LECTURER: JOHN DOE

SPECIFICATION

SPECIFICATION
TOPIC OUTLINE

UNIT 6

USING STRUCTURED TEXT IN THE SPECIFICATION OF DATA INTERFACES

SPECIFICATION OF QUALITY REQUIREMENTS

STUDY GOALS

- Specify the structure of XML documents with XML Schema.
- Describe how to create class diagrams from XML documents.
- Explain properties of quality properties and quality models.

EXPLAIN SIMPLY

1. What elements does an XML file consist of?
2. When is an XML file considered valid, when is it considered well-formed?
3. What is a sensible procedure for defining quality properties?

STRUCTURED TEXT AS AN EXCHANGE FORMAT

In the case of technical interfaces, it is necessary that the **type and structure** of the concretely exchanged message be defined as technically correct and unambiguous as possible.

Possible exchange formats are:

- **Binary messages**: Transmission of binary data between systems in the form of a sequence of 0's and 1's. The structure and content of binary messages cannot be read or written directly by humans.
- **Unstructured text messages**: Messages in the form of typical text characters that are basically not given a format. Rules must be agreed upon for processing by a system. In case of syntax errors, a violation of the agreed structure occurs.
- **Structured text messages**: Messages for which a clearly defined and easily checkable structure must be specified. Defined rules convert the message into a text structure, which in turn can be converted into a technical data structure.

XML languages are very widespread in the industrial environment.

STRUCTURE AND COMPOSITION OF XML DOCUMENTS

```
<?xml version="1.0" encoding="UTF-8"?>
<order>
   <headerdata>
      <orderno>48729</orderno>
      <customer>
         <title>Mr</title>
         <firstname>Samuel</firstname>
         <surname>Berg</surname>
         <birthname/>
         </customer>
         <order_dated>2011-04-12</order_dated>
         <customerno>AD-4333 532</customerno>
      </headerdata>
      <positiondata>
         <position>
            <id>1</id>
            <itemno>57823566</itemno>
            <quantity>4</quantity>
            <priceEUR>15.90</priceEUR>
         </position>
         <position>
            <id>2</id>
            <itemno>54733462</itemno>
            <quantity>2</quantity>
            <priceEUR>8.90</priceEUR>
         </position>
      </positiondata>
   </order>
```

XML files always have exactly one **root element** (order) with subordinate elements (header data, position data).

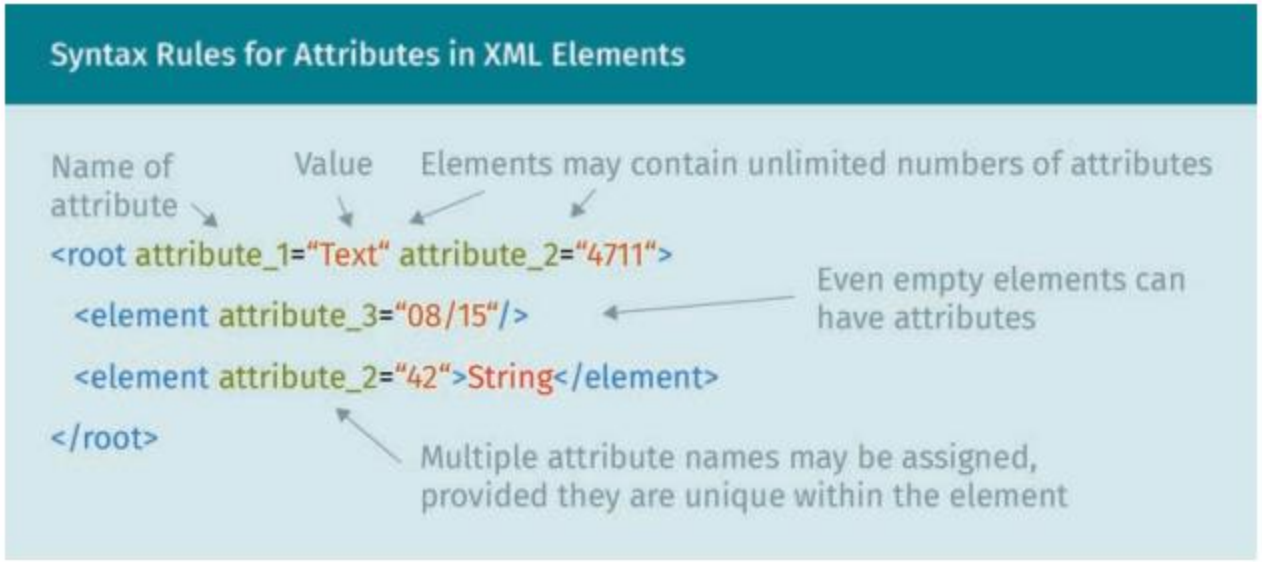
The **header data** contains, for example, general information.

Names of XML elements are shown between brackets "<" and ">" and are called **tags**.

The **content** of an XML element is between the **opening tag** ("<id>") and the **closing tag** ("</id>").

Image source: Coursebook.

STRUCTURE AND COMPOSITION OF XML DOCUMENTS



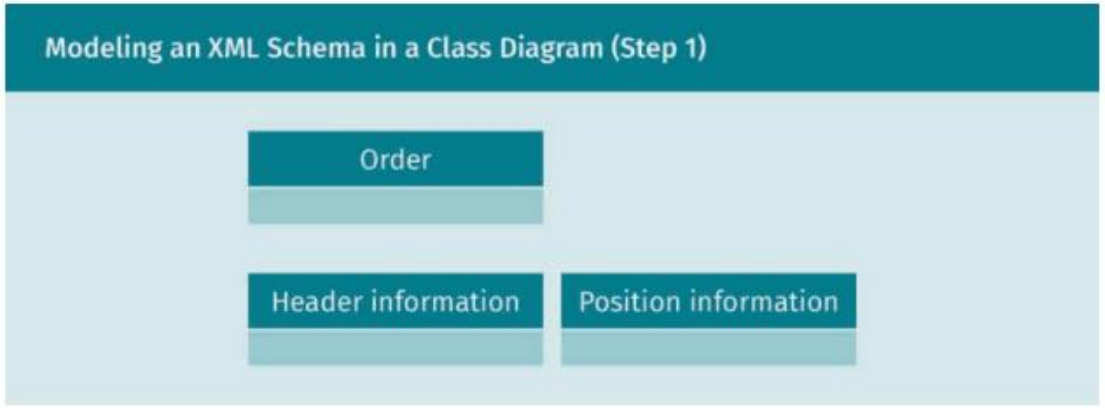

```
<headerdata client="Samuel Berg">
   <orderno>48729</orderno>
   <order_dated>2011-12-04</order_dated>
   <customerno>AD-4333 532</customerno>
</headerdata>
```

XML elements can be given **attributes** to specify different elements in more detail.

If the syntax in an XML file is followed, then the file is w**ell-formed**.
If the rules of the specified schema are still followed, the file is **valid**.

Image source: Coursebook.

DERIVING CLASS DIAGRAMS FROM XML FORMATS



Step 1:
All global elements from the XML schema are modeled as classes in the class diagram.

Step 2:
All global complex types from the XML schema are modeled as classes in the class diagram.

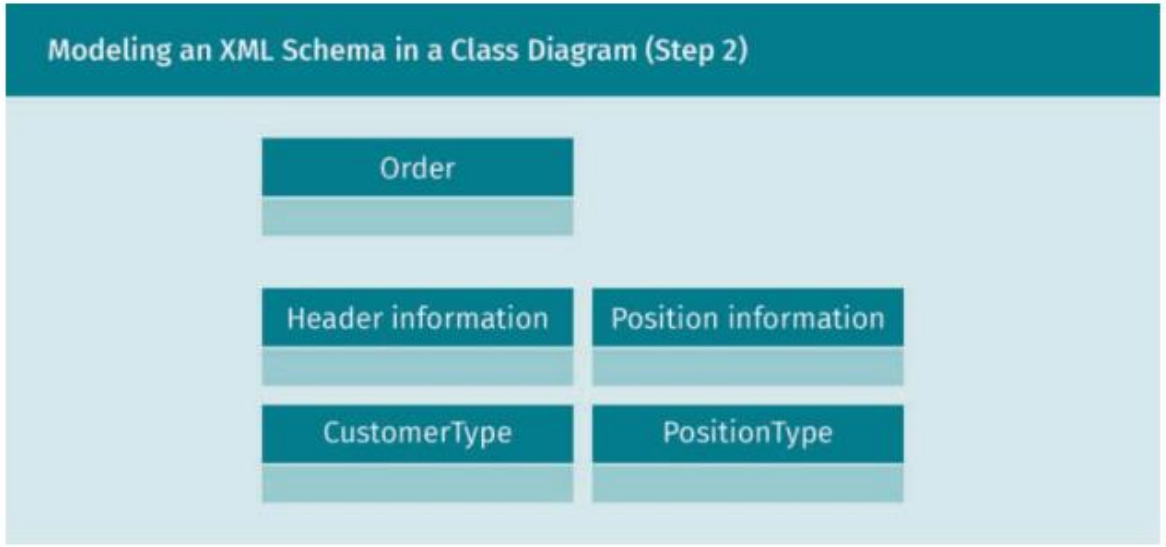
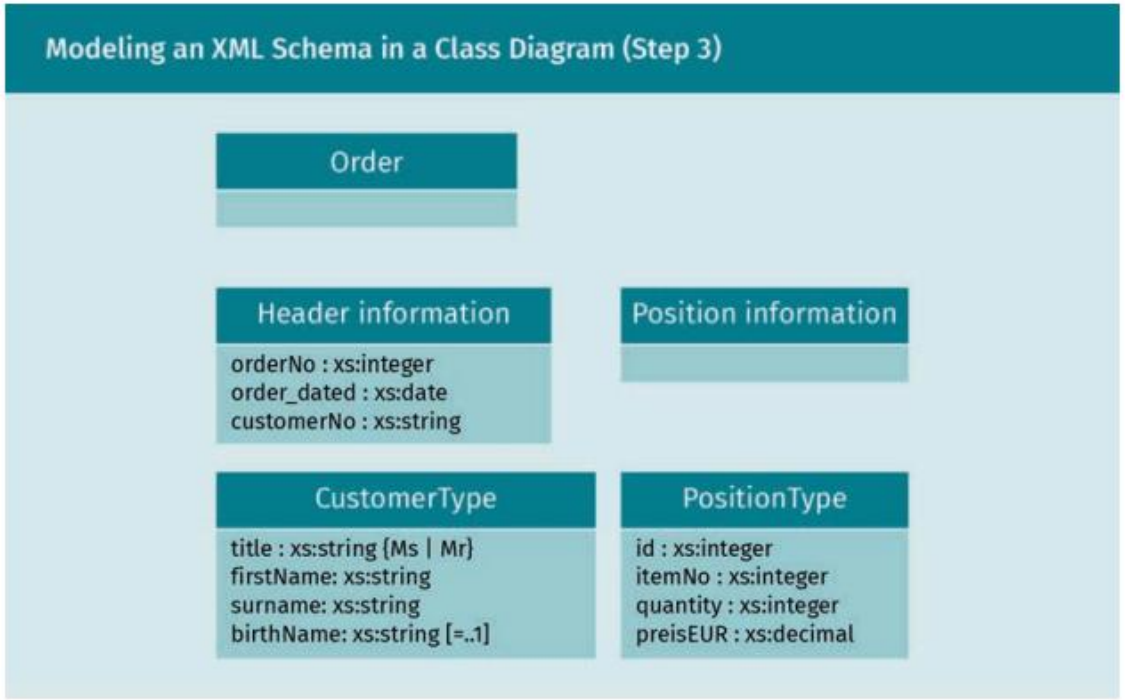


Image source: Coursebook.

DERIVING CLASS DIAGRAMS FROM XML FORMATS



Step 3: All simple sub-elements are modeled as attributes in the classes that contain them.

Step 4: All composites as well as multiple occurrences of elements are expressed by associations.

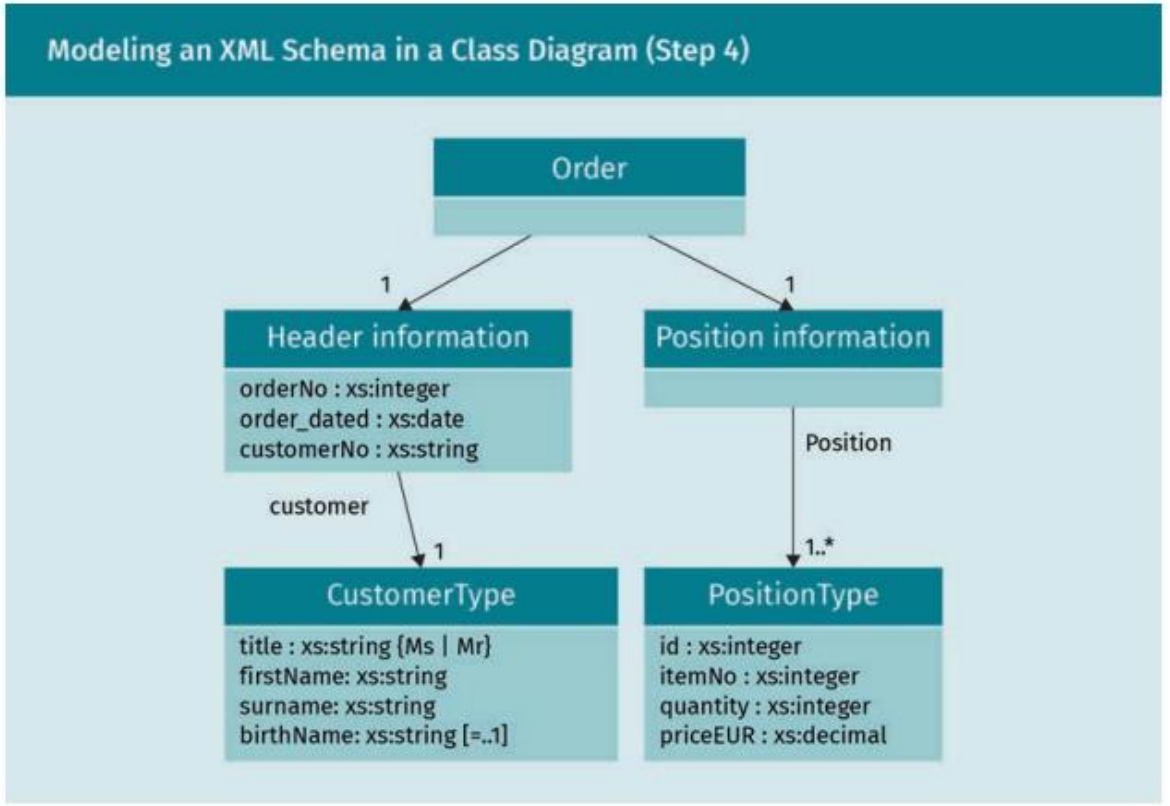


Image source: Coursebook.

SPECIFICATION OF QUALITY CHARACTERISTICS

Software quality is defined according to DIN-ISO 9126 as follows:

“Software quality is the totality of characteristics and characteristic values of a software product that relate to its ability to meet specified requirements.”

Quality characteristics define qualitative properties that the system must fulfill. Here the description of **technical** functions takes place, supplemented by qualitative and quantitative characteristics.
The sum of the quality characteristics describes the **quality goal**. Whether quality properties are suitable can be determined with the help of the **SMART model**.

The **quality model** is the dissection of the abstract generic term of quality into various **sub-terms**. The quality model according to ISO 9126 divides the term quality into six sub-features: Functionality, reliability, usability, efficiency, changeability, transferability. These six sub characteristics are themselves further subdivided. This model is also called the **FCM model** (**F**actor **C**riteria **M**etrics).

REVIEW STUDY GOALS

- Specify the structure of XML documents with XML Schema.
- Describe how to create class diagrams from XML documents.
- Explain properties of quality properties and quality models.

SESSION 6

TRANSFER TASK

Refer back to the example of the Deutsche Bank booking system one last time.

1. Based on the previous diagrams, write an exemplary XML file for a data exchange that could realistically take place in the booking process.

TRANSFER TASK
PRESENTATION OF THE RESULTS

Please present your results.

The results will be discussed in plenary.

1. XML messages ...
   a) … are considered well-formed if they follow the structure specified in the XML schema.
   b) … are comprised of simple and complex elements, each of which must be opened with a <tag> and closed with a </tag>.
   c) … are valid if all tags are closed with a corresponding end tag.
   d) … usually have a root element. In justified exceptional cases, however, this element may be omitted.

2. The definition of element types in the XML schema ...
   a) … is the only option for reusing element structures.
   b) … always precedes definition of the root element to ensure that the type definition is available for all subsequent elements.
   c) … makes it easier to reuse elements with the same structure.
   d) … is only possible with the compositor.

3. Simple elements in XML messages ...

a) … are specified with their name and data type in XML schemas as a minimum requirement.

b) … can be extended in their value range but not limited.

c) … contain no or precisely one child element.

d) … cannot be used in enumerations.

How did you like the course?

HOW DID YOU
LIKE THE COURSE?

LIST OF SOURCES