COMP2611: Data Structures
Project Assignment

DUE DATE :
Sunday 16 April, 2023 at Midnight

Objective:

Develop a graphical user interface (GUI) using wxWidgets in Linux, which implements the operations of the following Abstract Data Types (ADTs):

1. Binary Search Tree (BST)
2. AVL Tree
3. Red-Black Tree
4. Splay Tree
5. Set
6. Min Heap Tree.

The project is an extension of the work which was already started in **Assignment #1,** but will now involve the hierarchical and Set Abstract Data Types within a GUI setting.

The Random-Access File (RAF), "**Catalog.dat**", contains the **Billboard's Number 1 Songs** for the decade of the 1990s. The records in the file are structured as follows:

Data	**Data Type**
Month	char array [10]
Year	integer
Artist(s)	char array [50]
Song's title	char array [50]
Record label	char array [15]
Number of weeks at #1	integer

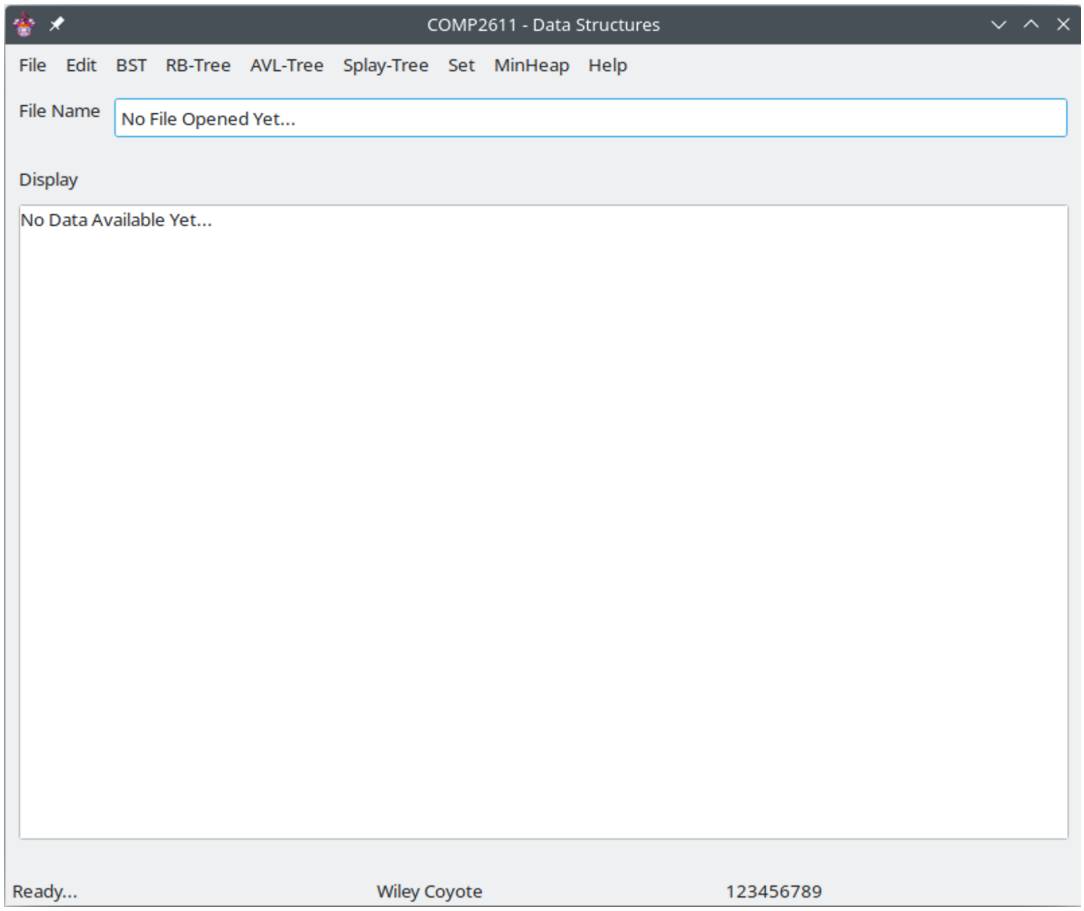
e.g.

Month	**Year**	**Artist(s)**	**Song's title**	**Record label**	**Weeks at number one**
August	1990	Mariah Carey	Vision of Love	Columbia	4
August	1997	The Notorious B.I.G. featuring Puff Daddy & Mase	Mo Money Mo Problems	Arista	2
January	1999	Britney Spears	Baby One More Time	Jive	2

Read the data from the RAF "**Catalog.dat**" to populate the ADTs of your project as follows:

1.	**BST**	**All** records
2.	**AVL Tree**	Songs on Arista label **only**.
3.	**RB-Tree**	Songs on Columbia label **only**.
4.	**Splay-Tree**	Songs on EMI label **only**.
5.	**Set**	Set A – Songs **BEFORE 1995**. Set B – Songs **AFTER 1994**. Intersection set – Artists with songs in both SetA and SetB
6.	**MinHeap**	Songs of **1990** only. Heapness is based on month's number.

Your GUI should appear as the following:



The main menu bar of your GUI, with the associated sub-menu items should appear as follows:

File	Edit	BST	AVL Tree	RB Tree
• Open File • Display File • Save • Save As • Exit	• Create ADTs • Add Record • Delete Record	• Inorder • Preorder • Postorder	• Inorder • Preorder • Postorder	• Inorder • Preorder • Postorder

Splay Tree	Heap	Set	Help
• Inorder • Preorder • Postorder	• Display All • Heap Sort	• Display SetA • Display SetB • Display Intersection • Display Union	• About • Exit

In Addition:

The functionalities of the sub-menu items are self-explanatory. However, the following should be noted:

1. The data file "Catalog.dat", should **NOT** be hard-coded in your program, but should be opened from the **system fileOpen dialog.**

2. When the file is opened, as well as when the **Display File** (in menu option **File**) is clicked, the file's contents should be **immediately** displayed in the main textbox. The full path of the file should also be displayed in the filename text box.

3. The key field for the BSTs is the song's title.

4. When the "**Create ADTs**" sub-menu item is clicked (in the Edit main menu item), the program should read the data records from the data file and populate **ALL the ADTs** which are affected by the details of the record as stipulated by the third table above.

5. When the "**Add Record**" sub-menu item is clicked (in the Edit main menu item), the program should open an input dialog where the details of the new record should be entered. Once OK is selected, **ALL the ADTs** which are affected by the details of the record as stipulated by the third table above should be updated with the new record.

6. When the "**Delete Record**" sub-menu item is clicked (in the Edit main menu item), the program should open an input dialog where the artist and song title are to be entered. Once OK is selected, the record should be deleted from **ALL the ADTs** which are affected by the details provided, as stipulated by the first table above.

7. In the display functions, the records should be displayed one record per line.

8. The nodes in the AVL tree must contain an attribute to describe the weight of the node (i.e., negative for **right-heavy**, positive for **left-heavy** and zero for **balanced**), which must be displayed in brackets at the end of the line when the AVL tree is traversed.

9. The nodes of the Red-Black tree must contain an attribute to describe the node's colour (**R** or **B**), which must also be displayed when the Red-black tree is traversed.

10. The output results of all the menu functions should be displayed in the **main text box within your GUI**.

11. When **Open File** is clicked (in the File main menu item), the **system fileOpen dialog** should be opened with the option to display files of type: **Data (*.dat), Text (*.txt)** and **All (*.*).** Once the contents of a file are displayed or the result of some processing is displayed, the menu selections of **Save** and **Save As** should open the corresponding dialogs to perform the desired task. **Save As** should allow the user to specify a file name and file type into which the contents can be saved. These two functions should **ONLY** save the contents of the main textbox.

12. Before each display operation is carried out, the display (main) textbox should be cleared.

13. The operation indicated by the sub-menu item should then be carried out on that particular ADT **ONLY**. The other ADTs **should NOT** be affected by the operations on another ADT.

14. The **Exit** menu item is to close the program

15. The **About** menu item should produce a dialog box with suitable information about the programmer, the program, and the architecture of the machine the program is running on.

16. When the cursor is placed on a sub-menu option, a description of the menu option should be displayed in the first partition of the status bar. At all other times, the string, "**Ready…**" should be displayed. The second and third sections of the status bar should contain your name and ID number respectively.

SUBMISSION:

Zip up all the files into a zip file with your ID number and "-Project02" as the file's name (e.g. **123456789-Project02.zip**) and submit it through the course's eLearning portal through the label "**Project Assignment #2**" no later than **Sunday 16 April, 2023 at midnight**. You may submit your zipped file multiple times as a **draft**, before your final submission; only the most recent copy will be retained. In fact, you are strongly encouraged to use the portal as a repository for your developing project. However, the portal will close at exactly midnight on Sunday, 16 April, 2023.

Submissions beyond the deadline will not be accepted.