

CS 635 Advanced Object-Oriented Design &
Programming
Spring Semester, 2006
Doc 16 Builder
Apr 11, 2006

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References

Design Patterns: Elements of Reusable Object-Oriented Software, Gamma, Helm, Johnson, Vlissides, Addison-Wesley, 1995, pp. 97-106

The Design Patterns Smalltalk Companion, Alpert, Brown, Woolf, 1998, pp. 47-62

Builder

Separate construction of a complex object from its representation

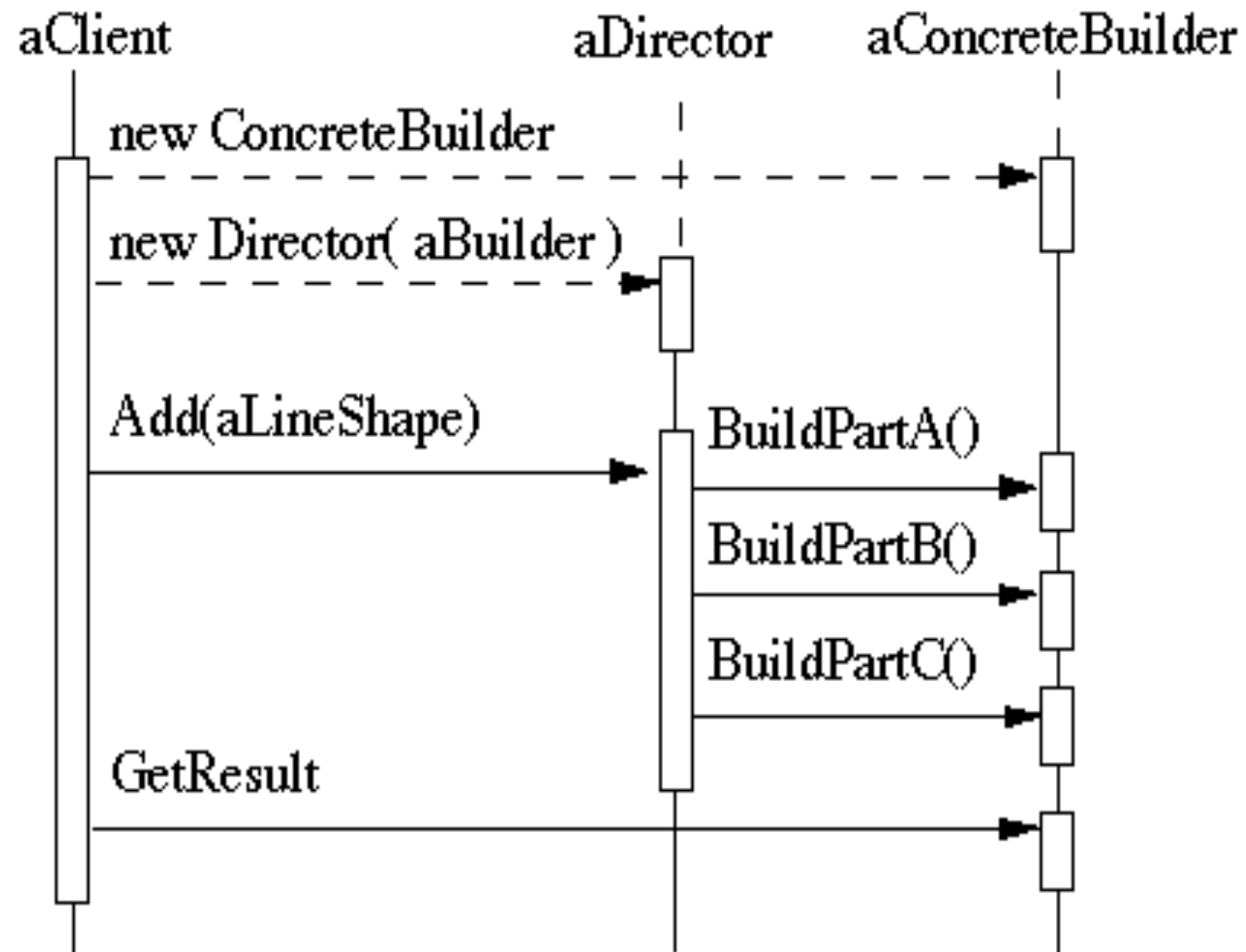
So same construction process can create different representations

Builder

Client

Director

Builder



RTF Converter

A word processing document has complex structure

How to convert Rich Text Format (RTF) to

TeX
html
PDF
etc.

Pseudo Solution

```
class RTF_Reader {
    TextConverter builder;
    String RTF_Text;

    public RTF_Reader( TextConverter aBuilder, String RTFtoConvert ){
        builder = aBuilder;
        RTF_Text = RTFtoConvert;
    }

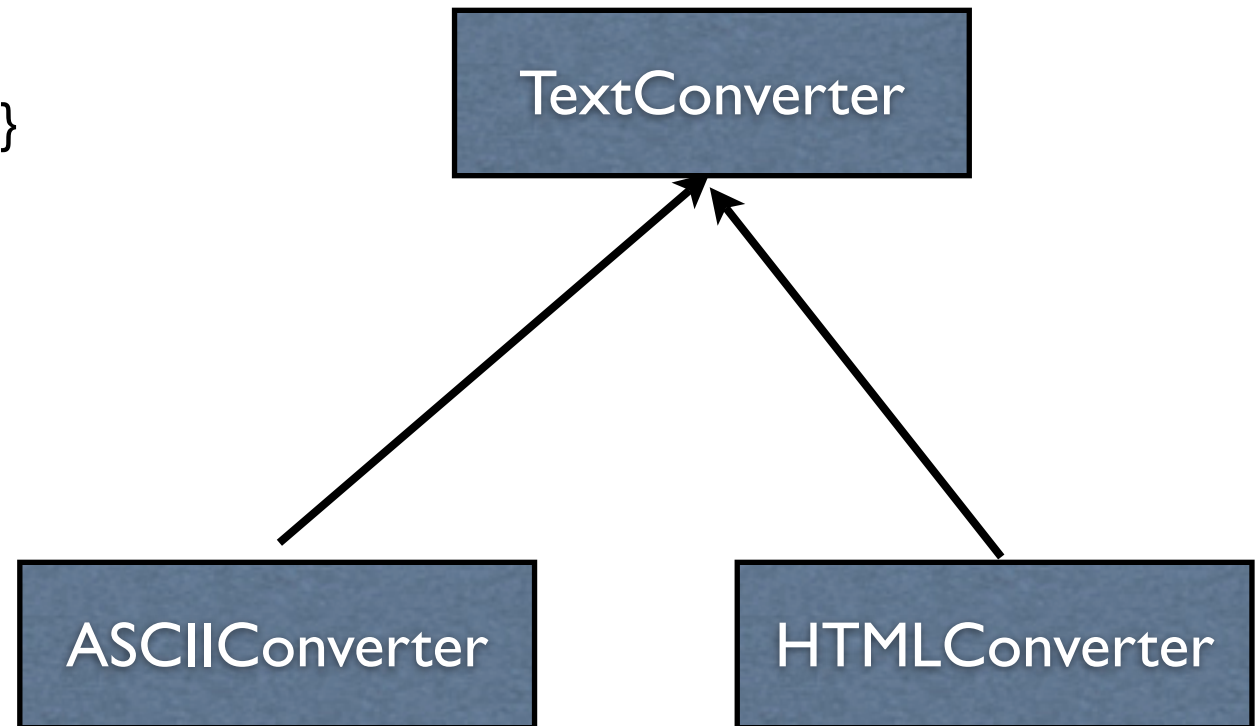
    public void parseRTF(){
        RTFTokenizer rtf = new RTFTokenizer( RTF_Text );

        while ( rtf.hasMoreTokens() ){
            RTFToken next = rtf.nextToken();

            switch ( next.type() ){
                case CHAR:  builder.character( next.char() ); break;
                case FONT:  builder.font( next.font() ); break;
                case PARA:  builder.newParagraph( ); break;
                etc.
            }
        }
    }
}
```

Builder Classes

```
abstract class TextConverter {  
    public void character( char nextChar ) { }  
    public void font( Font newFont ) { }  
    public void newParagraph() {}  
}
```



Sample Program

```
main(){
    ASCII_Converter simplerText = new ASCII_Converter();
    String rtfText;

    // read a file of rtf into rtfText

    RTF_Reader myReader =
        new RTF_Reader( simplerText, rtfText );

    myReader.parseRTF();

    String myProduct = simplerText.getText();
}
```

The Hard Part

The builder interface

Strategy vs Builder

Example - Simple API XML (SAX)

```
public static void main (String args[]) throws Exception {  
    XMLReader xr = XMLReaderFactory.createXMLReader();  
    MySAXApp handler = new MySAXApp();  
    xr.setContentHandler(handler);  
    xr.setErrorHandler(handler);  
  
    FileReader r = new FileReader("Foo.xml");  
    xr.parse(new InputSource(r));  
    handler.getResult();  
}
```

Examples - VW Smalltalk

ClassBuilder
MenuBuilder
UIBuilder

UIBuilder

```
##{UI.FullSpec}
#window:
##{UI.WindowSpec}
#label: ##{Kernel.UserMessage} #key: #CodingAssistant
        #defaultString: 'Coding Assistant' #catalogID: #UIPainter)
#min: ##{Core.Point} 242 320 )
#max: ##{Core.Point} 242 320 )
#bounds: ##{Graphics.Rectangle} 279 140 521 460 ) )
#component:
##{UI.SpecCollection}
#collection: #(
    ##{UI.LabelSpec}
        #layout: ##{Graphics.LayoutOrigin} 14 0 12 0 )
        #label: ##{Kernel.UserMessage} #key: #ADDACCESSORSToClass
            #defaultString: 'ADD ACCESSORS to Class' #catalogID: #UIPainter) )
    ##{UI.LabelSpec}
        #layout: ##{Graphics.LayoutOrigin} 16 0 65 0 )
        #label: ##{Kernel.UserMessage} #key: #forInstanceVariables
            #defaultString: 'for Instance Variables' #catalogID: #UIPainter) )
```

