

## CS 3340 - Program 1: Loading Controls Dynamically

### 25 Points

### Due Wednesday (Week 2), Jan. 27, 2015 by 5:00 PM

#### Program Description

The program has three classes: Prog1, FormClassCreate and FormClassShow.

The Startup object must be class Prog1 or Sub Main.

#### Class Prog1

This is a user created class with a main sub, which should run the application with an object of FormClassCreate. Recall that the sub main should be Shared.

#### Class FormClassCreate

This is a sub-class of class Form (System.Windows.Forms.Form) and is used to create and remove command buttons.

- Private fields

```
Private Const MAX_KEY_LENGTH As Integer = 6
```

```
Private _frmShow As FormClassShow
```

- The class could have a public method or property to set \_frmShow to an object of FormClassShow. This could also be done inside a constructor without the public method.
- The form GUI properties are specified as follows.
  - It has no controlbox, and the form border style is Fixed3D.
  - The size of the form is (520, 360).
  - The StartPosition is CenterScreen.
  - The title is "Program 1" followed by " - " and your first and last names. For example, "Program1 - Qi Yang".
  - The form has two menus (File and Button), two textboxes (txtCaption and txtKey), and two labels (lblCaption and lblKey).
  - The two textboxes have text "First" and "S16" respectively at the beginning, and should be aligned on the tops.
  - Textbox txtKey should have the focus at the beginning.
  - The two labels have text "Button Caption" and "Button Key" respectively, and should be aligned with the textboxes at the centers
  - The textboxes with the labels should be centered on the form both horizontally and vertically.
  - Menu File has two menu items: SHOW and EXIT. There is a separate bar between the two menu items.
    - Clicking SHOW will hide this form and display \_frmShow.
    - Clicking EXIT will terminate the program.
  - Menu Button has two menu items: CREATE and REMOVE.
    - Clicking CREATE will call method addButton of \_frmShow to create a new command button if a valid key is provided.
      - A key is required for each new button and is provided by textbox txtKey. The key can have at most six chars, and the first char cannot be a digit.
      - You should use the KeyPress event of txtKey to make sure the provided key is valid.
      - If no key is provided, then a message box will be displayed and method addButton will not be called..
      - Textbox txtCaption provides the caption for the new button. But the caption is not required and can be an empty string.
      - Other conditions may be enforced by method addButton of class FormClassShow, and a Try-Catch structure must be used to catch any exception from method addButton.
    - Clicking REMOVE will call method removeButton of \_frmShow to remove the button with the key specified in txtKey.
      - If no key is specified, then a message box will be displayed and method removeButton will not be called.
      - Method removeButton may throw an exception, and a Try-Catch structure must be used to avoid crashing.
  - The underlined chars are the access keys for the menu items.
  - The shortcut keys of the menu items are CTL+S, CTL+X, CTL+C and CTL+R, respectively.
  - Pressing Alt+F4 will not close the form.

#### Class FormClassShow

This is a sub-class of class Form and used to display the created buttons.

- Private fields

```

Private Const MAX_BUTTON_COUNT As Integer = 4

' For event resize
Private Const BUTTON_HEIGHT As Integer = 23
Private Const BUTTON_WIDTH As Integer = 75
Private Const MENU_HEIGHT As Integer = 24
Private Const MARGIN_SIZE As Integer = 100

Private _frmMain As Form
Private _allButtons As New SortedList

```

- Public property

```

' Sets _frmMain to a form object
Public WriteOnly Property MainForm As Form

```

- Public methods

```

' At most MAX_BUTTON_COUNT buttons can be created. If MAX_BUTTON_COUNT buttons have
' been created already, then an exception will be thrown and no button will be added.
' If no button in _allButtons has theKey as its key, the method creates a button with theKey
' and theCaption and adds the button to both the form and the sorted list.
' The Add method of the sorted list will check the uniqueness condition on key and raise an
' exception if the condition is violated. The method does not check the condition by itself
' and calls the Add method of the sorted list and lets the caller to handle the exception.
' No Try-and-Catch should be used inside the sub.
Public Sub addButton(ByVal theKey As String, ByVal theCaption As String)

' If a button in _allButtons has theKey as its key, the method removes the button from both
' the form and the sorted list. Otherwise, it throws an exception.
' No Try-and-Catch should be used inside the sub.
Public Sub removeButton(ByVal theKey As String)

```

- Required private methods

```

' Arranges all buttons on the form according to the requirements.
' It does not change any thing of any button, except its location on the form.
' You cannot use an if (or select) statement inside the method!
Private Sub ArrangeButtons()

' Changes the font of all buttons when a shortcut menu item is clicked.
' It also updates the menu item as checked or unchecked.
' You cannot use an if (or select) statement inside the method!
Private Sub ChangeFont(ByVal f As FontStyle, ByVal m As ToolStripMenuItem)

' Sets the font style of button b according to whether the three menu items
' are checked or not.
' The method should be called after a new button is created.
Private Sub setFont(ByVal b As Button)

```

- You will lose three points for each of the required private methods if it is missing.
- The form GUI properties are specified as follows.
  - The form has no controlbox, and the form border style is Sizable.
  - Its size is (650, 360) and the minimum size is (575, 100).
  - The title is "Program 1" followed by " - " and your first and last names. For example, "Program1 - Qi Yang".
  - The StartPosition is CenterScreen.
  - It has one menu File with two menu items: Return and Exit.
    - The shortcut keys are CTRL+R and CTRL+X.
    - There is a separate bar between the two menu items.
    - Clicking Return will hide this form and display \_frmMain.
    - Clicking Exit will terminate the program.
  - Within the client size of the form, a margin of 100 is reserved on the left side and the right side, and the margins must be excluded when computing the positions of the buttons on the form. Whenever the form is shown, the buttons should be displayed on the form as specified in the following:
    - The buttons should be displayed from left to right according to the order they are stored in the sorted list, and the first button is the left most one.
    - Vertically, each button is centered in the client area of the form, excluding the menu area.
    - Horizontally, the distances between any two consecutive buttons should be the same. The distance between the left/right margin and the first/last button should be the same as the distance between the buttons.
  - When the form is resized, the buttons must be arranged according to the above requirements.
  - A shortcut menu will be displayed when right clicking anywhere on the form.
    - The menu has three menu items: Font Bold, Font Italic, and Font Underline.
    - The shortcut keys are CTL+B, CTR+I and CTR+U, respectively.
    - When none of the menu items is checked, the caption of all buttons will have a regular font style. Checking and

unchecking any menu item will change the font style of all buttons accordingly.

- When a new button is created, its font style is also determined by the three menu items.
- Clicking any button on the form will display a message box with the key and the caption of the button **on two lines**.
- Pressing Alt+F4 will not close the form.

### Submission

- Drop your entire solution folder to folder Prog1 of the class DROP folder by the due time.
- The name of the folder MUST be UserName\_Prog1 using your UWP username. For example, YangQ\_Prog1.
- You will lose two points for incorrect submission, including incorrect folder name.
- You must follow the programming rules, and you may lose up to five points on style.