

## Module 8: Toolbars, Status Bars and ReBar

Program examples compiled using Visual C++ 6.0 (MFC 6.0) compiler on Windows XP Pro machine with Service Pack 2. Topics and sub topics for this Tutorial are listed below:

### Toolbars and Status Bars

#### Control Bars and the Application Framework

#### The Toolbar

#### The Toolbar Bitmap

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### Toolbars and Status Bars

All the Microsoft Visual C++ examples up to this point have included toolbars and status bars. AppWizard generated the code that initialized these application framework elements as long as you accepted the AppWizard default options **Docking Toolbar** and **Initial Status Bar**. The default toolbar provides graphics equivalents for many of the standard application framework menu selections, and the default status bar displays menu prompts together with the keyboard state indicators **CAP**, **NUM**, and **SCRL**.

This module shows you how to customize the toolbar and the status bar for your application. You'll be able to add your own toolbar graphical buttons and control their appearance. You'll also learn how to disable the status bar's normal display of menu prompts and keyboard indicators. This allows your application to take over the status bar for its own use.

### Control Bars and the Application Framework

The toolbar is an object of class `CToolBar`, and the status bar is an object of class `CStatusBar`. Both these classes are derived from class `CControlBar`, which is itself derived from `CWnd`. The `CControlBar` class supports control bar windows that are positioned inside frame windows. These control bar windows resize and reposition themselves as the parent frame moves and changes size. The application framework takes care of the construction, window creation, and destruction of the control bar objects. AppWizard generates control bar code for its derived frame class located in the files **MainFrm.cpp** and **MainFrm.h**.

In a typical SDI application, a `CToolBar` object occupies the top portion of the `CMainFrame` client area and a `CStatusBar` object occupies the bottom portion. The view occupies the remaining (middle) part of the frame. Beginning with MFC Library version 4.0, the toolbar has been built around the toolbar common control that first became available with Microsoft Windows 95. Thus the toolbar is fully dockable. The programming interface is much the same as it was in earlier versions of the MFC library, however. The button images are easy to work with because a special resource type is supported by the resource editor. The old global buttons array is gone.

Assuming that AppWizard has generated the control bar code for your application, the user can enable and disable the toolbar and the status bar individually by choosing commands from the application's **View** menu. When a control bar is

disabled, it disappears and the view size is recalculated. Apart from the common behavior just described, toolbar and status bar objects operate independently of each other and have rather different characteristics. In Visual C++ 6.0, a new MFC toolbar was introduced called the **rebar**. The rebar is based on the controls that come as part of Microsoft Internet Explorer 4.0 and provides a Microsoft Internet Explorer-style "sliding" toolbar. We will cover this later in this module.

## The Toolbar

A toolbar consists of a number of horizontally (or vertically) arranged graphical buttons that might be clustered in groups. The programming interface determines the grouping. The graphical images for the buttons are stored in a single bitmap that is attached to the application's resource file. When a button is clicked, it sends a command message, as do menus and keyboard accelerators. An update command UI message handler is used to update the button's state, which in turn is used by the application framework to modify the button's graphical image.

### The Toolbar Bitmap

Each button on a toolbar appears to have its own bitmap, but actually a single bitmap serves the entire toolbar. The toolbar bitmap has a tile, **15 pixels high** and **16 pixels wide**, for each button. The application framework supplies the button borders, and it modifies those borders, together with the button's bitmap tile color, to reflect the current button state. Figure 1 shows the relationship between the toolbar bitmap and the corresponding toolbar.



Figure 1: A toolbar bitmap and an actual toolbar.

The toolbar bitmap is stored in the file **Toolbar.bmp** in the application's `\res` subdirectory. The bitmap is identified in the resource script (RC) file as `IDR_MAINFRAME`. You don't edit the toolbar bitmap directly; instead you use Visual C++'s special toolbar-editing facility.

### Button States

Each button can assume the following states.

State	Meaning
0	Normal, un-pressed state.
TBSTATE_CHECKED	Checked (down) state.
TBSTATE_ENABLED	Available for use. Button is grayed and unavailable if this state is not set.
TBSTATE_HIDDEN	Not visible.
TBSTATE_INDETERMINATE	Grayed.
TBSTATE_PRESSED	Currently selected (pressed) with the mouse.
TBSTATE_WRAP	Line break follows the button.

Table 1.

A button can behave in either of two ways: it can be a pushbutton, which is down only when currently selected by the mouse, or it can be a check box button, which can be toggled up and down with mouse clicks. All buttons in the standard application framework toolbar are pushbuttons.

### The Toolbar and Command Messages

When the user clicks a toolbar button with the mouse, a command message is generated. This message is routed like the menu command messages you saw in [Module 7](#). Most of the time, a toolbar button matches a menu option. In the standard application framework toolbar, for example, the **Disk** button is equivalent to the **File Save** menu option because both generate the `ID_FILE_SAVE` command. The object receiving the command message doesn't need to know whether the message was produced by a click on the toolbar or by a selection from the menu.

A toolbar button doesn't have to mirror a menu item. If you don't provide the equivalent menu item, however, you are advised to define a keyboard accelerator for the button so that the user can activate the command with the keyboard or with a keyboard macro product for Microsoft Windows. You can use ClassWizard to define command and update command UI message handlers for toolbar buttons, whether or not they have corresponding menu items.

A toolbar has an associated bitmap resource and, in the RC file, a companion **TOOLBAR** resource that defines the menu commands associated with the buttons. Both the bitmap and the **TOOLBAR** resource have the same ID, typically `IDR_MAINFRAME`. The text of the AppWizard-generated **TOOLBAR** resource is shown below (you can open the RC file using text editor such as Notepad or WordPad):

```
IDR_MAINFRAME TOOLBAR DISCARDABLE 16, 15
BEGIN
    BUTTON        ID_FILE_NEW
    BUTTON        ID_FILE_OPEN
    BUTTON        ID_FILE_SAVE
    SEPARATOR
    BUTTON        ID_EDIT_CUT
    BUTTON        ID_EDIT_COPY
    BUTTON        ID_EDIT_PASTE
    SEPARATOR
    BUTTON        ID_FILE_PRINT
    BUTTON        ID_APP_ABOUT
END
```

The following is a portion of the **RC file** content for this Module program example.

```
////////////////////////////////////,
///
/// Toolbar
///

IDR_MAINFRAME TOOLBAR DISCARDABLE 16, 15
BEGIN
    BUTTON        ID_FILE_NEW
    BUTTON        ID_FILE_OPEN
    BUTTON        ID_FILE_SAVE
    SEPARATOR
    BUTTON        ID_DRAW_SQUARE
    BUTTON        ID_DRAW_CIRCLE
    BUTTON        ID_DRAW_PATTERN
    SEPARATOR
    BUTTON        ID_FILE_PRINT
    SEPARATOR
    BUTTON        ID_APP_ABOUT
END

////////////////////////////////////,
///
/// Menu
///
```

Listing 1.

The **SEPARATOR** constants serve to group the buttons by inserting corresponding spaces on the toolbar. If the number of toolbar bitmap panes exceeds the number of resource elements (excluding separators), the extra buttons are not displayed. When you edit the toolbar with the resource editor, you're editing both the bitmap resource and the **TOOLBAR** resource. You select a button image, and then you double-click on the left panel to edit the properties, including the button's ID.

## Toolbar Update Command UI Message Handlers

Remember from [Module 7](#) that update command UI (User Interface) message handlers are used to disable or add check marks to menu items. These same message handlers apply to toolbar buttons. If your update command UI message handler calls the `CCmdUI::Enable` member function with a `FALSE` parameter, the corresponding button is set to the disabled (grayed) state and no longer responds to mouse clicks.

On a menu item, the `CCmdUI::SetCheck` member function displays a check mark. For the toolbar, the `SetCheck()` function implements check box buttons. If the update command UI message handler calls `SetCheck()` with a parameter value of 1, the button is toggled to the down (checked) state; if the parameter is 0, the button is toggled up (unchecked). If the `SetCheck()` parameter value is 2, the button is set to the indeterminate state. This state looks like the disabled state, but the button is still active and its color is a bit brighter.

The update command UI message handlers for a pop-up menu are called only when the menu is painted. The toolbar is displayed all the time, so when are its update command UI message handlers called? They're called during the application's idle processing, so the buttons can be updated continuously. If the same handler covers a menu item and a toolbar button, it is called both during idle processing and when the pop-up menu is displayed.

## ToolTips

You've seen **ToolTips** in various Windows applications, including Visual C++. When the user positions the mouse on a toolbar button for a certain interval, text is displayed in a little ToolTip box next to the button as shown below.



Figure 2: ToolTips in action.

In [Module 7](#), you learned that menu items can have associated **prompt strings**, which are string resource elements with matching IDs as shown below.

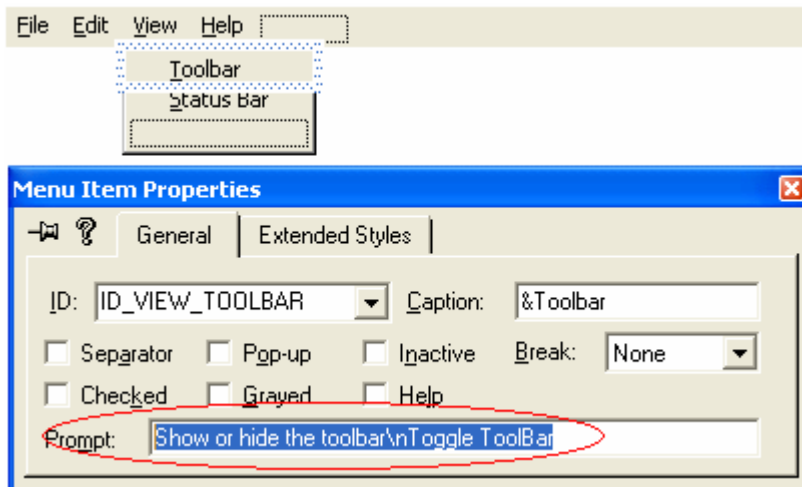


Figure 3: Prompt string and ToolTips.

To create a ToolTip, you simply add the tip text to the **end of the menu prompt**, preceded by a newline (`\n`) character as shown in Figure 3 (**Toggle ToolBar**). The resource editor lets you edit the prompt string while you are editing the toolbar images. Just double-click in the left panel.

## Locating the Main Frame Window

The toolbar and status bar objects you'll be working with are attached to the application's main frame window, not to the view window. How does your view find its main frame window? In an SDI application, you can use the `CWnd::GetParentFrame` function. Unfortunately, this function won't work in an MDI application because the view's parent frame is the MDI child frame, not the MDI frame window.

If you want your view class to work in both SDI and MDI applications, you must find the main frame window through the application object. The `AfxGetApp()` global function returns a pointer to the application object. You can use that pointer to get the `CWinApp` data member `m_pMainWnd`. In an MDI application, `AppWizard` generates code that sets `m_pMainWnd`, but in an SDI application, the framework sets `m_pMainWnd` during the view creation process. Once `m_pMainWnd` is set, you can use it in a view class to get the frame's toolbar with statements such as this:

```
CMainFrame* pFrame = (CMainFrame*) AfxGetApp()->m_pMainWnd;
CToolBar* pToolBar = &pFrame->m_wndToolBar;
```

You'll need to cast `m_pMainWnd` from `CFrameWnd*` to `CMainFrame*` because `m_wndToolBar` is a member of that derived class. You'll also have to make `m_wndToolBar` public or make your class a friend of `CMainFrame`. You can use similar logic to locate menu objects, status bar objects, and dialog objects. In an SDI application, the value of `m_pMainWnd` is not set when the view's `OnCreate()` message handler is called. If you need to access the main frame window in your `OnCreate()` function, you must use the `GetParentFrame()` function.

## The MYMFC11 Toolbar Example

In this example, you will replace the standard application framework **Edit**, **Cut**, **Copy**, and **Paste** toolbar buttons with three special-purpose buttons that control drawing in the view window. You will also construct a **Draw** menu with three corresponding menu items, as follows.

Menu Item	Function
<b>Circle</b>	Draws a circle in the view window.
<b>Square</b>	Draws a square in the view window.
<b>Pattern</b>	Toggles a diagonal line fill pattern for new squares and circles.

Table 2.

The menu and toolbar options force the user to alternate between drawing circles and squares. After the user draws a circle, the **Circle** menu item and toolbar button are disabled; after the user draws a square, the **Square** menu item and toolbar button are disabled.

On the application's **Draw** menu, the **Pattern** menu item gets a check mark when pattern fill is active. On the toolbar, the corresponding button is a check box button that is down when pattern fill is active and up when it is not active.

Figure 4 shows the application in action. The user has just drawn a square with pattern fill. Notice the states of the three drawing buttons.

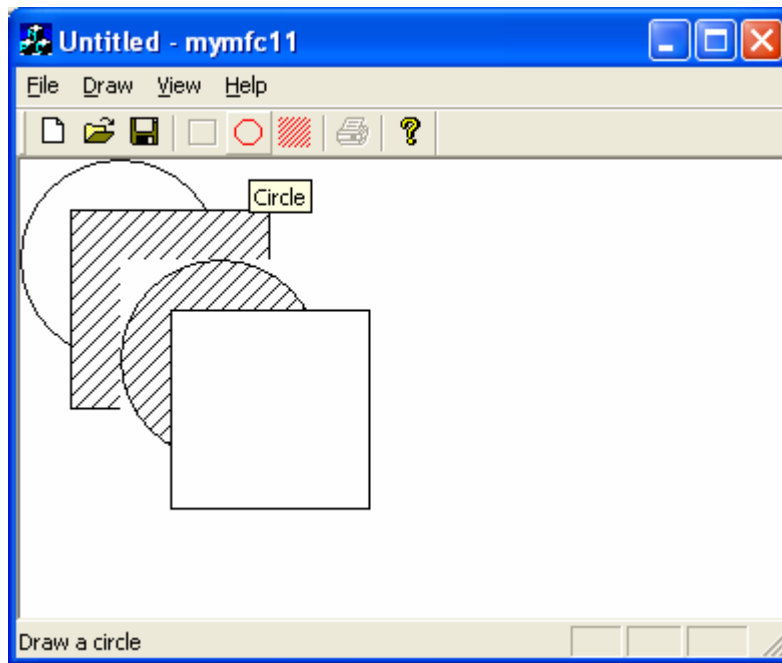


Figure 4: The MYMFC11 program in action.

The MYMFC11 example introduces the resource editor for toolbars. You'll need to do very little C++ coding. Simply follow these steps:

Run AppWizard to generate `\mfcproject\mymfc11` (or wherever you have designated the project folder). Accept all default settings but two: select **Single Document** and deselect **Printing and Print Preview** and **ActiveX Controls**. The options and the default class names are shown here.

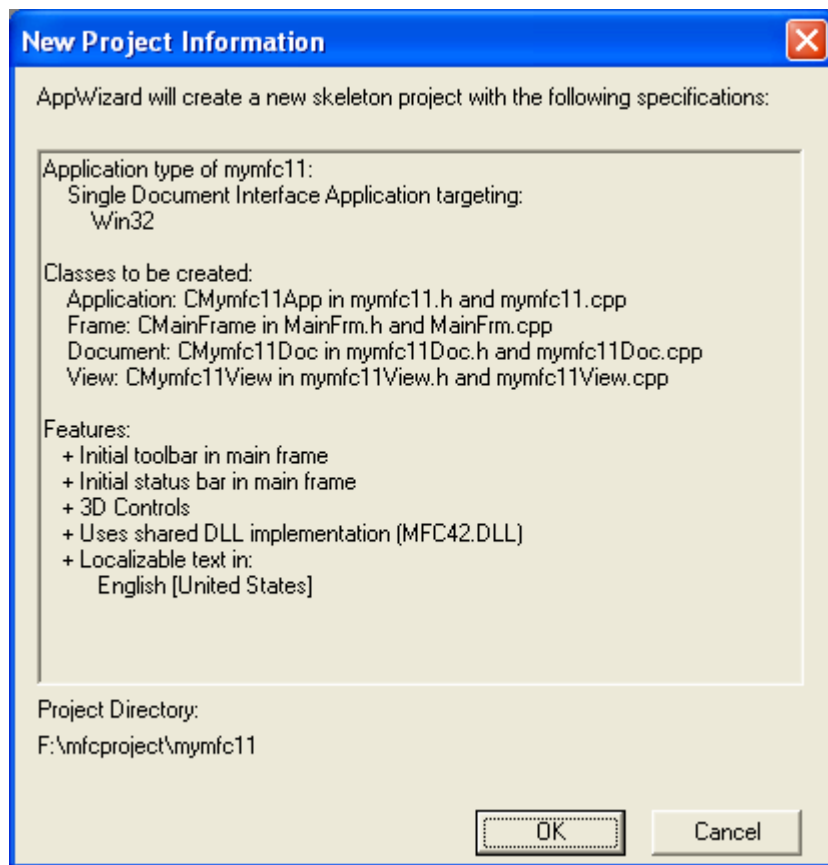


Figure 5: MYMFC11 project summary.

Use the resource editor to edit the application's main menu. In **ResourceView**, double-click on IDR\_MAINFRAME under **Menu**. Edit the IDR\_MAINFRAME menu resource to create a menu that looks like this which means you'll need to change the **Edit** menu.

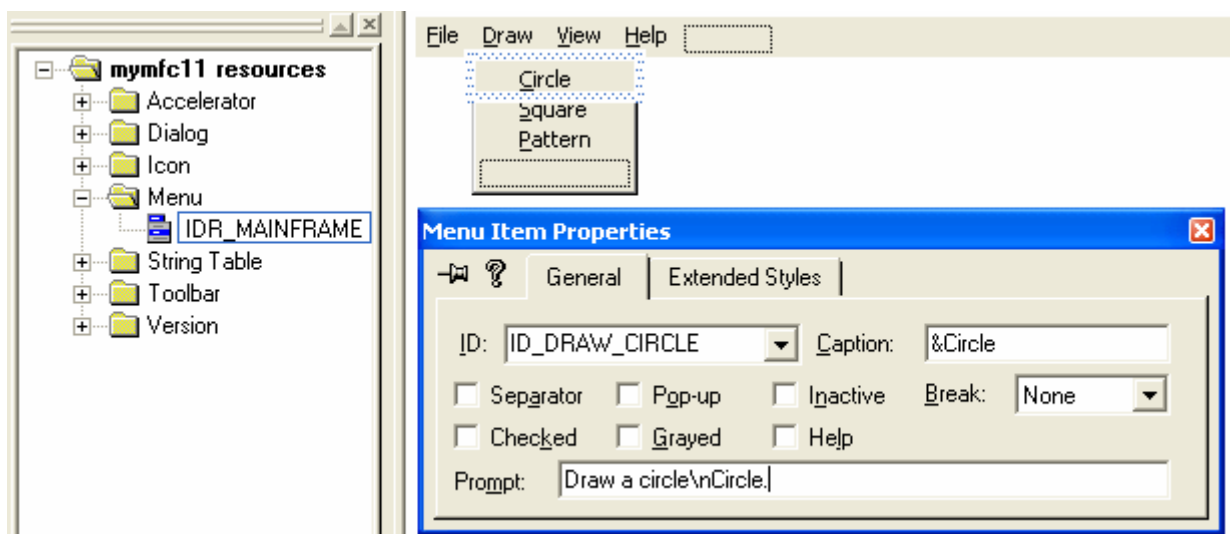


Figure 6: Adding and modifying new menus properties.

Use the following command IDs for your new menu items.

Menu	Caption	Command ID
Draw	Circle	ID_DRAW_CIRCLE
Draw	Square	ID_DRAW_SQUARE
Draw	Pattern	ID_DRAW_PATTERN

Table 3

When you're in the **Menu Item Properties** dialog, add some appropriate prompt strings and ToolTips (following a newline character). The string for ID\_DRAW\_CIRCLE might be "Draw a circle\nCircle."

### Bitmap Image example

Use the resource editor to update the application's toolbar. Edit the IDR\_MAINFRAME toolbar resource to create a bitmap that looks like the following. Start with by clicking the last grey button.

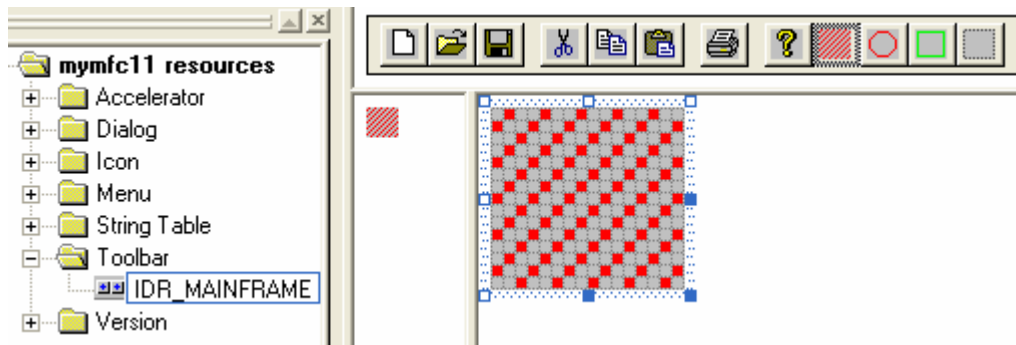


Figure 7: Creating a bitmap for our new toolbar item.

You'll be erasing the **Edit Cut**, **Copy**, and **Paste** tiles (fourth, fifth, and sixth from the left) and replacing them with new tiles. The toolbar editor is fairly intuitive. You simply move the buttons around with the mouse. The **Delete** key erases a button's pixels. If you want to eliminate a button entirely, just drag it off the toolbar. Use the rectangle and ellipse tools from the graphics toolbar. Experiment with different line widths. Save the resource file when you're done, just in case.

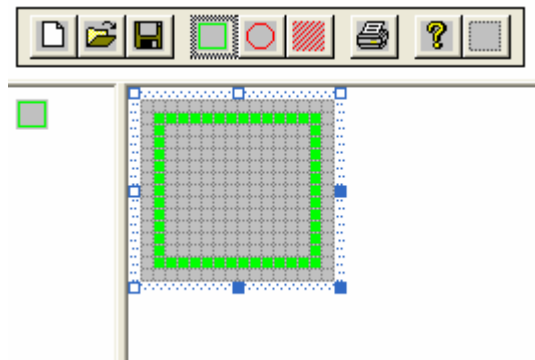


Figure 8: Using toolbar editor to create new toolbar bitmap.

Double click the button and assign the IDs ID\_DRAW\_CIRCLE, ID\_DRAW\_SQUARE, and ID\_DRAW\_PATTERN to the three new buttons.



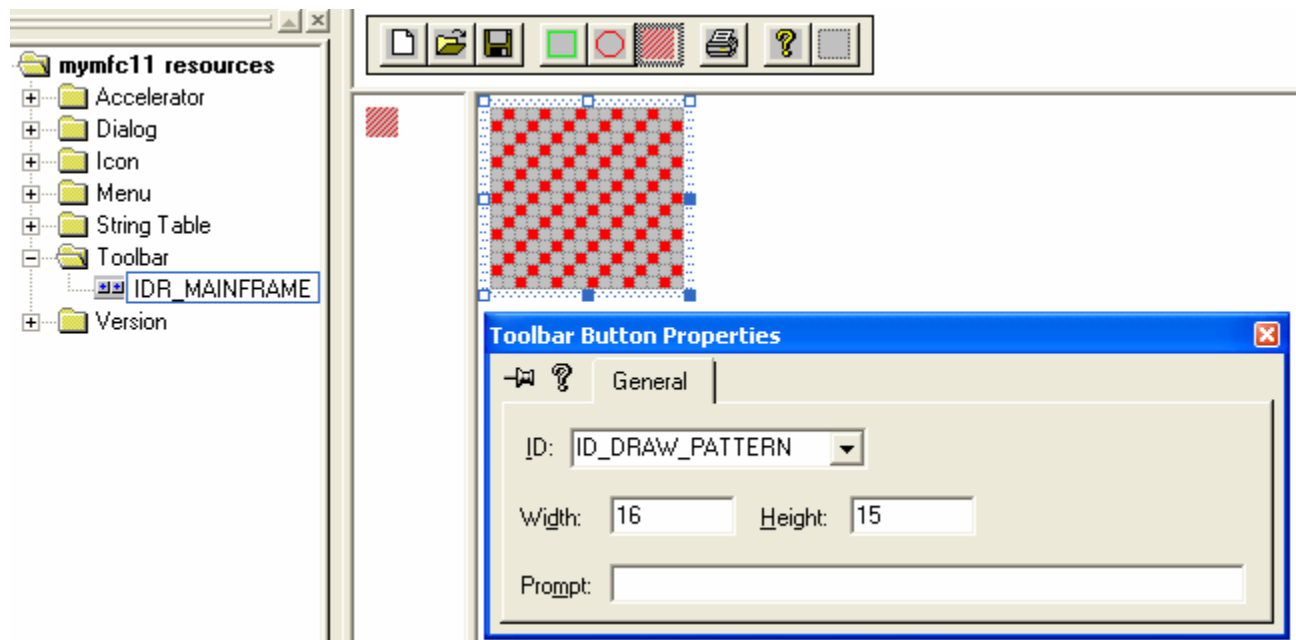


Figure 9: Creating and modifying new toolbar bitmap properties.

Use ClassWizard to add CMymfc11View view class message handlers. Add message handlers for the following command and update command UI messages, and accept the default function names shown in the following table.

Object ID	Message	Member Function
ID_DRAW_CIRCLE	COMMAND	OnDrawCircle()
ID_DRAW_CIRCLE	UPDATE_COMMAND_UI	OnUpdateDrawCircle()
ID_DRAW_PATTERN	COMMAND	OnDrawPattern()
ID_DRAW_PATTERN	UPDATE_COMMAND_UI	OnUpdateDrawPattern()
ID_DRAW_SQUARE	COMMAND	OnDrawSquare()
ID_DRAW_SQUARE	UPDATE_COMMAND_UI	OnUpdateDrawSquare()

Table 4

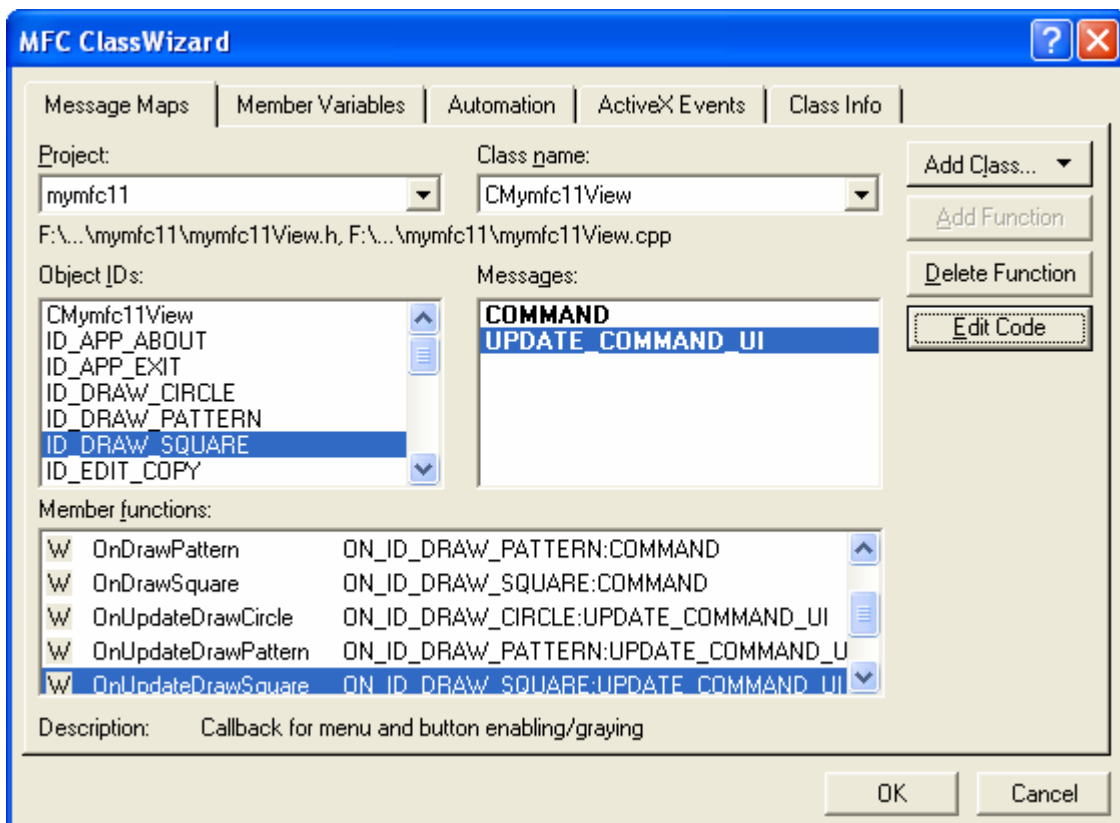


Figure 10: Adding CMymfc11View view class message handlers.

Add three data members to the CMymfc11View class. Edit the file **mymfc11View.h**, or use ClassView.

```
private:
    CRect m_rect;
    BOOL m_bCircle;
    BOOL m_bPattern;
```

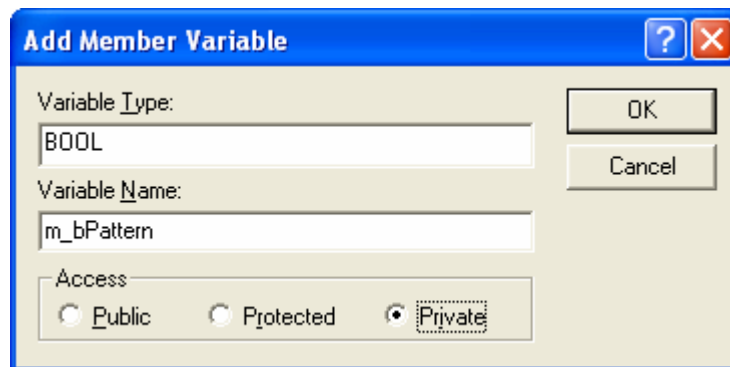


Figure 11: Adding data members/variable to the CMymfc11View class.

Edit the **mymfc11View.cpp** file. The CMymfc11View constructor simply initializes the class data members. Add the following code:

```
CMymfc11View::CMymfc11View() : m_rect(0, 0, 100, 100)
{
    m_bCircle = TRUE;
    m_bPattern = FALSE;
}
```

```

// CMymfc11View construction/destruction
CMymfc11View::CMymfc11View() : m_rect(0, 0, 100, 100)
{
    // TODO: add construction code here
    m_bCircle = TRUE;
    m_bPattern = FALSE;
}

```

Listing 2.

The OnDraw() function draws an ellipse or a rectangle, depending on the value of the m\_bCircle flag. The brush is plain white or a diagonal pattern, depending on the value of m\_bPattern.

```

void CMymfc11View::OnDraw(CDC* pDC)
{
    // brush with diagonal pattern
    CBrush brush(HS_BDIAGONAL, 0L);

    if (m_bPattern)
    {
        pDC->SelectObject(&brush);
    }
    else
    {
        pDC->SelectStockObject(WHITE_BRUSH);
    }
    if (m_bCircle)
    {
        pDC->Ellipse(m_rect);
    }
    else {
        pDC->Rectangle(m_rect);
    }
    // Deselects brush if selected
    pDC->SelectStockObject(WHITE_BRUSH);
}

```

```

// CMymfc11View drawing
void CMymfc11View::OnDraw(CDC* pDC)
{
    // TODO: add draw code for native data here
    // brush with diagonal pattern
    CBrush brush(HS_BDIAGONAL, 0L);

    if (m_bPattern)
    {
        pDC->SelectObject(&brush);
    }
    else
    {
        pDC->SelectStockObject(WHITE_BRUSH);
    }
    if (m_bCircle)
    {
        pDC->Ellipse(m_rect);
    }
    else {
        pDC->Rectangle(m_rect);
    }
    // Deselects brush if selected
    pDC->SelectStockObject(WHITE_BRUSH);
}

```

### Listing 3.

The `OnDrawCircle()` function handles the `ID_DRAW_CIRCLE` command message, and the `OnDrawSquare()` function handles the `ID_DRAW_SQUARE` command message. These two functions move the drawing rectangle down and to the right, and then they invalidate the rectangle, causing the `OnDraw()` function to redraw it. The effect of this invalidation strategy is a diagonal cascading of alternating squares and circles. Also, the display is not buffered, so when the window is hidden or minimized, previously drawn items are not redisplayed.

```
void CMymfc11View::OnDrawCircle()
{
    m_bCircle = TRUE;
    m_rect += CPoint(25, 25);
    InvalidateRect(m_rect);
}

void CMymfc11View::OnDrawCircle()
{
    // TODO: Add your command handler code here
    m_bCircle = TRUE;
    m_rect += CPoint(25, 25);
    InvalidateRect(m_rect);
}
```

### Listing 4.

```
void CMymfc11View::OnDrawSquare()
{
    m_bCircle = FALSE;
    m_rect += CPoint(25, 25);
    InvalidateRect(m_rect);
}

void CMymfc11View::OnDrawSquare()
{
    // TODO: Add your command handler code here
    m_bCircle = FALSE;
    m_rect += CPoint(25, 25);
    InvalidateRect(m_rect);
}
```

### Listing 5.

The following two update command UI functions alternately enable and disable the **Circle** and **Square** buttons and corresponding menu items. Only one item can be enabled at a time.

```
void CMymfc11View::OnUpdateDrawCircle(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(!m_bCircle);
}

void CMymfc11View::OnUpdateDrawCircle(CCmdUI* pCmdUI)
{
    // TODO: Add your command update UI handler code here
    pCmdUI->Enable(!m_bCircle);
}
```

### Listing 6.

```
void CMymfc11View::OnUpdateDrawSquare(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(m_bCircle);
}
```

```

void CMymfc11View::OnDrawSquare()
{
    // TODO: Add your command handler code here
    m_bCircle = FALSE;
    m_rect += CPoint(25, 25);
    InvalidateRect(m_rect);
}

```

Listing 7.

The OnDrawPattern() function toggles the state of the m\_bPattern flag.

```

void CMymfc11View::OnDrawPattern()
{
    m_bPattern ^= 1;
}

void CMymfc11View::OnDrawPattern()
{
    // TODO: Add your command handler code here
    m_bPattern ^= 1;
}

```

Listing 8.

The OnUpdateDrawPattern() function updates the **Pattern** button and menu item according to the state of the m\_bPattern flag. The toolbar button appears to move in and out, and the menu item check mark appears and disappears.

```

void CMymfc11View::OnUpdateDrawPattern(CCmdUI* pCmdUI)
{
    pCmdUI->SetCheck(m_bPattern);
}

void CMymfc11View::OnUpdateDrawPattern(CCmdUI* pCmdUI)
{
    // TODO: Add your command update UI handler code here
    pCmdUI->SetCheck(m_bPattern);
}

```

Listing 9.

Build and test the MYMFC11 application.

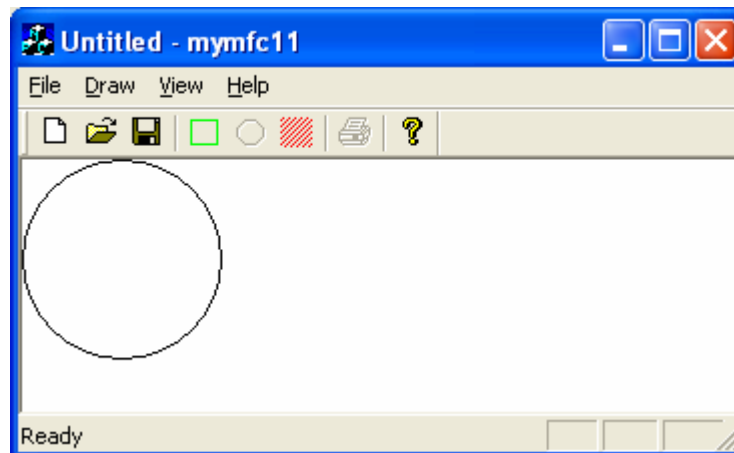


Figure 12: MYMFC11 program output with new toolbar buttons.

Notice the behavior of the toolbar buttons. Try the corresponding menu items, and notice that they too are **enabled**, **disabled**, and **checked** as the application's state changes. Observe the **ToolTip** when you stop the mouse pointer on one of the new toolbar buttons.

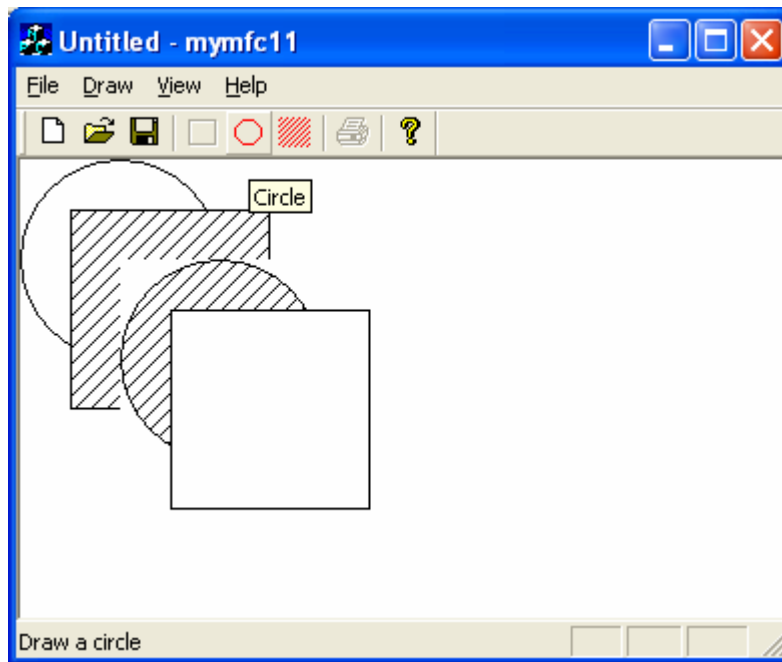


Figure 13: MYMFC11 program output in action.

## The Status Bar

The status bar window neither accepts user input nor generates command messages. Its job is simply to display text in panes under program control. The status bar supports two types of text panes, message line panes and status indicator panes. To use the status bar for application-specific data, you must first disable the standard status bar that displays the menu prompt and key-board status.

## The Status Bar Definition

The static indicators array that AppWizard generates in the **MainFrm.cpp** file defines the panes for the application's status bar. The constant `ID_SEPARATOR` identifies a message line pane; the other constants are string resource IDs that identify indicator panes. Figure 14 shows the indicators array and its relationship to the standard framework status bar.

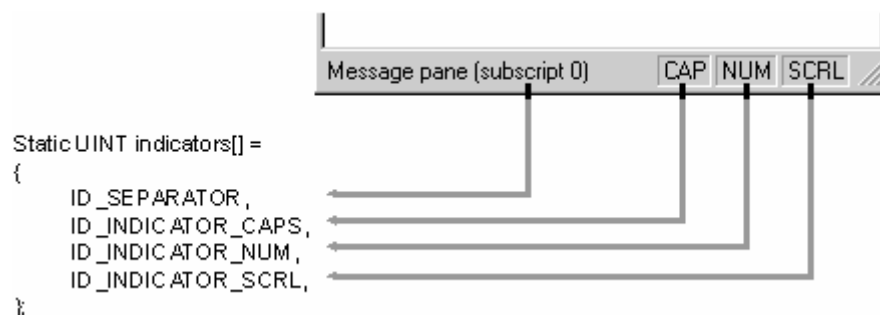


Figure 14: The status bar and the indicators array.

The `CStatusBar::SetIndicators` member function, called in the application's derived frame class, configures the status bar according to the contents of the indicators array.

## The Message Line

A message line pane displays a string that the program supplies dynamically. To set the value of the message line, you must first get access to the status bar object and then you must call the `CStatusBar::SetPaneText` member function with a zero-based index parameter. **Pane 0** is the leftmost pane, 1 is the next pane to the right, and so forth. The following code fragment is part of a view class member function. Note that you must navigate up to the application object and then back down to the main frame window.

```
CMainFrame* pFrame = (CMainFrame*) AfxGetApp()->m_pMainWnd;
CStatusBar* pStatus = &pFrame->m_wndStatusBar;
pStatus->SetPaneText(0, "message line for first pane");
```

Normally, the length of a message line pane is exactly one-fourth the width of the display. If, however, the message line is the first (index 0) pane, it is a stretchy pane without a beveled border. Its minimum length is one-fourth the display width, and it expands if room is available in the status bar.

## The Status Indicator

A status indicator pane is linked to a single resource-supplied string that is displayed or hidden by logic in an associated update command UI message handler function. An indicator is identified by a string resource ID, and that same ID is used to route update command UI messages. The **Caps Lock** indicator is handled in the frame class by a message map entry and a handler function equivalent to those shown below. The `Enable()` function turns on the indicator if the **Caps Lock** mode is set.

```
ON_UPDATE_COMMAND_UI(ID_INDICATOR_CAPS, OnUpdateKeyCapsLock)

void CMainFrame::OnUpdateKeyCapsLock(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(::GetKeyState(VK_CAPITAL) & 1);
}
```

The status bar update command UI functions are called during idle processing so that the status bar is updated whenever your application receives messages. The length of a status indicator pane is the exact length of the corresponding resource string.

## Taking Control of the Status Bar

In the standard application framework implementation, the status bar has the child window ID `AFX_IDW_STATUS_BAR`. The application framework looks for this ID when it wants to display a menu prompt. The update command UI handlers for the keyboard state indicators, embedded in the frame window base class, are linked to the following string IDs: `ID_INDICATOR_CAPS`, `ID_INDICATOR_NUM`, and `ID_INDICATOR_SCROLL`. To take control of the status bar, you must use a different child window ID and you must use different indicator ID constants. The only reason to change the status bar's child window ID is to prevent the framework from writing menu prompts in pane 0. If you like the menu prompts, you can disregard the following instructions. The status bar window ID is assigned in the `CStatusBar::Create` function called by the derived frame class `OnCreate()` member function. That function is contained in the **MainFrm.cpp** file that AppWizard generates. The window ID is the third `Create()` parameter and it defaults to `AFX_IDW_STATUS_BAR`. To assign your own ID, you must replace this call:

```
m_wndStatusBar.Create(this);
```

With this call:

```
m_wndStatusBar.Create(this, WS_CHILD | WS_VISIBLE | CBS_BOTTOM, ID_MY_STATUS_BAR);
```

You must also, of course, define the `ID_MY_STATUS_BAR` constant in the **resource.h** file (using Visual C++'s resource symbol editor). We forgot one thing. The standard application framework's **View** menu allows the user to turn the status bar on and off. That logic is pegged to the `AFX_IDW_STATUS_BAR` window ID, so you'll have to change the

menu logic, too. In your derived frame class, you must write message map entries and handlers for the `ID_VIEW_STATUS_BAR` command and update command UI messages. `ID_VIEW_STATUS_BAR` is the ID of the **Status Bar** menu item. The derived class handlers override the standard handlers in the `CFrameWnd` base class. See the MYMFC12 example for code details.

## The MYMFC12 Status Bar Example

The MYMFC12 example replaces the standard application framework status bar with a new status bar that has the following text panes.

Pane Index	String ID	Type	Description
0	ID_SEPARATOR (0)	Message line	x cursor coordinate
1	ID_SEPARATOR (0)	Message line	y cursor coordinate
2	ID_INDICATOR_LEFT	Status indicator	Left mouse button status
3	ID_INDICATOR_RIGHT	Status indicator	Right mouse button status

Table 5

The resulting status bar is shown in Figure 15. Notice that the leftmost pane stretches past its normal 1/20-screen length as the displayed frame window expands.

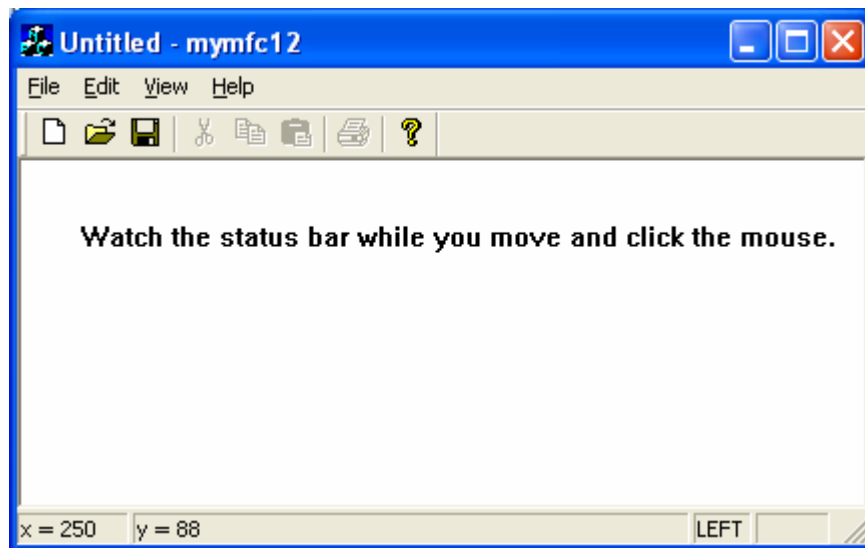


Figure 15: The status bar of the MYMFC12 example.

Follow these steps to produce the MYMFC12 example:

Run AppWizard to generate `\mfcproject\mymfc12`. Accept all default settings but two: select **Single Document** and deselect **Printing and Print Preview** and **ActiveX Controls**. The options and the default class names are shown here.



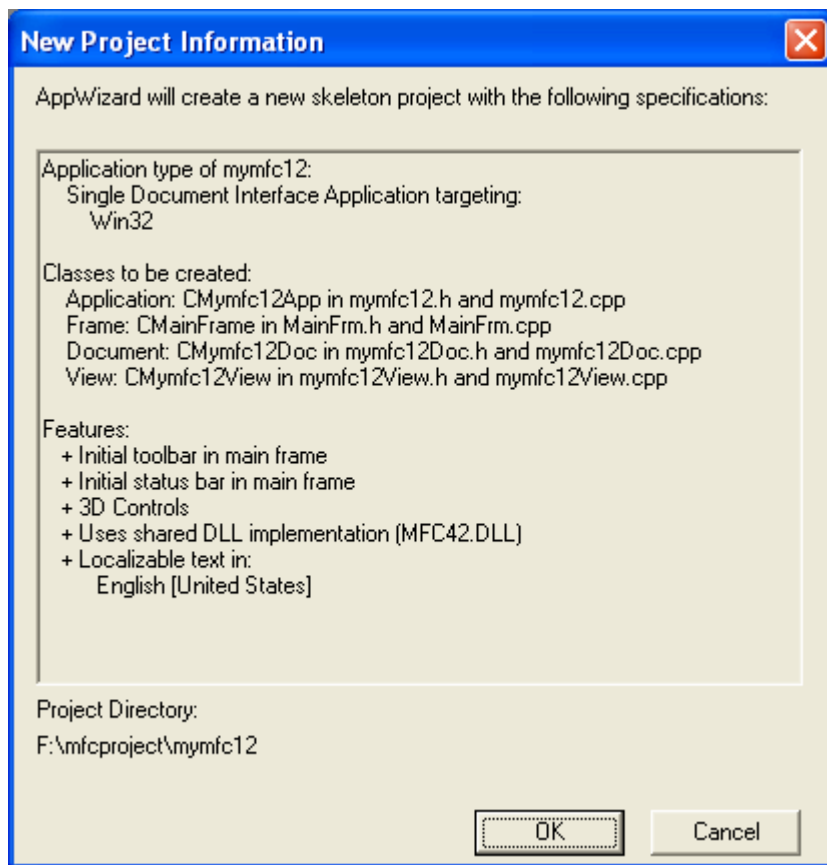


Figure 16: MYMFC12 project summary.

Use the string editor to edit the application's string table resource. The application has a single string table resource with artificial "segment" divisions left over from the 16-bit era. Double-click on the **String Table** icon in the **String Table** folder on the **ResourceView** page to bring up the string editor. Then, double-click on the empty entry at the end of the list. A dialog allows you to assign the ID and the string value as shown below.

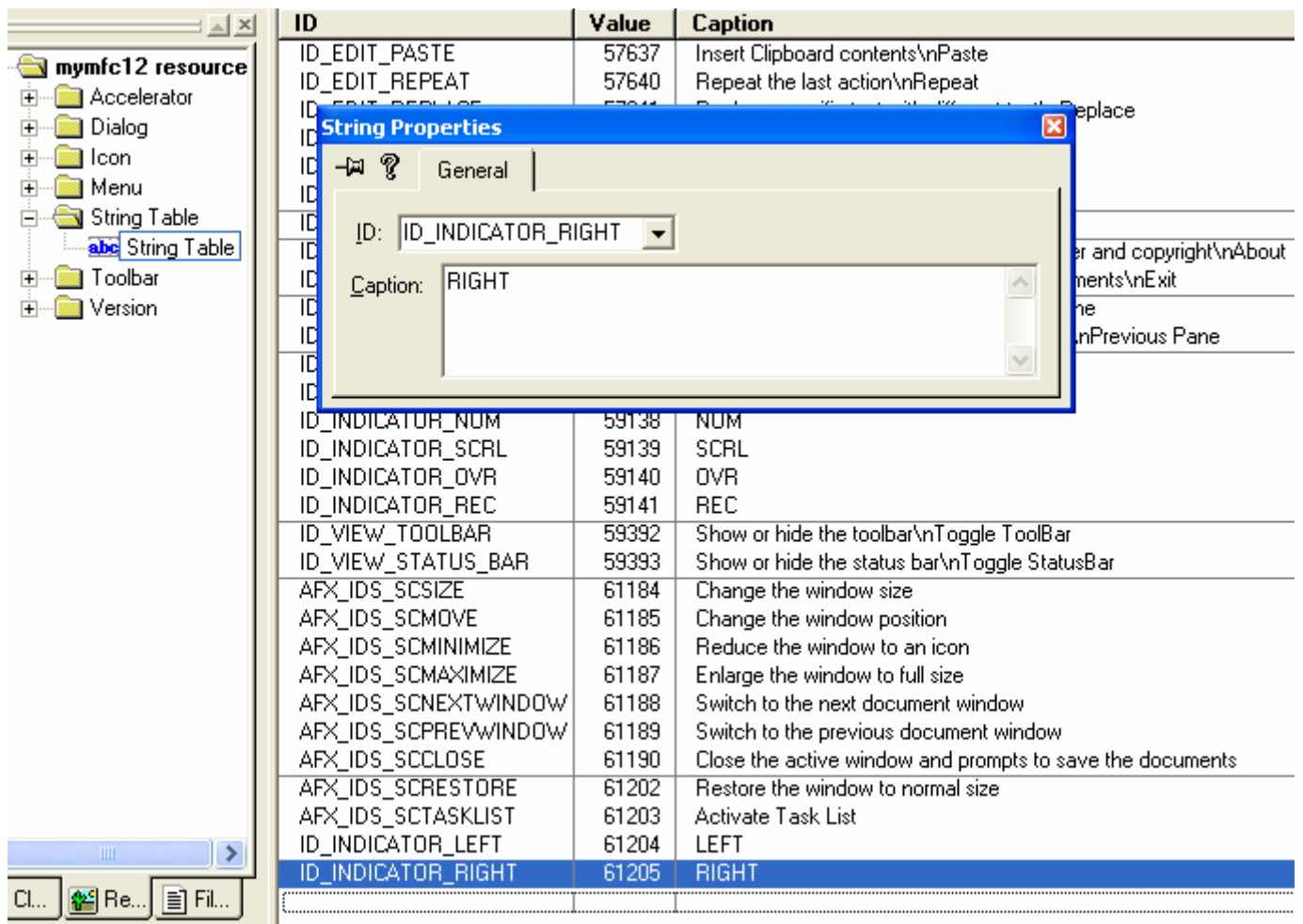


Figure 17: Using string editor to add and edit new string.

Add two strings as follows.

String ID	String Caption
ID_INDICATOR_LEFT	LEFT
ID_INDICATOR_RIGHT	RIGHT

Table 6

Use Visual C++ to edit the application's symbols. Choose **Resource Symbols** from the **View** menu. Add the new status bar identifier, ID\_MY\_STATUS\_BAR, and accept the default value.

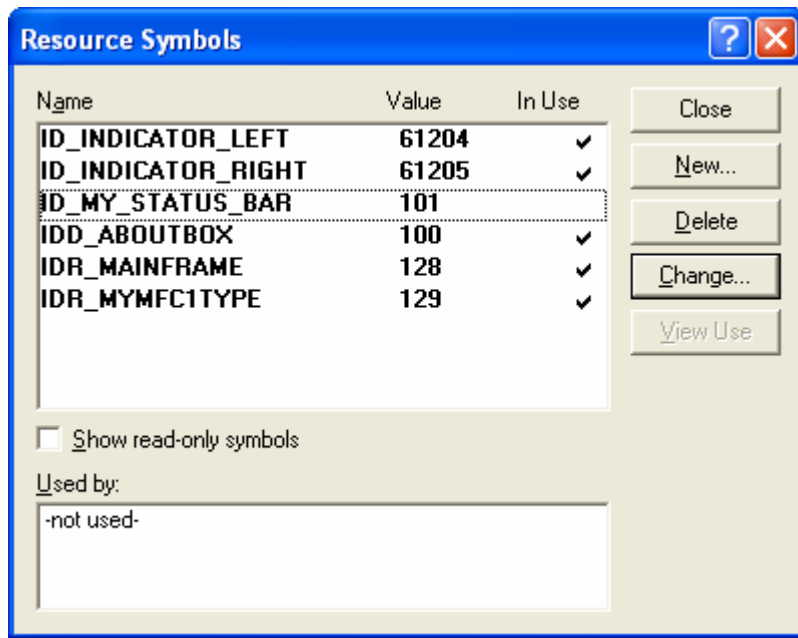


Figure 18: Using Resource Symbol dialog to add new status bar identifier, ID\_MY\_STATUS\_BAR.

Use ClassWizard to add **View** menu command handlers in the class CMainFrame. Add the following command message handlers.

Object ID	Message	Member Function
ID_VIEW_STATUS_BAR	COMMAND	OnViewStatusBar()
ID_VIEW_STATUS_BAR	UPDATE_COMMAND_UI	OnUpdateViewStatusBar()

Table 7

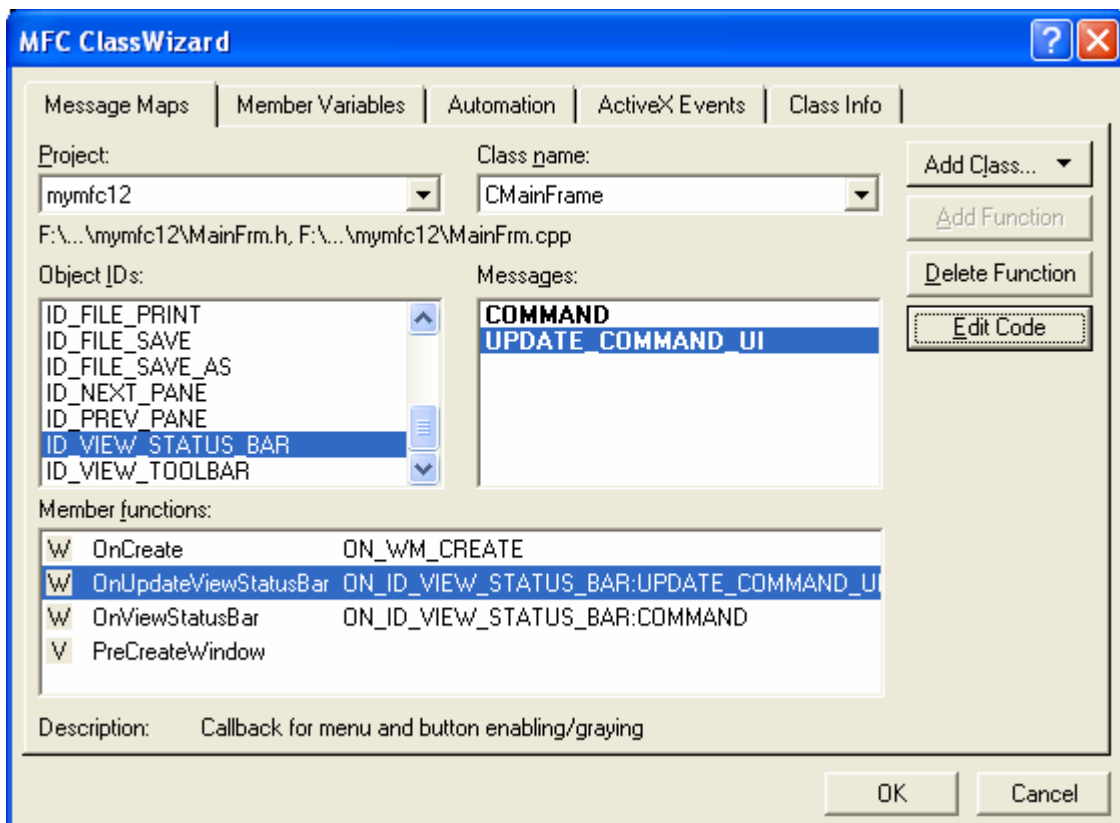


Figure 19: Adding **View** menu command handlers in the class CMainFrame.

Add the following function prototypes to **MainFrm.h**. You must add these CMainFrame message handler prototypes manually because ClassWizard doesn't recognize the associated command message IDs.

```

afx_msg void OnUpdateLeft(CCmdUI* pCmdUI);
afx_msg void OnUpdateRight(CCmdUI* pCmdUI);

// Generated message map functions
protected:
   //{{AFX_MSG(CMainFrame)
    afx_msg int OnCreate(LPCREATESTRUCT lpCreateStruct);
    afx_msg void OnViewStatusBar();
    afx_msg void OnUpdateViewStatusBar(CCmdUI* pCmdUI);
    afx_msg void OnUpdateLeft(CCmdUI* pCmdUI);
    afx_msg void OnUpdateRight(CCmdUI* pCmdUI);
    //}}AFX_MSG
    DECLARE_MESSAGE_MAP()
};

```

Listing 10.

Add the message handler statements inside the AFX\_MSG brackets so that ClassWizard will let you access and edit the code later. While **MainFrm.h** is open, make `m_wndStatusBar` **public** rather than **protected**.

```

public: // control bar embedded members
    CStatusBar m_wndStatusBar;
    CToolBar m_wndToolBar;

// Generated message map functions
protected:

```

Listing 11.

Edit the **MainFrm.cpp** file. Replace the original indicators array with the following code:

```
static UINT indicators[] =
{
    ID_SEPARATOR, // first message line pane
    ID_SEPARATOR, // second message line pane
    ID_INDICATOR_LEFT,
    ID_INDICATOR_RIGHT,
};

static UINT indicators[] =
{
    ID_SEPARATOR, // first message line pane
    ID_SEPARATOR, // second message line pane
    ID_INDICATOR_LEFT,
    ID_INDICATOR_RIGHT,
};
```

Listing 12.

Next edit the `OnCreate()` member function. Replace the following statement:

```
if (!m_wndStatusBar.Create(this) ||
    !m_wndStatusBar.SetIndicators(indicators,
    sizeof(indicators)/sizeof(UINT)))
{
    TRACE0("Failed to create status bar\n");
    return -1; // fail to create
}
```

With the statement shown here:

```
if (!m_wndStatusBar.Create(this,
    WS_CHILD | WS_VISIBLE | CBRS_BOTTOM, ID_MY_STATUS_BAR) ||
    !m_wndStatusBar.SetIndicators(indicators,
    sizeof(indicators)/sizeof(UINT)))
{
    TRACE0("Failed to create status bar\n");
    return -1; // fail to create
}

if (!m_wndStatusBar.Create(this,
    WS_CHILD | WS_VISIBLE | CBRS_BOTTOM, ID_MY_STATUS_BAR) ||
    !m_wndStatusBar.SetIndicators(indicators,
    sizeof(indicators)/sizeof(UINT)))
{
    TRACE0("Failed to create status bar\n");
    return -1; // fail to create
}

// TODO: Delete these three lines if you don't want the toolbar
```

Listing 13.

The modified call to `Create()` uses our own status bar ID, `ID_MY_STATUS_BAR`, instead of `AFX_IDW_STATUS_BAR` (the application framework's status bar object). Now add the following message map entries for the class `CMainFrame`. ClassWizard can't add these for you because it doesn't recognize the string table IDs as object IDs.

```
ON_UPDATE_COMMAND_UI(ID_INDICATOR_LEFT, OnUpdateLeft)
```

```

        ON_UPDATE_COMMAND_UI(ID_INDICATOR_RIGHT, OnUpdateRight)

// CMainFrame
IMPLEMENT_DYNCREATE(CMainFrame, CFrameWnd)

BEGIN_MESSAGE_MAP(CMainFrame, CFrameWnd)
   //{{AFX_MSG_MAP(CMainFrame)
    ON_WM_CREATE()
    ON_COMMAND(ID_VIEW_STATUS_BAR, OnViewStatusBar)
    ON_UPDATE_COMMAND_UI(ID_VIEW_STATUS_BAR, OnUpdateViewStatusBar)
    ON_UPDATE_COMMAND_UI(ID_INDICATOR_LEFT, OnUpdateLeft)
    ON_UPDATE_COMMAND_UI(ID_INDICATOR_RIGHT, OnUpdateRight)
    //}}AFX_MSG_MAP
END_MESSAGE_MAP()

```

Listing 14.

Next add the following CMainFrame member functions that update the two status indicators:

```

void CMainFrame::OnUpdateLeft(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(::GetKeyState(VK_LBUTTON) < 0);
}

void CMainFrame::OnUpdateRight(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(::GetKeyState(VK_RBUTTON) < 0);
}

void CMainFrame::OnViewStatusBar()
{
    // TODO: Add your command handler code here
}

void CMainFrame::OnUpdateViewStatusBar(CCmdUI* pCmdUI)
{
    // TODO: Add your command update UI handler code here
}

void CMainFrame::OnUpdateLeft(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(::GetKeyState(VK_LBUTTON) < 0);
}

void CMainFrame::OnUpdateRight(CCmdUI* pCmdUI)
{
    pCmdUI->Enable(::GetKeyState(VK_RBUTTON) < 0);
}

```

Listing 15.

Note that the left and right mouse buttons have virtual key codes like keys on the keyboard have. You don't have to depend on mouse-click messages to determine the button status. Finally, edit the following **View** menu functions that ClassWizard originally generated in **MainFrm.cpp**:

```

void CMainFrame::OnViewStatusBar()
{
    m_wndStatusBar.ShowWindow((m_wndStatusBar.GetStyle() & WS_VISIBLE) == 0);
    RecalcLayout();
}

void CMainFrame::OnUpdateViewStatusBar(CCmdUI* pCmdUI)

```

```

    {
        pCmdUI->SetCheck((m_wndStatusBar.GetStyle() & WS_VISIBLE) != 0);
    }

void CMainFrame::OnViewStatusBar()
{
    // TODO: Add your command handler code here
    m_wndStatusBar.ShowWindow((m_wndStatusBar.GetStyle() & WS_VISIBLE) == 0);
    RecalcLayout();
}

void CMainFrame::OnUpdateViewStatusBar(CCmdUI* pCmdUI)
{
    // TODO: Add your command update UI handler code here
    pCmdUI->SetCheck((m_wndStatusBar.GetStyle() & WS_VISIBLE) != 0);
}

```

Listing 16.

These functions ensure that the **View** menu **Status Bar** command is properly linked to the new status bar. Edit the `OnDraw()` function in **Mymfc12View.cpp**. The `OnDraw()` function displays a message in the view window. Add the following code:

```

    void CMymfc12View::OnDraw(CDC* pDC)
    {
        pDC->TextOut(30, 30, "Watch the status bar while you move and click the
        mouse.");
    }

// CMymfc12View drawing
void CMymfc12View::OnDraw(CDC* pDC)
{
    // TODO: add draw code for native data here
    pDC->TextOut(30, 30, "Watch the status bar while you move and click the mouse.");
}

```

Listing 17.

Add a `WM_MOUSEMOVE` handler in the `CMymfc12View` class. Use ClassWizard to map the message to `OnMouseMove()` and then edit the function as shown below. This function gets a pointer to the status bar object and then calls the `SetPaneText()` function to update the first and second message line panes.

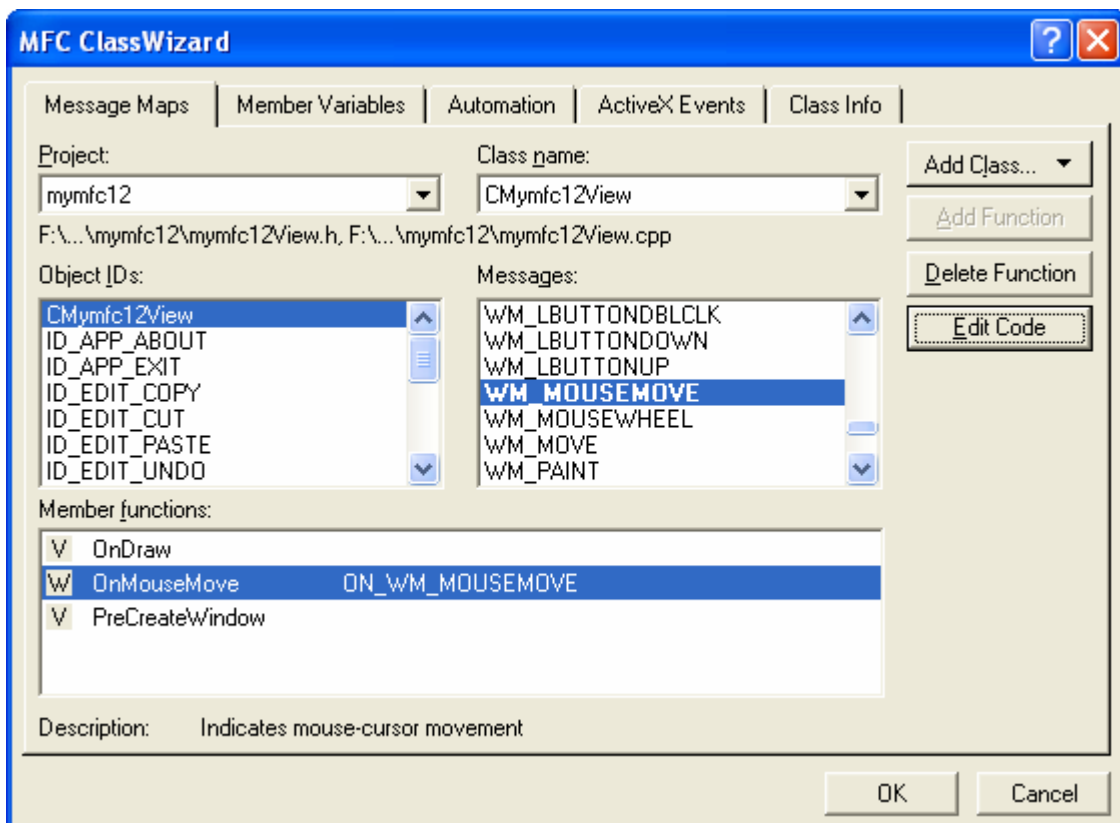


Figure 20: Adding a WM\_MOUSEMOVE handler in the CMymfc12View class.

```

void CMymfc12View::OnMouseMove(UINT nFlags, CPoint point)
{
    CString str;
    CMainFrame* pFrame = (CMainFrame*) AfxGetApp()->m_pMainWnd;
    CStatusBar* pStatus = &pFrame->m_wndStatusBar;
    if (pStatus) {
        str.Format("x = %d", point.x);
        pStatus->SetPaneText(0, str);
        str.Format("y = %d", point.y);
        pStatus->SetPaneText(1, str);
    }
}

// CMymfc12View message handlers
void CMymfc12View::OnMouseMove(UINT nFlags, CPoint point)
{
    // TODO: Add your message handler code here and/or call default
    CString str;
    CMainFrame* pFrame = (CMainFrame*) AfxGetApp()->m_pMainWnd;
    CStatusBar* pStatus = &pFrame->m_wndStatusBar;
    if (pStatus) {
        str.Format("x = %d", point.x);
        pStatus->SetPaneText(0, str);
        str.Format("y = %d", point.y);
        pStatus->SetPaneText(1, str);
    }
}

```

Listing 18.

Finally, add the include statement:



```
#include "MainFrm.h"
```

Near the top of the file **mymfc12View.cpp**.

```
// mymfc12View.cpp : implementation of the CMymfc12View class  
  
#include "stdafx.h"  
#include "mymfc12.h"  
  
#include "mymfc12Doc.h"  
#include "mymfc12View.h"  
#include "MainFrm.h"  
  
#ifdef _DEBUG  
#define new DEBUG_NEW  
#undef THIS_FILE  
static char THIS_FILE[] = __FILE__;  
#endif
```

Listing 19.

Build and test the MYMFC12 application. Move the mouse, and observe that the left two status bar panes accurately reflect the mouse cursor's position. Try the left and right mouse buttons. Can you toggle the status bar on and off from the **View** menu?

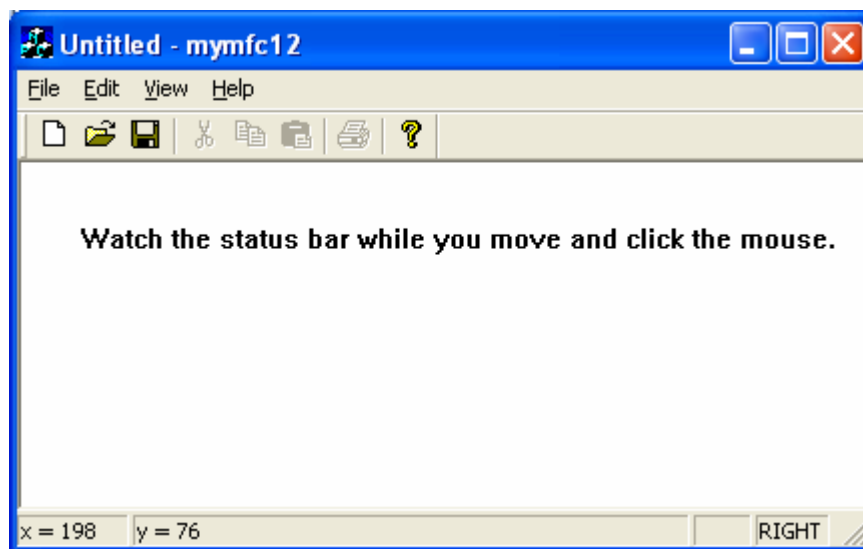


Figure 21: MYMFC12 program output with new status bar items.

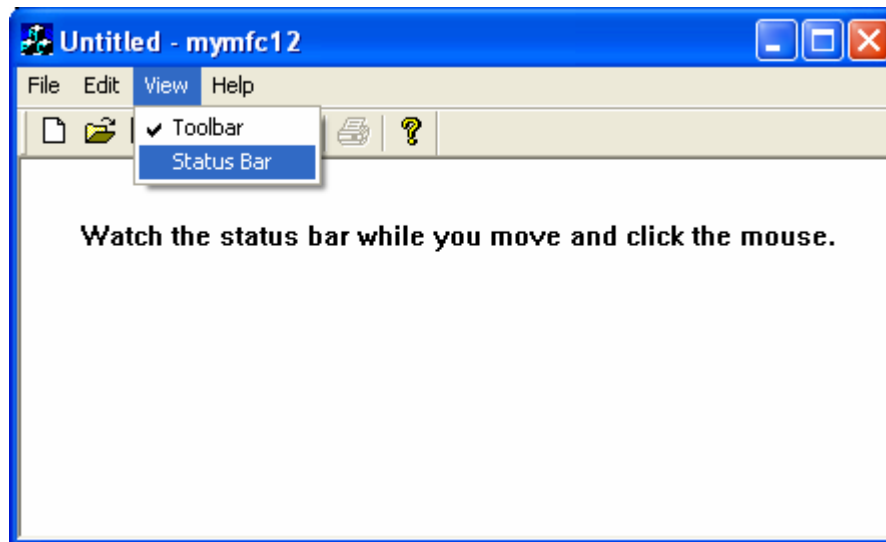


Figure 22: Disabling the status bar.

If you want the first (**index 0**) status bar pane to have a beveled border like the other panes and you want the status bar to grow and resize to fit their contents, include the following two lines in the `CMainFrame::OnCreate` function, following the call to the status bar `Create()` function.

```

m_wndStatusBar.SetPaneInfo(0, 0, 0, 50);
m_wndStatusBar.SetPaneInfo(1, 0, SBPS_STRETCH, 50);

if (!m_wndStatusBar.Create(this,
    WS_CHILD | WS_VISIBLE | CBS_BOTTOM, ID_MY_STATU
!m_wndStatusBar.SetIndicators(indicators,
    sizeof(indicators)/sizeof(UINT)))
{
    TRACE0("Failed to create status bar\n");
    return -1;    // fail to create
}

m_wndStatusBar.SetPaneInfo(0, 0, 0, 50);
m_wndStatusBar.SetPaneInfo(1, 0, SBPS_STRETCH, 50);

```

Listing 20.

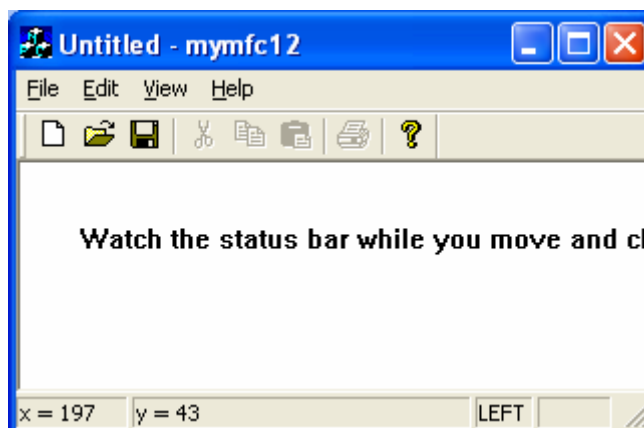


Figure 23: MYMFC12 with new status bar modification.

These statements change the width of the first two panes (from their default of one-fourth the display size) and make the second pane (**index 1**) the stretchy one.

## The Internet Explorer Rebar Toolbar

Visual C++ 6.0 contains many features that are part of Internet Explorer 4.0 and above: the Internet Explorer Common Controls. One of the controls in the IE Common Controls is a **rebar**. You're probably already familiar with the rebar if you have ever used Internet Explorer. The rebar differs from the default MFC toolbar in that it provides grippers and allows the user to "slide" its horizontal and vertical positions, whereas the MFC toolbar's position is changed via drag-and-drop docking. Rebars also allow the developer to provide many more internal control types, such as drop-down menus, than are available in `CToolBar`.

## Anatomy of a Rebar

Figure 24 shows the various terminologies used on a rebar. Each internal toolbar in a rebar is called a **band**. The raised edge where the user slides the band is called a **gripper**. Each band can also have a **label**.

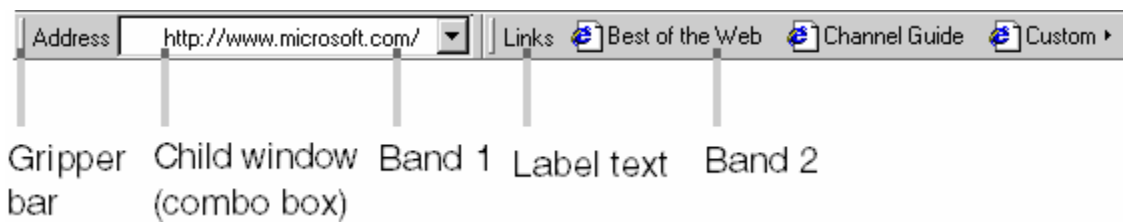


Figure 24: Rebar terminology.

MFC provides two classes that facilitate working with rebars:

- **CReBar**: A high-level abstraction class that provides members for adding `CToolBar` and `CDialogBar` classes to rebars as bands. `CReBar` also handles communication (such as message notifications) between the underlying control and the MFC framework.
- **CReBarCtrl**: A low-level wrapper class that wraps the **IE ReBar** control. This class provides numerous members for creating and manipulating rebars but does not provide the niceties that are found in `CReBar`.

Most MFC applications use `CReBar` and call the member function `GetReBarCtrl()`, which returns a `CReBarCtrl` pointer to gain access to the lower-level control if needed.

## The MYMFC13 Rebar Example

Let's get familiar with the rebar by jumping into an example. This example creates an SDI application that has a rebar with two bands: a familiar **toolbar band** and a **dialog bar band**. Figure 25 shows the example in action.

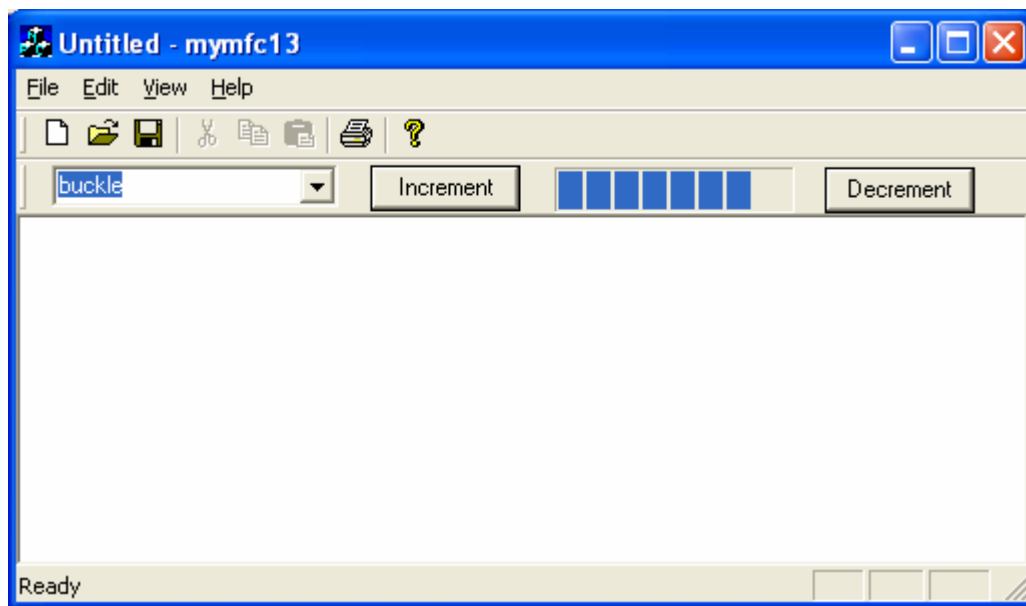


Figure 25: MYMFC13 rebar example.

Here are the steps required to create the MYMFC13 example:

Run AppWizard to generate mfcproject\mymfc13. Select **Single Document**. In Step 4, be sure you select **Internet Explorer ReBars** under the **How Do You Want Your Toolbars To Look** option. Figure 26 below shows the correct settings. Accept all other default settings.

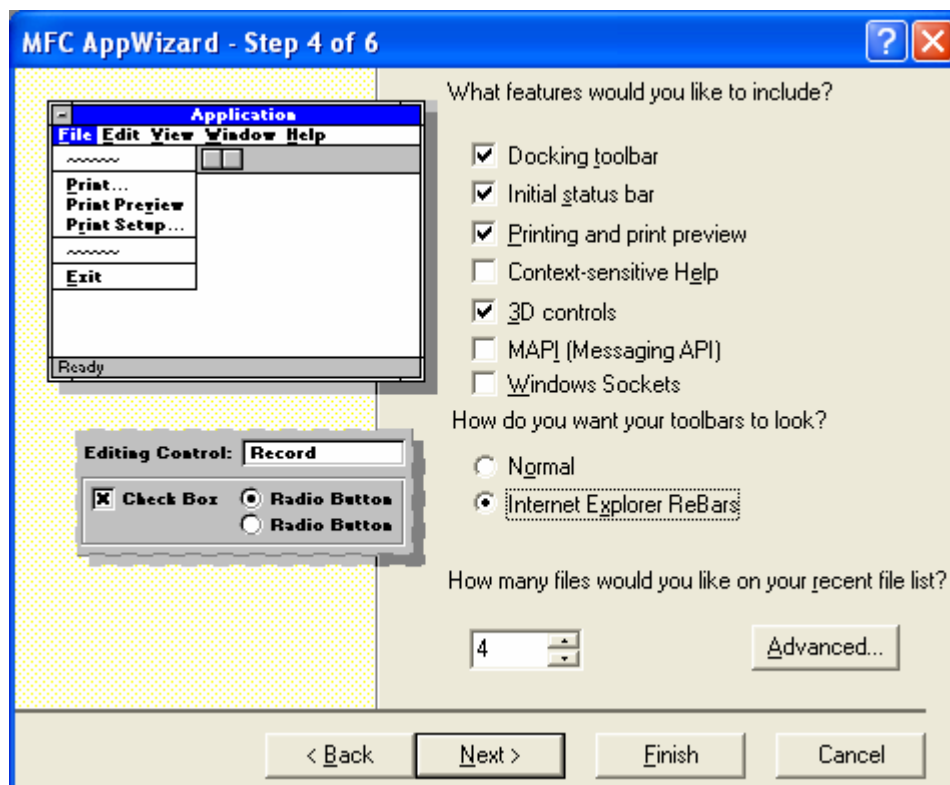


Figure 26: AppWizard Step 4 settings for the rebar control.

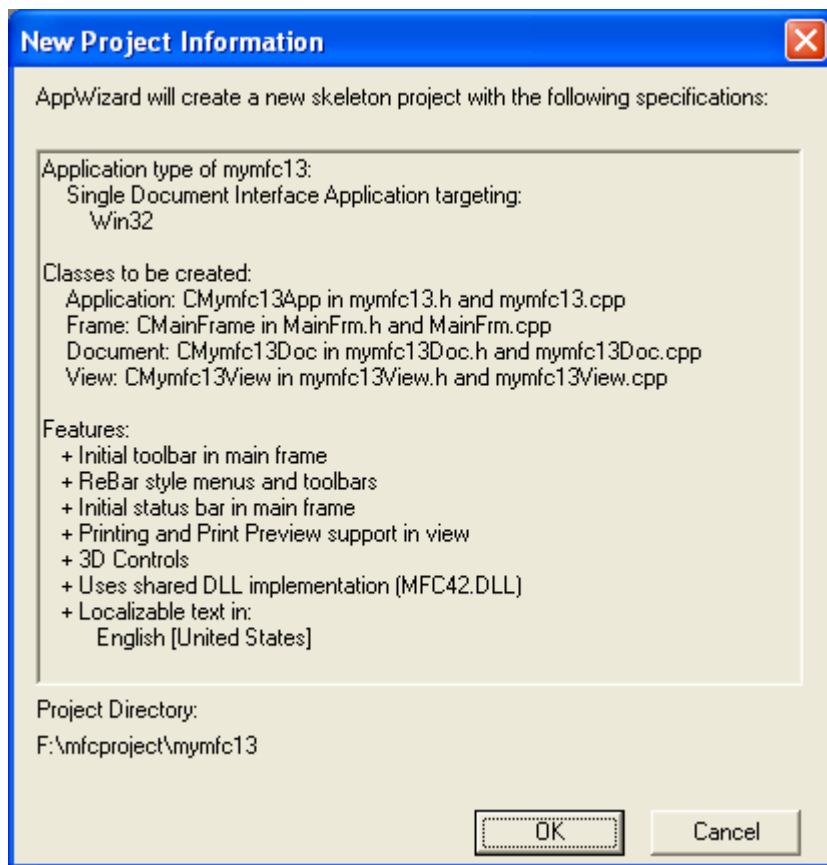


Figure 27: MYMFC13 project summary.

Compile and run the application. When you run the application, you will see that AppWizard has automatically created a rebar with two bands. One band contains a conventional toolbar and the other contains the text "TODO: layout dialog bar" in the band. Figure 28 below shows the initial rebar control.

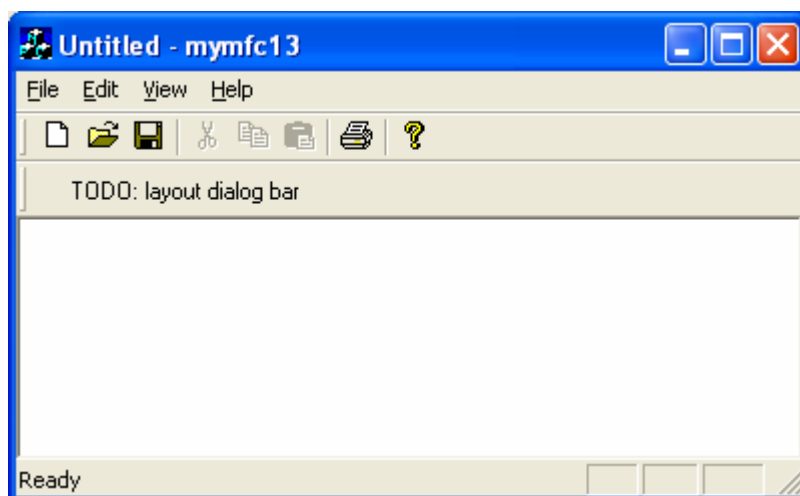


Figure 28: Initial windows for MYMFC13 example with the default rebar controls.

At this point, you can open the **MainFrm.h** header file and see the code below, which declares the CReBar data member m\_ndReBar.

```
protected: // control bar embedded members
```

```

        CStatusBar  m_wndStatusBar;
        CToolBar   m_wndToolBar;
        CReBar     m_wndReBar;
        CDialogBar m_wndDlgBar;

protected: // control bar embedded members
    CStatusBar  m_wndStatusBar;
    CToolBar   m_wndToolBar;
    CReBar     m_wndReBar;
    CDialogBar m_wndDlgBar;

// Generated message map functions

```

Listing 21.

In the **MainFrm.cpp** file, you can see the code that adds the toolbar and the dialog bar to the CReBar object:

```

if (!m_wndReBar.Create(this) ||
    !m_wndReBar.AddBar(&m_wndToolBar) ||
    !m_wndReBar.AddBar(&m_wndDlgBar))
{
    TRACE0("Failed to create rebar\n");
    return -1; // fail to create
}

if (!m_wndReBar.Create(this) ||
    !m_wndReBar.AddBar(&m_wndToolBar) ||
    !m_wndReBar.AddBar(&m_wndDlgBar))
{
    TRACE0("Failed to create rebar\n");
    return -1; // fail to create
}

```

Listing 22.

Lay out the **Dialog Bar**. Open the Visual C++ **resource editor**. Under the **Dialog** heading you'll find a dialog resource for the dialog bar with the ID `IDR_MAINFRAME`. Open `IDR_MAINFRAME` and you'll see the dialog bar with the text "TODO: layout dialog bar" as shown below.



Figure 29: Dialog bar ready to be edited.

Let's follow AppWizard's friendly suggestion and put some real controls into the dialog bar. First delete the static control with the "TODO" text in it. Next place a combo box in the dialog bar and enter some default data items: one, two, buckle, my, shoe!

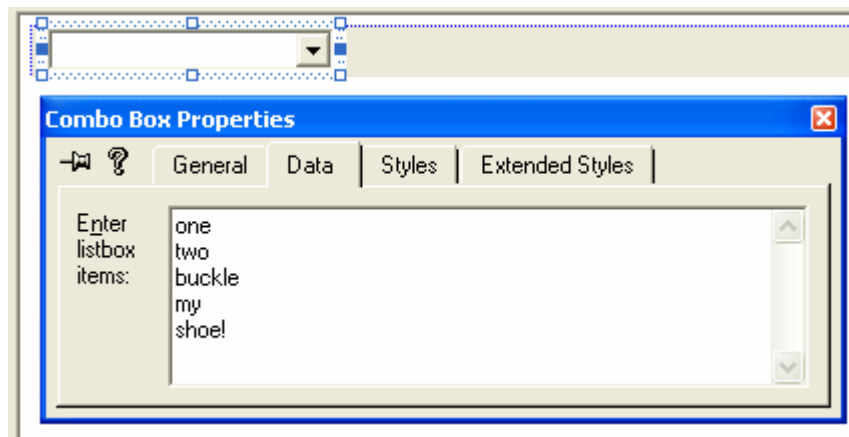


Figure 30: Adding and modifying the combo box in the dialog bar properties.

Now place a button on the dialog bar and change the button's text to **Increment**. Next place a progress bar with the default properties on the dialog bar. Finally place another button with the text **Decrement** on the dialog bar. When you are done laying out the dialog bar, it should look similar to Figure 32.

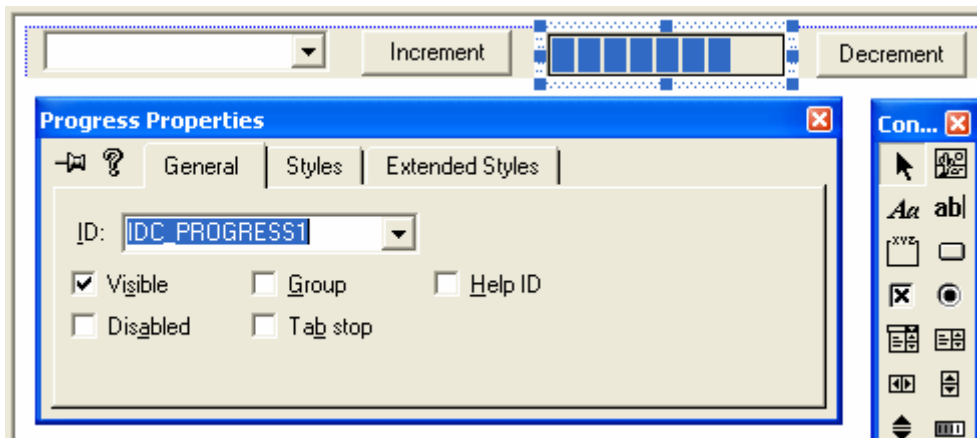


Figure 31: Adding and modifying progress bar control properties.

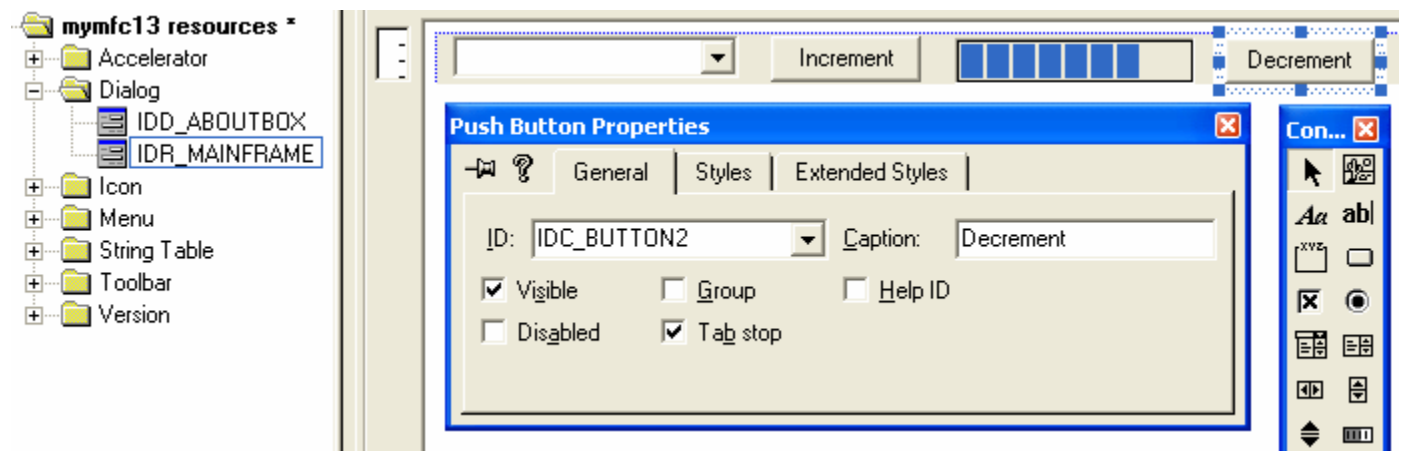


Figure 32: Adding and modifying button control properties.

Associate the dialog bar with the CMainFrame class. Before we can program the handlers for the **Increase** and **Decrease** buttons, we need to attach the dialog bar to a class using ClassWizard. While in the resource editor, bring up ClassWizard by double-clicking on the **Increase** button. You will now see this dialog.

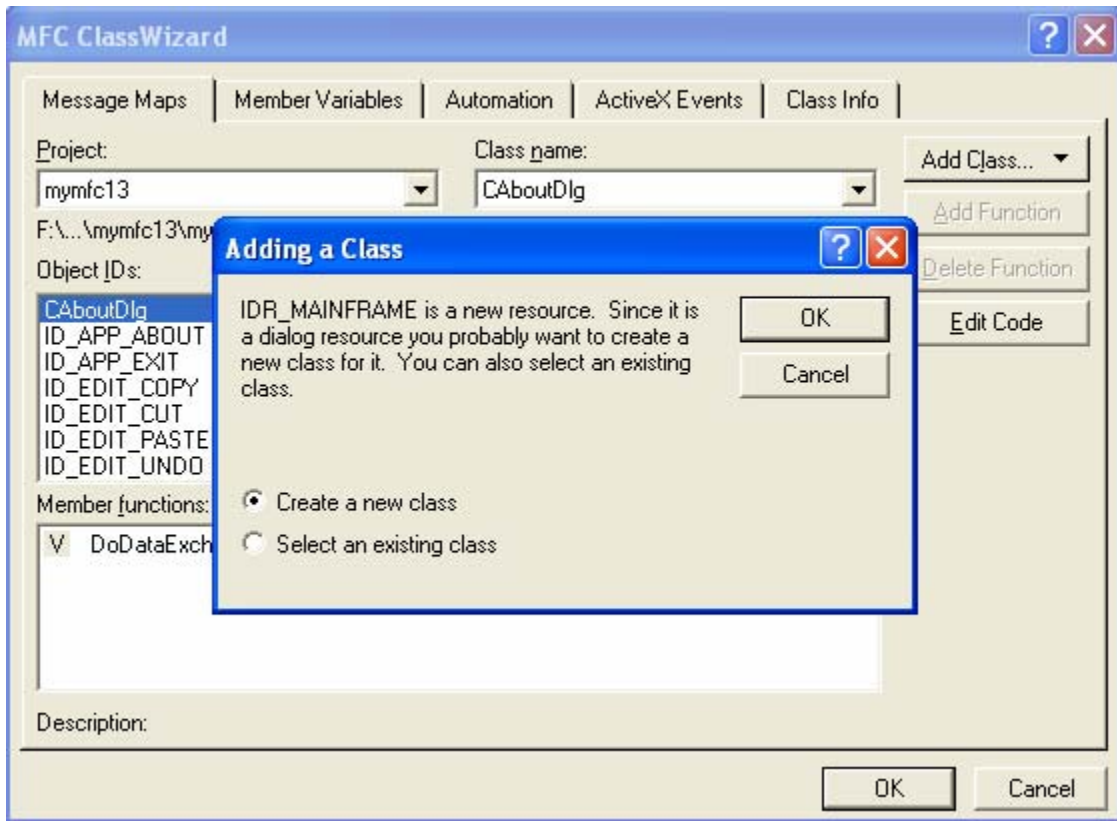


Figure 34: New class dialog prompt for IDR\_MAINFRAME.

Choose **Select An Existing Class**. We choose this option because we want our dialog resource to be a band in the toolbar, not a separate dialog class. Click **OK** and you will see these choices.

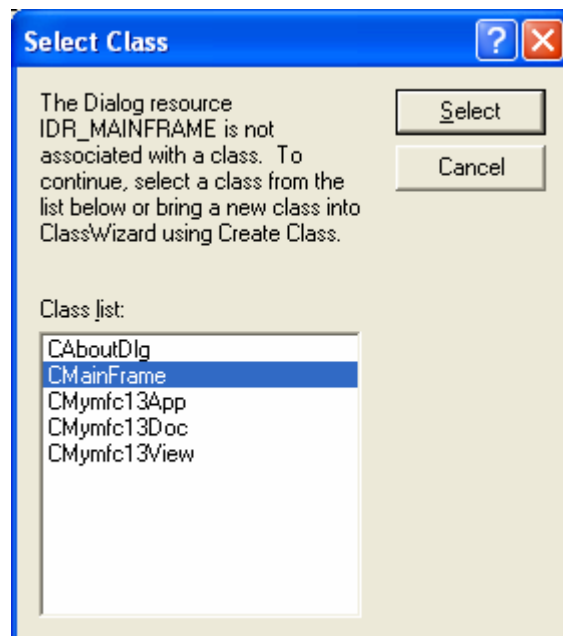




Figure 35: Associating the dialog bar with the CMainFrame class.

Choose CMainFrame from the list and click **Select**. ClassWizard will prompt you with one last dialog as shown below.

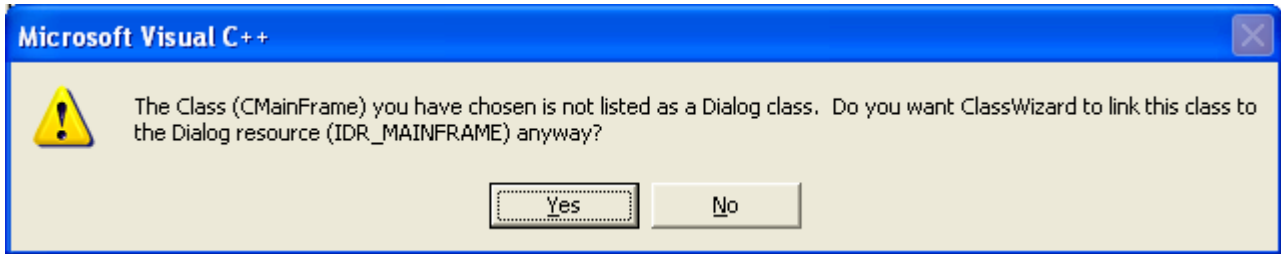


Figure 36: Associating CMainFrame class to the Dialog class prompt.

Click **Yes** and then exit ClassWizard. You have successfully associated the IDR\_MAINFRAME dialog bar with the CMainFrame class.

Program the dialog bar. To program the dialog bar, bring up the IDR\_MAINFRAME dialog resource in the resource editor again and double-click on the **Increment** button. ClassWizard will automatically create an ONBUTTON1 handler for you; accept the default name for this function and click the **Edit Code** button.

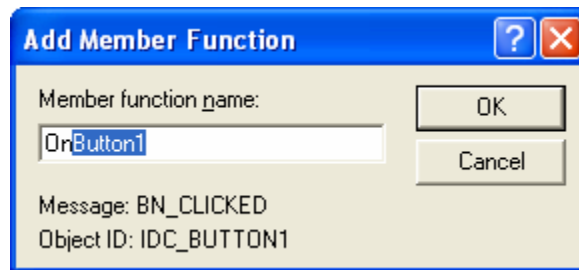


Figure 37: Creating the ONBUTTON1 handler for the **Decrement** button.

Enter the following code in the OnButton1 ( ) function:

```
void CMainFrame::OnButton1()
{
    CProgressCtrl * pProgress = (CProgressCtrl*)m_wndDlgBar.GetDlgItem(IDC_PROGRESS1);
    pProgress->StepIt();
}

// CMainFrame message handlers
void CMainFrame::OnButton1()
{
    // TODO: Add your control notification handler code here
    CProgressCtrl * pProgress = (CProgressCtrl*)m_wndDlgBar.GetDlgItem(IDC_PROGRESS1);
    pProgress->StepIt();
}
```

Listing 23.

The OnButton1 ( ) handler first gets a pointer to the progress control and then calls StepIt ( ) to increment the progress control.

Now we need to add similar code to the decrement handler. Double-click on the **Decrement** button in the resource editor and ClassWizard will automatically create an OnButton2 ( ) handler.

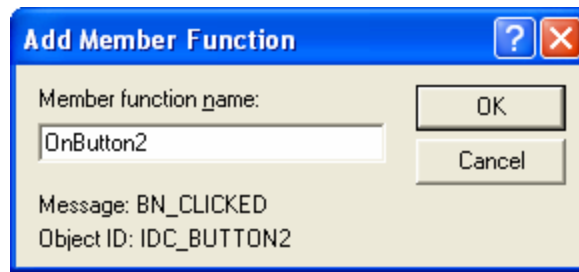


Figure 38: Adding the OnButton2() handler for the **Increment** button.

Add the following code to the OnButton2() member function:

```
void CMainFrame::OnButton2()
{
    CProgressCtrl * pProgress = (CProgressCtrl*)m_wndDlgBar.GetDlgItem(IDC_PROGRESS1);
    int nCurrentPos = pProgress->GetPos();
    pProgress->SetPos(nCurrentPos-10);
}

void CMainFrame::OnButton2()
{
    // TODO: Add your control notification handler code here
    CProgressCtrl * pProgress = (CProgressCtrl*)m_wndDlgBar.GetDlgItem(IDC_PROGRESS1);
    int nCurrentPos = pProgress->GetPos();
    pProgress->SetPos(nCurrentPos-10);
}
```

Listing 24.

Compile and test. Now you can compile and run MYMFC13 to see your custom rebar in action. The **Increment** button increases the progress bar and the **Decrement** button decreases it.

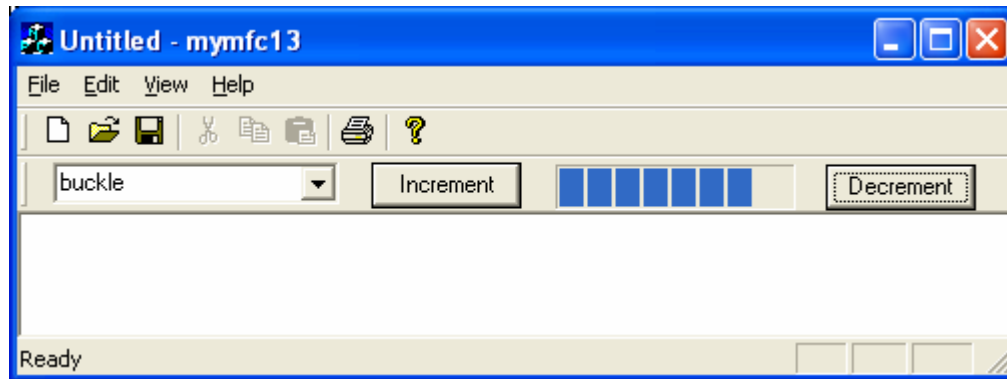


Figure 39: MYMFC13 program output in action, with rebar items.

In this Module, we learned how to use MFC's toolbar, status bar, and the new rebar control. In the next Module, we'll look at how to extend MFC to implement a frame window that remembers its position.

#### Further reading and digging:

1. [MSDN MFC 6.0 class library online documentation](#) - used throughout this Tutorial.
2. [MSDN MFC 7.0 class library online documentation](#) - used in .Net framework and also backward compatible with 6.0 class library
3. [MSDN Library](#)
4. [Windows data type.](#)
5. [Win32 programming Tutorial.](#)

6. [The best of C/C++, MFC, Windows and other related books.](#)
7. [Unicode and Multibyte character set: Story and program examples.](#)