B336 Advanced Internet Computing

From XML to WML
WAP Protocols
WMLScript

Learning Objectives

- Learn how to transform XML into WML
- Become familiar with layers of the WAP architecture
- Study WMLScript language

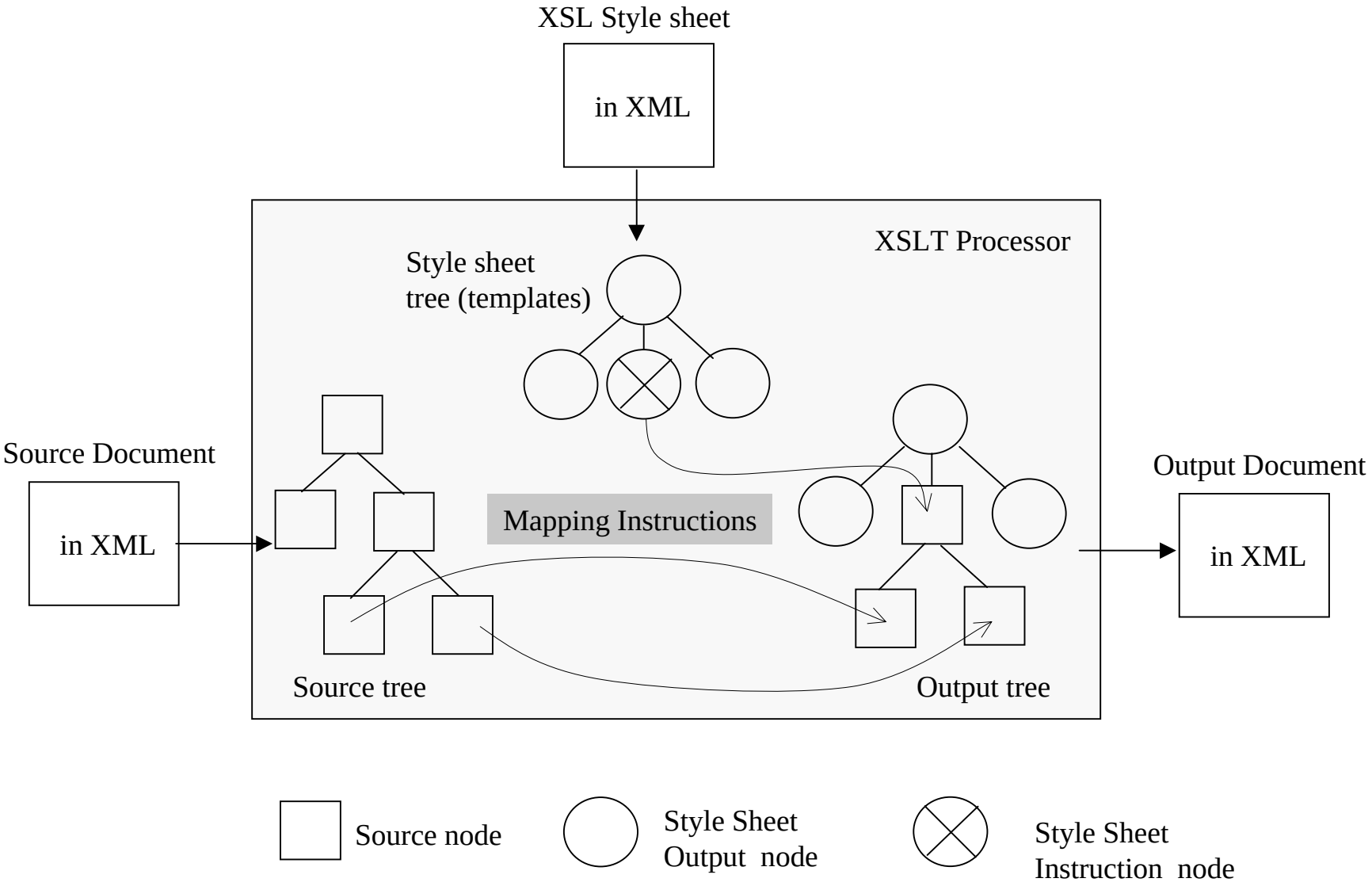
Transform XML into WML

- Recall that we would not usually work in WML directly
- Web content and services are likely to change rapidly
- New protocols and standards appear, and they change
- Might have legacy web content that needs delivery in these new forms
- To keep up, need dynamic mapping into suitable forms
- We'll be transforming XSL into WML using stylesheets
- XSLT is a language that is itself written in XML!
- So an XSLT style sheet for transforming things looks like (*is*) just another XML document

XSLT Processing

- To do the transformation, we need an XSLT processor
- Two common processors are:
  - Microsoft's MSXML parser includes an XSLT engine (but the XSLT engine built into Internet Explorer v5 is out of date)
  - James Clarke's XT dedicated XSLT engine, written in Java, up to date
- XSLT processors don't manipulate documents; they manipulate structure of the document model
- XSLT is a declarative language
- Underlying all XML documents is a tree structure
- XSLT style sheets specify templates for that show how trees in the source should appear as trees in target

XSLT Processor



Example XML to WML Transformation

- On the Web server, we need
  - our original content as an XML document
  - an XSLT engine
  - a transforming stylesheet written in XSL
- Suppose our XML content is the results of a database search:

```
<Author>
  <FirstName>Peter</FirstName>
  <MI>M</MI>
  <LastName>Filmore</LastName>
  <Biographical>
   Peter Filmore is a contractor to Vodaphone and has served
   as a representative in recent WAP forum meetings
  </Biographical>
  <Portrait> type="image/jpeg" href="filmore.jpg"/>
  <Portrait> type="image/vnd.wap.wbmp" href="filmore.wbmp"/>
  </p>
</Author>
```

Example XML to WML Transformation

- Our XSL stylesheet:

```
<xsl:sytlesheet xmlns:xsl="http:///www.w3.org/1999/XSL/Transform">
 <xsl:output method="wml" indent="yes"/>

 <xsl:template match="Author">
 <wml>
  <card newcontent="true">
    <onevent type="oneenterforward">
       <go href="main.wml#bio">
          <setvar name="bio" value="{Biographical}"/>
       </go>
    </onevent>
  </card>
 </wml>
 </xsl:template>

 <xsl:template match="@*" >
   <xsl:apply-templates />
 </xsl:template>

 <xsl:template match="* | text()">
   <xsl:apply-templates />
 </xsl:template>

</xsl:stylesheet>
```

this template maps the Author element into a suitable author instantion of a WML card

more templates map other expected structures

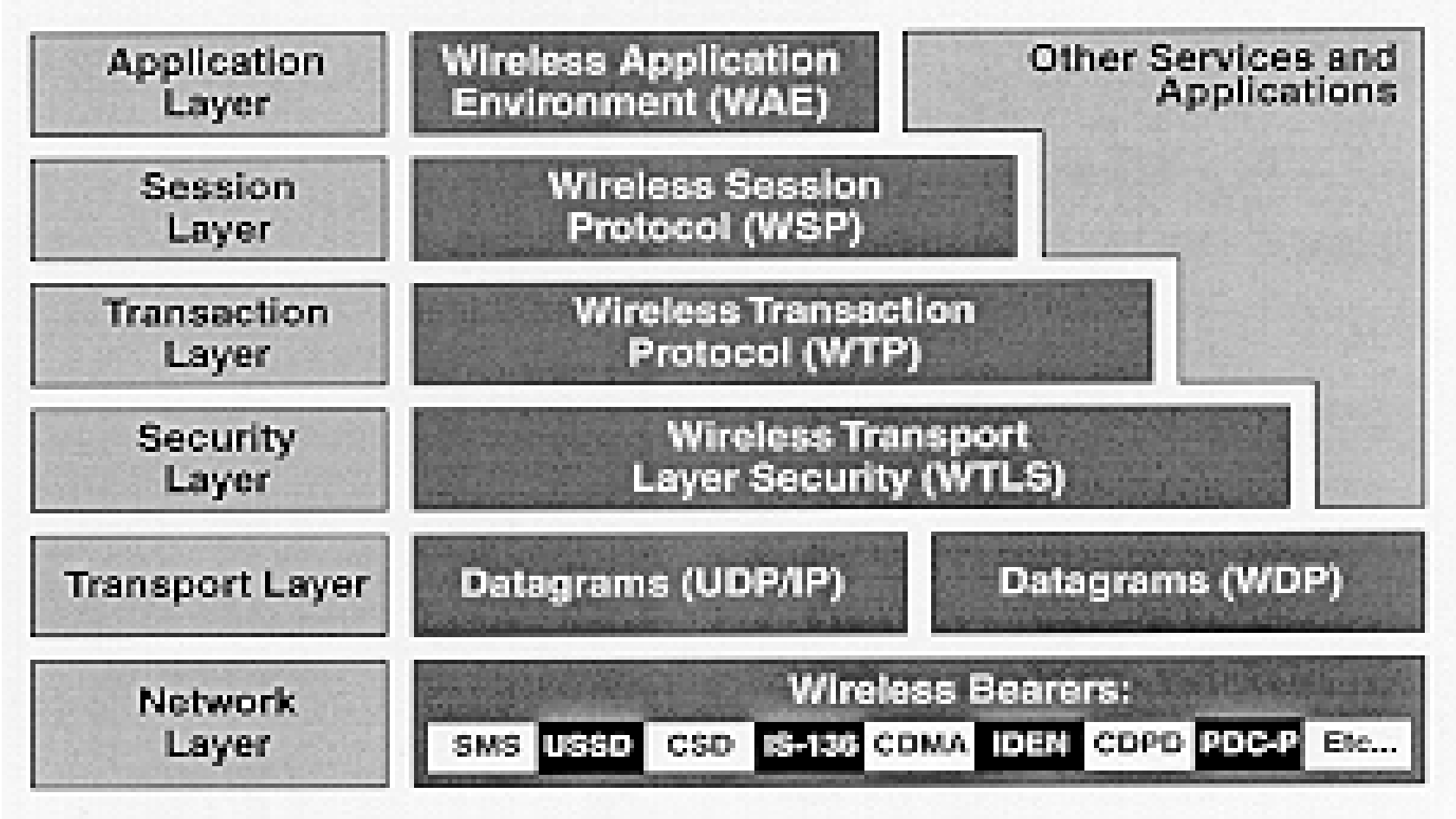
Example XML to WML Transformation

- Output will be a WML card with the author biography filled in:

```
. . .
<card id="bio" title="Biography">
  <p mode="nowrap">
  <a href="#main">Done</a>
   Peter Filmore is a contractor to Vodaphone and has served
   as a representative in recent WAP forum meetings
  </p>
<card>
. . .
```

- The stylesheet could actually be embedded within the orginal XML content, ready for use if a WML client needed to be served

WAP Architecture Layers



Source of diagram: WAP White Paper (http://www.wapforum.org/what/WAP_white_pages.pdf)

WAP Application Development

- Most of the developers of WAP applications and content would be working at the top level, WAE
- WAE consists of specifications for:
  - WML
  - WMLScript - a scripting language for client-side processing
  - Wireless Telephony Application (WTA) - interfaces for telephony services and programming
  - Content formats - definitions for formats like images, phone records, calendar, etc.

WAP Protocol Specifications

Wireless Application Environment (WAE) Specification Describes overall application

Wireless Markup Language (WML) Specification The WAP device markup language we have studied

Binary XML Content Format Specification Dictionary based compression scheme used to encode XML documents

WMLScript Language Specification An optimised script language like JavaScript that uses minimal CPU and memory

WMLScript Standard Libraries Specification Standard script libraries used by all clients using WMLScript

WAP Caching Model Specification Describes browsers caching behaviour and relation to browser's navigation history

Wireless Session Protocol (WSP) Specification Binary variant of the Internet HTTP protocol for wireless transport

Wireless Transaction Protocol (WTP) Specification Helper to WSP that manages individual request-response pairs

Wireless Datagram Protocol (WDP) Specification Common interface to various wireless transport services

WAP over GSM USSD Specification Mapping ofWDP onto USSD, which is a transport service used in GSM networks

Wireless Control Message Protocol (WCMP) Specification Used for error reporting over networks not supporting ICMP

Wireless Transport Layer Security (WTLS) Specification For authentication and encryption of messages

WMLScript

- The WML we've seen is essentially static, but WAP defines a scripting language to add active functionality to our content
- WMLScript is derived from JavaScript (JScript)
- It is a version of this, cut down for wireless work
- WMLScript programs are not embedded within WML documents (as in HTML), but stored as a separate files that are accessed via a URL
- WMLScript programs are function-oriented, might be many per program so each function must have a unique name

WMLScript

- To call a function xyz, use the URL of the file plus a fragment identifier (…#xyz)
- Functions cannot be nested
- All variables in functions are local, but functions can manipulate browser variables, which are global
- Declare variables with the var operator eg

```
var wap="Wireless Application Protocol";
```

- A WMLScript gets compiled in bytecode at the WAP gateway for transport to the handheld device

References

Anderson, et.al. *Professional XML*. Wrox Press, 2000. Chapters 9 & 14.

And see

WAP Forum at http://www.wapforum.org

James Clark's free XSLT processor at http://www.jclark.com/xml/xt.html