Windows® Phone

Understanding XAML

Session 2.2

Topics

- XAML and Silverlight
  - The role of the XAML markup language in the Silverlight design process
- Extensible Markup Languages
  - XAML elements and properties
- XAML and Silverlight pages

XAML and Silverlight

- A Silverlight application is made up of pages that contain elements
- These have properties that determine where they are, how they appear and what they can do in an application
- The Visual Studio tool allows us to manipulate the page content by using the design surface and the element properties pane

Expressing Silverlight Elements

- The description of the elements in a Silverlight application is actually held in a text file
- This file is formatted in a particular way
- Microsoft invented a language, XAML to hold this design information:
  - eXtensible Application Markup Language
- XAML was invented to hold user interface design information

Why do we need XAML?

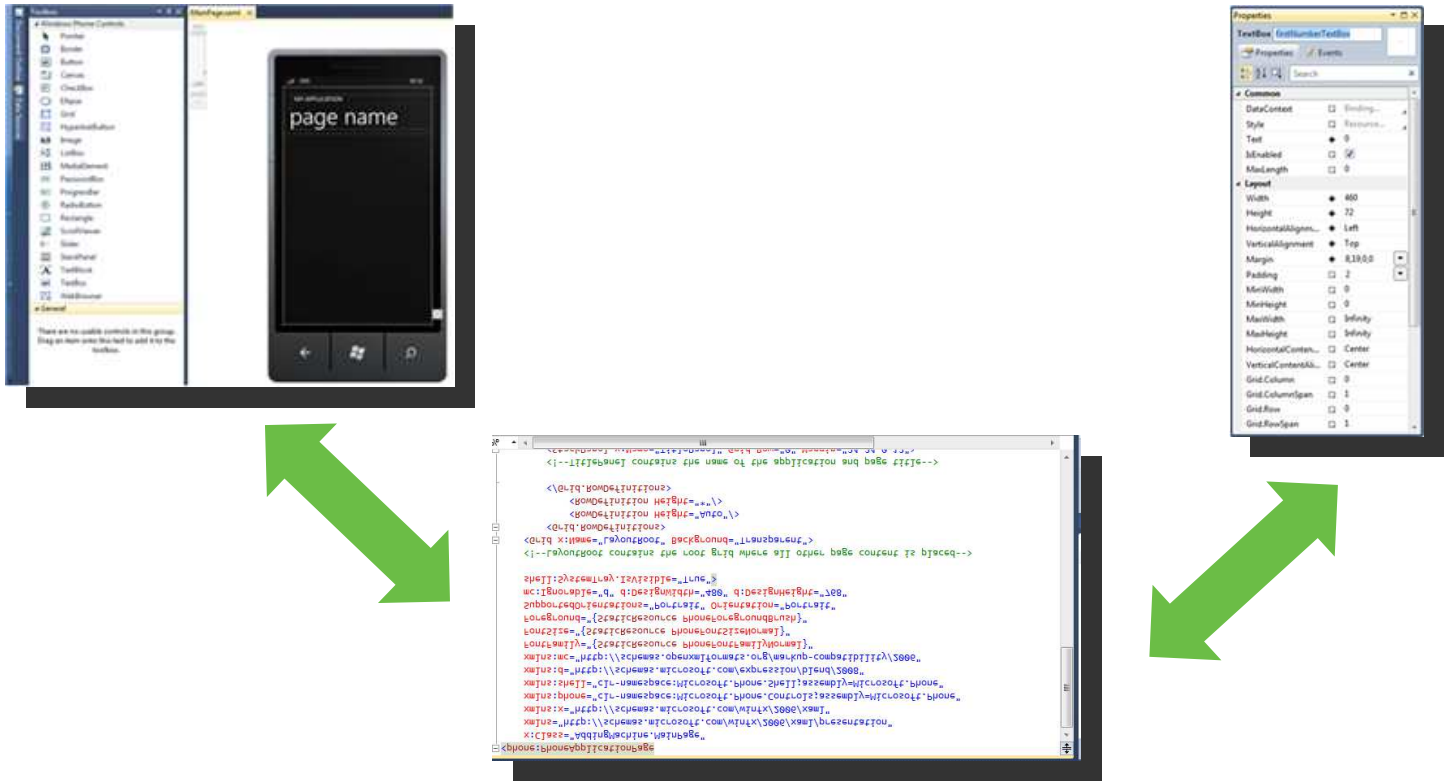
- XAML allows us to separate the role of graphic designer and programmer
  - The designer should not have to see code objects to work
  - The programmer should not be held back while the design is produced
- The XMAL file provides a separation between the code that drives the application and the way the application looks

XAML file content

```
<TextBox Height="72" HorizontalAlignment="Left"
Margin="8,19,0,0" Name="firstNumberTextBox" Text="0"
VerticalAlignment="Top" Width="460" TextAlignment="Center"
/>
```

- This snippet of XAML is the description of the **`firstNumberTextBox`**
- It contains fields that describe the position and size of the textbox
- This file is managed by Visual Studio as your program is being developed

XAML in Visual Studio



- The XAML file holds the information which is updated by both views

The XAML language

- XAML is a "declarative" language
- It just tells us about things, it does not tell us what they do and how they can do it
- The XAML file has a particular format
  - The characters < and > are used to mark the start and end of some elements in the file
- The format looks a bit like XML
  - eXtensible Markup Language

Using XAML

- You can actually edit the XAML text in your project to create new display elements and modify existing ones
- This can often be much quicker than using the editing interface provided by Visual Studio
- You just have to type the new values into the XAML window and the properties of the element are changed immediately

Demo

Demo 1: Editing XAML

The XAML file at run time

- When a Silverlight program runs the XAML file is compiled into a set of low level display instructions that are obeyed by the Silverlight runtime system
- This is the point at which the XAML object descriptions in the text are converted into program objects we can use in our code
- This all happens automatically as far as we are concerned

XAML and XML

- XAML looks a bit like XML
  - XML means "Extensible Markup Language"
- This means that XML is really a way of designing languages that want to talk about something
- Just like the english language lets us invent verbs and nouns and put them into sentences that have meaning in a particular context

Inventing our own XML

```
<?xml version="1.0" encoding="us-ascii" ?>
<HighScoreRecords count="2">
    <HighScore game="Breakout">
        <playername>Rob Miles</playername>
        <score>1500</score>
    </HighScore>
    <HighScore game="Space Invaders">
        <playername>Rob Miles</playername>
        <score>4500</score>
    </HighScore>
</HighScoreRecords>
```

- I invented this XML format to hold a video game high score table

HighScore element

```
<HighScore game="Breakout">
        <playername>Rob Miles</playername>
        <score>1500</score>
 </HighScore>
```

- The **HighScore** element contains two other elements, **playername** and **score**
- It also has a property that gives the name of the game
- I could add others, for example the date and time the score was achieved

HighScoreRecords element

```
<?xml version="1.0" encoding="us-ascii" ?>
<HighScoreRecords count="2">
    <HighScore game="Breakout">
        <playername>Rob Miles</playername>
        <score>1500</score>
    </HighScore>
    <HighScore game="Space Invaders">
        <playername>Rob Miles</playername>
        <score>4500</score>
    </HighScore>
</HighScoreRecords>
```

- The **HighScoreRecords** element contains a count of the number of **HighScore** elements

XML and data structures

- We can invent our own language format whenever we have some structured data that we want to store
- The designers of XAML have done this
- They have created a language that lets us design user interfaces

The XAML data revisited

```
<TextBox Height="72" HorizontalAlignment="Left"
Margin="8,19,0,0" Name="firstNumberTextBox" Text="0"
VerticalAlignment="Top" Width="460" TextAlignment="Center"
/>
```

- We can see that the XAML content that describes a textbox is very similar to a **HighScore** element
- The designers of XAML had to work out what data fields are required in a **TextBox** object

What is a Markup Language?

- The "ML" in XML stands for "Markup Language"
- A markup language was originally a set of commands for the printers of a document
  - 'Put the words "Table of Contents" in bold'
- When the World Wide Web was created the Hyper Text Markup Language was designed to allow a text file to describe a particular web page design

XML and HTML

- The idea of creating your own markup language was such a good one that people wanted a standard form for doing this
- XML came out of this drive for standards
  - It is the way in which the files use the < and /> and other characters to mean the start and end of elements, names and properties
  - It also tells you how to create "schemas" that define the structure and content of XML documents

XML Schema

- An XML schema describes a particular XML document format:
  - "A HighScore element must contain a PlayerName and a Score value, but the Date value is optional"
- Programs can use a schema to make sure that a particular document contains content which is valid

XML and software

- XML allows programs to share data irrespective of what kind of system was used to create the data
- There are many software tools that can create schemas and you can even store the contents of C# directly into XML structured files
- However, for now just remember that the description of a Silverlight page is a text file containing an XAML document

XAML and Silverlight Pages

- A Silverlight application is made up of a number of *pages*
- Each page is expressed as a single XAML source file
- The page will contain descriptions of a number of Silverlight elements
- From time to time we will have to make changes to the XMAL file directly

Review

- The design of a Silverlight page is expressed as a XAML document stored as text file
- The separation of the design from the program code makes it much easier for designers and programmers to work together
- The format of a XAML document is based on XML (an eXtensible Markup Language)
- XML allows us to create languages that describe any kind of structured data