NOTE:

You are to produce a piece of code spread across three files, Library.cpp, Library.h and Main.cpp.It should contain appropriately placed declarations and implementations associated with the specified classes; and a main() function. These classes and functions should be developed according to the details provided in this document.

You are to write a Library class that, during initialization, reads data from the keyboard or file, and has the format below:

3

N123 Object-Oriented-Programming Dave 2009 3

A251 UML-Modelling-and-Design Barry 2005 1

Z001 Practical-Guide-to-STL John 2000 5

The first line indicates the number of book records to follow. The general format for the other lines is:

book\_id book\_title name year\_published number\_of\_copies

Where book\_id is the book's ID, this must start with an uppercase letter, book title is the book's title(without space‘ ‘), this is followed by the author's first name, then comes the year in which the book was published (year\_published) and finally the number of copies held in the library (number\_of\_copies).

Then you should reads data from the keyboard or file, and has the following format:

3

12345 Joe 3 N123 A251 Z001

20498 Ales 1 Z001

19090 Mike Mike 2 N123 Z001

The first line indicates the number of borrower records to follow. The general format for the other lines is:

borrower\_id name number\_of\_books\_on\_loan book\_ids

Where borrower\_id is the borrower's ID number, this must be five digits, name is the borrower's name. Number\_of\_books\_on\_loan is the number of books currently loaned by the borrower, and finally, the line finishes with the book IDs of all the books currently loaned. A borrower can only borrow a maximum of 5 books.

Any line that does not conform to the format described should simply be rejected, with an appropriate message to standard error.

Details regarding the data and functionality of the classes required by the program are as follow. It is fine to write other supporting functions or to add additional data fields if you want to.

The Library class should have:

1. A total number of books on loan field.

2. A total number of borrowers field.

3. A Catalogue object (described below). This should be populated during initialization by the constructor.

4. An array of Borrower objects (described below). This should be populated during initialization by the constructor.

5. A constructor that accepts the input data.

6. An appropriate destructor.

7. A function that displays the total number of books on loan, the total number of book records and displays the individual book records.

8. A function that displays the total number of borrowers and the individual borrower records.

The BookRecord class should have:

1. A book ID field.

2. A book title field.

3. An author's first name field.

4. An author's last name field.

5. A year of publication field.

6. A total number of book copies field.

7. A number of copies still available for loan field.

8. An appropriate constructor and destructor.

9. A function that returns the book's ID.

10. A function that displays the data.

NOTE: In the function that enters a book record, the function should check that the book ID starts with an uppercase letter, and that the year of publication has 4 digits and starts with a 1 or a 2. Otherwise an error message should be displayed and the program should terminate.

The Borrower class should have:

1. An ID field.

2. A first name field.

3. A last name field.

4. A number of books loaned by the borrower field.

5. An array of the book IDs currently loaned by the borrower.

6. An appropriate constructor and destructor.

7. A function that displays the data.

NOTE: In the function that enters a borrower's record, the function should check that the borrower's ID consists of 5 digits. Otherwise an error message should be displayed and the program should terminate.

The Catalogue class should have:

1. A total number of book records field.

2. An array of BookRecords

3. An appropriate constructor and destructor.

4. A function that displays the total number of books in the catalogue and the individual book records.

NOTE: The program should update the total number of books on loan and the individual book numbers available for loan, based on the borrowers data.

Finally, write a main() function that displays the total number of books on loan, the total number of books in the catalogue, the individual book records, the total number of borrowers and the individual borrower records. An example output, given the provided input is as follows:

Total number of books on loan: 6

Total number of books in catalogue: 3

Book Record 0

=============

Book ID: N123

Title: Object-Oriented Programming

Author: Dave Smith

Year published: 2009

Total number of copies: 3

Number available for loan: 1

Book Record 1

=============

Book ID: A251

Title: UML Modelling and Design

Author: Barry Arthurs

Year published: 2005

Total number of copies: 1

Number available for loan: 0

Book Record 2

=============

Book ID: Z001

Title: Practical Guide to STL

Author: John Johnson

Year published: 2000

Total number of copies: 5

Number available for loan: 2

Total number of borrowers: 3

Borrower 0

===========

Borrower ID: 12345

Name: Joe Bloggs

Number of loaned books: 3

IDs of books on loan: N123 A251 Z001

Borrower 1

===========

Borrower ID: 20498

Name: Alex Alexis

Number of loaned books: 1

IDs of books on loan: Z001

Borrower 2

===========

Borrower ID: 19090

Name: Mike Mike

Number of loaned books: 2

IDs of books on loan: N123 Z001

The display functions do not need to follow exact formats, but should be clear.

IMPORTANT NOTE: Besides the two input data, the program should not depend on any input from the user when it runs. If it does you will lose marks.

In addition to the code you need to provide a class diagram. This will be submitted eletronically in a file Diagram.pdf.