Lebanese University
Faculty of Sciences 1

INFO216

Imperative Programming II

Final 09.10
Wed. 9 June am
Duration: 2 hours

Four full marks will be subtracted in case of the bad presentation of the answer sheet.

A library application manages books borrowing. For this purpose three data types are defined:

typedef struct date{int day, month, year;}date;
typedef struct book{long int ISBN; char title[50]; int copies; book* next;}book;
typedef struct loan{long int ISBN; char client[20]; date dloan; loan* next;}loan;

The list of books is **sorted** ascending according to the ISBNs. The list of loans is **sorted** descending according to the date of the loan i.e., from the most to the least recent loan. All of handling of these lists must **maintain** their orders. Assume that two distinct persons cannot have the same name.

For each loan, a new node, containing information on the loan, is added to the list of loans and the number of copies of the borrowed book borrowed is decremented by one value in the list of books. And at each book return, the corresponding node is removed from the list of the loans, and the number of copies of the book is incremented again in the list of books.

Assume that the following function is already defined: ***int datecmp(date d1, date d2);*** this function returns the number of days separating the date d1 and the date d2. If d1 is earlier than d2, the returned number is negative; if it is later than d2 the number is positive. If d1 and d2 refer to the same date, the function returns zero.

1. Define the function: ***int lend(long int ISBN, char* borrower, book* headBooks, date dloan, loan** headRefLoans);*** This function checks that the requested book belongs to the list of books, and there are still available copies, then it updates the number of available copies, and inserts the corresponding node in the list of loans. It returns 0 on failure, and 1 on success.

2. Define the function: ***int return(long int ISBN, char* borrower, book* headBooks, loan** headRefLoans);*** This function takes a book, if the book was actually lent to the borrower, removes the corresponding node from the list of loans, updates the number of copies available in the list of books. It returns 0 on failure, and 1 on success.

3. Define the function: ***int save(char* fname, loan** headRefLoans);*** This function copies the contents of the list of loans into a file given its name in the variable fname, and clears the list from the heap. You are free to work with text files or binaries. It returns 0 on failure, and 1 on success.

4. Define the function: ***int load(char* fname, loan** headRefLoans);*** This function builds the list of loans from the file which name is given as input. You must establish the inverse operation of the function save (). It returns 0 on failure, and 1 on success.

The End