COURSEWORK ASSIGNMENT	**UNIVERSITY OF EAST ANGLIA** **School of Computing Sciences**

Unit : CMP5015Y
Assignment Title : Reassessment Coursework 2 — C/C++

Date Set	:		
Date & Time of Submission	:		
Return Date	:		
Assignment Value	: 25%		
Set By	: Dr G. C. Cawley	**Signed:**	
Checked By	:	**Signed:**	

Aim:

The aim of this assignment is for the student to gain experience in the design and implementation of a relatively small program using an object oriented approach using the C++ programming language and basic file I/O, arrays and dynamic memory allocation in C.

Learning outcomes:

On successful completion of this exercise, the student will have reinforced a basic understanding of the concepts of classes and objects and will be familiar with the basic syntax of C and C++ programming constructs used to implement classes (including operator overloading) and have experience with stream-based I/O.

Assessment criteria:

Marking Scheme (out of 100 marks):

- Palindrome analysis program 40 marks.
- Album database: class `Duration` 20 marks.
- Album database: class `Track` 10 Marks
- Album database: class `Album` 10 marks
- Album database: class `AlbumCollection` 10 Marks
- Album database: albumDatabase.cpp:
    1. Display of album collection in alphabetical order of first artist and then album title - 4 marks
    2. Total play time of Pink Floyd albums - 2 marks
    3. Album with most tracks - 2 marks.
    4. Longest track in album collection - 2 marks.

Marks will be awarded according to the proportion of specifications successfully implemented, programming style (indentation, good choice of identifiers, commenting etc.), and appropriate use of programming constructs. Bonus marks may be awarded for correct use of more advanced programming constructs not covered in the lectures.

Description of assignment:

Part 1 - Palindrome Analysis in C

You are required to write a program in C that reads in a text file `words.txt` containing words separated by whitespace characters and punctuation. The program detects any palindromic words, i.e. words that contain a sequence of letters (not including numeric digits) that is the same read backwards as it is forwards, such as noon, kayak or radar. The program outputs a list of all of the palindromes that occur in the text file, along with the number of times each palindrome occurs in the text. Hints: start by writing function to determine whether a string is palindromic, then write a program that reads text from a file and prints the palindromic words as the occur in the text. Then write a program that counts the occurrences of each palindrome, the Linked List in C example (given in the C++ lectures on BlackBoard) may be useful for this (when adapted). The text file contains the word ”civic” five times. Include a printout of the ouptut of your program in the submission.

Part 2 - Album Database in C++

You are required to implement a C++ program to store and manipulate the details of a collection of music albums. The program will consist of the following classes:

1. `Duration` is a class used to store the duration of a `Track`, `Album` etc. The class should have three integer member variables, representing the number of hours, minutes and seconds. In addition to an appropriate selection of constructors and accessor methods, operator overloading should be used to allow stream based I/O using the << and >> operators, addition of `Duration` objects, and comparison of `Duration` objects using the full set of relational operators. The class should also provide a type conversion to integer, representing the total duration in seconds.

2. `Track` is a class used to store the details of an album track. It should have member variables storing the title of the track as a `string` and the `Duration` of the track. The class should have an appropriate selection of constructors and accessor methods, and should overload the << and >> operators for stream-based I/O.

3. `Album` is a class used to store the details of an album, with instance variables storing the name of the artist and title of the album as `string` objects and also a collection of `Track` objects, representing the contents of the album. The class should have an appropriate selection of constructors and accessor methods, and should overload the << and >> operators for stream-based I/O.

4. Class `AlbumCollection` is a class used to store the details of a collection of music albums. It should have a member variable that is a collection of `Album` objects. The class should have an appropriate selection of constructors and accessor methods, and should overload the << and >> operators for stream-based I/O. The >> operator should allow an `AlbumCollection` to be read in from the file `albums.txt` provided on BlackBoard.

Each class should have a separate `.h` and `.cpp` files for ease of compilation. The program should also have a `main` function in file `albumDatabase.cpp` that performs the following operations:

1. Display the entire album collection, arranged in alphabetical order of the album artist. If more than one album exists for a given artist, they should be displayed in alphabetical order of the album title.
2. Display the total play time of all Pink Floyd albums in the collection.
3. Display the album with the largest number of tracks.
4. Display the details of the longest track in the album collection.

Required:

A printed copy of your solution should be submitted to the hub, containing the printouts of your source code in the following order: The palindrome program and its output, `Duration.h, Duration.cpp, Track.h, Track.cpp, Album.h, Album.cpp, AlbumCollection.h AlbumCollection.cpp` and finally `AlbumDatabase.cpp`. The code should be formatted so that it prints out legibly using a sensible font size (e.g. format code to 80 columns wide). Submissions where these instructions are not followed may be penalized.

An electronic submission should also be made via BlackBoard, submit a .zip file containing the two project folders, use the `Build->Clean Solution` menu item to delete the temporary files etc. to minimize the size of the .zip file.

Handing in procedure:

A printed copy of your submission should be submitted to the Teaching Hub, by the date indicated above. A .zip file containing the `.java` files for your program should also be submitted via BlackBoard. See BlackBoard for further details.

Plagiarism:

Plagiarism is the copying or close paraphrasing of published or unpublished work, including the work of another student without the use of quotation marks and due acknowledgement. Plagiarism is regarded as a serious offence by the University and all cases will be reported to the Board of Examiners. Work that contains even small fragment of plagiarised material will be penalised.