School of Applied Sciences And Technology

Department of IST

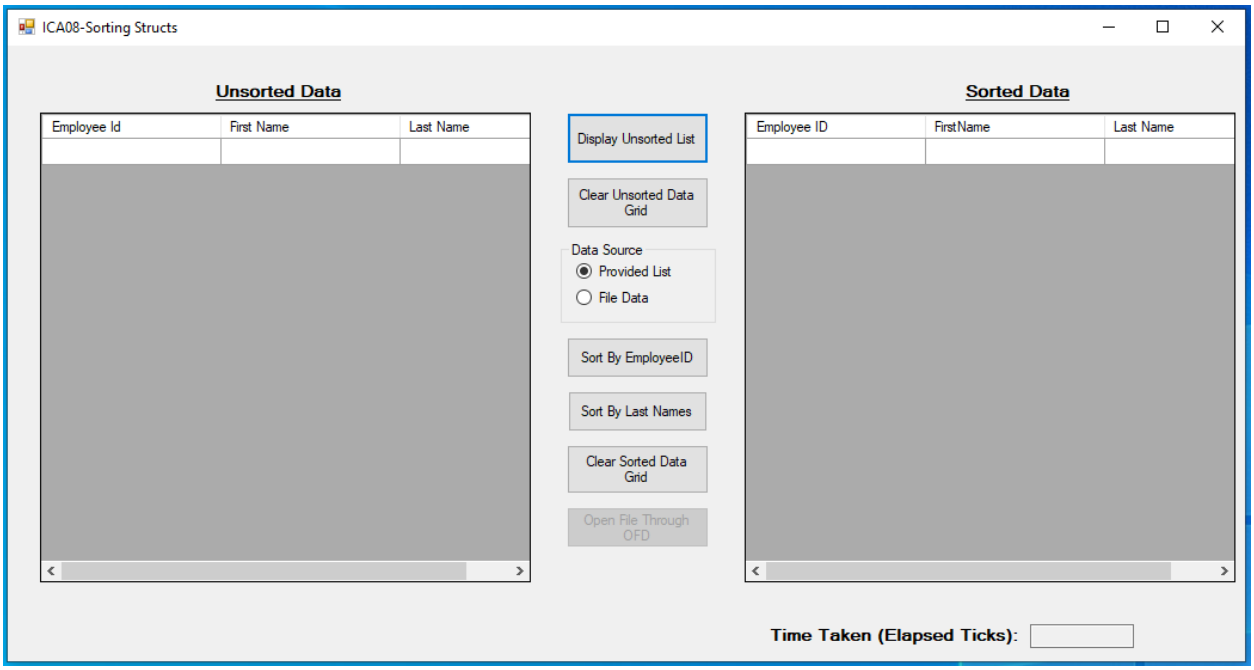
Program: CNT

## CMPE 1666-Lab02- Creating and Sorting lists of structs

In this lab, you are going to adapt the sorting algorithms (discussed in class) to sort a list of structs. You are going to create a simple list of structs from a provided data table to test your algorithm then construct a similar but longer list from data read from a provided text file. Once you are confident that the sorting algorithm is working properly, you'll apply it to the longer list created from the file.

The provided text file contains 100 lines, each line containing the employee id, first names and last names of an employee. The data items on each line (i.e for each employee) are separated from one another by a comma (",").

Start by creating a form-based application with the controls shown below. The form has 2 DataGridView components, a number of buttons, a pair of radio buttons, a read-only text box plus a few labels accompanying the controls. The default radio button must be the "**Provided List**" one. To each DataGridView, add 3 columns as shown and set the SortMode for each column to **Not Sortable**. The Form must also contain an **OpenFileDialog.** The "Open File Through OFD" button must initially be disabled.



In the Form class, declare an **Employee** struct type having, as members, an **employee id, first name** and **last name.** Do not include any method within the struct.

To the form class add a method **CreateEmployee()** that has, as parameters, an employee id, a first name and a last name. It creates and returns an Employee struct.

The application must declare and initialize 2 Lists of **Employee** structs. One will contain structs built from data given below. The second one will contain structs built from data provided in the file. The 2 Lists must be member variables of the Form1 class.

To the application add the following sorting methods:

- A method that sorts a List of **Employee** on ascending order of employee ids, using the **Selection Sort** technique.
- A method that sorts a List of **Employee** in ascending alphabetical order of last names, using the **Insertion Sort** technique. Don't worry about the order between employees having the same last name.

For easy testing during the development of your code, construct a first List of Employee structs from the values given in the table below. The easiest way to create the List will be to create 3 arrays, initializing them respectively with the values of the employee ids and salaries given, then iterate through the arrays to create each struct and add it to the List.

| Employee ID | First Name | Last Name |
|---|---|---|
| 28 | Emily | Johnson |
| 53 | Michael | Smith |
| 12 | Olivia | Williams |
| 18 | Daniel | Brown |
| 8 | Sophia | Jones |
| 2 | Ethan | Davis |
| 19 | Ava | Miller |
| 57 | Benjamin | Wilson |
| 62 | Isabella | Moore |
| 34 | Jacob | Taylor |
| 23 | Mia | Anderson |
| 14 | William | Thomas |
| 48 | Emma | Jackson |
| 35 | Alexander | Moore |
| 55 | Charlotte | Harris |
| 22 | James | Martin |
| 26 | Amelia | Thompson |
| 15 | Logan | Garcia |
| 7 | Harper | Martinez |
| 9 | Elijah | Robinson |
| 32 | Grace | Smith |
| 43 | Noah | Rodriguez |
| 41 | Lily | Lewis |
| 51 | Lucas | Clark |

The form load event must cause the creation of a List of Employees from the data provided in the above table. The List must also be displayed in the "Unsorted Data" DataGridView.

If the "**File Data**" radio button is checked, the "Open File through OFD" button must be enabled. The user must be able to open a file by dragging and dropping it onto the "**Unsorted Data**" DataGridView or by clicking on the "**Open File Through OFD**" button which opens a file through the Open File Dialog (You need to implement both).

In each case, you will open a file in which each line of data will be used to create an **Employee** struct. Your program must read the file, create the **Employee** structs and add them to the second List variable of your Form class. Note that each line from the file contains an employee id, a first name and a last name. So you will want to split the line, convert to the required type (using TryParse()) where applicable, then create the struct. The "**Unsorted Data**" DataGridView must be cleared and loaded with the data from this new List.

At any time, when the user clicks on the "**Display Unsorted List**" button, if the "**Provided List**" radio button is checked, the left DataGridView will display the unsorted data from the small list (created from the table data). If the "**File Data**" radio button is checked, the data in the longer list, created from the file, will be displayed.

When the user clicks on the "**Sort By Employee Id**" or the "**Sort By Employee Names**" button, the program will use the corresponding sorting method to sort the List accordingly. Again the List that will be sorted will be determined by the radio button checked. The sorted data will then be displayed in the right DataGridView. The sorting time must be calculated (using a Stopwatch object) and displayed in the read-only textbox.

Also Implement the 2 buttons for clearing the DataGridViews.

You may find the following info about DataGridViews helpful:

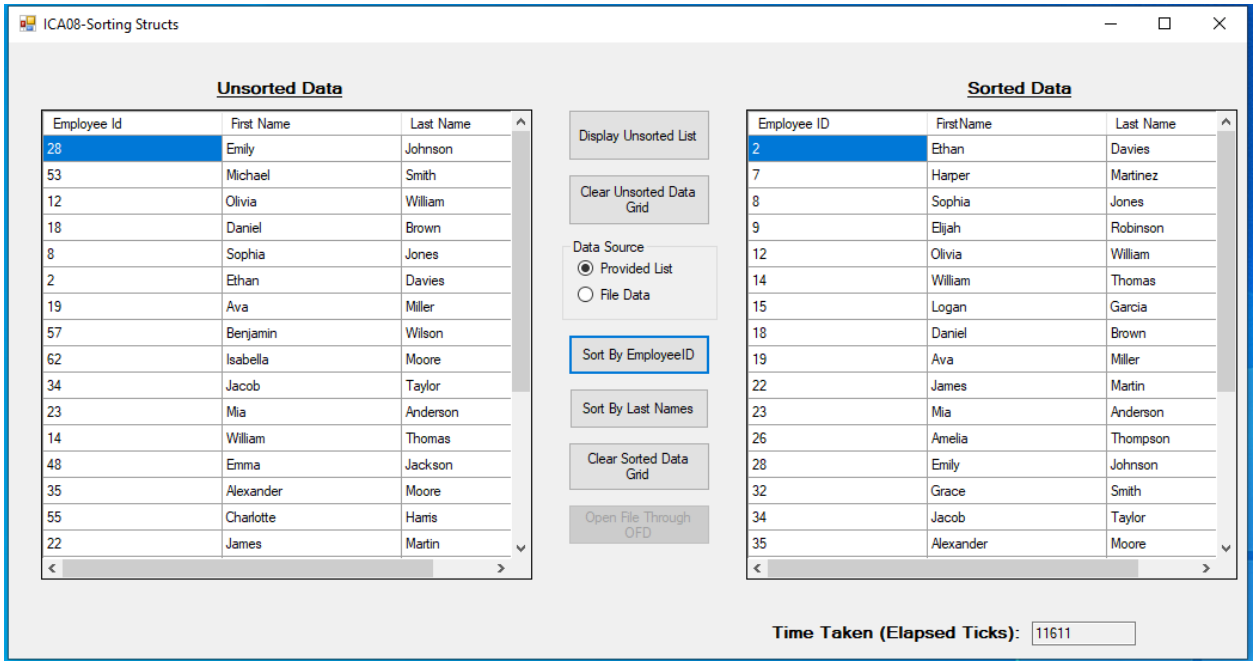
- To Add/Edit columns use the property Columns (under Misc. in the property pane).
- To Add a row of Data in the DataGridView, you'll need to create a variable of type **DataGridViewRow**. You will then clone **Row[0]** of your **DataGridView** control and assign it to your row variable.

  **Eg. DataGridViewRow row = (DataGridViewRow)UI_UnsortedData_DGV.Rows[0].Clone();**

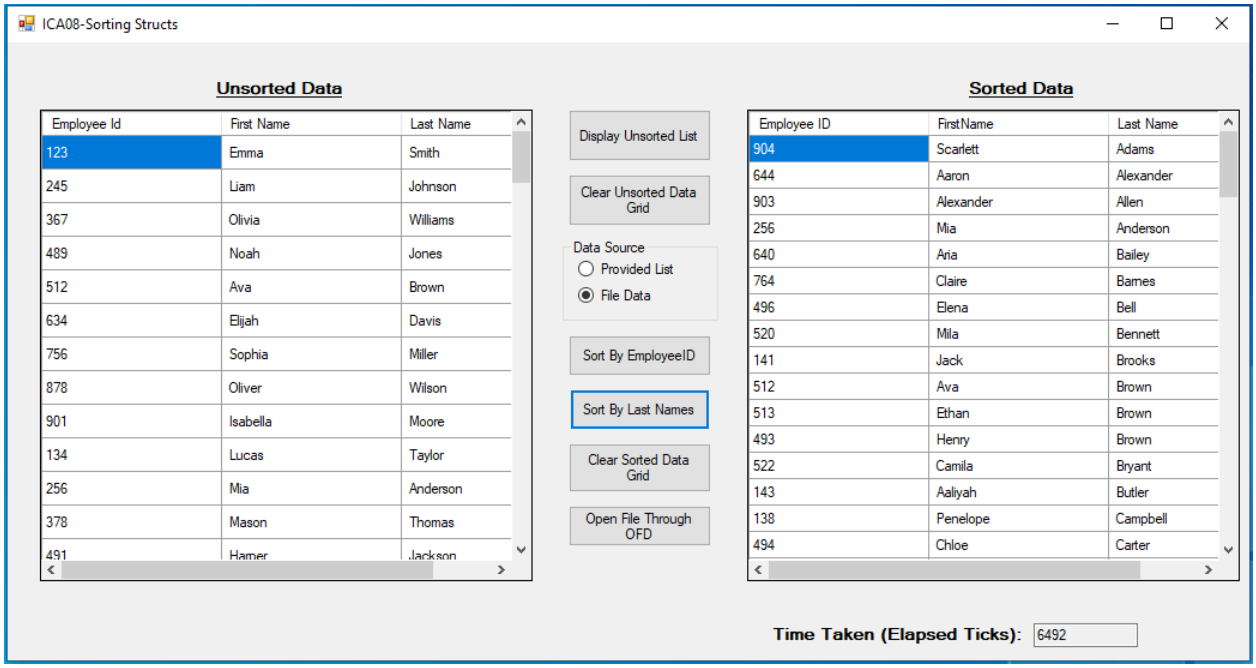
- A row created this way will have an array Cells representing the columns of your DataGridView. You can then assign values to the value property of these cells**. Eg. row.Cells[0].Value**= ……..
- You finally add the row to the property Rows of your **DataGridView** control.
  Eg. **UI_UnsortedData_DGV.Rows.Add(row);**

**Sample runs:**

1. Unsorted List (from table data) and List sorted on employee Id.




2. File data, unsorted List and List sorted on last name



**Rubric: Max Marks: 100**

| Item | Max Marks | Penalty |
|---|---|---|
| UI | 15 | Unprofessional layout: -4<br>No proper tab order: -2<br>Using default control names: -3 |
| Struct Properly defined | 5 | |
| Provided unsorted data properly displayed in left DataGridView. | 10 | Wrong Format: -2 |
| Provided table Data properly sorted through Selection Sort as required | 15 | |
| Provided table Data properly sorted through Insertion Sort as required | 15 | |
| Drag and Drop working as required.<br>Data loaded in left DataGridView | 10 | |
| File data sorted and displayed- Both sorting methods working as required | 10 | |
| File Loaded through Open File Dialog | 10 | |
| Execution Time calculated and Displayed | 7 | |
| DataGridViews cleared by corresponding buttons | 3 | |
| | | Data Loaded in List boxes not according to radio buttons: -5 |
| Documentation:<br>Programmer Block<br>Appropriate Variable Names<br>Program Properly commented | | Missing components of documentation: -5 to -20 |

**If struct and lists of structs are not used, the lab will be marked as 0. Also your DataGridView columns must be set to be Unsortable.**