africa  
Population: 195875237  
Area: 910770  
Density: 215.06553465748763  
, Country: Brazil  
Continent: America  
Population: 210867954  
Area: 8358140  
Density: 25.22905263611282  
, Country: Mexico  
Continent: America  
Population: 130759074  
Area: 1943950  
Density: 67.26462820545795  
, Country: U.S.  
Continent: America

Population: 326766748  
Area: 9147420  
Density: 35.72228540943785  
, Country: China  
Continent: Asia  
Population: 1415045928  
Area: 9388211  
Density: 150.7258334947947  
, Country: India  
Continent: Asia  
Population: 1354051854  
Area: 2973190  
Density: 455.42055973550293  
, Country: Indonesia  
Continent: Asia  
Population: 266794980  
Area: 1811570  
Density: 147.27279652456156  
, Country: Iran  
Continent: Asia  
Population: 82011735  
Area: 1628550  
Density: 50.35874550980934  
, Country: Japan  
Continent: Asia  
Population: 127185332  
Area: 364555  
Density: 348.8783091714556  
, Country: Pakistan  
Continent: Asia  
Population: 200813818  
Area: 770880  
Density: 260.49945257368205  
, Country: Russia  
Continent: Asia  
Population: 143964709  
Area: 16376870  
Density: 8.790734065789128  
, Country: Thailand  
Continent: Asia  
Population: 69183173  
Area: 510890  
Density: 135.41696451290883  
, Country: France  
Continent: Europe  
Population: 65233271  
Area: 547557  
Density: 119.13512383185677  
, Country: Germany  
Continent: Europe  
Population: 82293457  
Area: 348560  
Density: 236.0955273123709  
, Country: Italy  
Continent: Europe  
Population: 59290969  
Area: 294140  
Density: 201.57397497790168  
, Country: Turkey  
Continent: Europe  
Population: 81916871  
Area: 769630  
Density: 106.43669165703

, Country: U.K.  
Continent: Europe  
Population: 66573504  
Area: 241930  
Density: 275.1767205389989  
]