Windows Forms

Szymon Szczepański szymon.szczepanski@gmail.com
Maciej Świechowski m.swiechowski@mini.pw.edu.pl
Paweł Aszklar p.aszklar@mini.pw.edu.pl

Common controls – toolbox

Common Controls			
Button		NotifyIcon	
CheckBox		NumericUpDown	
CheckedListBox		PictureBox	
ComboBox		ProgressBar	
DateTimePicker		RadioButton	
Label		RichTextBox	
LinkLabel		TextBox	
ListBox		ToolTip	
ListView		TreeView	
MaskedTextBox		WebBrowser	
MonthCalendar			
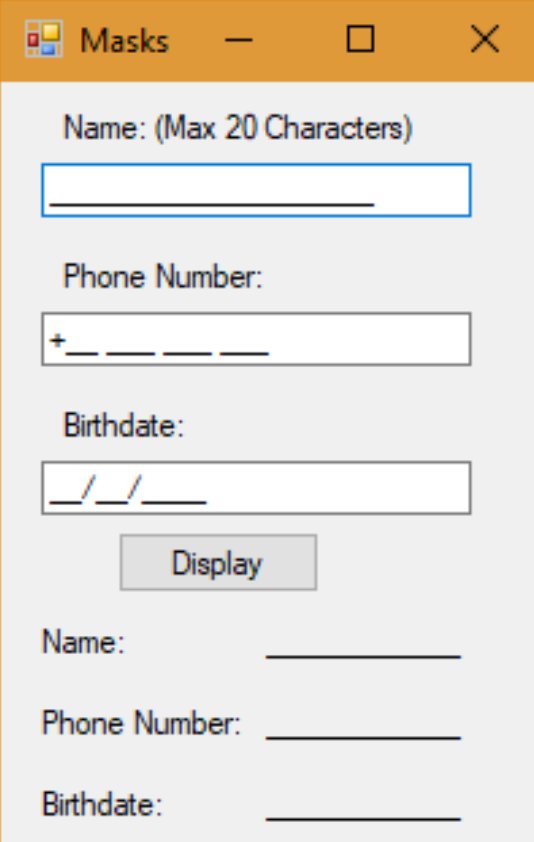
Labels

- Label
  - read only text and/or image
  - usually, description of a form or another control
  - in practice – it is used very often
- LinkLabel
  - derived from Label
  - can display hyperlinks
  - hardly ever used
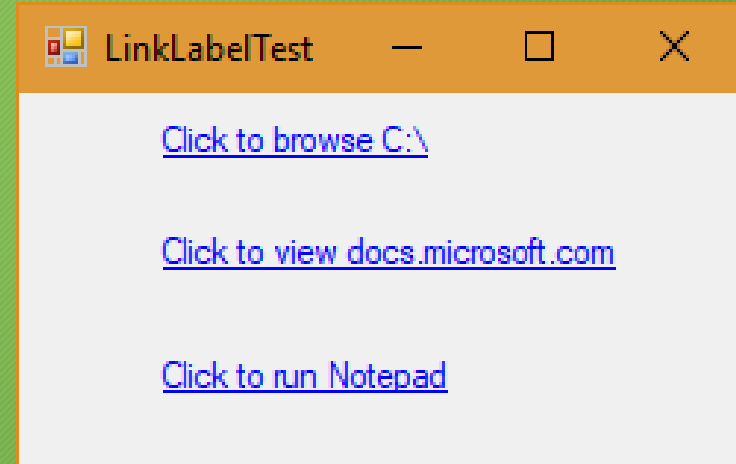
Text Controls

- Derived From **TextBoxBase**
- Keyboard shortcuts can be used (e.g. Ctrl+C, Ctrl +V...)
- **TextBox**
  - Most frequently used
  - Most used event : OnTextChanged,
  - Multiline
- **MaskedTextBox**
  - Allows us to control input format
  - Often used
  - Has some problems with the mask
- **RichTextBox**
  - Text input control with advanced formatting options
  - Can be saved to rtf files ☺
  - Don't use unless some WYSWIG is needed

Mouse

- Mouse events
  - **MouseMove**, **MouseDown**, **MouseUp**, **MouseClick**, **MouseDoubleClick**
  - **MouseEnter**, **MouseHover**, **MouseLeave**, **MouseWheel**
  - **Click**, **DoubleClick**
  - **MouseEventArgs**:
    {Button, Clicks, Delta, Location, X, Y}
- **Cursor** class
  - can be loaded from a stream, file, program, or the system's resources
- **Form.Cursor**
- **Cursors** class – standard cursors, e.g. **Cursors.WaitCursor**

Keyboard

- Events:
  - **KeyDown**
    - **KeyEventArgs**:
      {KeyCode, KeyData, Modifiers, Alt, Control, Shift, Handled, SuppressKeyPress)
  - **KeyPress**
    - **KeyPressEventArgs**:
      {KeyChar, Handled}
  - **KeyUp**
    - **KeyEventArgs**
- **Keys** enum
  - e.g. **Keys.Q**, **Keys.F5**, **Keys.LShiftKey**

Focus

- Current focus:
  - CanFocus, Focused
  - ContainsFocus() (including children)
  - Focus()
- Activating controls:
  - CanSelect
  - Select(), SelectNextControl()
  - Form.ActiveControl

- There always problem with Focus ☺
- Pay attention for default focus on newly opened view
- TabOrder should be good

Focus events – lifetime

- Keyboard / Select…()
  - Enter
  - GotFocus
  - Leave
  - Validating
  - Validated
  - LostFocus
- Mouse / Focus()
  - Enter
  - GotFocus
  - LostFocus
  - Leave
  - Validating
  - Validated

Buttons

- **ButtonBase**
  - base class for **Button**, **CheckBox**, **RadioButton**
- **Button**
  - **PerformClick()**
  - **DialogResult**
  - Mnemonics, e.g. "&Cut && Paste„
- **CheckBox**
  - Can have 2 or 3 check states (**ThreeState**)
  - Use when there is a yes/no scenario
- **RadioButton**
  - Use when there is exclusive choice from a small list of options and you are certain that a new value will not be added (e.g. text alignment)
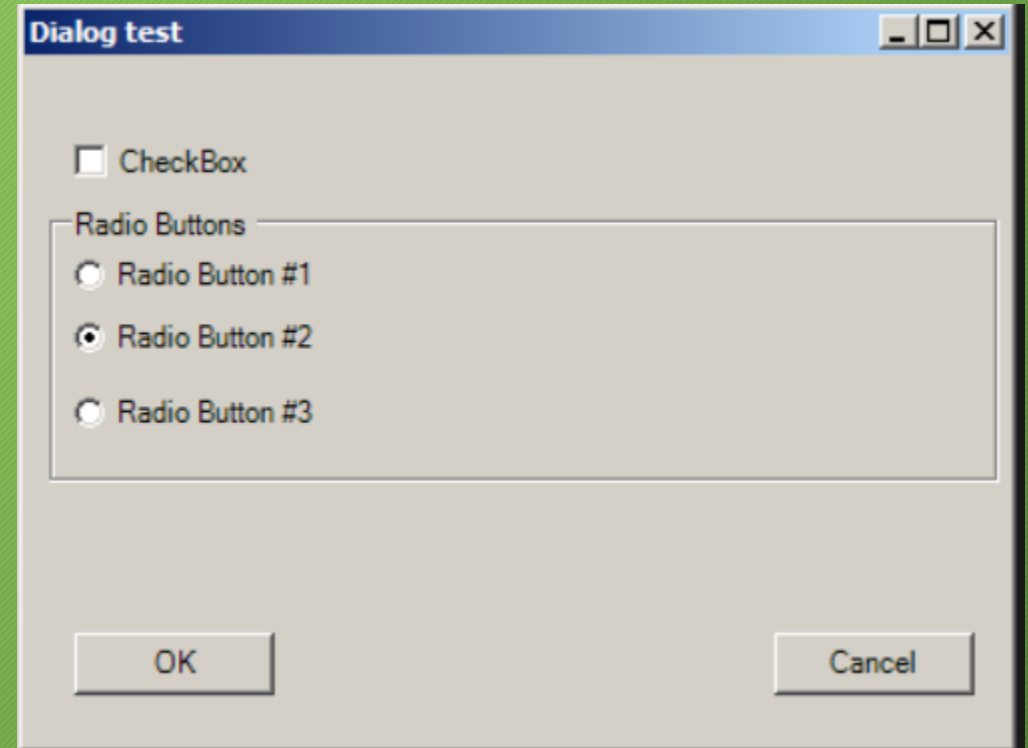
List Controls

- Displays lists of items in various graphical formats
- Can be bound to a data source (more details later)
- **ListControl**
  - base class for ListBox, CheckedListBox and ComboBox
- Elements common to all list controls:
  - SelectedValue, SelectedIndex
  - DataSource, DisplayMember, ValueMember
  - FormatString

List Controls cont'd

- **ListBox**
  - Items – collection of objects, Sorted
  - SelectionMode - Single or multiple selection
  - SelectedIndex, SelectedIndices, SelectedItem, SelectedItems
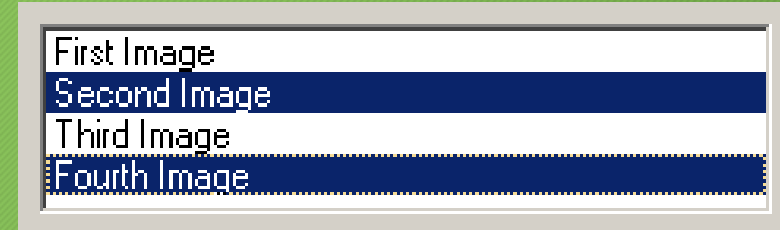
- **CheckedListBox**
  - derived from ListBox, no data source
  - CheckedIndex, CheckedIndices, CheckedItems
  - multiple items can be checked
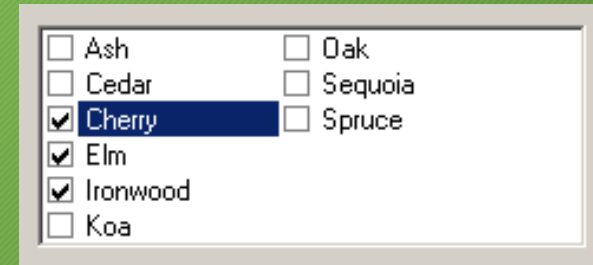
- **ComboBox**
  - single selection
  - Items, SelectedItem, SelectedText
  - DropDownStyle - possibility to enter a new value
  - used most often
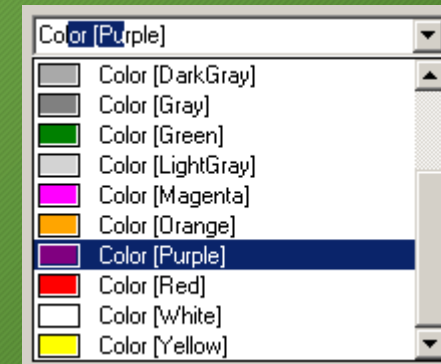
ListView

- List of items (`ListViewItem`) + optionally
  - icons
  - check boxes
  - additional information
- Several view modes
  - small icons
  - large icons
  - details
  - …

TreeView

- Used for displaying hierarchical data
- Nodes can be expanded/collapsed
- Nodes collection
  - Contains only top-level nodes
  - Each node has a collection of child nodes
- When used to gather data from a tree: create tree on demand
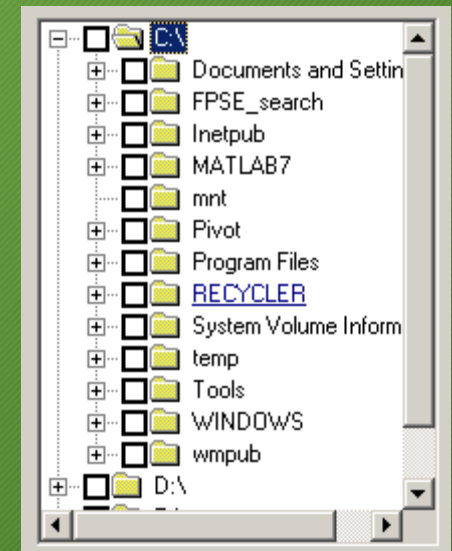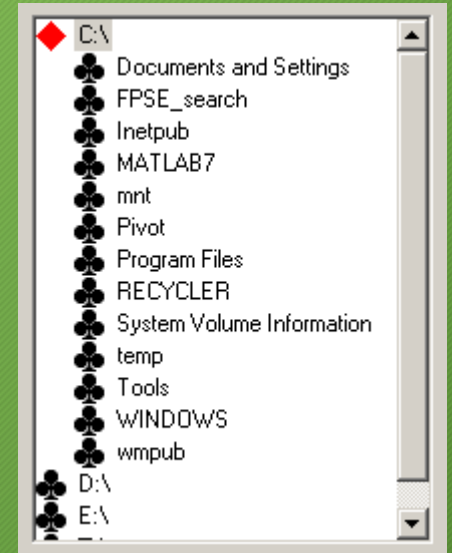
ScrollableControl

- Support for auto-scrolling behaviour
- Enabling auto-scrolling:
  1. `AutoScroll = true`
  2. `AutoScrollMinSize` = …
- `AutoScrollPosition`
- `VScroll, HScroll` – visibility of scroll bars
- `Scroll` event – notification of scrolling

- Usually not used directly:
  - use **Panel** instead

ContainerControl

- A control that can function as a container for other controls
- Are scrollable

- Focus management

- Useful properties:
  - **ActiveControl**
  - **ParentForm**
- Not used directly, prefer Form or UserControl

Containers

- **Panels**
  - **Panel**
    - used mostly for grouping controls
    - consider creating UserControl instead
  - **FlowLayoutPanel**
    - dynamically lays out its content horizontally or vertically
    - useful for programmatically created views
  - **TableLayoutPanel**
    - dynamically lays out its contents in a grid
    - behaviour similar to HTML tables
- **GroupBox**
  - frame and caption around a group of related controls
  - often used to group radio buttons
  - consider separating GroupBox and its controls into a UserControl
- **SplitContainer**
  - two panels separated by a movable splitter

UpDownBase (spin boxes)

- **NumericUpDown**
  - Value
  - Minimum, Maximum, Increment
  - DecimalPlaces, Hexadecimal, ThousandsSeparator
  - UpButton(), DownButton()
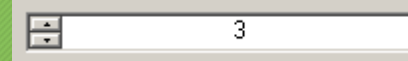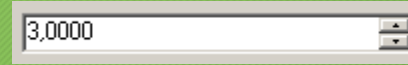
- **DomainUpDown**
  - Sorted
  - Wrap
  - UpButton(), DownButton()
  - In real life – barely ever used
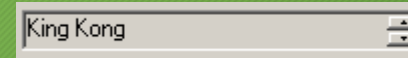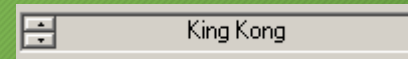
TabControl

- TabPages – collection of TabPage objects
- SelectedIndex, SelectedTab
- SelectTab(), DeselectTab()
- Deselecting, Deselected, Selecting, Selected
- Very good way to simplify create wizard
- Good way of creating more user friendly interface
- Useful for complicated views

Menus & Toolbars

- **ToolStrip** - represents a toolbar
- **StatusStrip** – represents a status bar
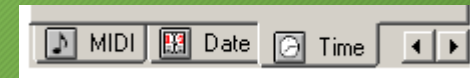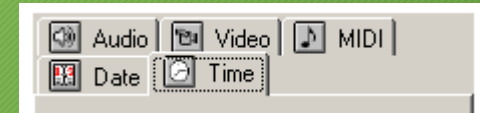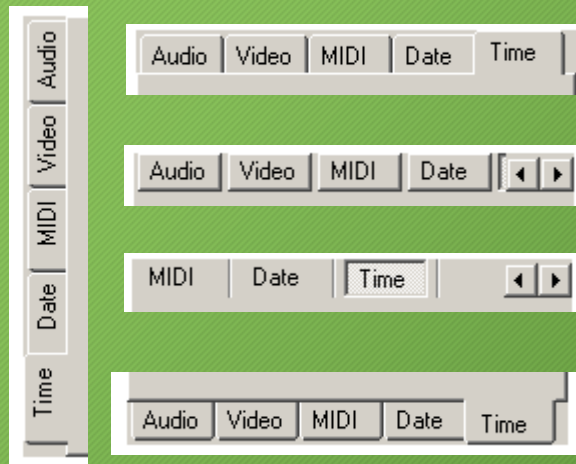- Can host various controls, e.g. dropdown, button, progress bar etc. or custom controls
- Advanced layout capabilities, e.g. overflow, docking and rafting
- **MenuStrip**
  - derived from ToolStrip
  - hosts:
    - ToolStripMenuItem, ToolStripComboBox, ToolStripSeparator, ToolStripTextBox
  - Form.MainMenuStrip
- **ContextMenuStrip**
  - derived from ToolStripDropDownMenu
  - Control.ContextMenuStrip
- Mnemonics
- Accelerators (independent of mnemonics):
  - ShortcutKeys, ShowShortcutKeys, ShortcutKeyDisplayString
- **ToolStripManager, ToolStripRenderer**
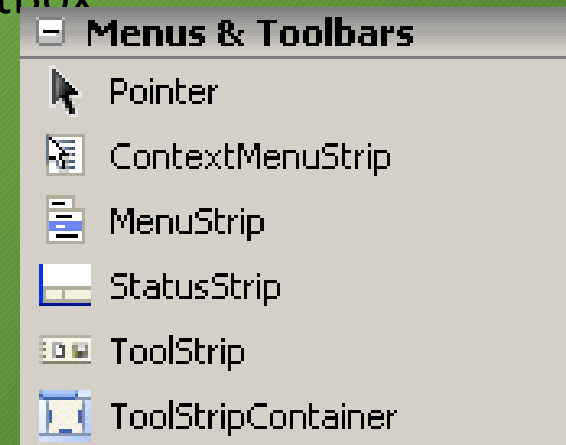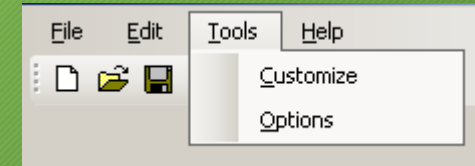
Other Useful Controls

- **PictureBox**
  - including various resizing modes

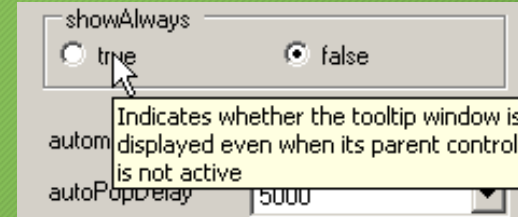- **ProgressBar**
  - providing various display styles

Basic Graphical Components

- **ToolTip**
  - SetToolTip(Control, string), GetToolTip
  - One tooltip can be assigned to multiple controls
- **NotifyIcon**
  - Icon
  - ContextMenu
  - Text – for icon's tooltip
  - Visible
  - Tray-only applications are becoming increasingly popular

Date & Time Controls

- **DateTimePicker**
  - customizable appearance
  - Format, CustomFormat
  - MinDate, MaxDate
  - ShowCheckBox, ShowUpDown
  - Value, Text

- **MonthCalendar**
  - customizable appearance
  - MinDate, MaxDate, TodayDate
  - BoldedDates, MonthlyBoldedDates, AnnuallyBoldedDates
  - ShowToday, ShowTodayCircle, ShowWeekNumbers
  - SelectionStart, SelectionEnd, SelectionRange

Other Controls & Components

- **Background worker**
  - simplifies executing operations on background threads
  - threading in WindowsForms is not so easy
- **DirectoryEnty, DirectorySearcher**
  - encapsulate ActiveDirectory interactions
- **EventLog**
  - provides access to Windows Event Log
  - warning: needs elevated privilege to create Event Log Source
- **FileSystemWatcher**
  - provides notification about changes in the file system
- **HelpProvider**
  - provides… help ☺
- **ImageList**
  - manages a collection of images

Basic Components

- **PerformanceCounter**
  - represents Windows performance counter
  - rarely used
- **Process**
  - allows processes manipulation (e.g. starting and controlling external applications)
- **SerialPort**
  - represents serial port
  - rarely used
- **ServiceController**
  - allows Windows services manipulation
  - rarely used
- **Timer**
  - one of several timers available
 - be aware that Timer is not the best way to measure time

Validation

- Validation is one of most often used features of Windows Forms
- For more complex business logic use CustomValidator or create new validation
- Sometimes need custom code to provide validation result in some buttons events
- **Control**
  - CausesValidation
  - Validating (allows cancelling), Validated
- **ContainerControl**
  - AutoValidate
  - Validate(), ValidateChildren()
- **ErrorProvider**
  - SetIconAlignment, SetIconPadding
  - BlinkStyle, BlinkRate
  - ContainerControl
    (when used with data-bound control)
  - SetError(control, message)
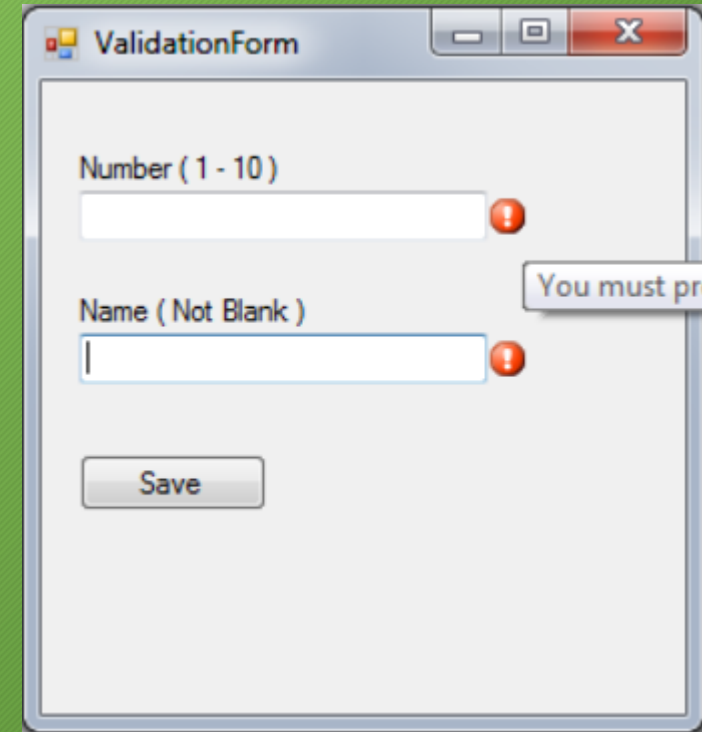
Dialogs Toolbox
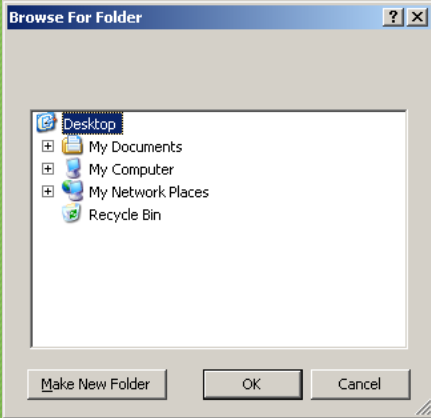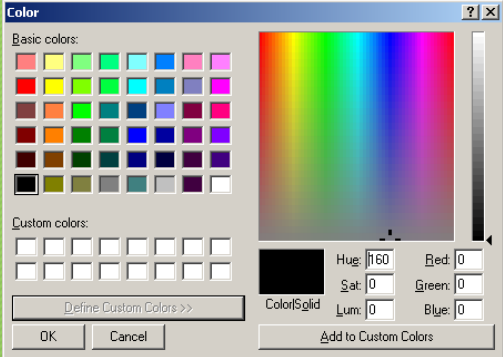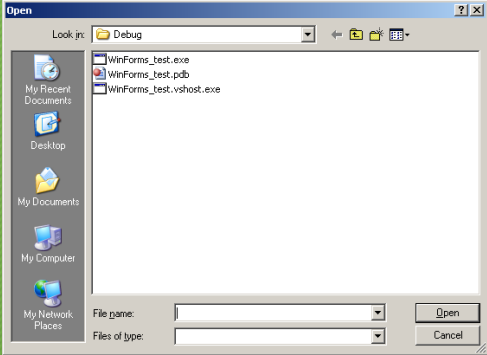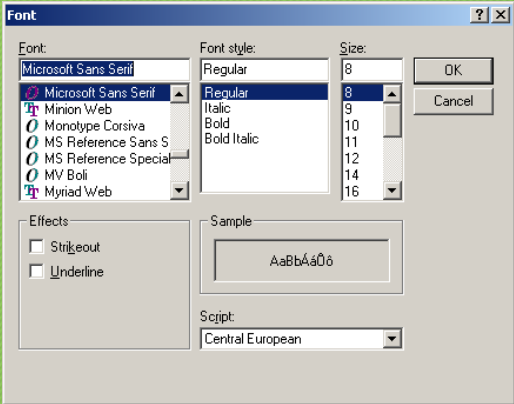
Other Toolbox Groups

- Printing suport

- Database support for ADO.NET

- Reporting suport

- WPF Interoperability