

## Database and Information Systems

### Homework 5

November 9, 2004; Due November 16, 2004 at 1:30 pm

For this homework, you should test your answers using Galax, an XQuery processor. See <http://www.seas.upenn.edu/~zives/assignments.htm> for information about where to download the Galax system for Windows, Linux, or Solaris. Alternatively, you can ssh to **eniac-l.seas.upenn.edu** (note the extra “-l”: ordinary *eniac* will **not** work) and run `~zives/galax/bin/galax` on your query source file(s).

Consider the schemas for an online bookstore shown in Figures 1 and 2, derived from student answers to Problem 2 in the previous homework. These schemas are available at `~tjgreen/public/schema-a.xml` and `~tjgreen/public/schema-b.xml`, with corresponding sample data sets `~tjgreen/public/data-a.xml` and `~tjgreen/public/data-b.xml`.

**Problem 1 [25 points]:** Write an XML Schema capturing an integrated view of the two schemas.

**Problem 2 [25 points]:** Write a view in XQuery over the two schemas outputting XML that conforms to your integrated schema.

**Problem 3 [25 points]:** Write the following query in XQuery over your view from the previous problem: Find all books written by authors named Jim Gray.

**Problem 4 [25 points]:** Manually write the unfolding of the previous query over Schema A.

```

<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:simpleType name="authorIdType">
    <xs:restriction base="xs:string">
      <xs:length value="16"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="authorType">
    <xs:sequence>
      <xs:element name="authorId" type="authorIdType"/>
      <xs:element name="name" type="xs:string"/>
      <xs:element name="gender" type="xs:string"/>
      <xs:element name="country" type="xs:string"/>
      <xs:element name="birthDate" type="xs:string"/>
      <xs:element name="deathDate" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="bookType">
    <xs:sequence>
      <xs:element name="isbn" type="xs:string"/>
      <xs:element name="title" type="xs:string"/>
      <xs:element name="author" type="authorIdType"
        maxOccurs="unbounded"/>
      <xs:element name="publicationDate" type="xs:string"/>
      <xs:element name="genre" type="xs:string"/>
      <xs:element name="salesRank" type="xs:integer"/>
      <xs:element name="publisher" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="catalogType">
    <xs:sequence>
      <xs:element name="book" type="bookType" minOccurs="0"
        maxOccurs="unbounded"/>
      <xs:element name="author" type="authorType" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="catalog" type="catalogType"/>
  <xs:element name="dude" type="xs:string"/>
</xs:schema>

```

Figure 1: Schema *A*

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="bookstore">
    <xs:complexType>
      <xs:sequence>
        <!-- definition of complex elements -->
        <xs:element name="book" minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="title" type="xs:string"/>
              <xs:element name="isbn" type="xs:string"/>
              <xs:element name="price" type="xs:string"/>
              <xs:element name="publishdate" type="xs:string"/>
              <xs:element name="note" type="xs:string" minOccurs="0" maxOccurs="unbounded"/>
              <xs:element name="authorRef" type="xs:positiveInteger" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="bookid" type="xs:positiveInteger" use="required"/>
          </xs:complexType>
        </xs:element>
        <xs:element name="author" minOccurs="0" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="fname" type="xs:string"/>
              <xs:element name="lname" type="xs:string"/>
              <xs:element name="birthday" type="xs:string"/>
              <xs:element name="email" type="xs:string"/>
              <xs:element name="gender" type="xs:string"/>
              <xs:element name="country" type="xs:string"/>
              <xs:element name="note" type="xs:string" minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="authorid" type="xs:positiveInteger" use="required"/>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="dude" type="xs:string"/>
</xs:schema>

```

Figure 2: Schema *B*