

School of Information Technology

Department of Computer Science



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COS326 Database Systems: Practical 5 2024

Release Date: 01 September 2024

Submission Date: 08 September 2024

Lecturer: Mr S.M Makura

Total: 50 Marks

Objectives

In this practical you will use BaseX to execute XQuery queries on XML data. As you know, XQuery uses Xpath and FLWOR expressions. The objectives of this practical are to learn how to query data in an XML database and appreciate the difference between structured and semi-structured data.

Submission Procedure:

When you are done:

1. You must submit the file named:
 - a. **XQueries.txt which** contains all your queries.
 - b. Compress the above document into an archive and upload it to the ClickUP link for practical submissions **before** the due date/time. The file name for the archive must have your student number as part of the file name, e.g. **uXXXXXXXXX.zip** (*XXXXXXXXX is your student number*).

Preparation

For this practical exercise, you will use the BaseX XML database software to execute XQuery queries on XML data. The BaseX software version that you will be using is BaseX 10.1. It is available on ClickUP and can also be downloaded from <http://www.basex.org> . You will also find documentation and a demo section at the URL.

If you need more information on XPath and XQuery you can visit the <http://www.w3schools.com> website.

You are provided with the *Musicians.xml* file. Use BaseX to create a new database for the *Musicians.xml* file and write XQuery queries for the tasks listed below.

Task 1: XPath Expressions

(Note: you are supposed to write XPath expressions **only** here)

Question 1: List the names of all the musicians in the database.

[3 Marks]

Expected output:

```
7 Results, 103 b
If These Trees Could Talk
Justin Bergh
Tool
Zebra and Giraffe
Ben Folds
Harris Tweed
Billy Talent
```

Question 2: For a specific musician, list the album names and their years. [3 Marks]

Expected output (for Billy Talent):

```
3 Results, 120 b
<album year="1999">Watoosh!</album>
<album year="2003">Billy Talent</album>
<album year="2006">Billy Talent II</album>
```

Question 3: List the names of all musicians who have released an album titled “Lateralus”. [5 Marks]

Expected output:

```
2 Results, 18 b
Justin Bergh
Tool
```

Question 4: List all musicians who have the word “Pop” anywhere in their genre.

[5 Marks]

Expected output:

⬇️ 🏠 🔍 3 Results, 37 b

Justin Bergh
Ben Folds
Harris Tweed

Question 5: List all the solo musicians.

[5 Marks]

Expected output:

⬇️ 🏠 🔍 2 Results, 23 b

Justin Bergh
Ben Folds

Question 6: Show the name and genre of the second solo musician.

[5 Marks]

Expected output:

⬇️ 🏠 🔍 2 Results, 20 b

Ben Folds
Power Pop

Question 7: Display the fourth album by the musician “Ben Folds”.

[5 Marks]

Expected output:

⬇️ 🏠 🔍 1 Result, 7 b

Super D

Question 8: List the names of albums that were released in 2008 or later.

[5 Marks]

Expected output:

```
📄 🏠 🔍 4 Results, 76 b
Above the Earth, Below the Sky
Lateralus
Collected Memories
Way to Normal
```

Task 2: FLWOR Expressions

(Note: you are supposed to write FLWOR expressions **only** here)

Question 9:

Write a FLWOR query to determine the rate at which a specific musician produces albums. List all the musician names and their corresponding rates, ordering the results from the most frequent to the least frequent. For example, assume that a specific artist has released three albums in 2001, 2002 and 2004. To calculate the rate, divide the difference in years between the first and last album by the number of albums. The calculation for this example is then: $(2004-2001+1)/3 = 1.3$ years. Make sure that each artist is displayed on a new line.

[10 Marks]

Expected output:

```
📄 🏠 🔍 7 Results, 174 b
Zebra and Giraffe, rate: 1
Harris Tweed, rate: 1
Ben Folds, rate: 1.14
If These Trees Could Talk, rate: 2
Billy Talent, rate: 2.67
Justin Bergh, rate: 3
Tool, rate: 3.5
```

Question 10

Design an interesting FLWOR query of your choice for the Musicians database. Marks will be awarded based on the level of interestingness and usefulness.

[4 marks]