**Program 4/5 Design**

**Overview of Program**

The goal of this program is to create and organize multiple playlists of media for an online course. It will allow the user to add different types of videos to their playlist and customize their name, length, description, comments, and other various qualities. There will be three types of Media: Short Video, Audio File, and Long Video. The program will organize all the different types of media into specific playlists at the user’s discretion and they will all be stored inside of an array of linear linked list, where each index is a specific playlist.

Dynamic binding will be utilized to house the different derived classes in the playlists, assisted with an abstract base class. Additionally, for the second part of the assignment, there will be a balanced tree that will house the entirety of one course playlist in each of the nodes and be sorted by the name of the course. This will be accomplished by placing an array of linear linked lists inside each of the balanced tree nodes.

**Base Class and Derived Classes**

The program will be implemented utilizing Object Oriented Programming. The base class of the program will be Media and will be an abstract base class. The base class itself will be able to hold the media’s name, description, length, number of likes the Media has, and date published. There will be three derived classes from this base class, the three classes will be Short Video, Long Video, and Audio File.

The *Short Vide*o class will maintain all the information from the base class Media as well as have an array of frequently asked questions for the user to see as well as the ability to cite a textbook as reference for what the video covers. The  *Long Video* class will maintain all the information from the base class Media as well as have the ability to view the subtitles for the video. The final derived class will be the *Audio File* class. This class will maintain all the information from the base class Media as well as allow the user to see the URL from which the audio file is from and also be able to see the subtitles for the file.

The *Short* and *Long Video* classes will each have their own quizzes associated with each piece of media created. The Short video will have a shorter multiple choice quiz and the answer key will be available for reference after they have completed the quiz. The Long video class will have a different type of quiz that will have an essay question format and they will also be able to compare their answers to the answer key once the quiz has been finished. Both the Short and Long video objects will each contain their respective quiz as a data member utilizing a “has a” relationship.

**Dynamic Binding**

The *Media* class will be an abstract base class and utilize upcasting to allow the user to assign the correct derived object at runtime. All the pure virtual functions will be implemented across the different *Media* derived classes.

**External Data File**

The program will read in a starting number of videos to fill in one playlist. This will be a mixture of different media types for this playlist. Any Media that the user adds to any playlist will also be sent out to the external file and they will be stored in the file.

**Data Structures**

The program will be implemented using two data structures, a balanced tree, and an array of linear linked lists. The array of linear linked lists will have its own node class as well as a list class to manage to creation of the data structure. Each index of the array will house a playlist of videos and each node in the playlist will be one of the media types. Through the use of dynamic binding each of the nodes will be able to be a different class. The full use of Display, Display one, Remove, Remove all and Retrieve will be functional for the data structure.

The balanced tree will be sorted by the name of the course and each node will house its own array of linear linked list. This data structure will essentially store an entire school’s *Media* catalog for all the courses. The balanced tree will most likely be a 2-3 tree and will be continuously balanced as new data is added to the tree. The full use of Display, Display one, Remove all, and Retrieve will be functional for the data structure.

**Summary**

This program will be created through the use of Object Oriented Programming and utilize and Abstract Base Class and Dynamic Binding. There will be a base class name *Media* that has 3 derived classed, each being their own specific type of media. Two of the derived classes will support a quiz functionality. The balanced tree and Array of LLL’s classes will be managed by a list class with a “has a” relationship. Utilizing single inheritance, the program will create a systematic process for the user to access the different types of media and their information.