

Technical

Documentation-One Page

Calendar (Group 18)

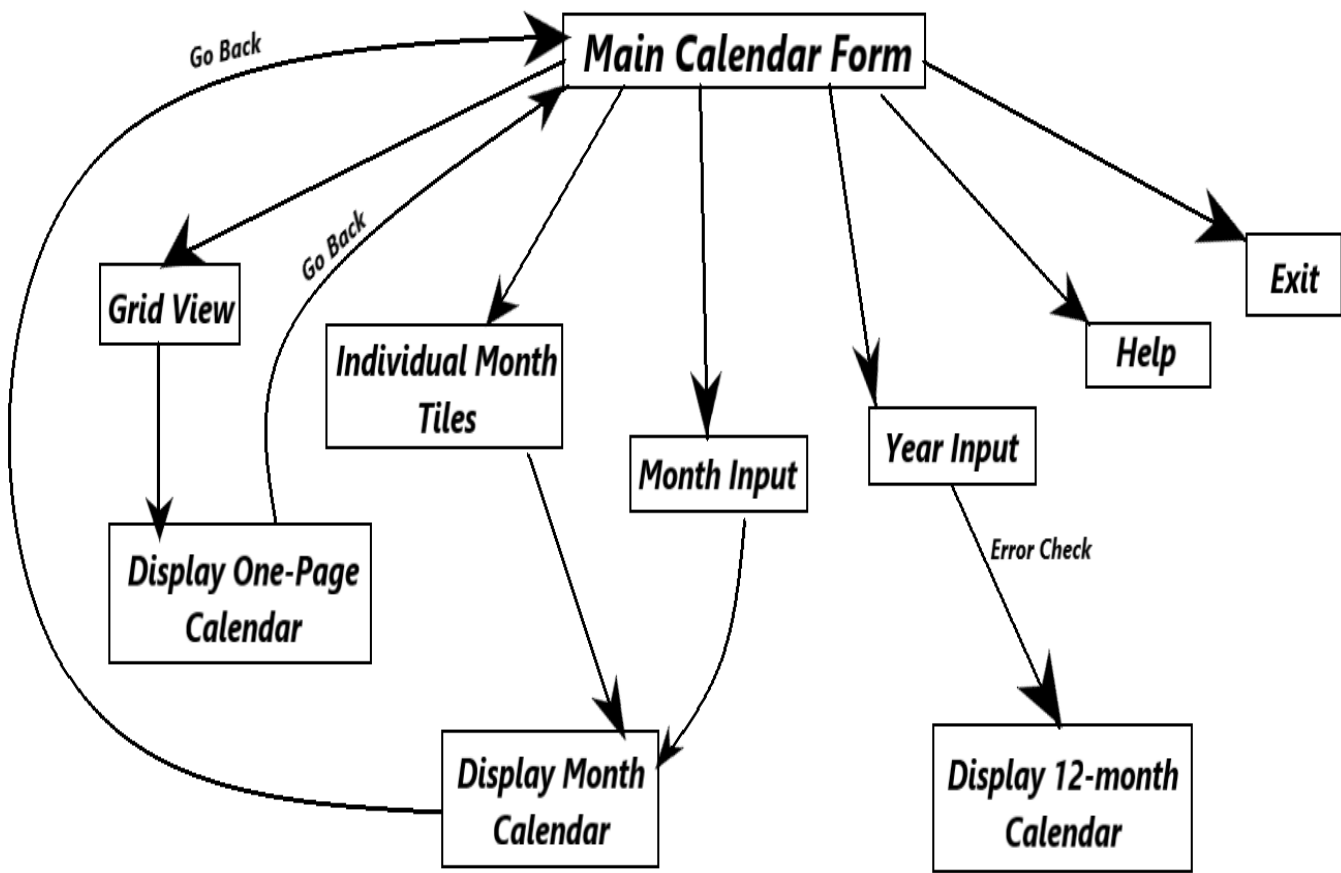
Developed By:

Udbhav Chugh: 170101081

Makharia Ayush: 170101034

Sachin Giri: 170101059

Flow Chart of Form Linking:



Algorithm:

Tomohiko Sakamoto's Algorithm-to find day of the week(returns remainder corresponding to date: 0->Sunday 1->Monday, 2->Tuesday and so on)

Explanation: Jan 1st 1 AD is a Monday in Gregorian calendar. If we exclude Leap years, total number of days in each year is 365. January has 31 days i.e. $7*4+3$ days so the day on 1st Feb. will always be 3 days ahead of the day on 1st January. February has 28 days(excluding leap years) which is exact multiple of 7 ($7*4=28$) Hence there will be no change in the month of March and it will also be 3 days ahead of the day on 1st January of that respective year. Considering this pattern, if we create an array of the leading number of days for each month then it will be given as `code[] = {0, 3, 3, 6, 1, 4, 6, 2, 5, 0, 3, 5}`. Every leap year our calculation will gain one extra day.

Adding $\text{year}/4 - \text{year}/100 + \text{year}/400$ solves this issue(number of leap years till date, we take floor values). The current year should not be counted for the leap day calculation for the first two months(since leap day is 29th February). So we need to subtract 1 from the `code[]` values of every month after February, i.e., we need to make the following changes:

1. `code[]` now becomes {0, 3, 2, 5, 0, 3, 5, 1, 4, 6, 2, 4}.
2. if m corresponds to Jan/Feb (that is, $\text{month} < 3$) we decrement y by 1.

3.the annual increment inside the modulus is now $\text{year} + \text{year}/4 - \text{year}/100 + \text{year}/400$ in place of year.

Formula:

If $\text{month} < 3 \rightarrow \text{year} = 1$

$\text{remainder} = \text{year} + \text{year}/4 - \text{year}/100 + \text{year}/400 + \text{code}(\text{month}-1) + \text{day} \% 7;$

Main Calendar Form (Form1) functionalities:

Widgets:

- **Table Layout:**
 - TableLayoutPanel1: 4*3 table grid to display each month calendar
- **Buttons:**
 - **Btn_Grid_View**(Grid View): Links to Form_Grid_View(Form 2) to view calendar in grid form.
 - **Btn_Month_calendar** (View Month Calendar): Links to Form_Month_Calendar(Form 3) to view particular month calendar.
 - **Btn_Jan-Btn_Dec** (12 Month Tiles): Links to Form_Month_Calendar(Form 3) to view month calendar depending on the month tile clicked.
 - **Btn_Year_Calendar** (View Year Calendar): Reads input Textbox_Year_Input and displays corresponding year calendar in Main Calendar Form. Also handles errors in Input.
 - **Btn_Main_Title**: Shows Heading by taking corresponding year as input.
 - **Help_User**: Opens link to User Documentation to get user comfortable with the software.
- **Combobox:**
 - **Combo_Month_Select**: Generates drop down menu for month input (with default January)
- **TextBox:**
 - **TextBox_Year_Input**: Takes one-line year input from user
- **Labels:**
 - 2 labels used- **Lbl_Select_Month**(Select Month) and **Lbl_Enter_Year**(Enter Year(1583-99999))

Functions:

- **dayNum:**
 - takes day(Integer),month(Integer) and year(Integer) as input
 - Calculates the remainder corresponding to days of week(0->Sunday,1->Monday and so on) using the above mentioned **Tomohiko Sakamoto's Algorithm**
 - Returns this remainder as Integer
- **numberOfDays:**
 - takes month(Integer) and year(Integer) as parameter inputs.
 - Returns the total no of days in a particular month(taking leap years into account).
- **printMonth:**
 - takes num(month number) (Integer), year, outp(button.text)(String) and tempstr(month name)(String) as parameter inputs
 - this function asks start function to find the day for the 1st of that month and also numberOfDays function to find the no. of days in the month and then prints the calendar for the month taking care of the spacing so as to maintain rows and columns.
 - does not return anything
- **dayCode:**
 - takes i(month name)(string) as parameter input
 - this function returns the month number for corresponding months.
- **Form1_Load(Form_Main_Calendar):**
 - Runs on loading Form_Main_Calendar. It sets default value for the month dropdown menu and also calls the printMonth function to print on the buttons Btn_Jan-Btn_Dec the month calendar.

Error Handling and Corner Cases:

- The year input checks for input being a numerical value and displays an error message if the condition is not met.
- It further checks if the input is in the range of 1583 and 99999 or else displays an error message.(Note: The Georgian Calendar came into effect in Oct,1582 and hence our software works from 1583).
- All cases of leaving input blank, starting year with multiple zeros,spaces after year input have been handled.
- Presence of decimal was also handled using Contains function to search for substring “.”

Form Grid View(Form2) functionalities:

Widgets:

- **Table_layout:**
 - 10*12 table layout to place all cells.
- **Buttons:**
 - **Button1-Button21:** Print month name in corresponding table cell.
 - **Btn_Dates:** prints “Dates”.
 - **Dates Buttons:** To display 1-31 as columns on left.
 - **Days Buttons:** To display Mon-Sun in a 7*7 grid.(each row and column has 7 days)
 - **Btn_Go_To_Main:** Links to Form _Main_Calendar(Form1) and closes the current form.
 - **Btn_title_grid_view:** Shows Heading by taking corresponding year as input.

Functions:

- **monname:**
 - takes i(month code)(Integer) as input parameter
 - returns the corresponding three letter month code
- **Form2_Load(Form_Grid_View):**
 - Prints heading, calculates the position cells for each month and places month name at their corresponding cells in the grid.

Form Month Calendar(Form3) functionalities:

Widgets:

- **Buttons:**
 - **Btn_Month_title:**displays current month and year taken as input.
 - **Btn_Month_Show:**displays the month calendar.
 - **Btn_go_back_to_main:** Links to Form _Main_Calendar and closes the current form

Functions:

- **printMonth:**
 - takes num(month number)(Integer), year(Integer) and outp(btn_month_show.text)(String) as input
 - this function asks start function in Form_Main_Calendar (form1) to find the day for the 1st of the corresponding month and also numberOfDays function in Form_Main_Calendar (form1) to find the number of days in the month and then prints the calendar for the month taking care of the spacing so as to maintain rows and columns.
 - does not return anything.
- **monthname:**
 - takes i(month number)(Integer) as parameter input
 - returns month name.
- **Form3_Load(Form_Month_Calendar Load):**
 - It displays current year and month for which the form is called and then calls printMonth function for the corresponding month.

Bibliography:

- <https://www.geeksforgeeks.org/tomohiko-sakamotos-algorithm-finding-day-week/>
- <https://docs.microsoft.com/en-us/dotnet/visual-basic/>
- <https://www.youtube.com/playlist?list=PLC601DEA22187BBF1>
- <http://accent.main.jp/ecal/>
- <https://whatis.techtarget.com/definition/Gregorian-calendar>
- www.stackoverflow.com/questions