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XQuery – XML Query Language

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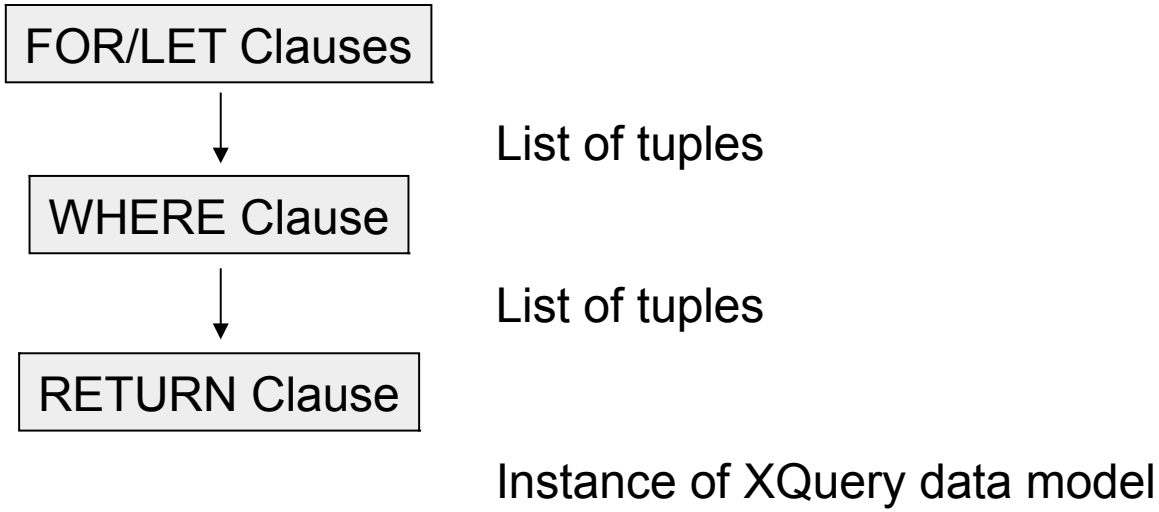
XQuery

XML Query Language (XQuery)
http://www.w3.org/TR/xquery

FLWR: FOR ... LET... FOR... LET... WHERE... RETURN...



FOR and LET for selecting and aggregating data

- FOR: Binds *node variables* – iteration
- LET: Binds *collection variables* – one value

Collections and Sorting

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Find all book titles published after 2012:

```
FOR $x IN document("bib.xml")/bib/book
WHERE $x/year > 2012
RETURN $x/title
```

Result:

```
<title> abc </title>
<title> def </title>
<title> ghi </title>
```

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For each author of a book by Juergen Mangler, list all books he published:

```
FOR $a IN distinct(document("bib.xml")
                   /bib/book[publisher="Juergen Mangler"]/author)
RETURN <result>
          $a,
          FOR $t IN /bib/book[author=$a]/title
          RETURN $t
       </result>
```

distinct = a function that eliminates duplicates

Result:

```
<result>
        <author>Rinderle-Ma</author>
        <title>abc</title>
        <title>def</title>
</result>
<result>
        <author>Hildebrandt</author>
        <title>ghi</title>
</result>
```

- FOR $x in expr -- binds $x to each element in the list expr
- LET $x = expr -- binds $x to the entire list expr
  - Useful for common subexpressions and for aggregations

```
<big_publishers>
    FOR $p IN distinct(document("bib.xml")//publisher)
    LET $b := document("bib.xml")/book[publisher = $p]
    WHERE count($b) > 100
    RETURN $p
</big_publishers>
```

count = a (aggregate) function that returns the number of elems

Find books whose price is larger than average:

```
LET $a=avg(document("bib.xml")/bib/book/@price)
FOR $b in document("bib.xml")/bib/book
WHERE $b/@price > $a
RETURN $b
```

FOR v.s. LET

```
FOR $x IN document("bib.xml")/bib/book
RETURN <result> $x </result>
```

Returns:

```
<result> <book>...</book></result>
<result> <book>...</book></result>
<result> <book>...</book></result>
...
```

```
LET $x := document("bib.xml")/bib/book
RETURN <result> $x </result>
```

Returns:

```
<result> <book>...</book>
         <book>...</book>
         <book>...</book>
         ...
</result>
```

Collections in XQuery

- Ordered and unordered collections
  - /bib/book/author = an ordered collection
  - Distinct(/bib/book/author) = an unordered collection
- LET $a = /bib/book → $a is a collection
- $b/author → a collection (several authors...)

- RETURN <result> $b/author </result>

Returns:

```
<result> <author>...</author>
         <author>...</author>
         <author>...</author>
           ...
</result>
```

Collections in XQuery

What about collections in expressions ?

- $b/@price → list of n prices
- $b/@price * 0.7 → list of n numbers
- $b/@price * $b/@quantity → list of n x m numbers ??
- $b/@price * ($b/@quant1 + $b/@quant2) ≠ $b/@price * $b/@quant1 + $b/@price * $b/@quant2 !!

Sorting in XQuery

- Sorting arguments: refer to the name space of the RETURN clause, not the FOR clause
- To sort on an element you don't want to display, first return it, then remove it with an additional query.

```
<publisher_list>
   FOR $p IN distinct(document("bib.xml")//publisher)
   RETURN <publisher> <name> $p/text() </name> ,
                  FOR $b IN document("bib.xml")//book[publisher = $p]
                  RETURN <book>
                                    $b/title ,
                                    $b/@price
                               </book> SORTBY(price DESCENDING)
              </publisher> SORTBY(name)
</publisher_list>
```

If-Then-Else

```
FOR $h IN //holding

RETURN <holding>

                $h/title,

                IF $h/@type = "Journal"

                        THEN $h/editor

                ELSE $h/author

            </holding> SORTBY (title)
```

Quantifiers

```
FOR $b IN //book
WHERE EVERY $p IN $b//para SATISFIES
   contains($p, "sailing")
RETURN $b/title
```

← Universal

Existential →

```
FOR $b IN //book
WHERE SOME $p IN $b//para SATISFIES
   contains($p, "sailing")
   AND contains($p, "windsurfing")
RETURN $b/title
```

Other Stuff in XQuery

- BEFORE and AFTER
  - for dealing with order in the input
- FILTER
  - deletes some edges in the result tree
- Recursive functions
  - Currently: arbitrary recursion
  - Perhaps more restrictions in the future ?

Group-By

```
FOR $b IN document("http://www.bn.com")/bib/book,
    $y IN $b/@year
WHERE $b/publisher="Morgan Kaufmann"
RETURN    GROUPBY $y
          WHERE count($b) > 10
          IN <year> $y </year>
```

← with GROUPBY

Equivalent SQL →

```
SELECT year
FROM Bib
WHERE Bib.publisher="Morgan Kaufmann"
GROUPBY year
HAVING count(*) > 10
```

Group-By

```
FOR $b IN document("http://www.bn.com")/bib/book,
        $a IN $b/author,
        $y IN $b/@year
RETURN  GROUPBY $a, $y
                IN <result> $a,
                            <year> $y </year>,
                            <total> count($b) </total>
                  </result>
```

← with GROUPBY

without GROUPBY →

```
FOR $Tup IN distinct(FOR $b IN document("http://www.bn.com")/bib,
                           $a IN $b/author,
                           $y IN $b/@year
                         RETURN <Tup> <a> $a </a> <y> $y </y> </Tup>),
        $a IN $Tup/a/node(),
        $y IN $Tup/y/node()
  LET $b = document("http://www.bn.com")/bib/book[author=$a,@year=$y]
  RETURN <result> $a,
                            <year> $y </year>,
                            <total> count($b) </total>
                  </result>
```