CS 270 Homework 5
Due Friday May 10
Homework 5

• Implement the data structure shown on the following slides. The data structure is a double linked list of names and dates of birth (DOB). A single node holds a name and and DOB. Each node exists on two lists. One list is sorted in ascending order by name and the other list is sorted in descending order by age. You must write a test driver to test your implementation. Your implementation of the list must not depend on your test driver because I will use my own test driver to test your program.
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//Implements double linked lists of names and dates of birth (DOB)
//One list is sorted in ascending order by name (last name the primary sort key and first name the
//secondary sort key).
//The second list is sorted in descending order by age (as determined by the DOB)
//There is only one SortedNode for each each data item (name and DOB)
//The node is part of two lists. The names list is traversed using nextNames and prevNames
//and the DOB list is traversed using nextDOB and prevDOB

typedef struct Name {
    char * first;
    char * last;
} Name;

typedef struct DOB {
    int year;
    int month;
    int day;
} DOB;
typedef struct SortedNode {
    Name name;
    DOB dob;
    struct SortedNode *nextName;
    struct SortedNode *nextDOB;
    struct SortedNode *prevName;
    struct SortedNode *prevDOB;
} SortedNode;

typedef struct SortedLists {
    SortedNode *headNames;
    SortedNode *headDOBs;
} SortedLists;

SortedLists * createSortedLists();
//return a new empty List
void insertSorted(struct SortedLists *aList, Name n, DOB d);
//PRE: aList has been created and the names list and DOB list are sorted
//insert a new element (n,d). The new element is inserted into aList so both the names
//list and DOB list remain sorted
//only one new SortedNode is created by each call to this function

void deleteSorted(struct SortedLists *aList, Name n, DOB d);
//PRE: aList has been created and is sorted
//remove all occurrences of elements that match (n,d)

DOB* findDOBs(struct SortedLists *aList, Name n);
//PRE: aList has been created and is sorted
//return an array of DOBs for each name that matches n
//the last element in the array has a DOB with a values of year, month and day of 0, 0 and 0 respectively.
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Name* findNames(struct SortedLists *aList, DOB d);
//PRE: aList has been created and is sorted
//return an array of Names for each DOB that matches d
//the last element in the array has a Name with a values of first and last of NULL (\0), and NULL (\0) respectively.

void printOrderedNames(struct SortedLists *aList);
//PRE: aList has been created
//print the contents of the list (name and DOB) to standard out
//the elements in the list are printed one person per line
//the output should be sorted (ascending) by name

void printOrderedDOBss(struct SortedLists *aList);
//PRE: aList has been created
//print the contents of the list (name and DOB) to standard out
//the elements in the list printed one person per line
//the output should be sorted (descending) by age

void destroySortedList(struct SortedLists *aList);
//PRE: aList has been created
//free space created for aList
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• You will need to create three files: SortedLists.h, SortedLists.c and TestDriver.c. SortedLists.h contains the declarations shown on the previous slides. SortedLists.c contains the implementation of the functions shown in SortedLists.h and other functions that help with the implementation of the functions in SortedLists.h. TestDriver.c contains a main function and any other functions you used to test your implementation.
Homework 5 Submission

• You will demonstrate your program to me in my office or in Wing 16. When you demo you will use your computer or the computers in Wing 16. After you demo you will send me one file SortedLists.c.

• I will send you a test driver and test files to use during the demo. Those files will not be sent until Sunday May 5.
Homework 5 Due Dates

- Homework 5 is worth 40 of the 150 homework points.

- Friday May 10 is the due date for homework 5. If you successfully demonstrate before the due date you can get some bonus points as follows.

  - Monday May 6 or Tuesday May 7: 10 bonus points.

  - Wednesday May 8 or Thursday May 9: 5 bonus points.

  - Demonstrating on May 10, May 13 or May 14 will considered on time.

- Homework 5 will not be accepted after May 14.