Practical 03 - Build xml and xsd file for IPA Courses

Objectives:

- To produce a valid XMS Schema Definition (.xsd file) to reflect the scenario below.
- To produce a valid XML file, based on the Schema above, which reflects some elements of this course.

Scenario:

- There are courses run by the IPA.
- Each course has a name, and occurs at a particular time of day (morning, afternoon or evening).
- Each course must have exactly one Lecturer, and zero one or many Students.
- Each Lecturer has a firstname, surname and staff title (Senior Lecturer, Lecturer or Associate Lecturer)
- Each Student has a firstname, surname and student number (exactly 6 digits)

Instructions:

1. Get set up:
   1.1. Sign in to your VM
   1.2. Create a folder "/home/user/development"
   1.3. Unpack Eclipse there (if required)
   1.4. Launch Eclipse
   1.5. Create a workspace folder in /home/user/development/workspace
   1.6. Close the welcome screen.
2. Create a new project "Practical 03":
   2.1. In Eclipse, locate the "Package Explorer" window.
   2.2. Right-click in the "Package Explorer" window.
   2.3. Select "New" then "Project"
   2.4. In the "New Project" | "Select a wizard" dialogue:
      2.4.1.Locate and open the "General" folder.
      2.4.2.Locate and select the "Project" item.
      2.4.3.Click "Next"
   2.5. In the "New Project" | "Project" dialogue:
      2.5.1.Enter a "Project name:" of "Practical 03"
      2.5.2.Click "Finish"
   2.6. In the "Package Explorer" window, note that the new project has been created.
3. Create a new folder
   3.1. In Eclipse, locate the "Package Explorer" window.

3.2. In the "Package Explorer" window, locate the "Practical 03" project.
3.3. Right-click in the "Practical 03" project.
3.4. Select "New" then "Folder"
3.5. In the "New Folder" | "Folder" dialogue:
3.5.1. Check that the "parent folder" is the "Practical 03" project.
3.5.2. Locate and select the "Project" item.
3.5.3. Enter a "Folder name:" of "xml files"
3.5.4. Click "Finish"
3.6. In the "Package Explorer" window, note that the new folder has been created under the project.

4. Create .xsd document
4.1. In Eclipse, locate the "Package Explorer" window.
4.2. In the "Package Explorer" window, locate and open the "Practical 03" project.
4.3. In the "Practical 03" project, locate and open the "xml files" folder.
4.4. Right-click in the "xml files" folder.
4.5. Select "New" then "Other"
4.6. In the "New" | "Select a wizard" dialogue:
4.6.1. Locate and open the "XML" folder.
4.6.2. In the XML folder, locate and select the "XML Schema File" item.
4.6.3. Click Next.
4.7. In the "New XML Schema" dialogue:
4.7.1. Check that the "parent folder" is the "xml files" folder within the "Practical 03" project.
4.7.2. Set a file name of "<username>_IPACourse.xsd"
4.7.3. Click Finish.
4.8. In the "Package Explorer" window, note that the new .xsd file has been created in the folder under the project.
4.9. Note that the new .xsd file has been opened in the Edit window, and that as with the XML file, there are “Design” and “Source” tabs,

5. Add some basic content to the .xsd file
5.1. In the .xsd edit window, select the "Design" tab is selected.
5.2. In the Design tab:
5.2.1. Right click on the "Elements" list, and then select "Add Element".
5.2.2. Set the name of the new element to "IPACourse"
5.2.3. Note the element has type "string"
5.2.4. Switch to the "Source" view, and note that the XSD reflects the element we added.
5.3. Save the changes to the .xsd file (disk icon on toolbar or “File” | “Save”).

6. Validate the .xsd file.
6.1. Right click on the "Edit" window, in the “Source” tab, and select "Validate".
6.2. Ensure that the validation completes with no errors or warnings.

7. Break the .xsd, then re-validate.
   7.1. Break an aspect of the .xsd.
   7.2. Note the problem is highlighted immediately.
   7.3. Hover over the highlighted error to see an explanation.
   7.4. Save the changes to the .xsd file (disk icon on toolbar or “File” | “Save”).
   7.5. Right click on the "Edit" window, and select "Validate".
   7.6. Note that validation fails, and the error(s) are marked with a red "X"
8. Fix the .xsd, then re-validate.
   8.1. Fix the broken aspect of the .xsd.
   8.2. Note the problem highlighted disappears.
   8.3. Save the changes to the .xsd file (disk icon on toolbar or “File” | “Save”).
   8.4. Right click on the "Edit" window, and select "Validate".
   8.5. Ensure that the validation completes with no errors or warnings.
9. Build an .xml file based on the .xsd
   9.1. Before continuing, revalidate to check that the .xsd file is valid, and that the validation completes with no errors or warnings.
   9.2. In the "Package Explorer" window, locate and open the "Practical 03" project.
   9.3. In the "Practical 03" project, locate and open the "xml files" folder.
   9.4. Right-click in the "xml files" folder.
   9.5. Select "New" then "Other"
   9.6. In the "New” | “Select a wizard" dialogue:
      9.6.1. Locate and open the "XML" folder.
      9.6.2. In the XML folder, locate and select the "XML File" item.
      9.6.3. Click Next.
   9.7. In the "New XML File" dialogue:
      9.7.1. Check that the "parent folder" is the "xml files" folder within the "Practical 03" project.
      9.7.2. Set a file name of "<username>_IPACourse_01.xml"
      9.7.3. Click Next.
   9.8. In the "New XML File” | “Create XML File from" dialogue:
      9.8.1. Select "Create XML file from an XML schema file"
      9.8.2. Click Next.
   9.9. In the "New XML File” | “Select XML Schema File" dialogue:
      9.9.1. Check that "Select File from Workspace" is selected.
      9.9.2. Locate and select the "<username>_IPACourse.xsd"
      9.9.3. Click Next.
   9.10. In the "New XML File” | “Select Root Element" dialogue:

9.10.1. Check that Root Element:" is set to "IPACourse".
9.10.2. Note the other settings, ensure that they are set as follows:
- Create optional attributes - selected
- Create optional elements - selected
- Limit optional element depth - not selected
- Create first choice of required choice - selected
- Fill elements and attributes with data - selected

9.11. Click Finish.

10. Note that the new .xml file:
- has been created in the folder under the project.
- has been opened in the Edit window, beside the .xsd file.
- has been created under the folder.

11. Edit the XML file.
11.1. Note the two tabs in the .xml edit window, "Design" and "Source".
11.2. Ensure that the "Design" tab is selected.
11.2.1. In the Design tab, note the various fields set on this .xml document.
11.3. Switch to the "Source" view.
11.3.1. Note that the .xml file reflects the .xsd we based it on.
11.3.2. Note that the "String" has been filled with sample data.
11.4. Edit the sample data to set a course name.
11.5. Save the changes.
11.6. Validate the .xml file.
11.6.1. Right click on the "Edit" window, and select "Validate".
11.6.2. Ensure that the validation completes with no errors or warnings.
11.7. Note that the .xml file is validated for both:
11.7.1. Syntax and internal structure.
11.7.2. Compliance with the underlying .xsd file.
11.8. Close the .xml file.

12. Add a complex data type to the .xsd
12.1. Open the .xsd file in the Edit Window.
12.2. Go to the "Design" tab.
12.3. Right-click in the "Types" list
12.4. Select “Add Complex Type”.
12.5. Set the complex type name to "IPACourseType"
12.6. Add some fields to the "IPACourseType" type.

12.6.1. Double-click on the "IPACourseType" type to open it.
12.6.2. In the resulting view, right-click on the "IPACourseType
12.6.2.1. Select "Add Element"
12.6.2.2. Set the new element name to "Student"
12.6.2.3. Select "Add Element"
12.6.2.4. Set the new element name to "Lecturer"
12.6.2.5. Select "Add Element"
12.6.2.6. Set the new element name to "CourseName"
12.6.2.7. Select "Add Element"
12.6.2.8. Set the new element name to "TimeOfDay"
12.6.2.9. Save the changes.
12.6.3. Switch to the source view, and review the created structure.
12.7. Modify the the "IPACourse" to be of type "IPACourseType"
12.7.1. Return to the design view
12.7.2. Locate the "IPACourse" element
12.7.3. Right click on the "IPACourse" element
12.7.4. Select "Set Type", then "Browse"
12.7.4.1. From the "Set Type" | "Browse List" list, select the "IPACourseType", then click "OK"
12.7.4.2. Save the changes.
12.7.5. Switch to the design view.
12.7.5.1. Review the created structure.

13. Build "<username>_IPACourse_01.xml" based on this revised .xsd
13.1. As above, build an XML file based on the revised .xsd.
13.2. Review the .xml file.
14. Continue to modify the .xsd file until it reflects the data model outlined in the scenario above.
14.1. Steps required will include:
14.1.1. Add bounds to the "Lecturer" (One)
14.1.2. Add bounds to the "Student" (Zero, One, or Many)
14.1.3. Add constraints to the "Time of Day" (Morning, Afternoon or Evening).

15. "Student" and "Lecturer" are similar. You could consider creating a complex type for "Person", and basing both "Student" and "Lecturer" on it.
15.1.1. In the "Design" view, create a new complex type called "Person".
15.1.1.1. Add "FirstName" as string.
15.1.1.2. Add "Surname" as string.
15.1.2. In the design view, create a complex type for "Lecturer" based on "Person"
15.1.2.1. Create new complex type "Lecturer"

15.1.2.2. Right click complex type "Lecturer" and select "Set Base Type"
15.1.2.3. Set base type of "Lecturer" to be "Person"
15.1.2.4. Add "StaffTitle" as a String.
15.1.2.5. Constrain "StaffTitle" to: Senior Lecturer, Lecturer or Associate Lecturer
15.1.2.5.1. Click on the "StaffTitle" element.
15.1.2.5.2. In the "element" pane at the botom of the screen
15.1.2.5.3. Select "Restrict Values by Enumerations"
15.1.2.5.4. Note: User the lower of the two "Add" buttons to set the possible values, then the upper of the two Add buttons to add this constraint to the field.
15.1.2.5.5. Set the possible values to the three values listed above.
15.1.3. Create a complex type for "Student", also based on “Person”
15.1.3.1. Create new complex type "Student"
15.1.3.2. Right click complex type "Student" and select "Set Base Type"
15.1.3.3. Set base type of "Student" to be "Person"
15.1.3.4. Add "StudentID" as an Integer.
15.1.3.5. Add constraint on Student ID, by pattern, so that it must be 6 digits.
15.1.3.5.1. In the "element" pane at the bottom of the screen
15.1.3.5.2. Select "Restrict Values by Patterns"
15.1.3.5.3. Use the pattern builder to set a pattern of \d{6}

16. Modify "IPACourse" element to use the “Lecturer” and “Student” complex types.
    16.1. Change type of element "Lecturer" to "tns:Lecturer"
    16.2. Change type of element "Student" to "tns:Lecturer"
17. To demonstrate "inheritance", modify complex type for "Person".
    17.1. Modify “Person” by adding "DateOfBirth" as date.
    17.2. Note that "Date of Birth" now appears on both Student and Lecturer
18. Save all changes
19. Create a valid XML file based on the completed .xsd file
    19.1. Populate with credible sample data.
    19.2. Ensure that it validates against the XSD.
20. Save all changes
21. Make sure you know how to export the 2 files (.xml and .xsd) from Eclipse, and how to get them out of your VM.