158.247 Database Design
Assignment 3

Consider the following relational data:

Books

bid	Title	Author	Year
b323	To Mock a Mockingbird	Richard Smullyan	1985
b233	Alice's Adventures in Wonderland	Lewis Carroll	1865
b312	How to Bake Pi	Eugenia	2015

Libraries

lid	Name	Phone
s282	Albany Library	555-1234
s521	Manawatu Library	555-6543

OnLoan

bid	lid	loaned
b323	s282	TRUE
b233	s521	FALSE
b233	s282	FALSE
b312	s282	FALSE

Q1. We want to export this data into an XML file. Write a DTD describing the following XML structure:

- there is one root element called `books`
- the `books` element contains a sequence of `book` subelements, one for each book in the database
- each `book` element contains one `title` subelement, one `author` subelement, one `year` subelement, and a sequence of `library` subelements, one for each library that has the book
- each `library` element contains one `name`, one `phone`, and one `available` element (a boolean value either `true` or `false`). A book is available if it is not out on loan.

Create an XML document `books.xml` obtained by exporting the database above. Include the DTD in your XML document, and make sure to validate it. [6 marks]

Q2. Assuming that you have an XML document with the structure given in Q1, write an XQuery that returns the title, author and year, library for all books at one or more libraries and are not out on loan. Save the query as `query.txt`. [4 marks]

Q3. Assume the same database is represented in an XML document whose structure follows the relational tables:

```
<db>
    <books>
        <row>
            <bid>b323</bid>
            <title>To Mock a Mockingbird</title>
            <author>Richard Smullyan</author>
            <year>1985</year>
        </row>
        ...
    </books>
    <libraries>
        ...
    </libraries>
    <onloan>
        ...
    </onloan>
</db>
```

Write an XQuery that, when given an input with the structure described above, constructs an XML document with the structure described in Q1. Save this query as `transform.txt` [10 marks]

Submit `books.xml`, `query.txt` and `transform.txt`.