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CS5200, Summer 2,2020

Assignment 8

## Build XML structure from UML class diagram

1. **Assumptions for converting UML to XML:**
2. Multiplicities of all child attributes are 1 (one and only once instance)
3. Every furnishing has exactly 1 room and 1 manufacturer
4. Room and manufacturers can have multiple furnishings i.e.. One to Many
5. Attributes can be null because empty tags “” are allowed in XML.
6. The relationship “Every manufacturer has minimum one furniture” cannot be established due to limitations of XML.
7. The XML document is a standalone document, i.e.. a document with internal DTD for all the validations so we standalone=”yes” has been included in the opening xml tags.
8. **XML Code for UML Class Diagram**

**(Download** [**Here**](https://amanbatra.in/static/room.xml)**) or From this attachment**

**<?xml version="1.0" encoding="UTF-8" standalone="yes"?>**

**<!DOCTYPE root [**

**<!ELEMENT root (Room\*, Manufacturer\*, Furnishing\*)>**

**<!ELEMENT Room (length,width)>**

**<!ATTLIST Room name ID #REQUIRED>**

**<!ELEMENT length (#PCDATA)>**

**<!ELEMENT width (#PCDATA)>**

**<!ELEMENT Furnishing (type)>**

**<!ATTLIST Furnishing fid ID #REQUIRED>**

**<!ELEMENT type (#PCDATA)>**

**<!ATTLIST Furnishing RoomRef IDREF #REQUIRED>**

**<!ATTLIST Furnishing manufacturerRef IDREF #REQUIRED>**

**<!ELEMENT Manufacturer (manufacturerName,contact)>**

**<!ATTLIST Manufacturer mid ID #REQUIRED>**

**<!ELEMENT manufacturerName (#PCDATA)>**

**<!ELEMENT contact (#PCDATA)>**

**]>**

**<root>**

**<Room** name="UpperKitchen"**>**

**<length>**30ft**</length>**

**<width>**60ft**</width>**

**</Room>**

**<Room** name="LowerKitchen"**>**

**<length>**50ft**</length>**

**<width>**50ft**</width>**

**</Room>**

**<Room** name="Bedroom1"**>**

**<length>**34ft**</length>**

**<width>**43ft**</width>**

**</Room>**

**<Room** name="Bedroom2"**>**

**<length>**56ft**</length>**

**<width>**27ft**</width>**

**</Room>**

**<Room** name="Bedroom3"**>**

**<length>**77ft**</length>**

**<width>**40ft**</width>**

**</Room>**

**<Room** name="LivingRoom"**>**

**<length>**30ft**</length>**

**<width>**60ft**</width>**

**</Room>**

**<Room** name="GuestRoom"**>**

**<length>**60ft**</length>**

**<width>**40ft**</width>**

**</Room>**

**<Room** name="StorageRoom"**>**

**<length>**40ft**</length>**

**<width>**40ft**</width>**

**</Room>**

**<Manufacturer** mid="M140"**>**

**<manufacturerName>**IKEA**</manufacturerName>**

**<contact>**(424) 532-2322,(424) 532-2323**</contact>**

**</Manufacturer>**

**<Manufacturer** mid="M141"**>**

**<manufacturerName>**Ashley Furniture Industries**</manufacturerName>**

**<contact>**(428) 432-3310**</contact>**

**</Manufacturer>**

**<Manufacturer** mid="M142"**>**

**<manufacturerName>**Furniture Industries**</manufacturerName>**

**<contact>**(628) 532-3610**</contact>**

**</Manufacturer>**

**<Manufacturer** mid="M143"**>**

**<manufacturerName>**Emeco**</manufacturerName>**

**<contact>**(423) 532-2344, emeco@eme.co**</contact>**

**</Manufacturer>**

**<Manufacturer** mid="M144"**>**

**<manufacturerName>**Coalesse**</manufacturerName>**

**<contact>**(423) 532-2344**</contact>**

**</Manufacturer>**

**<Manufacturer** mid="M145"**>**

**<manufacturerName>**Rooms To Go**</manufacturerName>**

**<contact>**(423) 532-2344, rtg@gmail.cs**</contact>**

**</Manufacturer>**

**<Furnishing** fid="F12" manufacturerRef="M140" RoomRef="UpperKitchen"**>**

**<type>**Double Bed**</type>**

**</Furnishing>**

**<Furnishing** fid="F13" manufacturerRef="M142" RoomRef="LowerKitchen"**>**

**<type>**Table Unit**</type>**

**</Furnishing>**

**<Furnishing** fid="F14" manufacturerRef="M143" RoomRef="LowerKitchen"**>**

**<type>**Study Table**</type>**

**</Furnishing>**

**<Furnishing** fid="F15" manufacturerRef="M144" RoomRef="StorageRoom"**>**

**<type>**Single Bed**</type>**

**</Furnishing>**

**<Furnishing** fid="F16" manufacturerRef="M143" RoomRef="GuestRoom"**>**

**<type>**Couch**</type>**

**</Furnishing>**

**<Furnishing** fid="F17" manufacturerRef="M142" RoomRef="Bedroom1"**>**

**<type>**Chairs**</type>**

**</Furnishing>**

**<Furnishing** fid="F18" manufacturerRef="M145" RoomRef="Bedroom3"**>**

**<type>**Cabinet**</type>**

**</Furnishing>**

**<Furnishing** fid="F19" manufacturerRef="M143" RoomRef="GuestRoom"**>**

**<type>**Corner**</type>**

**</Furnishing>**

**</root>**

1. **Validating XML using** [**freeformatter**](https://www.freeformatter.com/xml-validator-xsd.html) **online tool provide in the XML module**

A screenshot of a social media post

Description automatically generated

**Instances to prove one-to-many relationship between furnishing and room:**

**<Furnishing** fid="F13" manufacturerRef="M142" RoomRef="LowerKitchen"**>**

**<type>**Table Unit**</type>**

**</Furnishing>**

**<Furnishing** fid="F14" manufacturerRef="M143" RoomRef="LowerKitchen"**>**

**Instances to prove one-to-many relationship between furnishing and manufacturer:**

**<Furnishing** fid="F14" manufacturerRef="M143" RoomRef="LowerKitchen"**>**

**<type>**Study Table**</type>**

**</Furnishing>**

**<Furnishing** fid="F16" manufacturerRef="M143" RoomRef="GuestRoom"**>**

**<type>**Couch**</type>**

**</Furnishing>**

**<Furnishing** fid="F19" manufacturerRef="M143" RoomRef="GuestRoom"**>**

**<type>**Corner**</type>**

**</Furnishing>**

**Checks Done:**

ü Internal DTD works on all platforms (standalone=”yes”)

ü Rooms can have multiple furnishings, but furnishing has only 1 room

ü Manufacturers can have multiple furnishings, but furnishing has only 1 manufacturer

ü ALL IDs are Unique, no ID starts with a letter

ü No duplicate attributes can exist, because no attributes are multivalued/categorical

ü Missing tags will not be accepted.

ü A key that isn’t present in the document, cannot be referred.

1. **Additional Checks: Test Screenshots and Details**

(All tests have been done using <https://www.xmlvalidation.com/> )

**1. Checking foreign key constraints by introducing a key which is not present in the document**

**A picture containing bird

Description automatically generated**

The key “M1422” in the manufacturerid tag is not valid key and it was introduced just to check foreign key constraint.

**A picture containing bird

Description automatically generated**

It is clear from the output that the identifier “M1422” Is missing hence, the XML document has failed to compile.

**2. Checking foreign key constraints by trying to declare an instance of furnishing with no key (IDREF) and missing values**

The manufacturerid attribute in line 95 was omitted and the RoomRef attribute in line 98 was intentionally left blank to test the constraint violations and null values for ID.

A picture containing bird, tree, flower

Description automatically generated

A screenshot of a cell phone

Description automatically generated

We can conclude from the image above, that omitting an ID attribute or passing empty tag “” in an ID attribute will raise the above shown errors.

**3. Checking domain constraints by passing an invalid value for ID field**

In line 51, I passed an ID value which starts with a number mid=”140”, In a valid XML document each id begins with a letter([A-Za-z]) and may be followed by any number of letters, digits ([0-9]), hyphens ("-"), underscores ("\_"), colons (":"), and periods ("."), so the code shall raise an error.

A screenshot of a cell phone

Description automatically generated

We can see that a numeric was not accepted and the we got an error message:

A screenshot of a cell phone

Description automatically generated

**4. Checking data integrity by omitting a #REQUIRED tag from an instance(record).**

I intentionally removed the child attribute tags <length> </length> and <width> </width> from Room class to check if data integrity is being followed.

**A screenshot of a cell phone

Description automatically generated**

It can be concluded from the error shown below that, if any required tag is missing, the XML document check will raise an error:

**A picture containing bird

Description automatically generated**

1. **The binary tree view of the XML is attached below:**