Resources

- Resource – the binary data which can be added to any Windows executable module (.exe or .dll)
- The source of resources: HMODULE or HINSTANCE
  - LoadLibrary(), LoadLibraryEx()
  - GetModuleHandle(), GetModuleHandleEx()
- Types of resources:
  - bitmaps, cursors, icons, fonts
  - string tables, message tables
  - accelerator tables, menus, dialog boxes
  - metafiles
  - information about version of the module
- Identification: type, name, and language
  - for numbers: MAKEINTRESOURCE(), IS_INTRESOURCE()

Using resources

- Finding
  - FindResource(), FindResourceEx()
- Loading
  - LoadResource(), LockResource()
  - LoadAccelerators(), LoadBitmap(), LoadCursor(), LoadIcon(), LoadImage(), LoadMenu(), LoadString()
- Destroying
  - DestroyAcceleratorTable(), DeleteObject(), DeleteCursor(), DestroyIcon(), DestroyMenu()
- Modification
  - BeginUpdateResource(), EndUpdateResource()
  - UpdateResource()

Icons and Strings

- Icons
  - HICON
  - loading: LoadIcon(), LoadImage()
  - creating: CreateIcon(), CreateIconIndirect()
  - drawing: DrawIcon(), DrawIconEx()
  - copying: CopyIcon(), CopyImage(), DuplicateIcon()
  - destroying: DestroyIcon()
  - types: system (big and small), shell's (small and big)
- Strings
  - LoadString()
  - FormatMessage()

Menu

- HMENU
- The menu bar – the main (the 1st) level of window's menu
  - retrieving a handle: GetMenu()
  - retrieving information: GetMenuBarInfo()
  - redrawing: DrawMenuBar()
- Context menu
  - WM_CONTEXTMENU
  - CreatePopupMenu(), GetSubMenu()
  - TrackPopupMenu(), TrackPopupMenuEx()
- System menu – standard window's menu created by the system (available at the window's icon)
  - retrieving a handle: GetSystemMenu()
  - WM_SYSCOMMAND

Menu Items

- Identification
  - the command identifier - GetMenuItemID()
  - the position number (starting from 0)
- Information: GetMenuItemInfo(), GetMenuState()
- Submenu
  - GetSubMenu()
- Default item of a submenu
  - GetMenuDefaultItem(), SetMenuDefaultItem()
- Menu identifier
  - GetMenuItemID()
- Separator
  - the MFT_MENUBREAK flag

States of Menu Items

- Checked
  - CheckMenuItem(), CheckMenuRadioItem(), SetMenuItemInfo()
  - SetMenuItemBitmaps()
- Disabled
  - EnableMenuItem()
- Hilited
  - HiliteMenuItem()
- Nonstandard drawing
  - the MFT_OWNERDRAW flag
  - WM_MEASUREITEM, WM_DRAWITEM, WM_MENUCHAR

Using Menus

- Loading
  - LoadMenu(), LoadMenuIndirect()
- Creating
  - CreateMenu(), CreatePopupMenu()
- Modification
  - InsertMenuItem(), AppendMenu(), InsertMenu(), RemoveMenu(), DeleteMenu()
- Visibility - RegisterClassEx(), CreateWindowEx()
  - SetMenu()
- Destroying
  - DestroyMenu()
- Messages
  - WM_INITMENU, WM_MENUSELECT, WM_COMMAND

Accelerators

- Keyboard hotkeys generating the WM_COMMAND message
- The ACCEL structure:
  - combination of keys
  - an identifier
  - flags
- Using accelerators:
  - call the TranslateAccelerator() function in the message loop
  - WM_KEYUP, WM_KEYDOWN --> WM_COMMAND
- Operations:
  - LoadAccelerators()
  - CreateAcceleratorTable()
  - CopyAcceleratorTable()
  - DestroyAcceleratorTable()

Dialog Boxes

- Used to get input data from the user
- Each dialog box has an owner
- Dialog boxes templates – in resources or in memory
- The coordinate space
  - special dialog box units, independent on display
  - MapDialogRect(), GetDialogBaseUnits()
- The font
  - WM_SETFONT (the default: SYSTEM_FONT)
- The dialog box procedure
  - do not call DefWindowProc()
  - return TRUE, if a message was processed
- WM_INITDIALOG (instead of WM_CREATE)

Modal Dialog Boxes

- The only window of the application receiving the user's input
- Standard styles: WS_POPUP, WS_SYSMENU, WS_CAPTION, DS_MODALFRAME (never: WS_CHILD)
- Creating and displaying
  - DialogBox(), DialogBoxIndirect()
  - DialogBoxParam(), DialogBoxIndirectParam()
- The system creates a new message loop for the dialog box and all application's messages are processed here
  - messages not related with this dialog box are forwarded to the owner window
  - WM_ENTERIDLE - sent do the owner when the message queue is empty
- Closing and destroying: EndDialog()

Modeless Dialog Boxes

- They allow to work with other windows of the application
- Standard styles: WS_POPUP, WS_CAPTION, WS_BORDER, WS_SYSMENU
- Creating
  - CreateDialog(), CreateDialogIndirect()
  - CreateDialogParam(), CreateDialogIndirectParam()
- Displaying
  - ShowWindow() (necessary, if the WS_VISIBLE style is not set)
- Using
  - call the IsDialogMessage() function for each message
- Destroying
  - DestroyWindow()

Controls

- The dialog box's template defines the position, size, style, identifier, and window class of all controls
- All controls are child windows (WS_CHILD is applied)
- Each control has an unique identifier (except for statics)
- The user's actions on controls generate messages sent to the dialog box
  - WM_COMMAND
  - WM_NOTIFY - common controls
- To get the control's HWND: GetDlgItem()
- Modifications:
  - SetDlgItemText(), SetDlgItemInt()
  - CheckDlgButton()
  - EnableWindow(), SetFocus()

Standard Controls

- Predefined window classes for controls:
  - BUTTON, COMBOBOX, EDIT, LISTBOX, SCROLLBAR, STATIC
  - RichEdit (ver.1.0), RICHEDIT_CLASS (ver.2.0 i 3.0)
- Common controls - InitCommonControlsEx()
  - ComboBoxEx, Flat Scroll Bar
  - Date and TimePicker, Month Calendar
  - Progress Bar, Trackbar, Up-Down
  - List View, Tree View, Header, Image List
  - Pager, Property Sheet, Tab
  - Rebar, Toolbar, Status Bar
  - Animation, IP Address, ToolTip, SysLink

Nonstandard Controls

- The nonstandard drawing
  - owner-drawn
    - static, button, listbox, combobox
    - using special style, e.g. SS_OWNERDRAW
    - WM_MEASUREITEM, WM_DRAWITEM
  - custom draw
    - header, list view, rebar, toolbar, tooltip, trackbar, tree view
    - NM_CUSTOMDRAW
- Subclassing – using a custom window procedure
  - SetWindowLong() with GWL_WNDPROC
  - call CallWindowProc() for standard processing of messages
- A new control – a new window class and window procedure

Scrolling

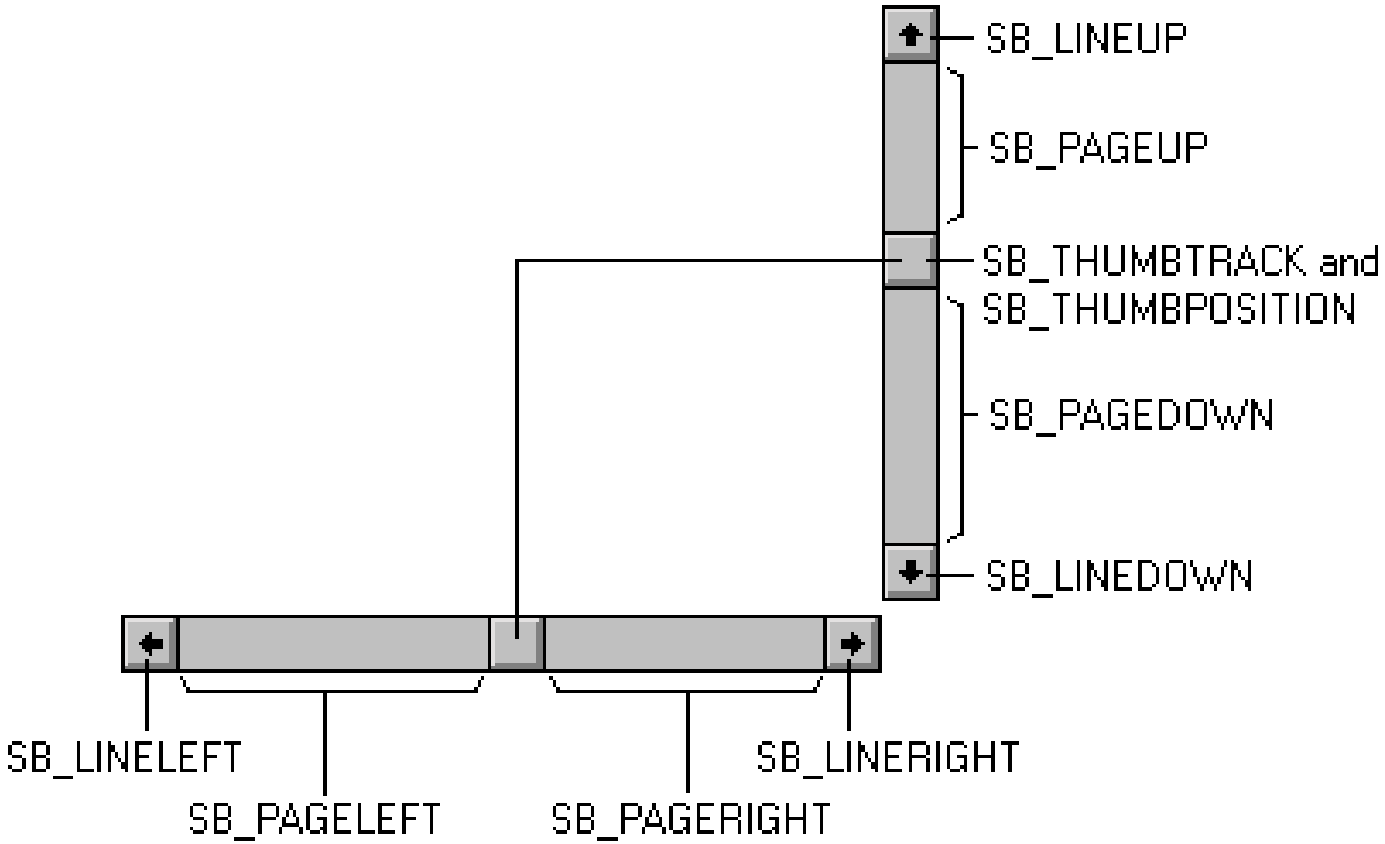
- The standard Scroll Bar
  - it is placed outside the client area
  - it is a part of a window (created with it)
  - WS_HSCROLL, WS_VSCROLL
  - GetSystemMetrics(), GetSysColors(), SetSysColor()
- The Scroll Bar Control
  - it is a window of the "SCROLLBAR" class (with its own HWND)
  - built-in processing of keyboard messages
  - InitCommonControlsEx(), CreateWindowEx()
- Scrolling the window’s content or the DC
  - ScrollWindowEx(), ScrollDC()

Using Scroll Bars

- Visibility
  - ShowScrollBar()
- Enabling
  - EnableScrollBar()
- Settings
  - SetScrollInfo(), GetScrollInfo()
  - SetScrollPos(), GetScrollPos()
  - SetScrollRange(), GetScrollRange()

Scroll Bar Messages

- WM_HSCROLL, WM_VSCROLL



Standard dialog boxes

- MessageBox(), MessageBoxEx()
- The standard dialog boxes:
  - to choose a color - ChooseColor(), CHOOSECOLOR
  - to choose a font - ChooseFont(), CHOOSEFONT
  - to find a text - FindText(), FINDREPLACE
  - to replace a text - ReplaceText(), FINDREPLACE
  - to open a file - GetOpenFileName(), OPENFILENAME
  - to save a file - GetSaveFileName(), OPENFILENAME
  - page settings - PageSetupDlg(), PAGESETUPDLG
  - printing
    - PrintDlg(), PRINTDLG
    - PrintDlgEx(), PRINTDLGEX [2000]
- The templates of standard dialog boxes can be customized