Text and Fonts in Windows

DrawString()

- Graphics class member method to display a string on a graphics object
- Six overloaded forms
- All have Font as an argument

Fonts
- FONT: Typeface, style, size, attributes of characters in a character set
  - Provide control over visual aspect of text

Categories of Fonts
- Windows System Fonts
  - Always available
- Logical Fonts – Defined in separate resource files
  - Stroke fonts
    - Consist of line/curve segments – so continuously scalable
    - Slow to draw
    - Legibility not good
  - Raster fonts—Bitmaps
    - Scaling by non-integer scaling factor difficult
    - Fast to display
    - Legibility very good
- TrueType fonts—Rasterized stroke fonts
  - Stored as strokes with hints to convert to bitmap
  - Continuously scalable
  - Fast to display
  - Legibility very good
- Combine best of both stroke and raster fonts
- Device fonts
  - Native to output device (e.g., built-in printer fonts)

Windows System Fonts

- Font: ANSI_FIXED_FONT
- Font: ANSI_VAR_FONT
- Font: DEVICE_DEFAULT_FONT
- Font: OEM_FIXED_FONT
- Font: SYSTEM_FONT
- Font: SYSTEM_FIXED_FONT

Windows Stock Fonts

Some Stroke Fonts

Modern AaBbCcDdEe
Roman AaBbCcDdEe
Script AaBbCcDdEe
Some Bitmapped Fonts

Courier AaBbCcDdEe
MS Serif AaBbCcDdEe
MS Sans Serif AaBbCcDdEe
Unicode αβγδεξηθικλμνξοπρστυφχψω

Windows Raster Fonts

Some TrueType Fonts

Courier New AaBbCcDdEe
Courier New Bold AaBbCcDdEe
Courier New Italic AaBbCcDdEe
Times New Roman AaBbCcDdEe
Times New Roman Bold AaBbCcDdEe
Times New Roman Italic AaBbCcDdEe
Times New Roman Bold Italic AaBbCcDdEe
Arial AaBbCcDdEe
Arial Bold AaBbCcDdEe
Arial Bold Italic AaBbCcDdEe
Unicode αβγδεξηθικλμνξοπρστυφχψω

Windows TrueType Fonts

Changing Fonts

- Two important classes in System.Drawing:
  - FontFamily
    - Specified by a string such as “Times New Roman”
  - Font
    - A combination of a FontFamily, attributes (e.g., Bold, Italic, etc.), and a point size
- Font Class
  - Three categories of Font constructors
    - Based on an existing Font object
    - Based on character string identifying the font family
    - Based on a FontFamily object

Simplest Font Constructor

- Creates a new font based on an existing font
- New font is the same except for the font style
  - Font(Font font, FontStyle fs);
    - FontStyle Enumeration
      - Regular 0
      - Bold 1
      - Italic 2
      - Underline 4
      - Strikeout 8
    - Can use bitwise OR operator to combine Font styles
- Examples:
  - Font f = this.Font;  // Get this form’s Font property
  - Font fItalic = new Font(f, FontStyle.Italic);
    - Can now draw with this new fItalic font

MeasureString()

- Member of Graphics class
- Returns width and height of imaginary rectangle bounding a string
  - Several overloaded forms
  - Simplest:
    - MeasureString(string str, Font font);
      - Returns a SizeF structure
    - Members are width and height of bounding rectangle in pixels

Font-Bold-Italic Example Program

- Outputs text with one word bolded and another italicized
  - Creates new fonts from form’s existing font
  - Uses MeasureString() to position each new word on the window’s client area
Creating Fonts by Name

- Specify a font by giving its font family name, the point size, and optionally a style.

Font Constructors:
- Font(string strFamily, float fSizeInPoints)
  - There are about 72 “points” per inch
  - Anything smaller than 8-point is very hard to read
- Font(string strFamily, float fSizeInPoints, FontStyle fs)
  - strFamily must represent a TrueType font that is on the system

```csharp
Font myFont = new Font("Times New Roman", 12);
```

- The Font property of a window form can also be set in the form’s constructor, e.g.:
  ```csharp
  this.Font = new Font("Arial", 24, FontStyle.Bold);
  ```

Font-Name & Font-Sizes example programs
- Note use of foreach( ) C# construct
- And font.GetHeight(g): more general than MeasureString()
- Could be used for a printer or screen graphics object

Font Class Properties

- All are read-only
  - string            Name          Font family name
  - FontFamily        FontFamily    Font family class
  - FontStyle         Style         From constructor
  - bool              Bold          True if boldface
  - bool              Italic        True if italic
  - bool              Underline    True if underlined
  - bool              Strikeout    True if strikeout
  - float             Size          From constructor
  - GraphicsUnit      Unit          From constructor
  - float             SizeInPoints Computed from Size
  - int               Height       Line spacing for video display
- Others

- Example program: Font-Properties