F28DM Database Management Systems

Coursework 2

Project: XML Representation of the Sports Center
Relational Database

Team Members:
1- Christian Chester
2- Daniyar Nazarbayev
3- Naqeeb Naseer

Overview: XML Document

The XML document represents four tables from the relational database that was created in the previous coursework. It was decided to choose the Staff, Member, Department and Programs tables since they have a good variety of relationships between each other thus making the task of representing them in XML a more interesting one.
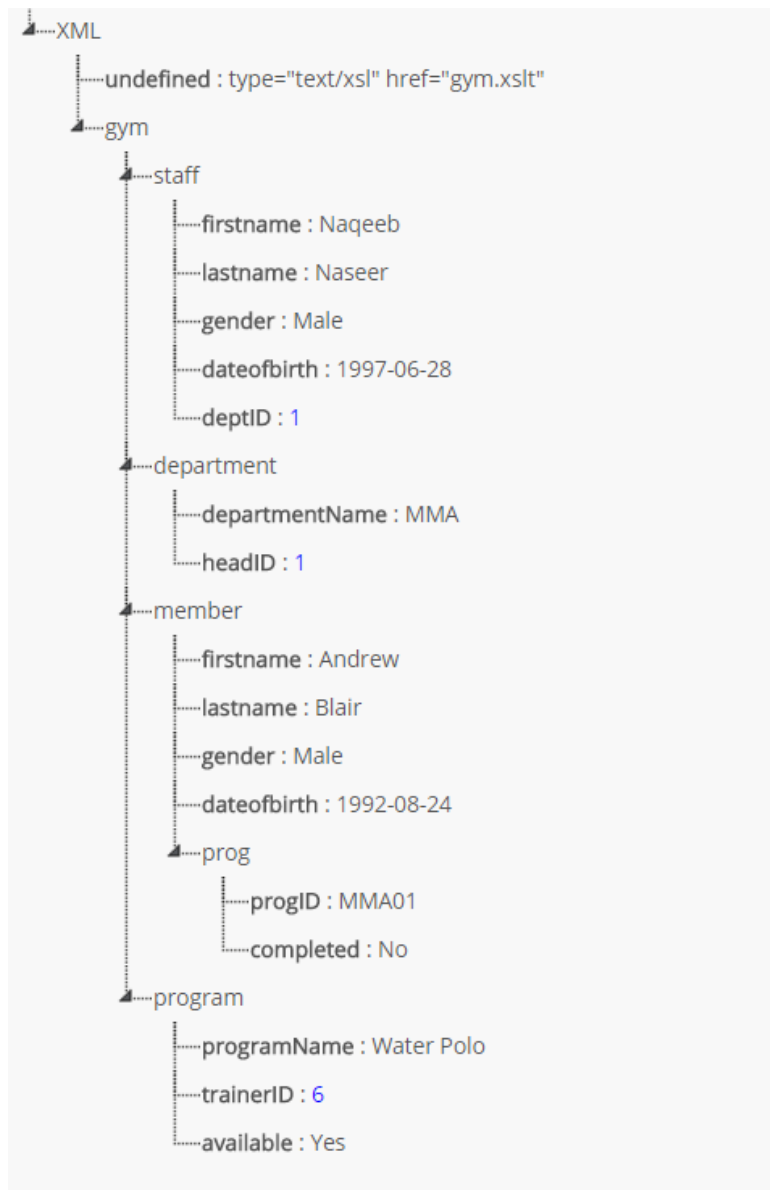
There exists a One-to-Many and One-to-One relationship between Staff and Department. Furthermore, a Many-to-Many relationship exists between Member and Program which was represented in XML by introducing a new child element 'prog' in the Member table that included the specific program's ID as well as the completion status. Also, a recursive relationship exists in Staff.

An XML schema file was used to place restrictions, create custom types as well as create keys and key references within the XML document.

Some of the custom types include genderType and pidType. GenderType places a pattern value restriction on the gender element whereby it only accepts two values 'Male' and 'Female'. PidType places a length restriction on the programID element whereby it only accepts strings of length five.

One of the keys and key references include deptIDkey and deptIDRef. DeptIDkey sets the deptID attribute of the Department table to be a unique primary key whereas deptIDRef is a key reference of the foreign key deptID element in the Staff table which refers to deptIDkey.

Sample Tree View: XML Document

```
▲····XML
      |····undefined : type="text/xsl" href="gym.xslt"
      ▲····gym
            ▲····staff
                  |····firstname : Naqeeb
                  |····lastname : Naseer
                  |····gender : Male
                  |····dateofbirth : 1997-06-28
                  |····deptID : 1
            ▲····department
                  |····departmentName : MMA
                  |····headID : 1
            ▲····member
                  |····firstname : Andrew
                  |····lastname : Blair
                  |····gender : Male
                  |····dateofbirth : 1992-08-24
                  ▲····prog
                        |····progID : MMA01
                        |····completed : No
            ▲····program
                  |····programName : Water Polo
                  |····trainerID : 6
                  |····available : Yes
```

Above is a sample tree view of the XML document with one record in each table.

XPath Queries

Following are the XPath queries created:

1- **gym/staff[supervisorID=1]/firstname/text()**

   Description: Returns the first name of staff members who are supervised by supervisor 'x'.

   Output:

```
▶ XPath:
gym/staff[supervisorID=1]/firstname/text()
▶ XML:  Test   Save   Color   Format   Fix
INFO - XPath returned 2 items (compiled in 0ms, evaluated in 5ms)
<?xml version="1.0" encoding="UTF-8"?>
<result>
Christian
Bruce
</result>
```

2- **gym/member[prog/completed='No']/firstname/text()**

   Description: Returns the first name of members who have not completed a course.

   Output:

```
▶ XPath:
gym/member[prog/completed='No']/firstname/text()
▶ XML:  Test   Save   Color   Format   Fix
INFO - XPath returned 83 items (compiled in 1ms, evaluated in 4ms)
<?xml version="1.0" encoding="UTF-8"?>
<result>
Andrew
Tristan
Amelia
London
Callie
Stella
Alexandra
Charlie
Logan
Luke
Madelyn
Arianna
Leo
Thomas
Caroline
Caleb
Chase
Lillian
Mila
Wyatt
Penelope
Thomas
Noah
Hadley
Isaiah
Genesis
Easton
Abigail
Bella
Josiah
Eva
Elliot
Henry
Alex
Jacob
Zachary
Connor
```

3- gym/member[count(prog)>1]/firstname/text()

Description: Returns the first name of members who have taken more than 1 course (completed/not completed).

Output:

```
▶ XPath:
gym/member[count(prog)>1]/firstname/text()
▶ XML:  Test   Save   Color   Format   Fix
▶ INFO - XPath returned 80 items (compiled in 0ms, evaluated in 7ms)

<?xml version="1.0" encoding="UTF-8"?>
<result>
Amelia
London
Harper
Callie
Stella
Alexandra
Charlie
Logan
Luke
Madelyn
Leo
Caroline
Caleb
Chase
Lillian
Mila
Wyatt
Penelope
Thomas
Noah
Hadley
Isaiah
Genesis
Easton
Abigail
Bella
Josiah
Eva
Elliot
Chase
Kennedy
Henry
Zachary
Connor
Daniel
Gabriella
Connor
```

4- gym/member[prog/progID=//program[programName='Crossfit']/@programID]/firstname/text()

Description: Returns the first name of members who take a program with name 'x'.

Output:

```
▶ XPath:
gym/member[prog/progID=//program[programName='Crossfit']/@programID]/firstname/text()
▶ XML:  Test   Save   Color   Format   Fix
▶ INFO - XPath returned 19 items (compiled in 0ms, evaluated in 839ms)

<?xml version="1.0" encoding="UTF-8"?>
<result>
Skylar
Caleb
Hadley
Genesis
Abigail
Bella
Josiah
Eva
Chase
Jordan
Aubrey
Aubrey
Vivian
Taylor
Brayden
Michael
Alice
Maya
Easton
</result>
```

5- count(gym/member[prog/progID=//program[trainerID=4]/@programID])

Description: Returns the number of members taught by a particular trainer 'x'.

Output:

```
▶ XPath:
count(gym/member[prog/progID=//program[trainerID=4]/@programID])
▶ XML:  Test   Save   Color   Format   Fix

  INFO - XPath returned 1 item (compiled in 1ms, evaluated in 1377ms)

  36
```

6- count(gym/member[contains(prog/progID,'YOG')])

Description: Returns the number of members who attend programs of a department 'x'.

Output:

```
▶ XPath:
count(gym/member[contains(prog/progID,'YOG')])
▶ XML:  Test   Save   Color   Format   Fix

  INFO - XPath returned 1 item (compiled in 1ms, evaluated in 7ms)

  30
```

Work Split and Team Contribution

The contribution of each group member is as follows:
1- Christian Chester – XML file content, 2 XPath queries, 1 XSLT file
2- Daniyar Nazarbayev – 2 + 1 extra XSLT files
3- Naqeeb Naseer – XML schema file (.xsd), 4 XPath queries, Report

Dev Notes

Four XSLT link statements are provided in the XML document with one active and the other three commented out. Different views of the XML document based on the XSLT styling and conditions can be viewed by simply commenting and activating the desired XSLT link statement.