CPS 501 **Assignment 8**

Assigned: 04/04/2020. Due: 04/10/2020, 11 pm (on Isidore).

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1. We are going to implement a dictionary for the information of the counties in the Ohio state. For each county, we may use the following class to represent the main information:

// class for counties

class County

{

String name; // county name

int[] FIPS; // FIPS code

String seat; // county seat

long population; // population number

double area; // area in sq mi.

…

}

Please complete the above class by adding the following constructors.

// default constructor

County()

{

...

}

// constructor for explicitly initialize every member variable

County(...)

{

...

}

// copy constructor

County(final County county)

{

...

}

You need to be very carefully in implementing the copy constructor such that it is performing a **deep copy** of the input object due to the integer array FIPS.

1. A dictionary for counties can be implemented as a singly linked list whose nodes represent the county information.

class Node

{

County county\_info; // the reference to the information of the county

Node next;

...

}

class Dictionary

{

Node head; // the reference to the head node

...

}

1. Please adding the following two constructors to the class Node.

// default constructor

Node()

{

...

}

// explicitly initialize every member variable by the user inputs

Node(final County info, final Node node)

{

...

}

1. Please adding the following two constructors to the class Dictionary.

// default constructor

Dictionary()

{

...

}

// copy constructor

Dictionary(final Dictionary dictionary)

{

...

}

Notice that you need to perform a **deep copy** for the object referenced by the input dictionary.

1. We consider the FIPS codes as the keys. Please adding the following two methods to the class Dictionary.

// inserting a new element to a dictionary

void insert(final County info)

{

...

}

// deleting an existing element from a dictionary

boolean delete(final int[] FIPS)

{

...

}

For insertion, please make sure that you did a linear search before inserting the new node or replacing an existing one. For the key comparison, you need to compare two integer arrays.

1. Adding a function display to the class Dictionary such that it displays all county’s information there.
2. Let us test our implementation. Please consecutively insert the following counties to an empty dictionary list2020.
3. **Name:** Butler. **FIPS:** 017. **Seat:** Hamilton. **Population:** 368,130. **Area:** 467.27.
4. **Name:** Clinton. **FIPS:** 027. **Seat:** Wilmington. **Population:** 42,040. **Area:** 410.88.
5. **Name:** Cuyahoga. **FIPS:** 035. **Seat:** Cleveland. **Population:** 1,249,352. **Area:** 458.49.
6. **Name:** Franklin. **FIPS:** 049. **Seat:** Columbus. **Population:** 1,264,518. **Area:** 539.87.
7. **Name:** Hamilton. **FIPS:** 061. **Seat:** Cincinnati. **Population:** 802,374. **Area:** 407.36.
8. **Name:** Montgomery. **FIPS:** 113. **Seat:** Dayton. **Population:** 535,153. **Area:** 461.68.
9. Making a copy named list2021 for list2020 using the copy constructor in the class Dictionary.
10. Assuming that the population in all counties in 2021 rise by 6%. Please update the information in the list list2021 and check that the nodes in list2020 still keep the original data.
11. Making a copy named list2022 for list2021.
12. Assume that Butler county and Hamilton county are merged in 2022, and the merged county still using the the FIPS and seat of the Hamilton county, please update the information accordingly in the list list2022.

Please use the function display to check the correctness of all implementations.