

Whoa!! Tenali has now saved the pride of Vijayanagara. However, to test the talents of both the ministers further, the King assigns two more tasks to them.

1. To arrange all the cities in the country in the decreasing order of their population.
2. To arrange all the states in the country in the decreasing order of their population.

Moreover, the King wants them to rejig their brains more and hence has disallowed merge sort for the new challenge.

Modify City and State class, Design a new class Country. In this assignment, you shall define and use new public/private variables and functions. (You are advised to finish the Merging part before starting the Quick sort part).

1. The City class should have one more private variable `state_id` of long int type. It should also have additional public functions
 - `City(long int c_id, long int s_id, long long int c_p)`: Additional parametrised constructor for initializing `city_id`, `state_id` and `city_population`
 - `long int getStateId()`: the function returns the `state_id`.
2. The State class should have one more private variable `totalStatePopulation` of long long int type. It should also have additional public functions
 - `void setTotalStatePopulation()`: the function sums up the `city_population` of all the cities and updates `totalStatePopulation`.
 - `long long int getTotalStatePopulation()`: the function returns the `totalStatePopulation`.
3. The Country class should have two private data members, `states` (which is an array of objects) and `numStates` (the size of the array) of long int type. It should also have public functions
 - `Country(long int n_s)`: A parametrised constructor which initialises `num_states` and allocates the space for array `states` to hold `numStates` State objects.
 - `~Country()`: destructor to de-allocate the memory allocated to the `states` array.
 - `readInput()`: Reads input states, cities belonging to each state and their population.
 - `void sortAllCities()`: It should sort all cities in the Country, in the decreasing order of their population. It should do so only by merging the arrays returned by `sortCitiesOfState()` of each State. It should then print the `state_id` and `city_id` of the cities in sorted order.
 - `void sortStates()`: It first finds the `totalStatePopulation` of all the states in the Country (you shall have a private function for this) and then sorts the states in the decreasing order of `totalStatePopulation` using quick sort. Once sorting is finished, print the `state_id` in sorted order.

Input Format

(number of states in the country followed by details of each state)

```
num_states
state_id1 num_cities1
city_id1 city_population1
city_id2 city_population2
.
.
.
state_id2 num_cities2
city_id3 city_population3
city_id4 city_population4
.
.
.
```

Constraints

$0 < \text{num_cities of each State} < 10^5$

$0 < \text{num_states} < 10^5$

Output Format

(In decreasing order of city populations: output of merging)