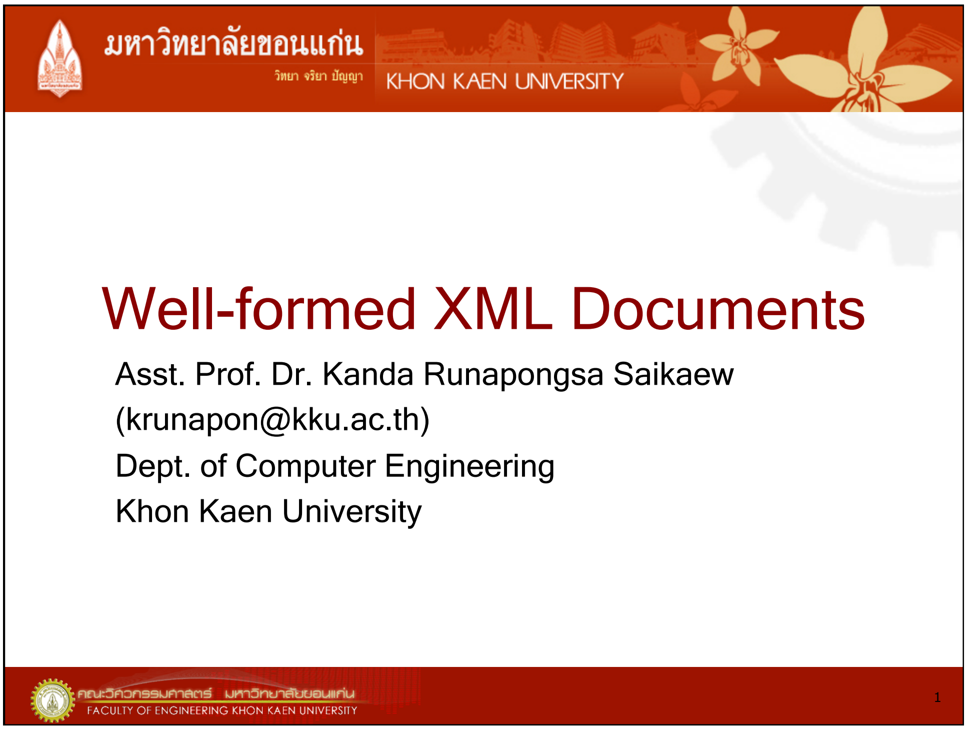

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Well-formed XML Documents

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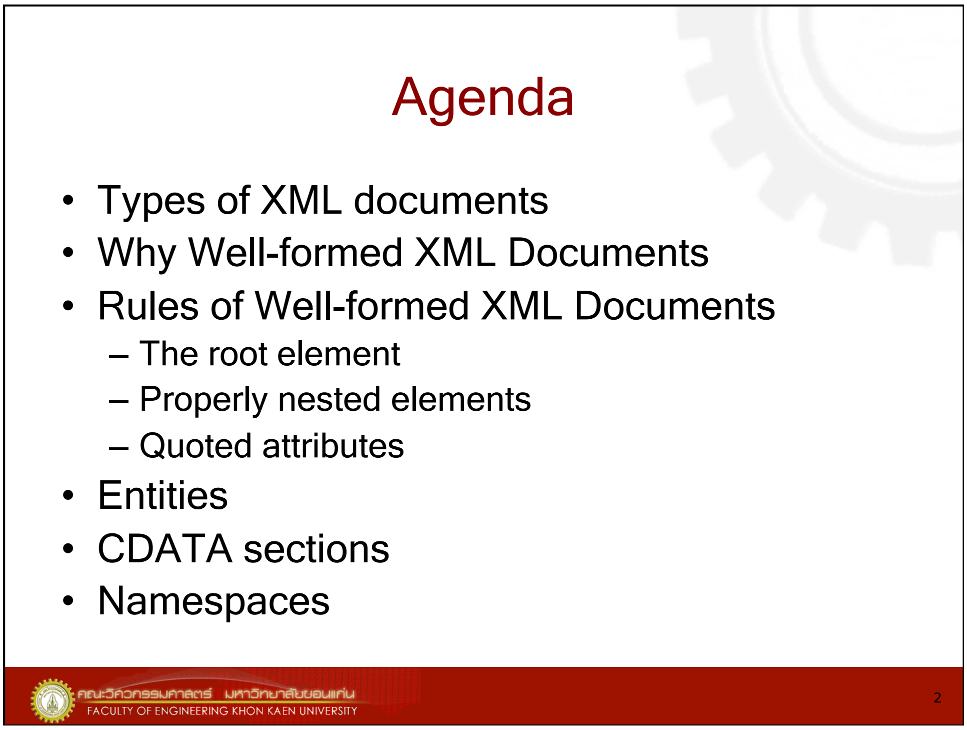
1



Agenda

- Types of XML documents
- Why Well-formed XML Documents
- Rules of Well-formed XML Documents
  - The root element
  - Properly nested elements
  - Quoted attributes
- Entities
- CDATA sections
- Namespaces

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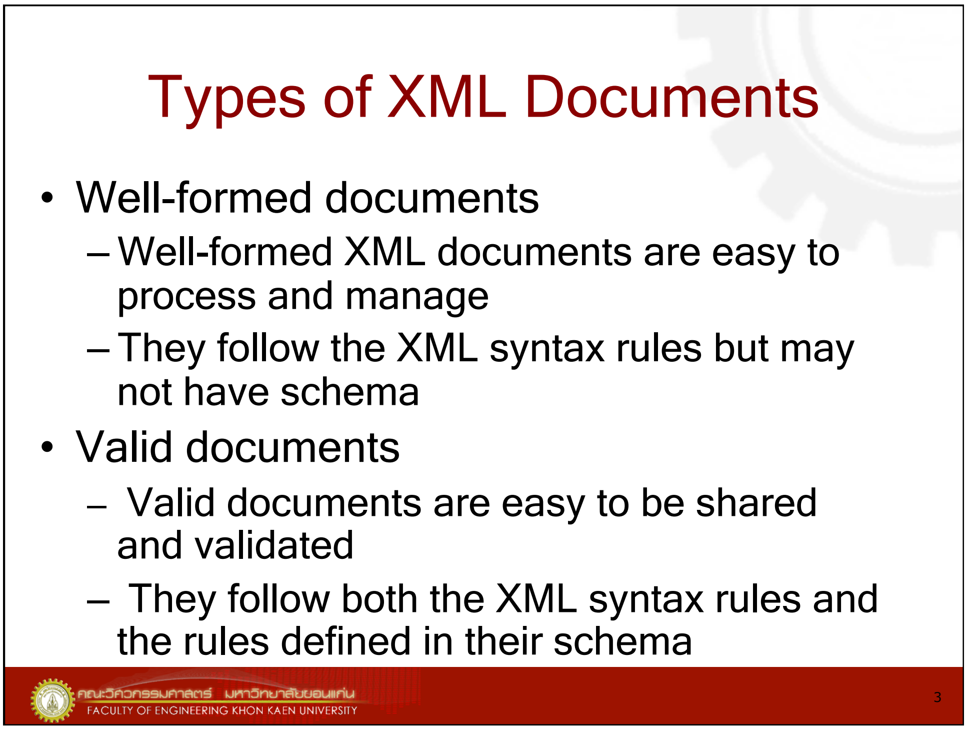

Types of XML Documents

- Well-formed documents
  - Well-formed XML documents are easy to process and manage
  - They follow the XML syntax rules but may not have schema
- Valid documents
  - Valid documents are easy to be shared and validated
  - They follow both the XML syntax rules and the rules defined in their schema

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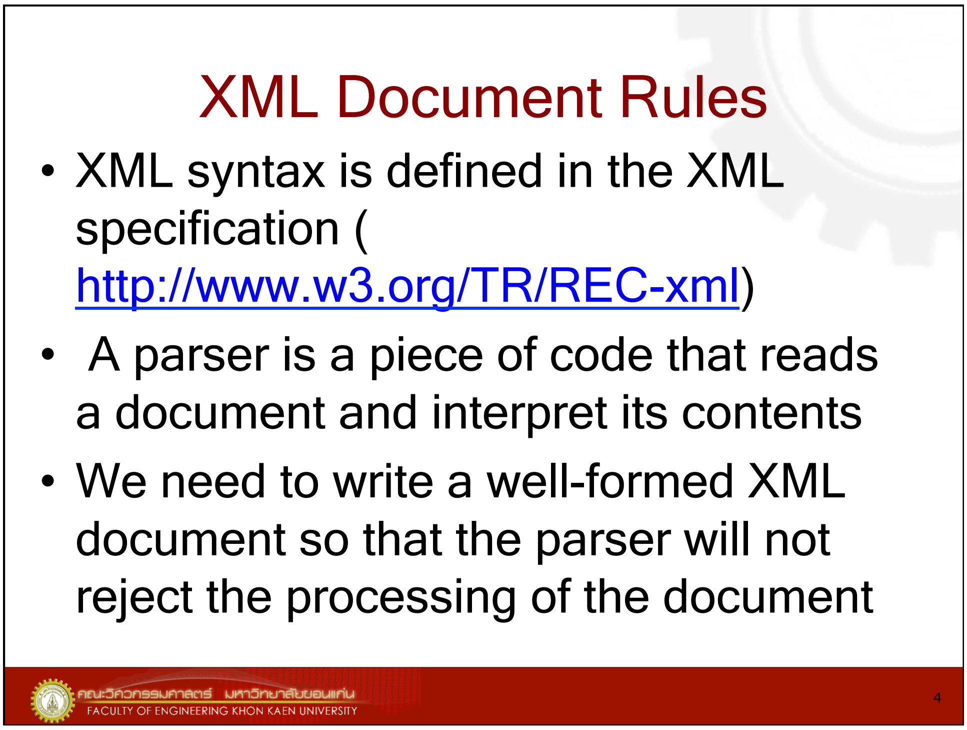

XML Document Rules

- XML syntax is defined in the XML specification (http://www.w3.org/TR/REC-xml)
- A parser is a piece of code that reads a document and interpret its contents
- We need to write a well-formed XML document so that the parser will not reject the processing of the document

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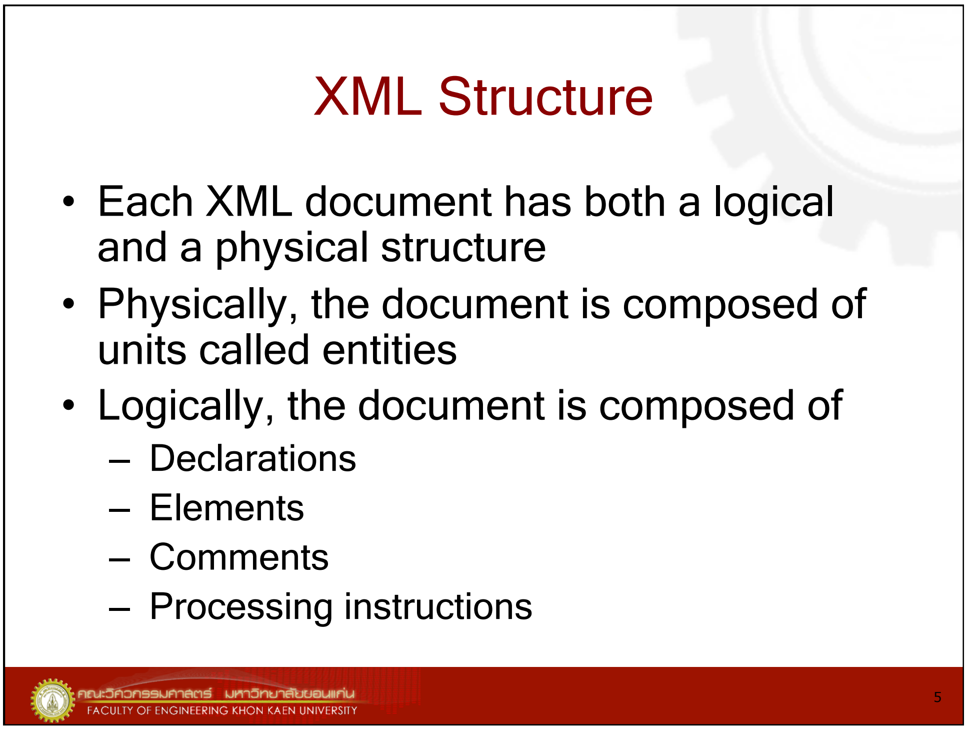
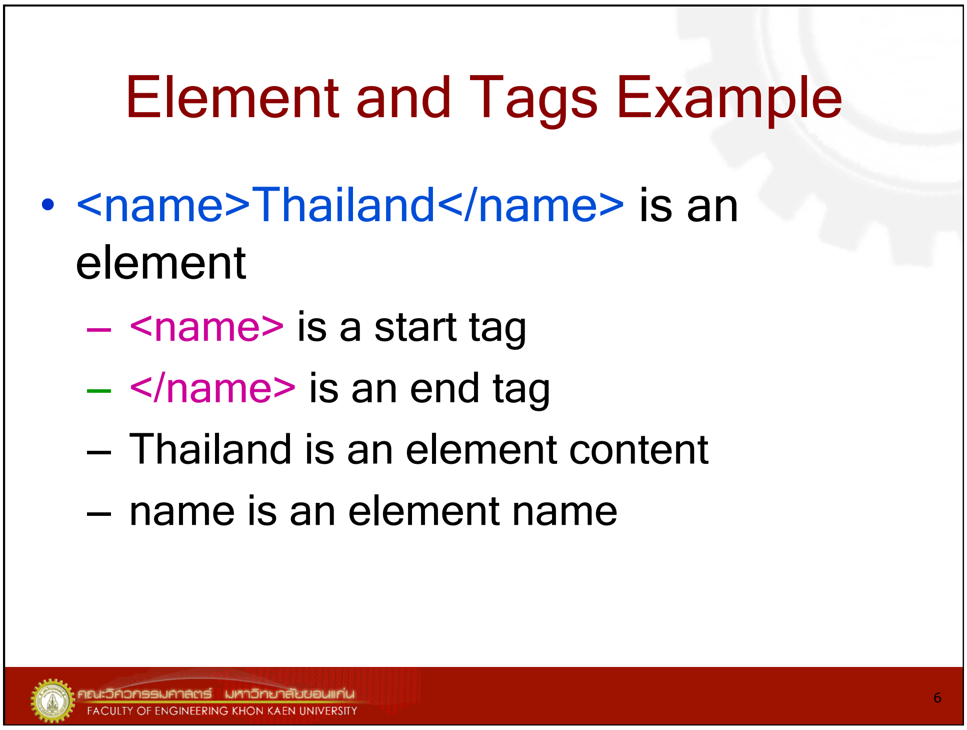


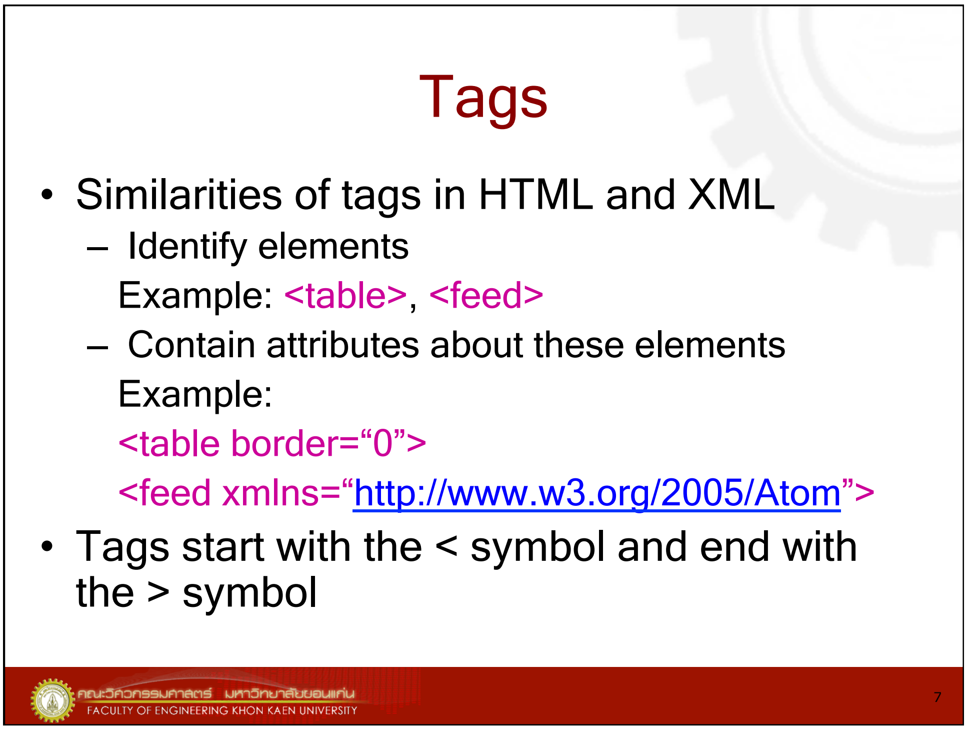
XML Structure

- Each XML document has both a logical and a physical structure
- Physically, the document is composed of units called entities
- Logically, the document is composed of
  - Declarations
  - Elements
  - Comments
  - Processing instructions



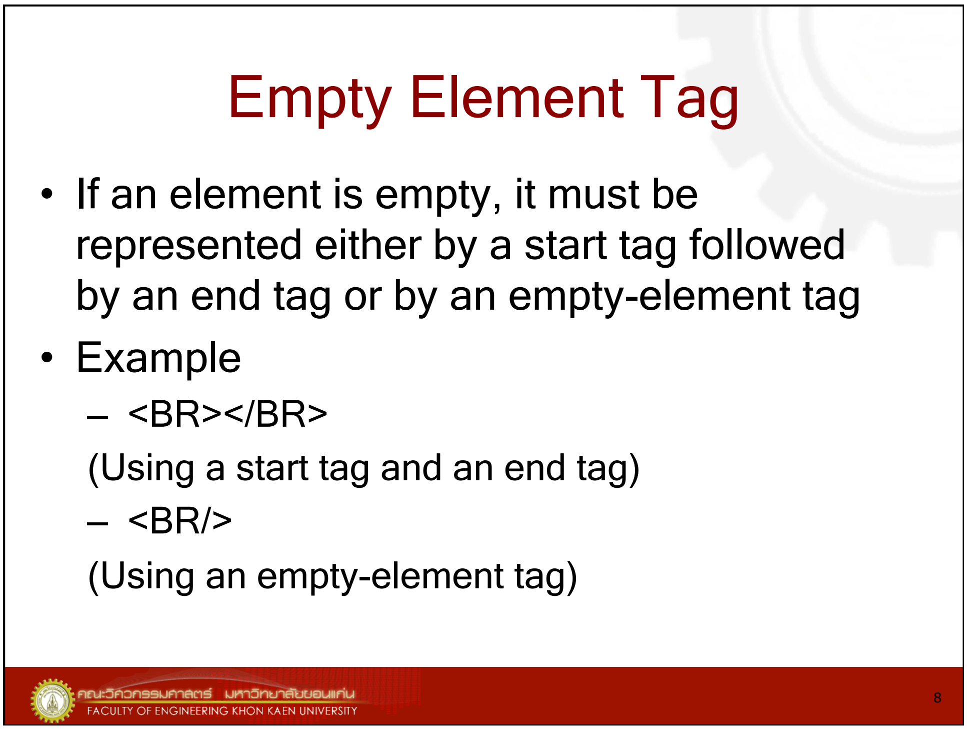
Element and Tags Example

- <name>Thailand</name> is an element
  - <name> is a start tag
  - </name> is an end tag
  - Thailand is an element content
  - name is an element name



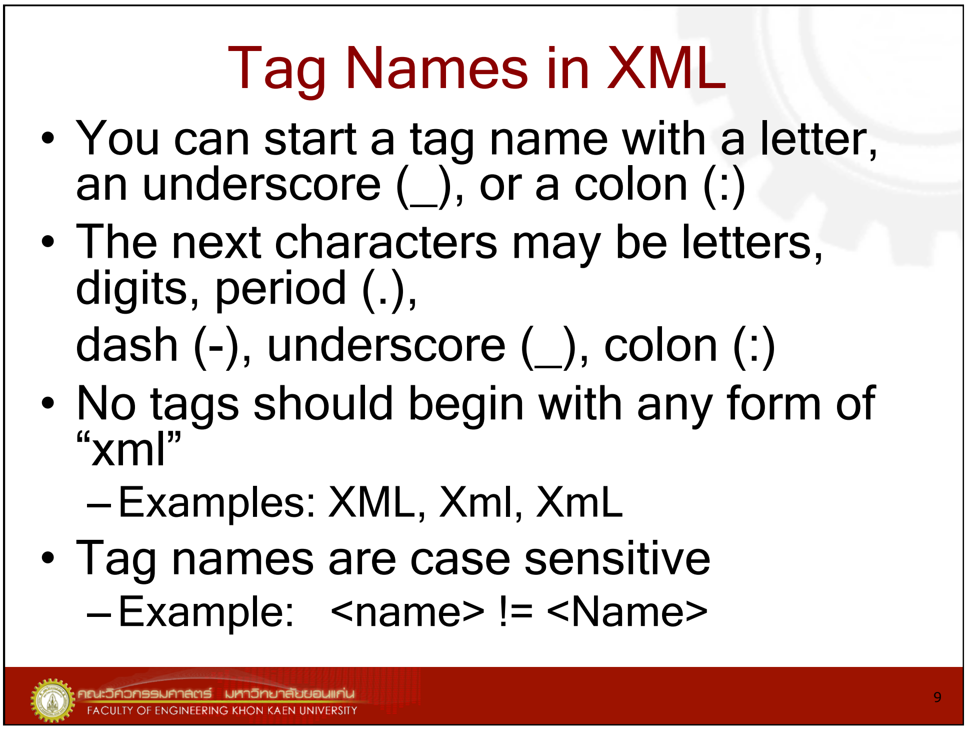
Tags

- Similarities of tags in HTML and XML
  - Identify elements
    Example: <table>, <feed>
  - Contain attributes about these elements
    Example:
    <table border="0">
    <feed xmlns="http://www.w3.org/2005/Atom">
- Tags start with the < symbol and end with the > symbol



Empty Element Tag

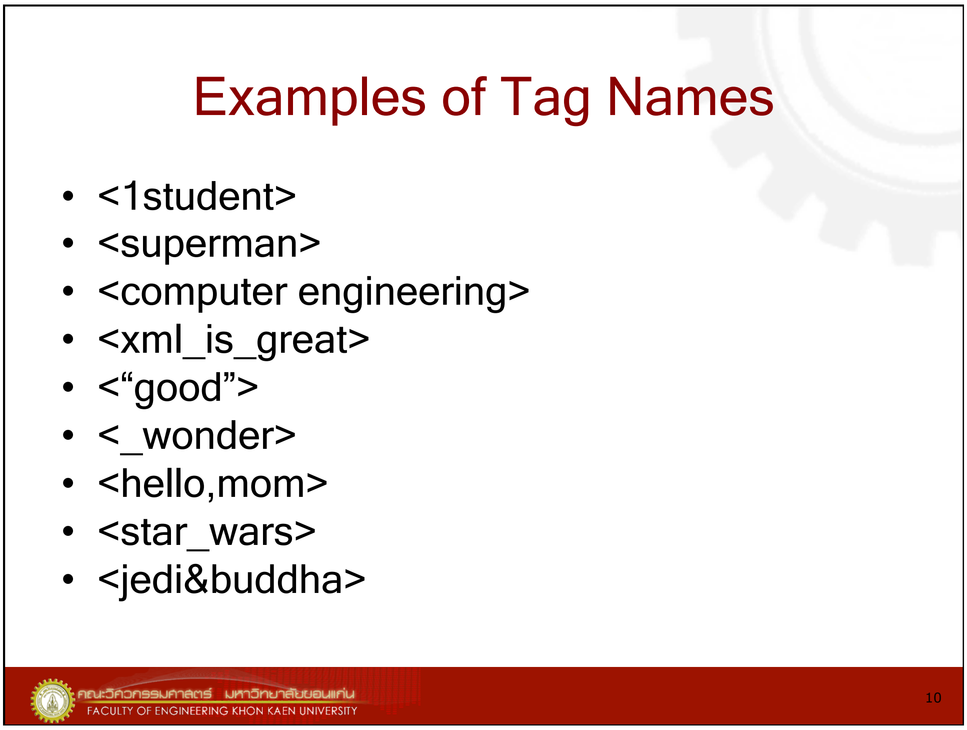
- If an element is empty, it must be represented either by a start tag followed by an end tag or by an empty-element tag
- Example
  - <BR></BR>
  (Using a start tag and an end tag)
  - <BR/>
  (Using an empty-element tag)



Tag Names in XML

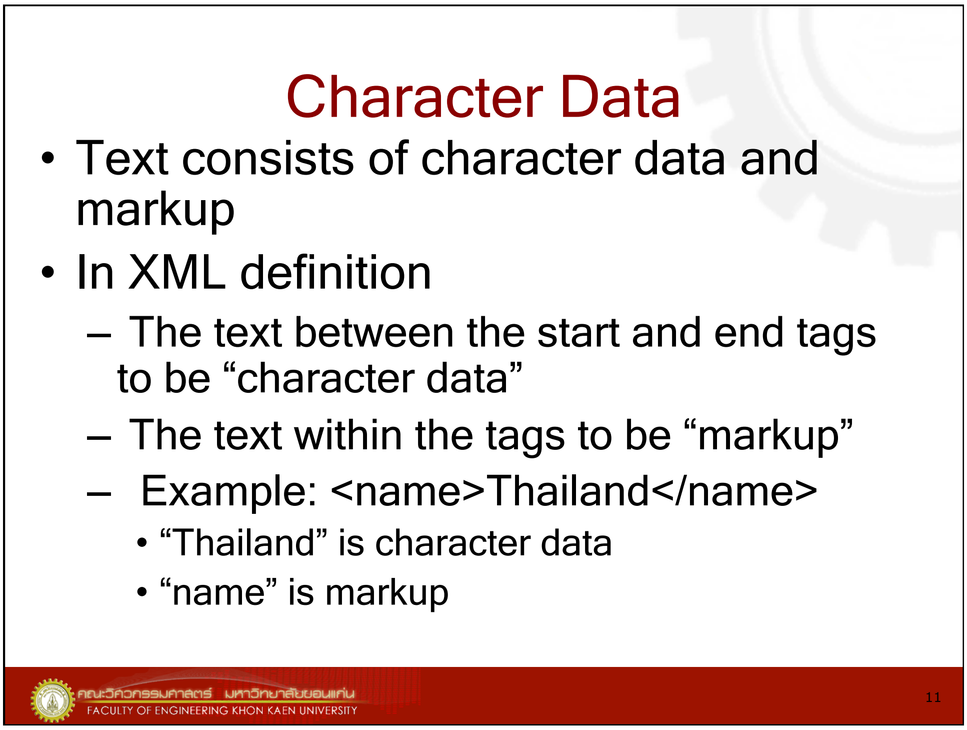
- You can start a tag name with a letter, an underscore (_), or a colon (:)
- The next characters may be letters, digits, period (.),

  dash (-), underscore (_), colon (:)
- No tags should begin with any form of “xml”
  - Examples: XML, Xml, XmL
- Tag names are case sensitive
  - Example: <name> != <Name>



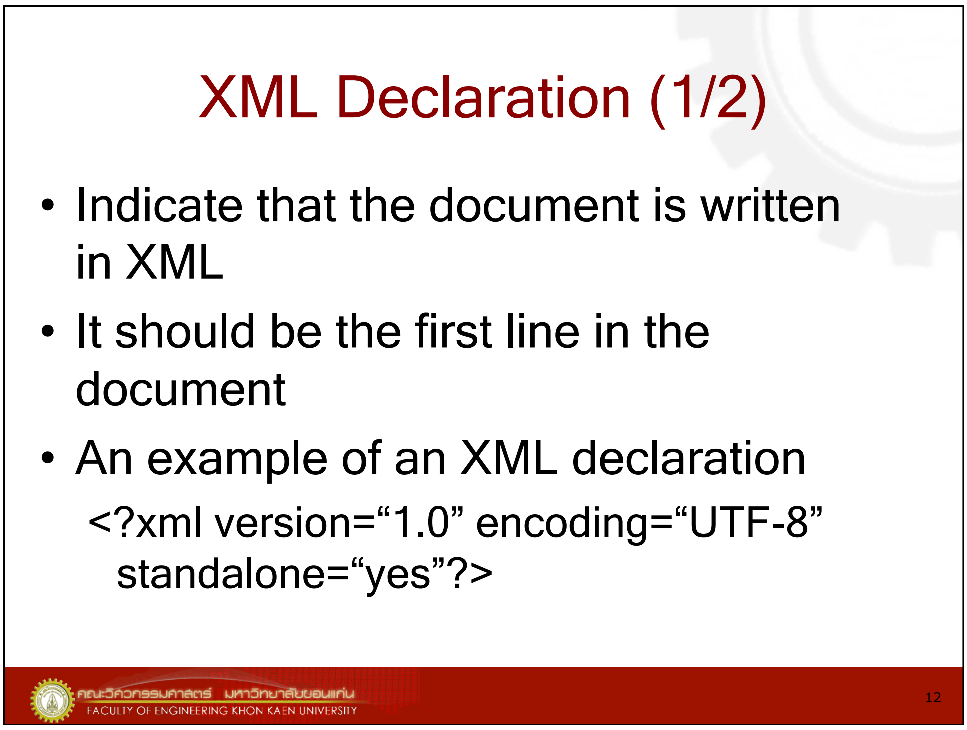
Examples of Tag Names

- <1student>
- <superman>
- <computer engineering>
- <xml_is_great>
- <“good”>
- <_wonder>
- <hello,mom>
- <star_wars>
- <jedi&buddha>



Character Data

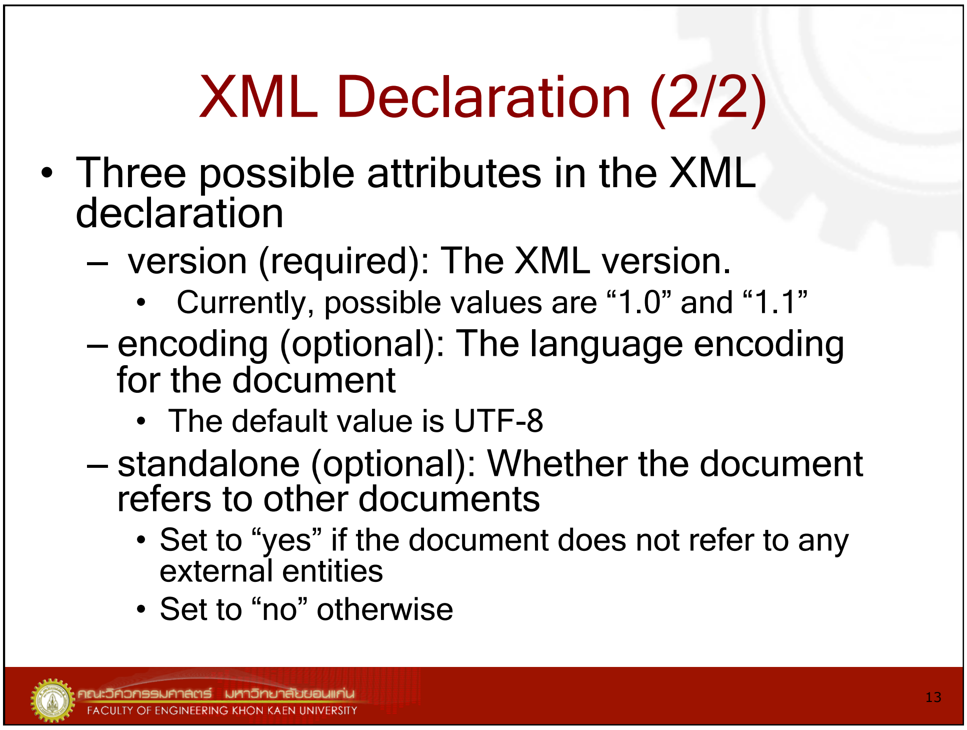
- Text consists of character data and markup
- In XML definition
  - The text between the start and end tags to be “character data”
  - The text within the tags to be “markup”
  - Example: <name>Thailand</name>
    - “Thailand” is character data
    - “name” is markup



XML Declaration (1/2)

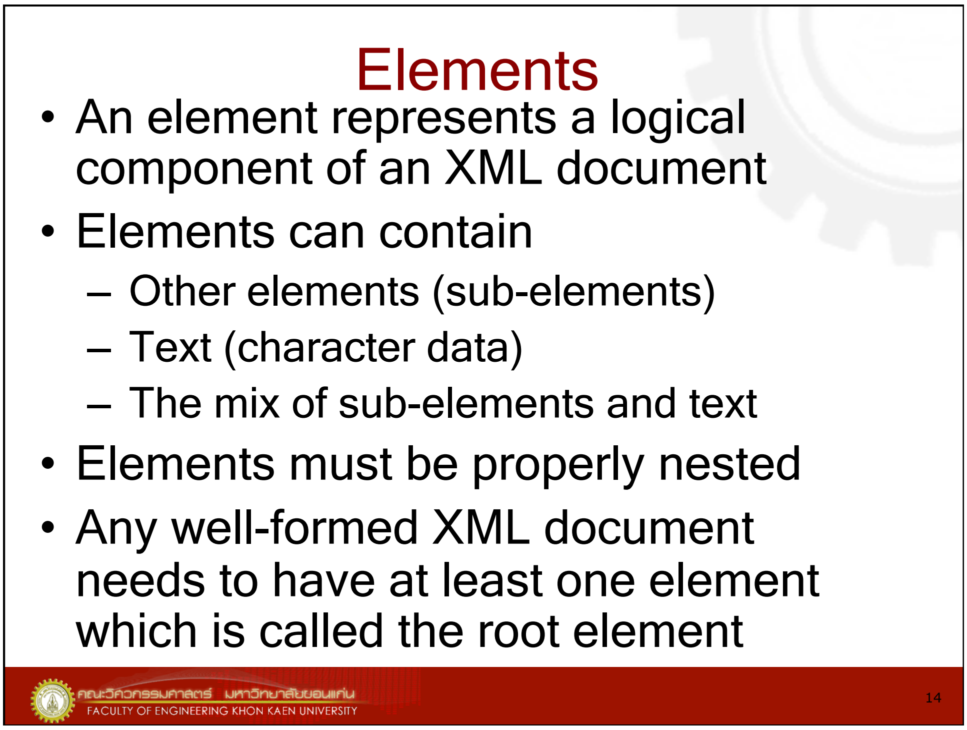
- Indicate that the document is written in XML
- It should be the first line in the document
- An example of an XML declaration

  <?xml version=“1.0” encoding=“UTF-8” standalone=“yes”?>



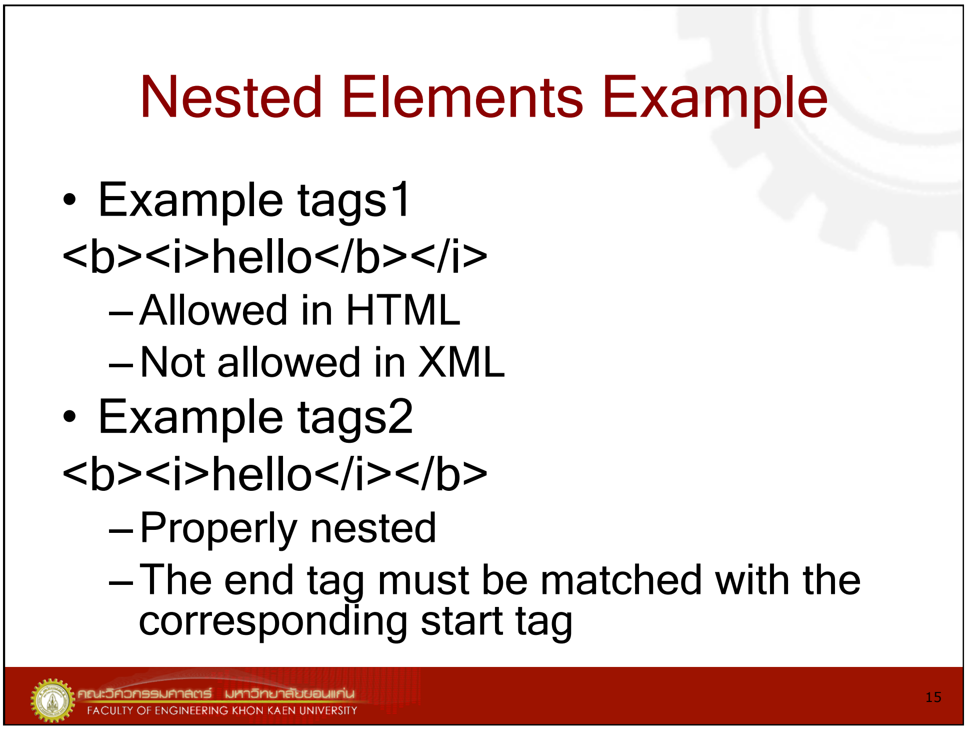
XML Declaration (2/2)

- Three possible attributes in the XML declaration
  - version (required): The XML version.
    - Currently, possible values are “1.0” and “1.1”
  - encoding (optional): The language encoding for the document
    - The default value is UTF-8
  - standalone (optional): Whether the document refers to other documents
    - Set to “yes” if the document does not refer to any external entities
    - Set to “no” otherwise



Elements

- An element represents a logical component of an XML document
- Elements can contain
  - Other elements (sub-elements)
  - Text (character data)
  - The mix of sub-elements and text
- Elements must be properly nested
- Any well-formed XML document needs to have at least one element which is called the root element



Nested Elements Example

- Example tags1

<b><i>hello</b></i>

  - Allowed in HTML
  - Not allowed in XML
- Example tags2

<b><i>hello</i></b>

  - Properly nested
  - The end tag must be matched with the corresponding start tag

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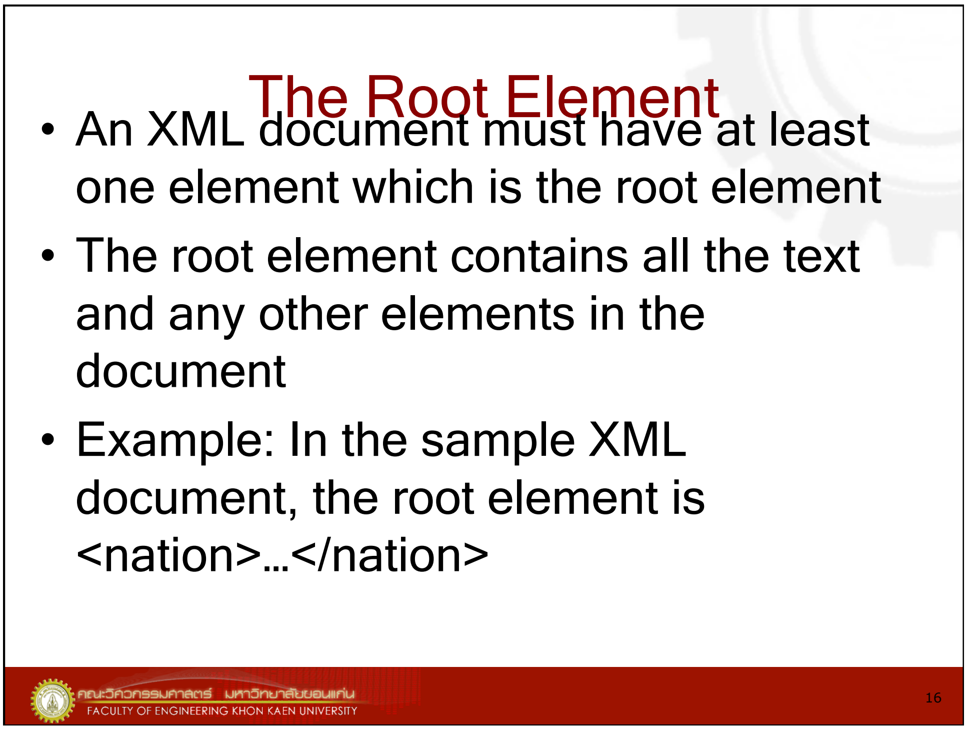

The Root Element

- An XML document must have at least one element which is the root element
- The root element contains all the text and any other elements in the document
- Example: In the sample XML document, the root element is <nation>…</nation>

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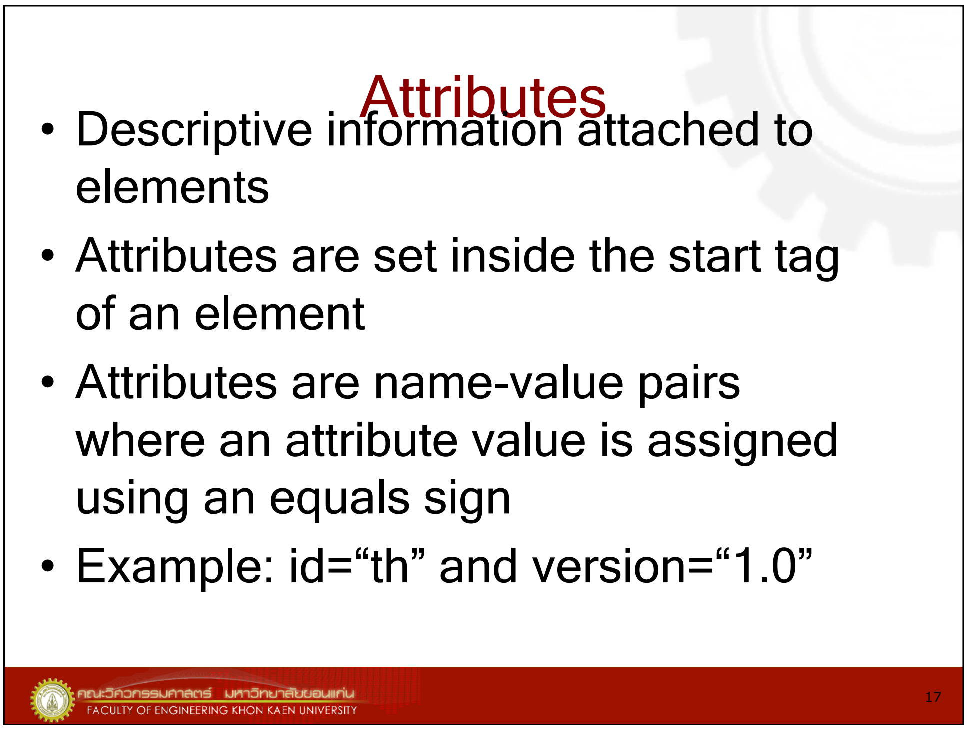
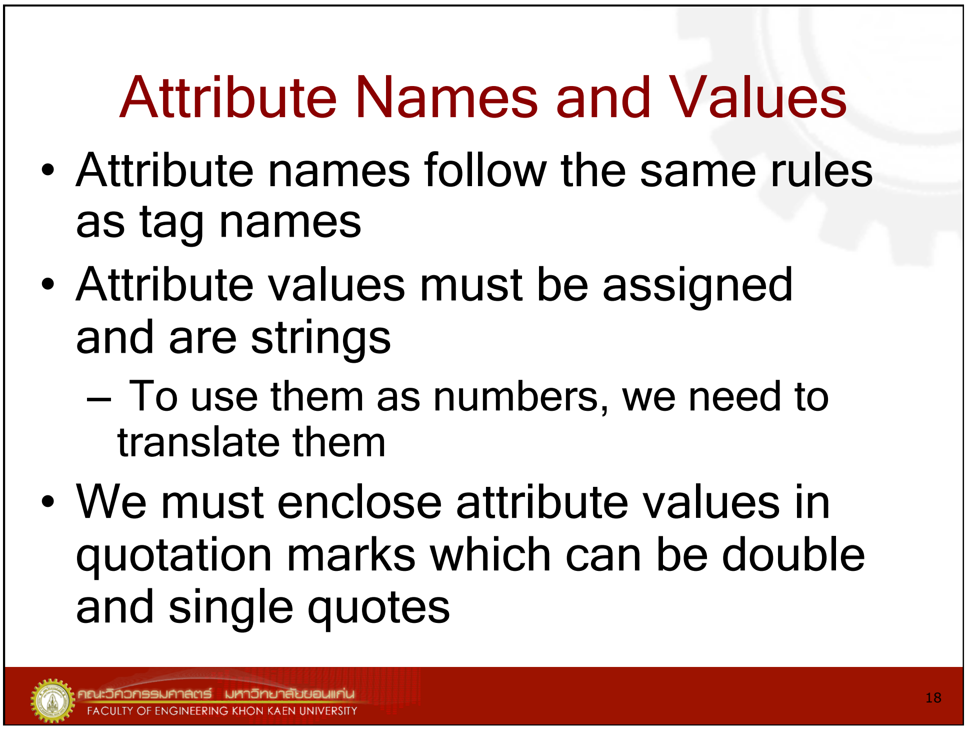


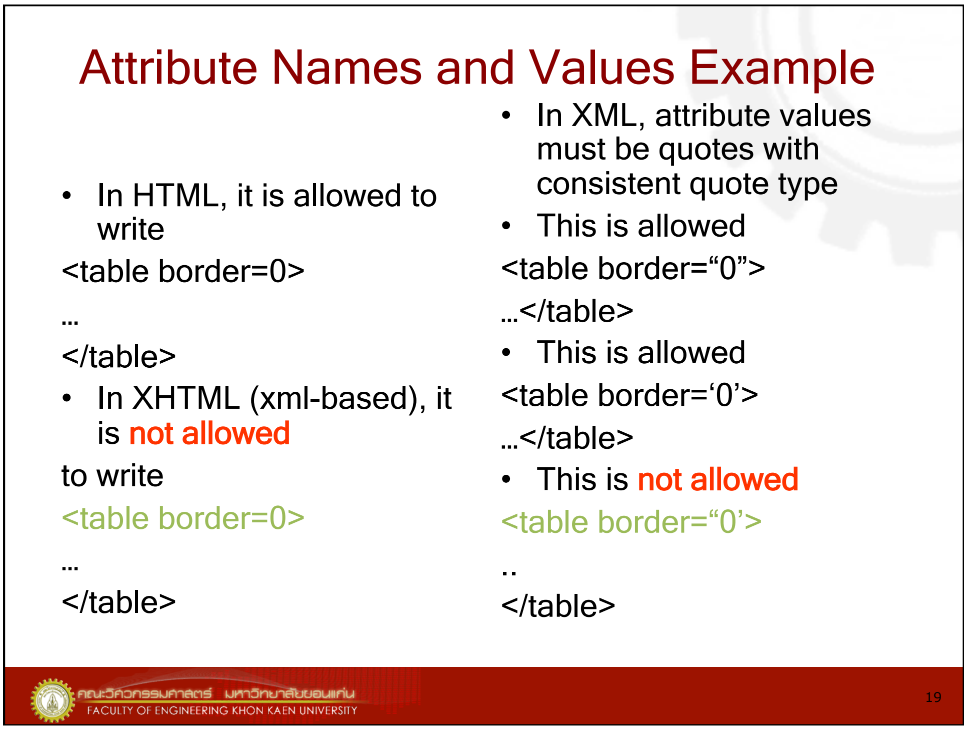
Attributes

- Descriptive information attached to elements
- Attributes are set inside the start tag of an element
- Attributes are name-value pairs where an attribute value is assigned using an equals sign
- Example: id="th" and version="1.0"



Attribute Names and Values

- Attribute names follow the same rules as tag names
- Attribute values must be assigned and are strings
  - To use them as numbers, we need to translate them
- We must enclose attribute values in quotation marks which can be double and single quotes



Attribute Names and Values Example

- In HTML, it is allowed to write

<table border=0>

…

</table>

- In XHTML (xml-based), it is not allowed

to write

<table border=0>

…

</table>

- In XML, attribute values must be quotes with consistent quote type
- This is allowed

<table border="0">

…</table>

- This is allowed

<table border='0'>

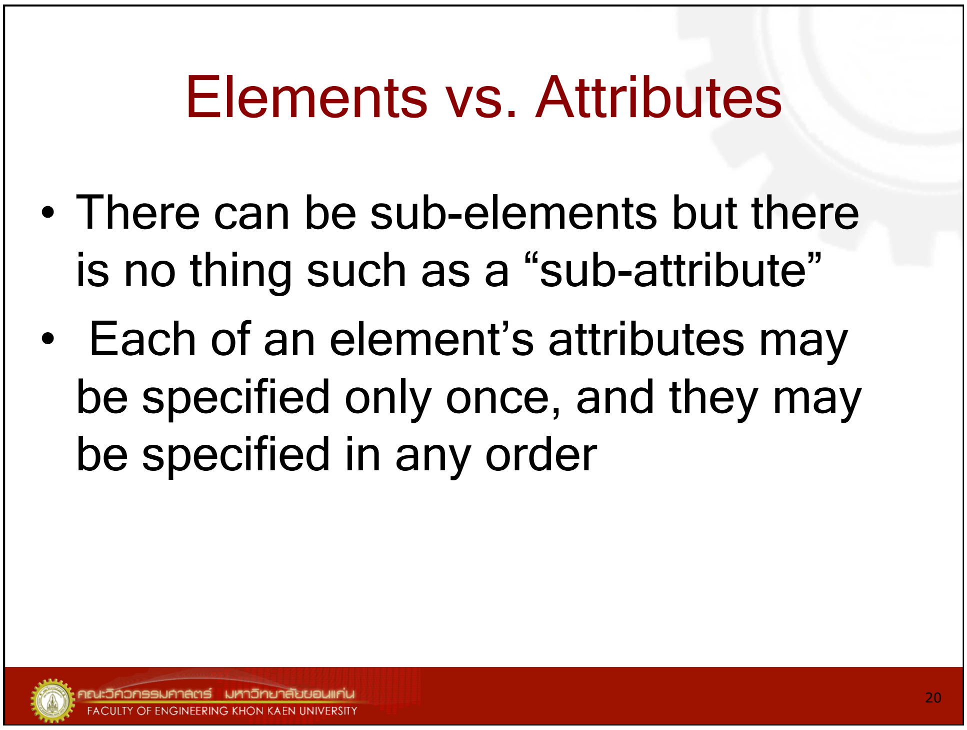
…</table>

- This is not allowed

<table border="0'>

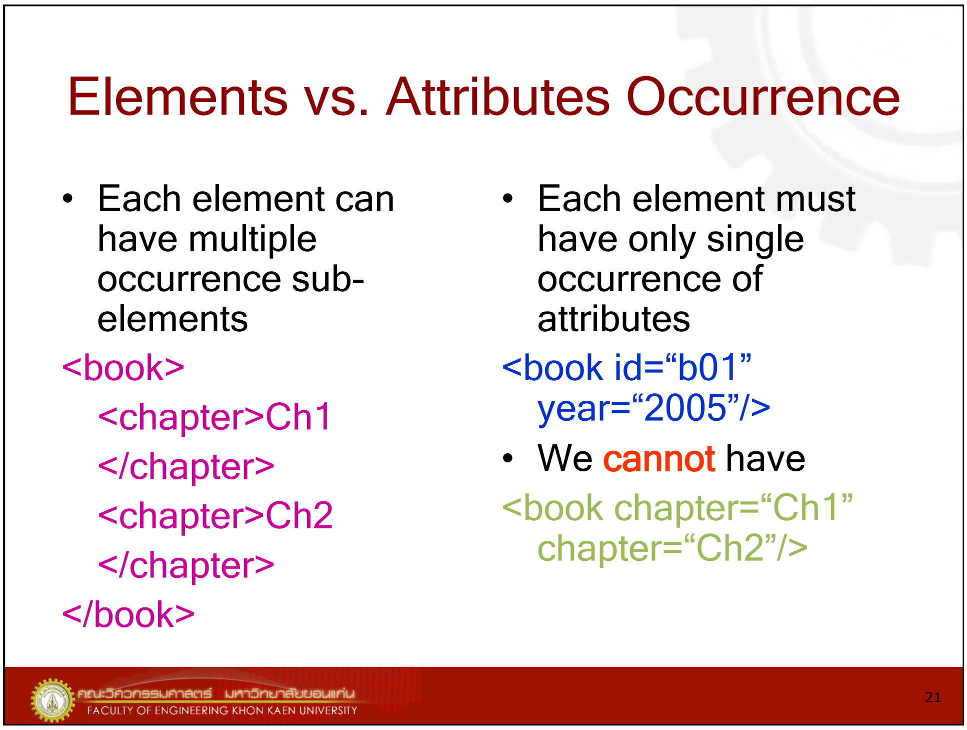
..

</table>



Elements vs. Attributes

- There can be sub-elements but there is no thing such as a "sub-attribute"
- Each of an element's attributes may be specified only once, and they may be specified in any order



Elements vs. Attributes Occurrence

- Each element can have multiple occurrence sub-elements

```
<book>
   <chapter>Ch1
   </chapter>
   <chapter>Ch2
   </chapter>
</book>
```

- Each element must have only single occurrence of attributes

```
<book id="b01"
   year="2005"/>
```

- We cannot have

```
<book chapter="Ch1"
   chapter="Ch2"/>
```

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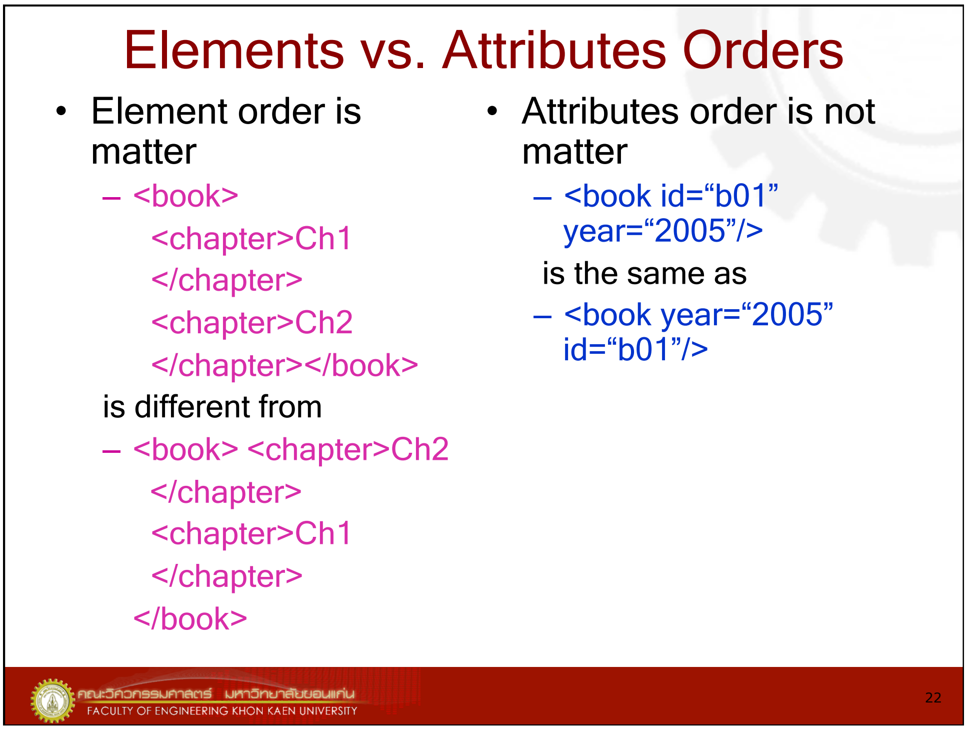

Elements vs. Attributes Orders

- Element order is matter

  -
    ```
    <book>
       <chapter>Ch1
       </chapter>
       <chapter>Ch2
       </chapter></book>
    ```

  is different from

  -
    ```
    <book> <chapter>Ch2
       </chapter>
       <chapter>Ch1
       </chapter>
    </book>
    ```

- Attributes order is not matter

  -
    ```
    <book id="b01"
    year="2005"/>
    ```

  is the same as

  -
    ```
    <book year="2005"
    id="b01"/>
    ```

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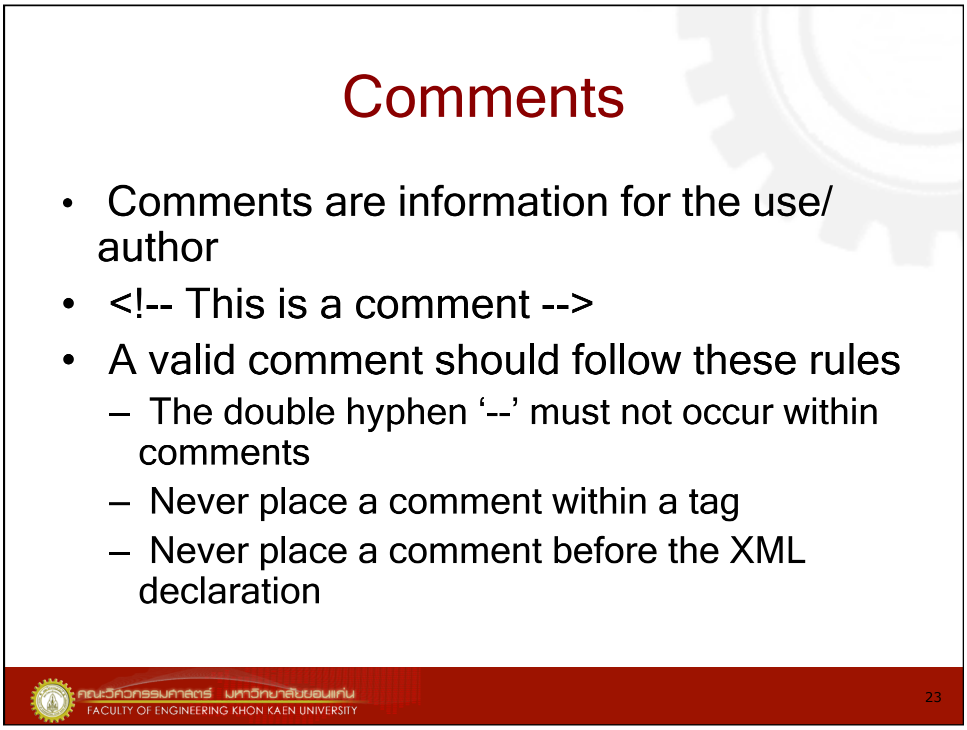

Comments

- Comments are information for the use/ author
- <!-- This is a comment -->
- A valid comment should follow these rules
  - The double hyphen '--' must not occur within comments
  - Never place a comment within a tag
  - Never place a comment before the XML declaration

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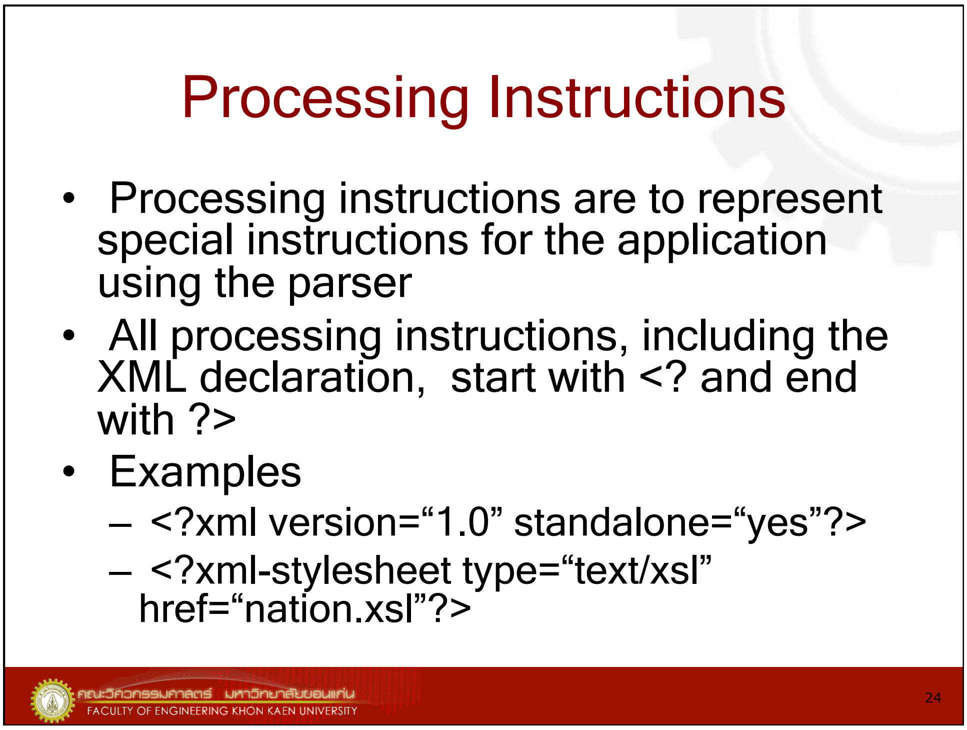

Processing Instructions

- Processing instructions are to represent special instructions for the application using the parser
- All processing instructions, including the XML declaration, start with <? and end with ?>
- Examples
  - <?xml version="1.0" standalone="yes"?>
  - <?xml-stylesheet type="text/xsl" href="nation.xsl"?>

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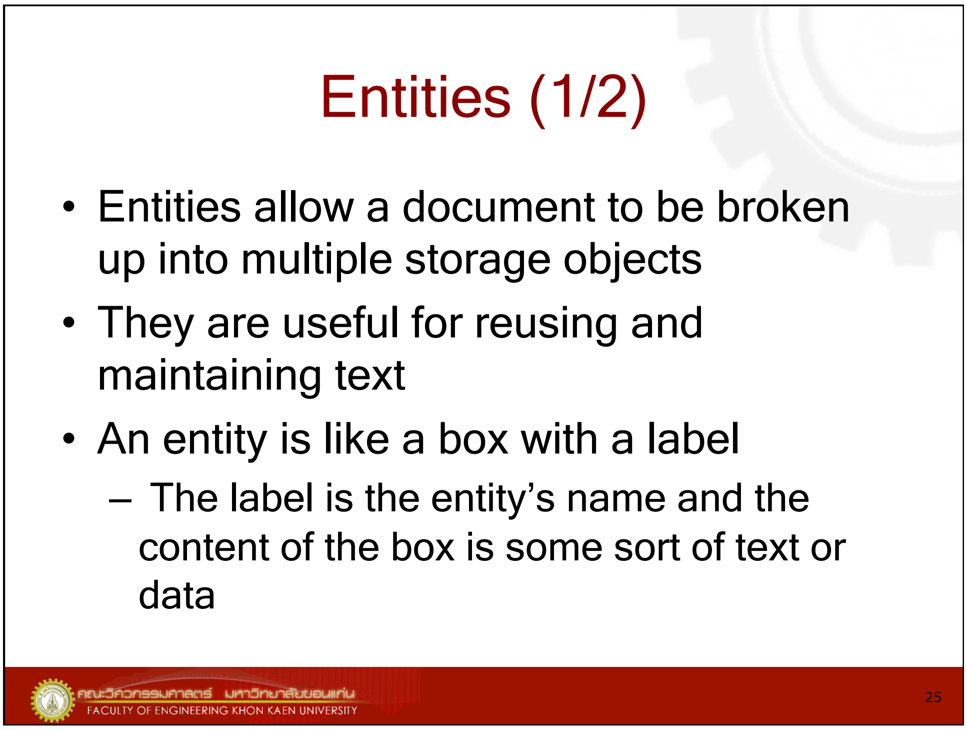
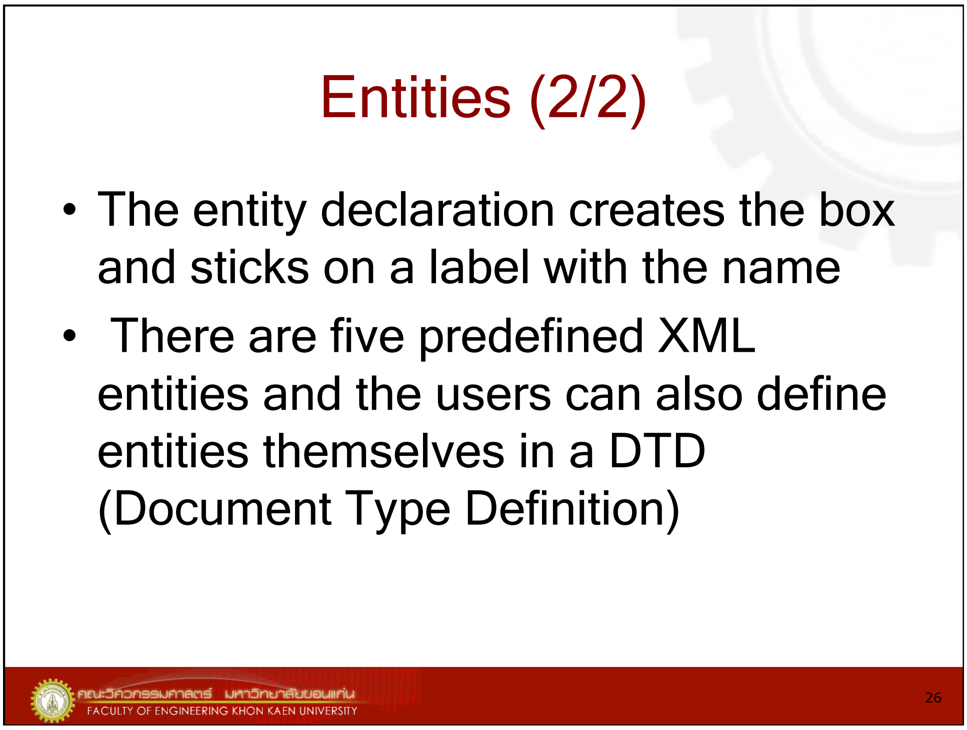


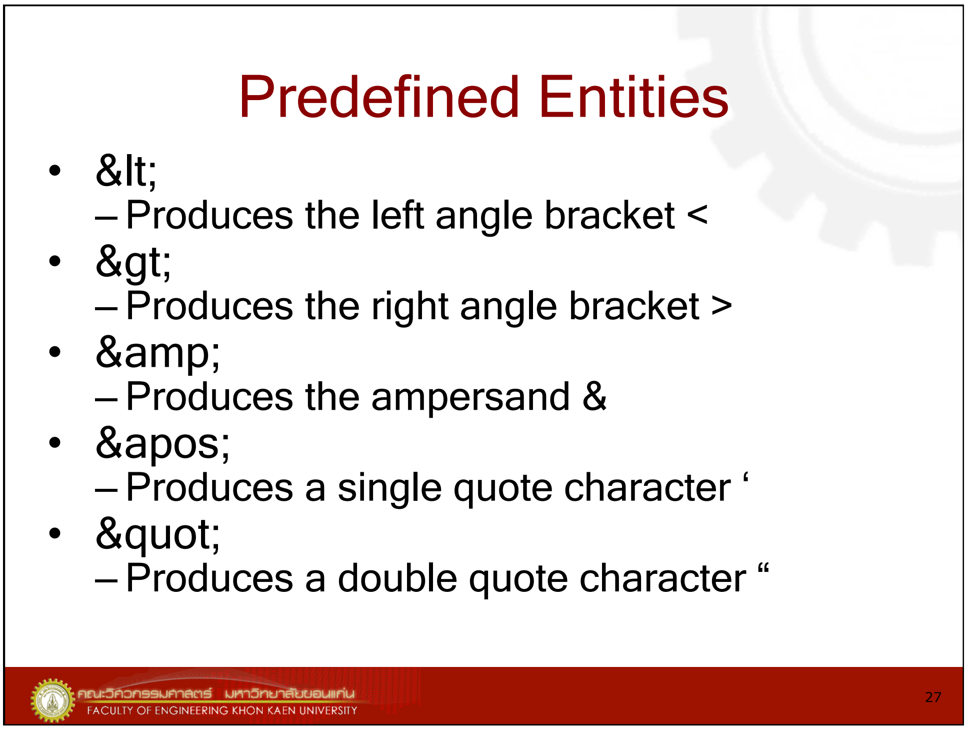
Entities (1/2)

- Entities allow a document to be broken up into multiple storage objects
- They are useful for reusing and maintaining text
- An entity is like a box with a label
  - The label is the entity's name and the content of the box is some sort of text or data



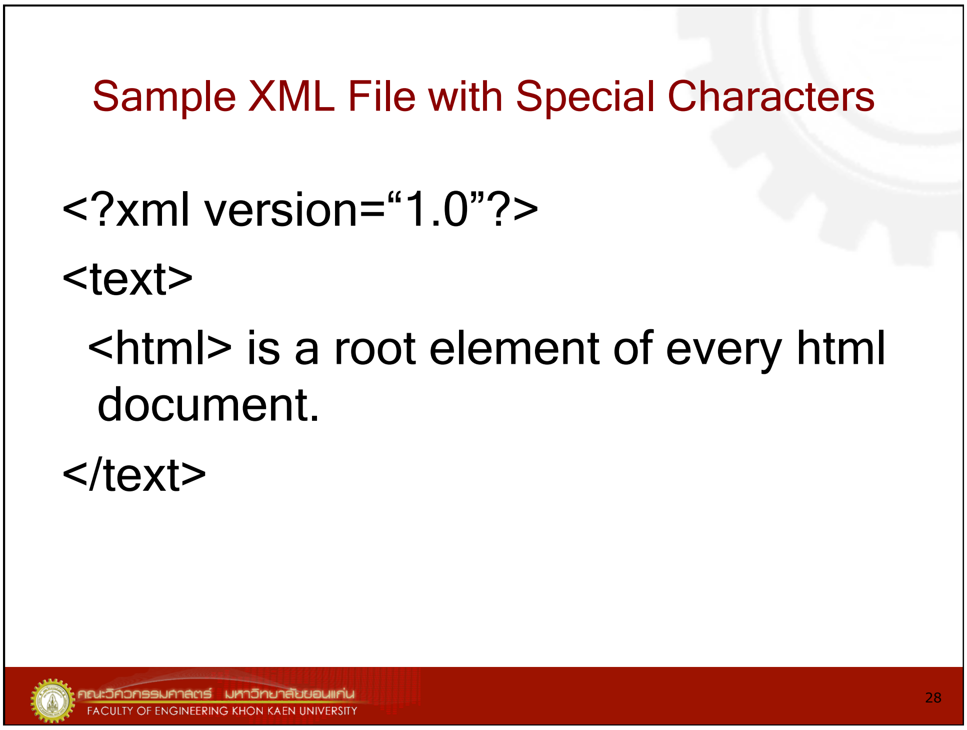
Entities (2/2)

- The entity declaration creates the box and sticks on a label with the name
- There are five predefined XML entities and the users can also define entities themselves in a DTD (Document Type Definition)



Predefined Entities

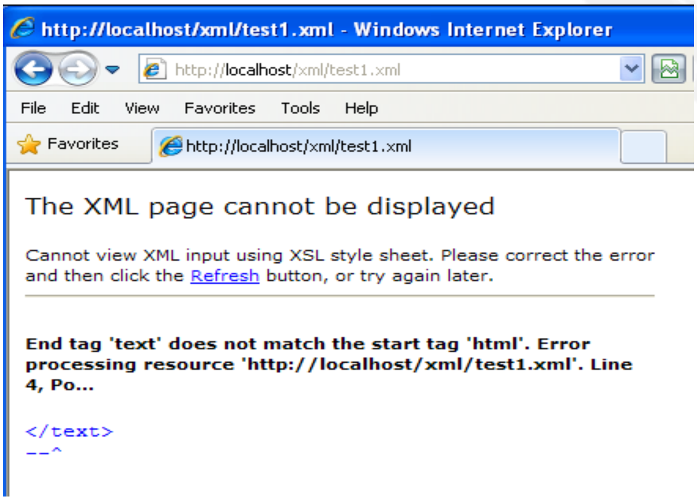
- &lt;
  - Produces the left angle bracket <
- &gt;
  - Produces the right angle bracket >
- &amp;
  - Produces the ampersand &
- &apos;
  - Produces a single quote character ‘
- &quot;
  - Produces a double quote character “



Sample XML File with Special Characters

```
<?xml version="1.0"?>
<text>
  <html> is a root element of every html
   document.
</text>
```

XML Document that is Not Well-formed


http://localhost/xml/test1.xml - Windows Internet Explorer
http://localhost/xml/test1.xml
File Edit View Favorites Tools Help
Favorites
http://localhost/xml/test1.xml

The XML page cannot be displayed

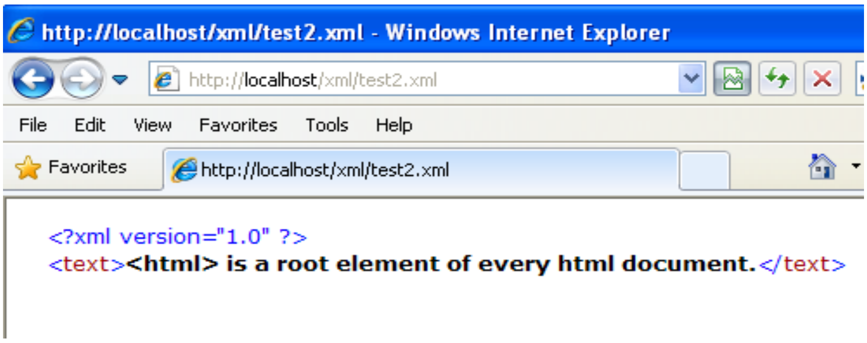
Cannot view XML input using XSL style sheet. Please correct the error and then click the Refresh button, or try again later.

End tag 'text' does not match the start tag 'html'. Error processing resource 'http://localhost/xml/test1.xml'. Line 4, Po...

```
</text>
--^
```

Predefined Entities Example

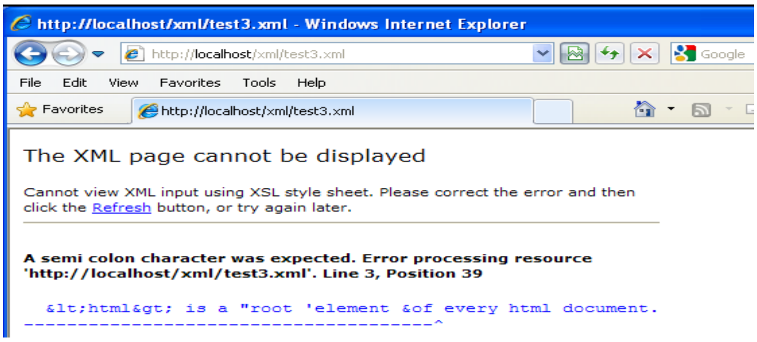
```
<?xml version="1.0"?>
<text>
   &lt;html&gt; is a root element of every html document.
</text>
```


http://localhost/xml/test2.xml - Windows Internet Explorer
http://localhost/xml/test2.xml
File Edit View Favorites Tools Help
Favorites
http://localhost/xml/test2.xml

```
<?xml version="1.0" ?>
<text><html> is a root element of every html document.</text>
```

Testing All Special Characters

```
<?xml version="1.0"?>
<text>
 &lt;html&gt; is a "root 'element &of every html document.
</text>
```



http://localhost/xml/test3.xml - Windows Internet Explorer
http://localhost/xml/test3.xml
Google
File Edit View Favorites Tools Help
Favorites
http://localhost/xml/test3.xml

The XML page cannot be displayed

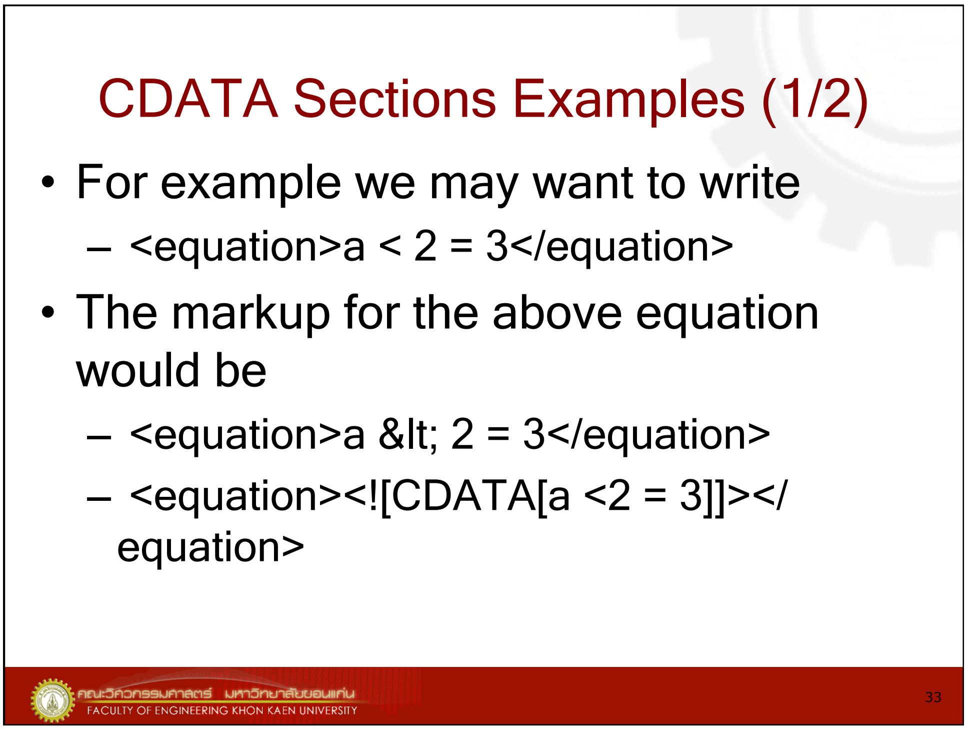
Cannot view XML input using XSL style sheet. Please correct the error and then click the Refresh button, or try again later.

A semi colon character was expected. Error processing resource 'http://localhost/xml/test3.xml'. Line 3, Position 39

```
  &lt;html&gt; is a "root 'element &of every html document.
--------------------------------------^
```

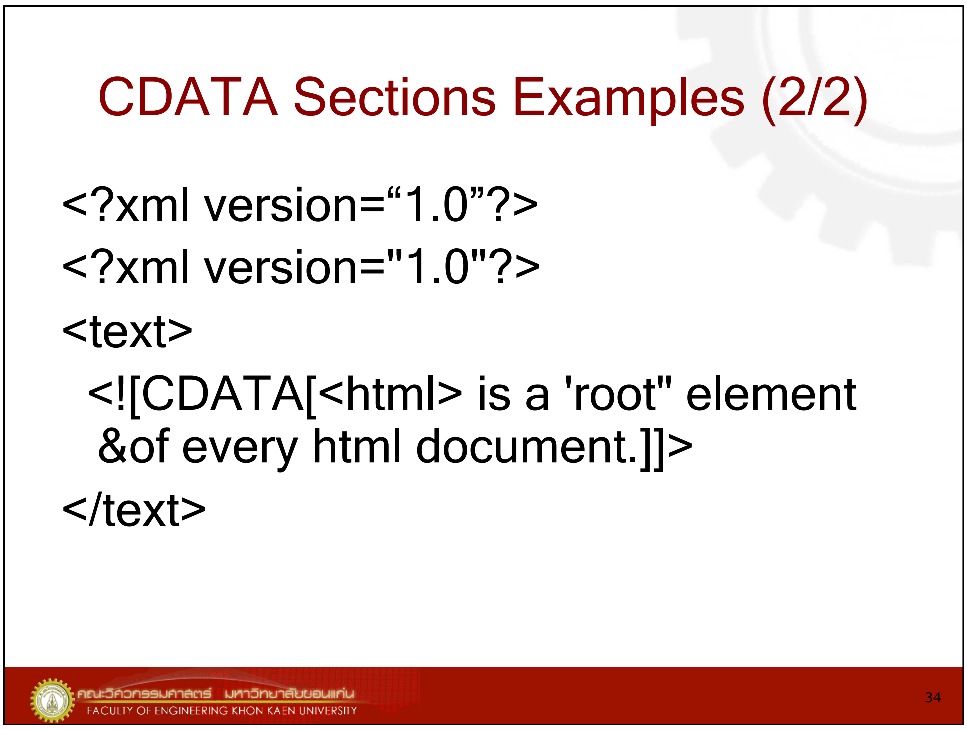
CDATA Sections (1/2)

- CDATA Sections are used to escape blocks of text containing characters which would otherwise be recognized as markup
- All tags and entity references are ignored by an XML processor that treats them just like any character data



CDATA Sections Examples (1/2)

- For example we may want to write
  - <equation>a < 2 = 3</equation>
- The markup for the above equation would be
  - <equation>a &lt; 2 = 3</equation>
  - <equation><![CDATA[a <2 = 3]]></equation>



CDATA Sections Examples (2/2)

<?xml version=“1.0”?>

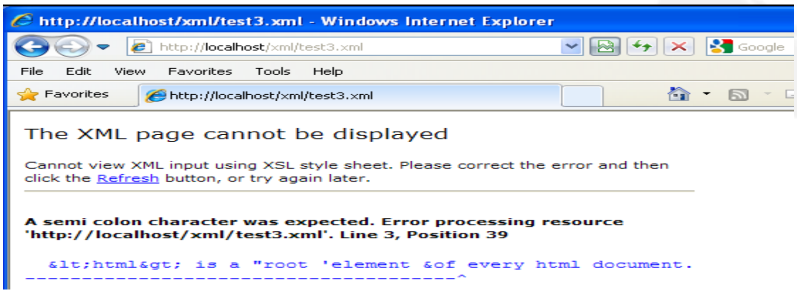
<?xml version="1.0"?>

<text>

<![CDATA[<html> is a 'root" element &of every html document.]]>

</text>

XML File with CDATA Section

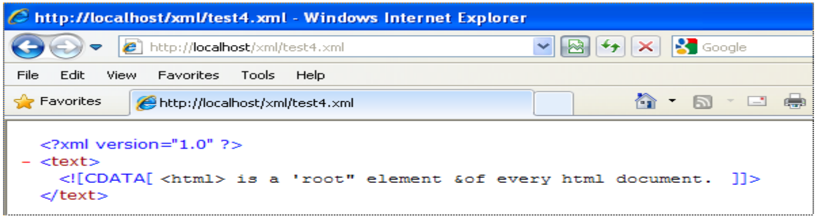

http://localhost/xml/test3.xml - Windows Internet Explorer
http://localhost/xml/test3.xml
Google
File Edit View Favorites Tools Help
Favorites
http://localhost/xml/test3.xml

The XML page cannot be displayed

Cannot view XML input using XSL style sheet. Please correct the error and then click the Refresh button, or try again later.

A semi colon character was expected. Error processing resource 'http://localhost/xml/test3.xml'. Line 3, Position 39

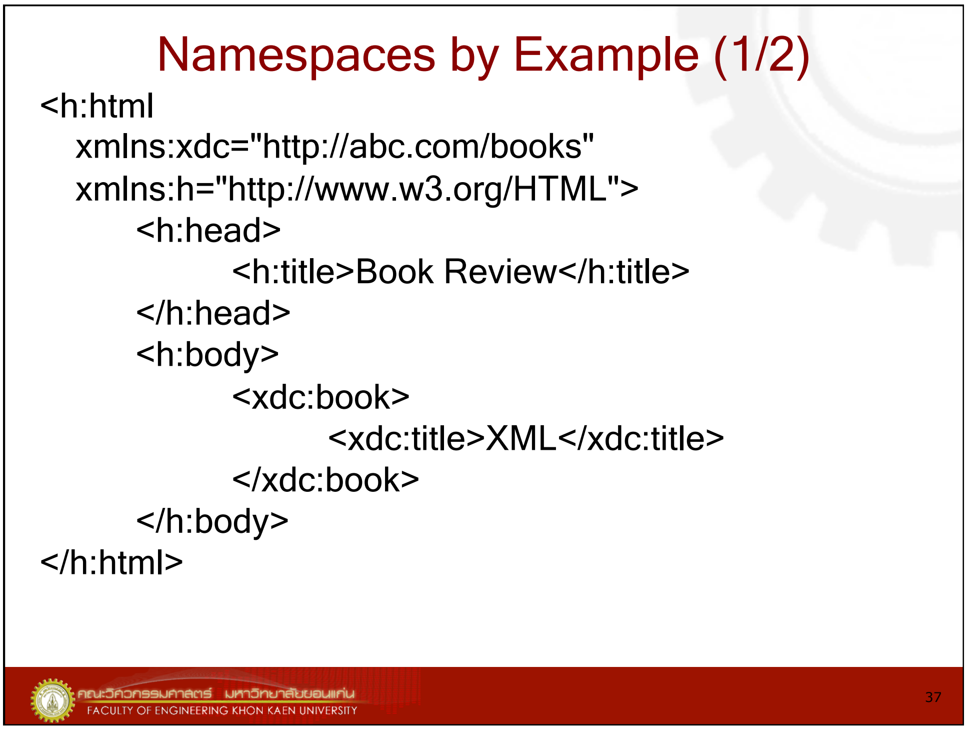
```
  &lt;html&gt; is a "root 'element &of every html document.
-------------------------------------------^
```


http://localhost/xml/test4.xml - Windows Internet Explorer
http://localhost/xml/test4.xml
Google
File Edit View Favorites Tools Help
Favorites
http://localhost/xml/test4.xml

```
  <?xml version="1.0" ?>
- <text>
    <![CDATA[ <html> is a 'root" element &of every html document.  ]]>
  </text>
```

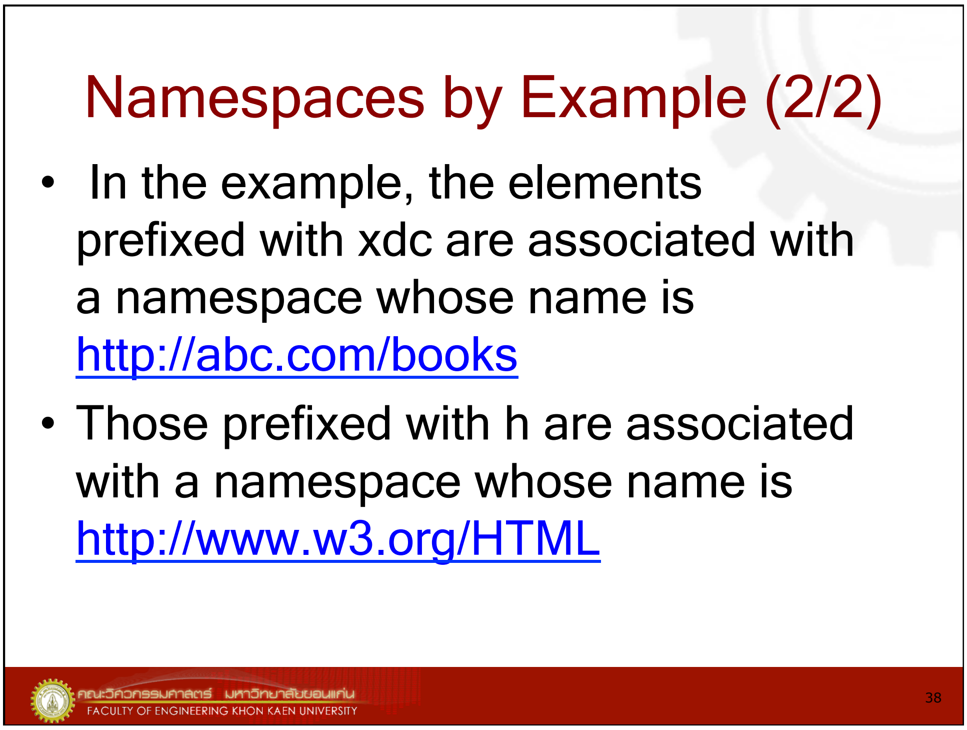
Namespaces

- Namespaces allow you to make sure that one set of tags cannot conflict with another
  - Example, 'title' of 'book' and 'title' of 'page' in HTML
- Namespaces work by letting you prepend a name followed by a colon to tag and attribute names, changing those names so they do not conflict



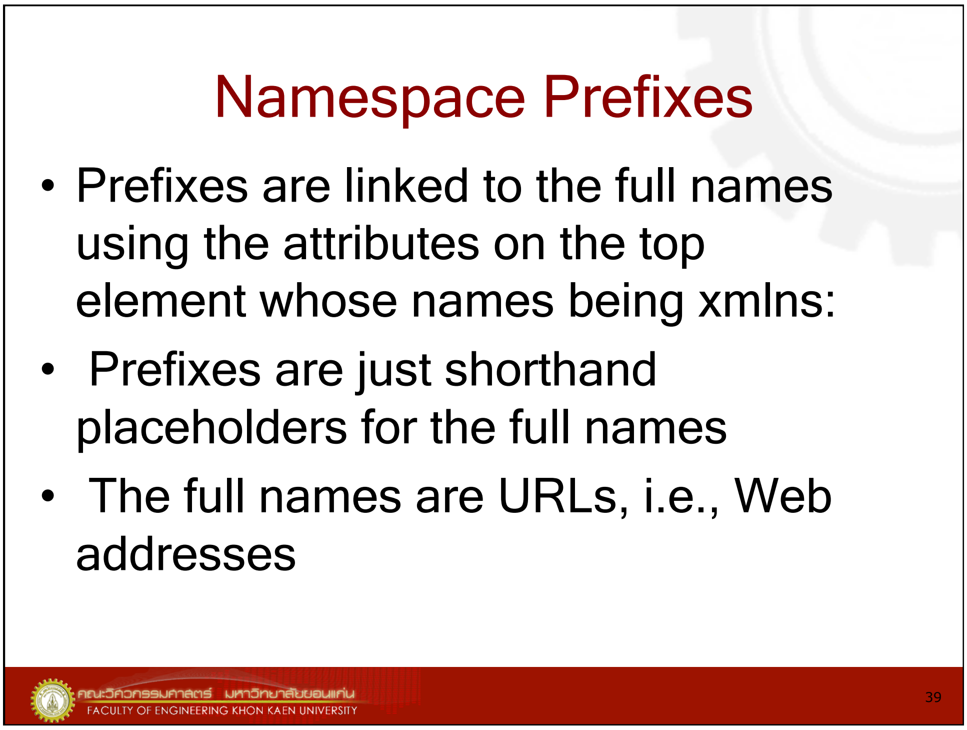
Namespaces by Example (1/2)

```
<h:html
   xmlns:xdc="http://abc.com/books"
   xmlns:h="http://www.w3.org/HTML">
        <h:head>
                <h:title>Book Review</h:title>
        </h:head>
        <h:body>
                <xdc:book>
                        <xdc:title>XML</xdc:title>
                </xdc:book>
        </h:body>
</h:html>
```



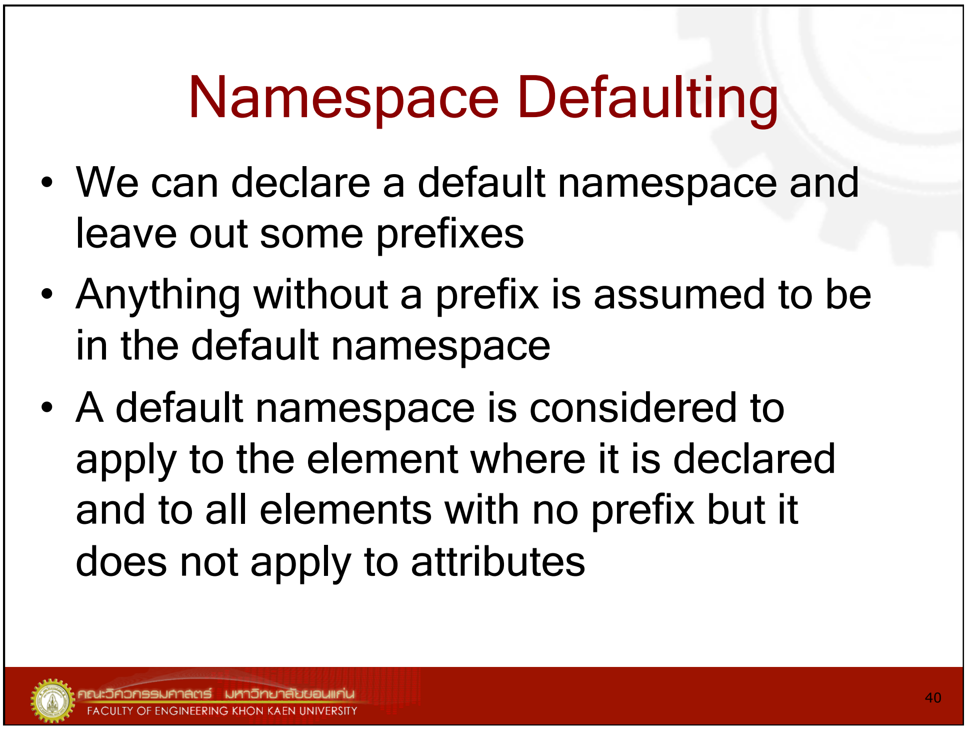
Namespaces by Example (2/2)

- In the example, the elements prefixed with xdc are associated with a namespace whose name is http://abc.com/books
- Those prefixed with h are associated with a namespace whose name is http://www.w3.org/HTML



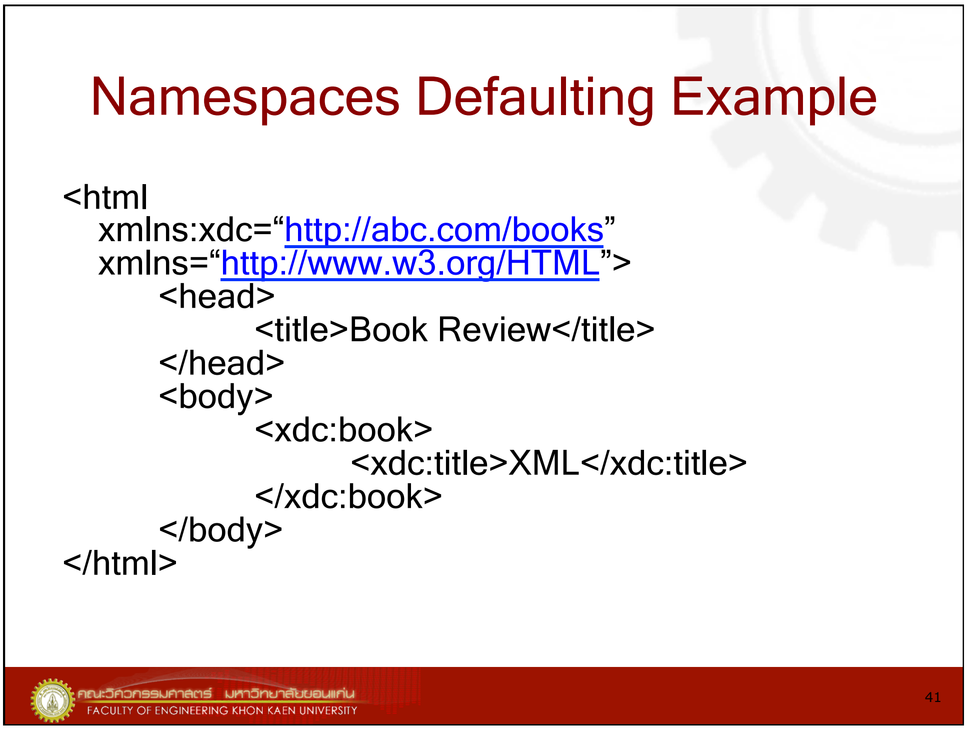
Namespace Prefixes

- Prefixes are linked to the full names using the attributes on the top element whose names being xmlns:
- Prefixes are just shorthand placeholders for the full names
- The full names are URLs, i.e., Web addresses



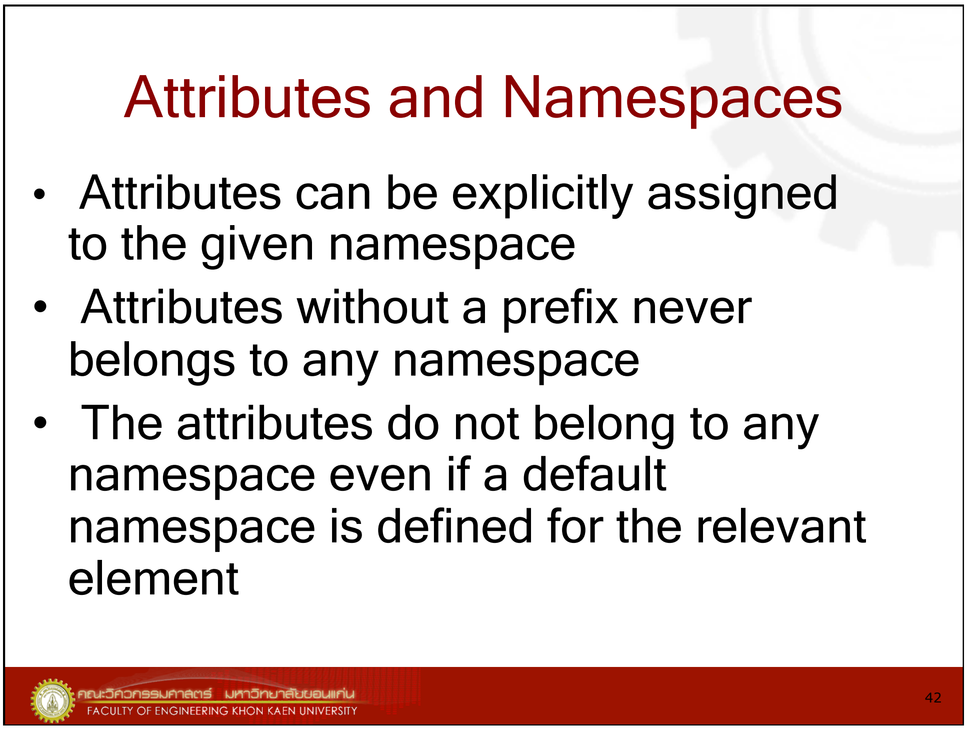
Namespace Defaulting

- We can declare a default namespace and leave out some prefixes
- Anything without a prefix is assumed to be in the default namespace
- A default namespace is considered to apply to the element where it is declared and to all elements with no prefix but it does not apply to attributes



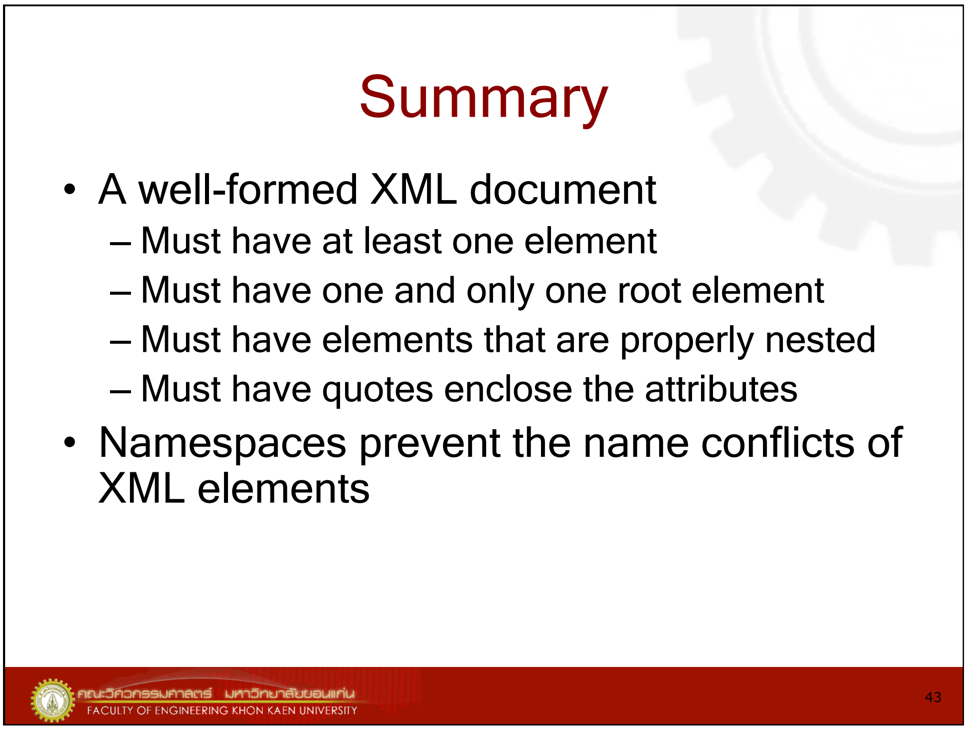
Namespaces Defaulting Example

```
<html
   xmlns:xdc="http://abc.com/books"
   xmlns="http://www.w3.org/HTML">
        <head>
                <title>Book Review</title>
        </head>
        <body>
                <xdc:book>
                        <xdc:title>XML</xdc:title>
                </xdc:book>
        </body>
</html>
```



Attributes and Namespaces

- Attributes can be explicitly assigned to the given namespace
- Attributes without a prefix never belongs to any namespace
- The attributes do not belong to any namespace even if a default namespace is defined for the relevant element



Summary

- A well-formed XML document
  - Must have at least one element
  - Must have one and only one root element
  - Must have elements that are properly nested
  - Must have quotes enclose the attributes
- Namespaces prevent the name conflicts of XML elements

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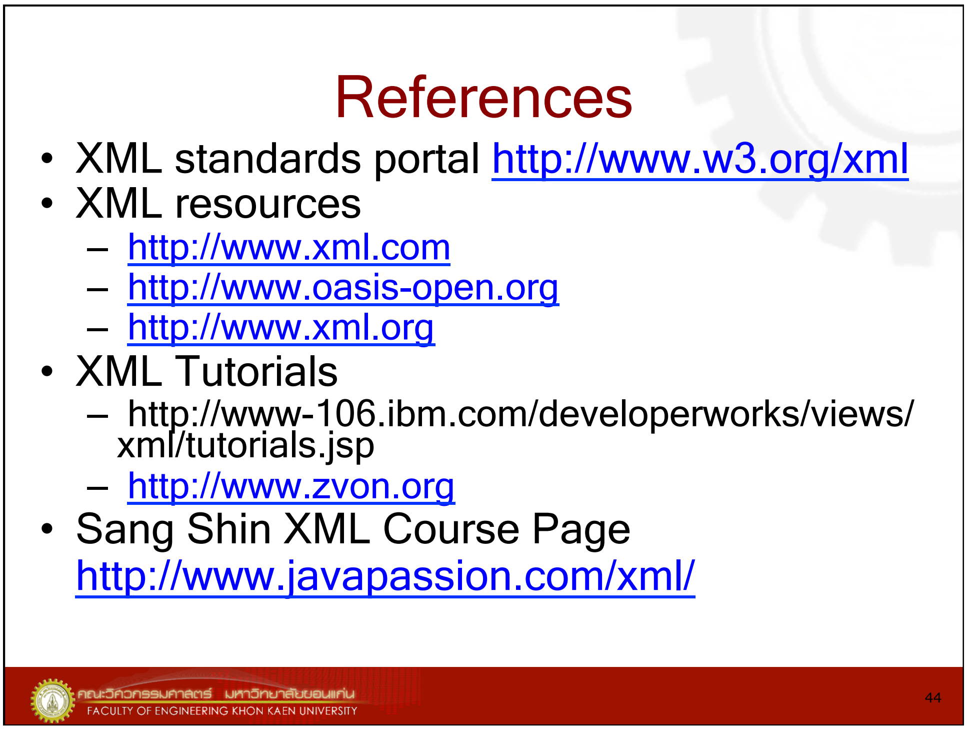

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