

School of Information Technology

Department of Computer Science



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Engineering, Built Environment and
Information Technology

COS326 Database Systems: Practical 6 2024

Release Date: 09 September 2024

Submission Date: 16 September 2024 @ 23:59

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. **FLWORQueries.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 11.2. It can be downloaded from <http://www.basex.org>. You will also find documentation.

If you need more information on FLWOR queries, you can visit the <http://www.w3schools.com> website.

Scenario

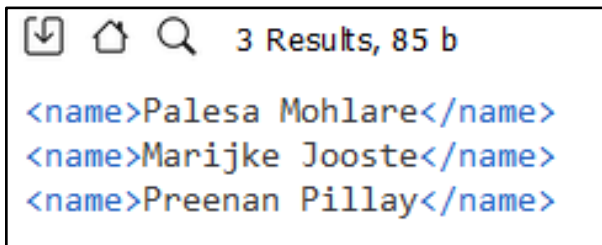
You are provided with the *students.xml* and *courses.xml* files. Use BaseX to create a new database for the files and write FLWOR queries for the tasks listed below.

Task 1: FLWR Expressions

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

Question 1: List the names of students enrolled in the "Database Systems" course. [3 Marks]

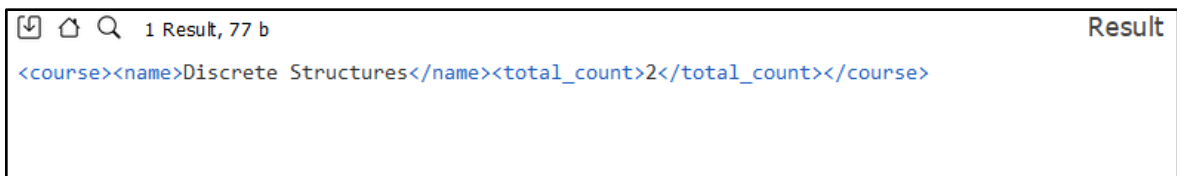
Expected Output:



BaseX query result showing 3 results, 85 b. The results are XML elements: <name>Palesa Mohlare</name>, <name>Marijke Jooste</name>, and <name>Preenan Pillay</name>.

Question 2: Count the total number of students enrolled in "Discrete Structures" course. [5 Marks]

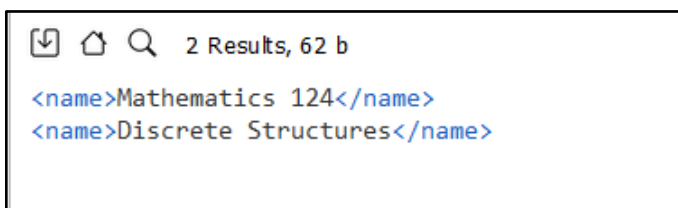
Expected Output:



BaseX query result showing 1 result, 77 b. The result is an XML element: <course><name>Discrete Structures</name><total_count>2</total_count></course>. The word "Result" is visible in the top right corner of the window.

Question 3: List all courses offered by the "Mathematics" department. [3 Marks]

Expected Output:



BaseX query result showing 2 results, 62 b. The results are XML elements: <name>Mathematics 124</name> and <name>Discrete Structures</name>.

Question 4: Find the names of instructors teaching courses taken by "Marijke Jooste" [4 Marks]

Expected Output:

```
3 Results, 122 b
<instructor>Stefan Gruner</instructor>
<instructor>Sheunesu Makura</instructor>
<instructor>Ruaan Kellerman</instructor>
```

Question 5: List the course codes of all courses that have exactly 18 credits. [3 Marks]

Expected Output:

```
2 Results, 40 b
<code>COS326</code>
<code>COS330</code>
```

Question 6: List the names of students who are enrolled in both "Introduction to Computer Science" and "Mathematics 124" courses. [6 Marks]

Expected Output:

```
1 Result, 27 b
<name>Thando Mandela</name>
```

Question 7: List the names of students who are not enrolled in any course offered by the "Mathematics" department. [6 Marks]

Expected Output:

```
2 Results, 56 b
<name>Tshifhiwa Ndou</name>
<name>Preenan Pillay</name>
```

Question 8: List the names of courses that have more than 3 students enrolled. [6 Marks]

Expected Output:

```
📄 🏠 🔍 2 Results, 88 b
<name>Introduction to Computer Science</name>
<name>Computer Security and Ethics</name>
```

Question 9: Find the names of instructors whose courses are being taken by more than two students. [6 Marks]

Expected Output:

```
📄 🏠 🔍 3 Results, 118 b
<instructor>Stefan Gruner</instructor>
<instructor>Sheunesu Makura</instructor>
<instructor>Hein Venter</instructor>
```

Question 10: List the names of students studying first year courses offered by the Department of Computer Science in descending order. [8 Marks]

Expected Output:

```
📄 🏠 🔍 4 Results, 114 b
<name>Tshifhiwa Ndou</name>
<name>Thando Mandela</name>
<name>Preenan Pillay</name>
<name>Marijke Jooste</name>
```

[Total Marks: 50]