NDBI040: **Modern Database Concepts**

http://www.ksi.mff.cuni.cz/~svoboda/courses/191-NDBI040/

Practical Class 3

XPath and XQuery

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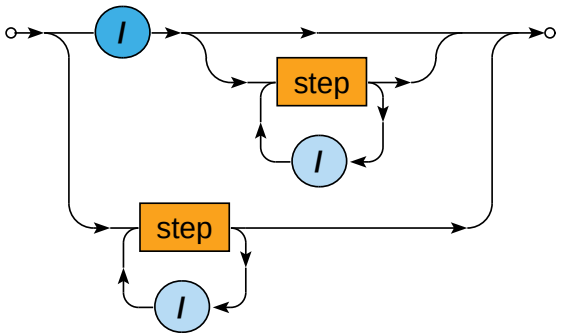
XPath

Path Expressions

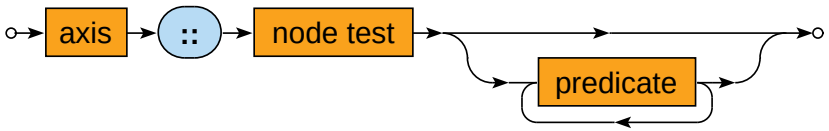
Path expression

- Absolute / relative paths



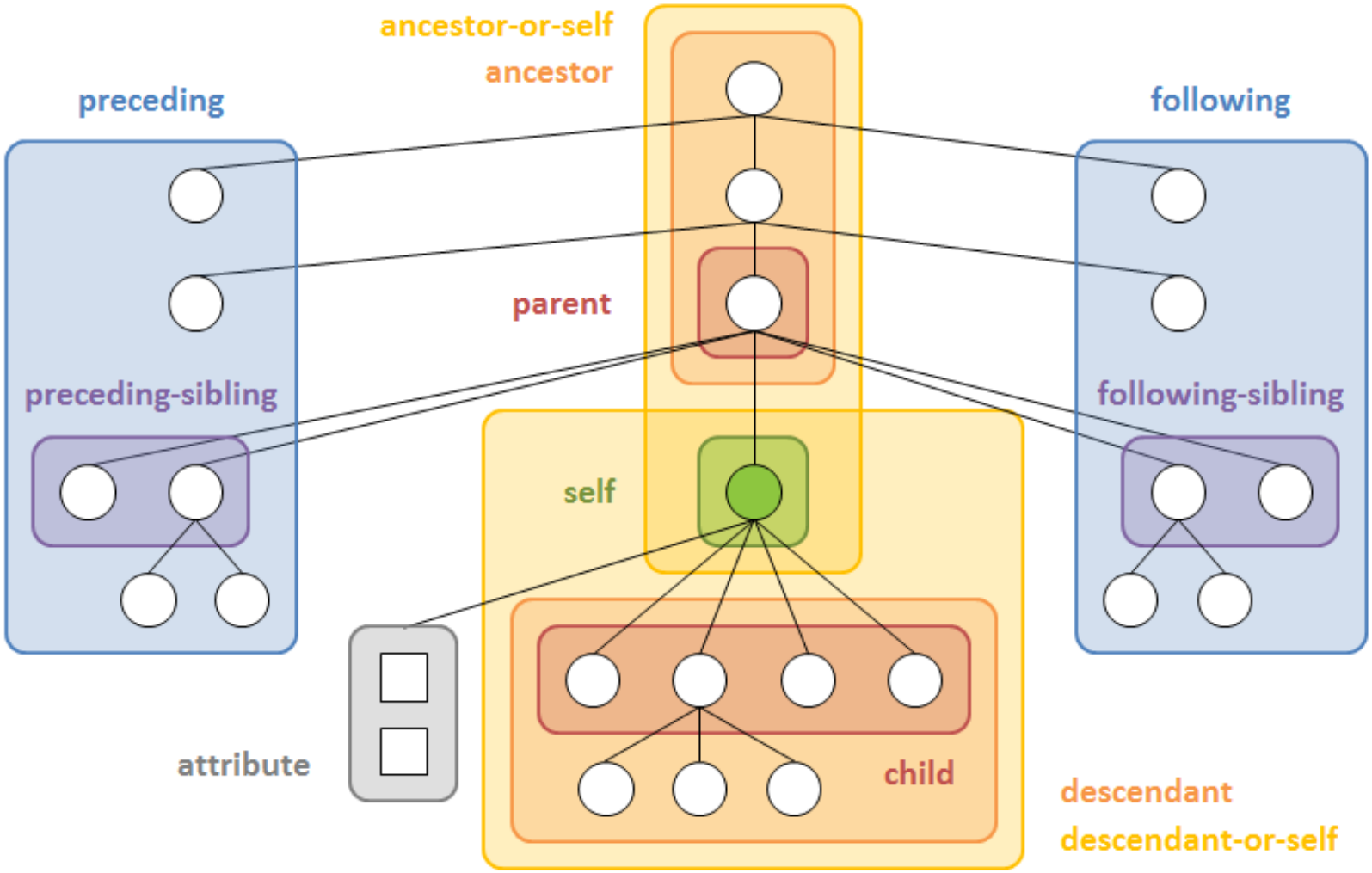
Path Expressions

Steps of path expressions



- **Axis**
  - Specifies the **relation of nodes** to be selected for a given node
- **Node test**
  - **Basic condition** the selected nodes must further satisfy
- **Predicates**
  - **Advanced conditions** the selected nodes must further satisfy

Path Expressions: Axes



Exercise 1

Express the following XPath queries

- **Names of all airline companies** (whole `airline` elements)
- **Full names of all airports** (just text content)
- **Codes of all airports** (their values)
- **The last ticket of the third flight** (in the document order)
- **Distinct codes of flight ticket classes** (without duplicities)

Exercise 2

Express the following XPath query

- **Flight numbers operated by *A6-EOQ* aircraft on *2019-10-13***

Exercise 3

Express the following XPath query

- **Flights with at least one first class ticket (*F*) or business class ticket (*C*)**

Exercise 4

Express the following XPath query

- **Flights without any first class ticket (*F*) as well as any business class ticket (*C*)**
  - Include only flights with at least one ticket

Exercise 5

Express the following XPath query

- **Numbers of flights that depart on *2019-10-18* or any date later and that have no aircraft assigned yet**

Exercise 6

Express the following XPath query

- **Lines with duration above the overall average**

Exercise 7

Express the following XPath query

- **Overall number of flights heading to any airport in Germany (*DEU*) on *2019-10-18***

Exercise 8

Express the following XPath query

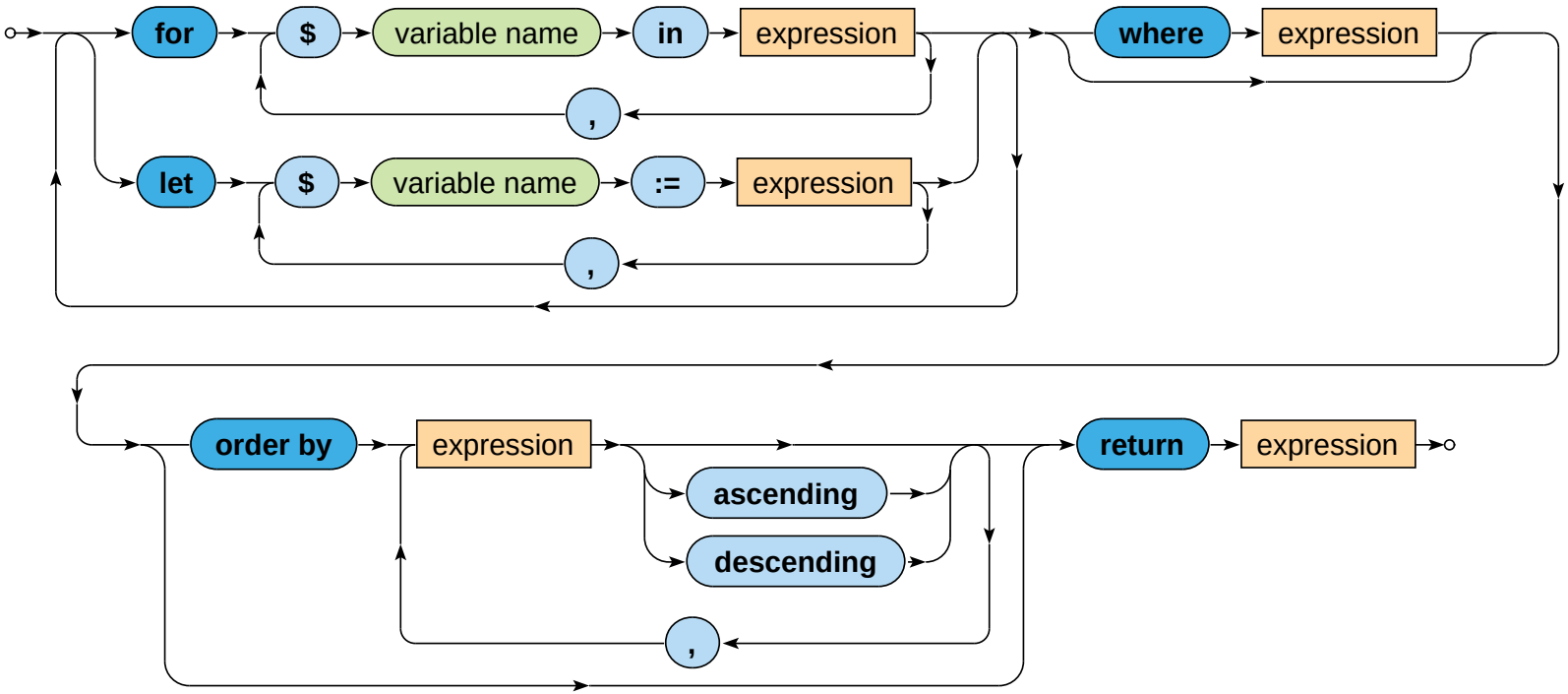
- **Passenger name on the very last ticket in the entire file**

XQuery

FLWOR Expressions

FLWOR

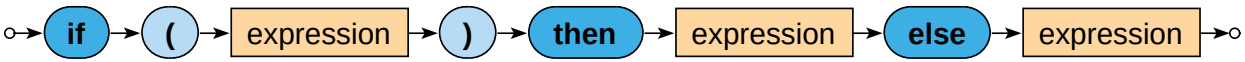
- Versatile construct allowing for **iterations over sequences**



Conditional Expressions

Condition

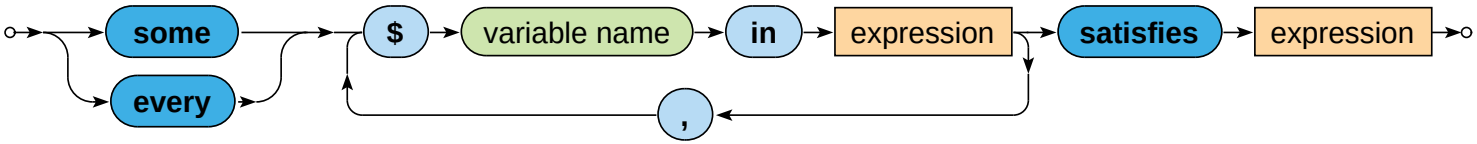
- Note that the `else` branch is compulsory
  - Empty sequence `()` can be returned if needed



Quantified Expressions

Quantifier

- Returns `true` if and only if…
  - in case of `some` **at least one item**
  - in case of `every` **all the items**
- … of a given sequence/s **satisfy the provided condition**



Exercise 1

Express the following XQuery query

- **Flights heading to any airport in Germany (*DEU*) on *2019-10-18***

Exercise 2

Express the following XQuery query

- **Sequence of lines longer than *60* minutes**
- Respect the following output structure

```
<line origin="airport-code" destination="airport-code">
  <code>line-number</code>
  <departure>departure-time</departure>
  <arrival>arrival-time</arrival>
</line>
...
```

- Propose two solutions using **direct / computed constructors** respectively

Exercise 3

Express the following XQuery query

- **Names of airline companies such that all their flights are associated with aircrafts**

Exercise 4

Express the following XQuery query

- **Generate an XHTML table with data about flights from *PRG***
  - Use `<i>Unknown</i>` when an aircraft is not assigned
  - Sort the flights using dates (descending order) and times of departure (ascending)

```
<table>
  <tr>
    <th>Date</th><th>Time</th><th>Number</th><th>Aircraft</th>
  </tr>
  <tr>
    <td>flight-date</td>
    <td>time-of-departure</td>
    <td>line-number</td>
    <td>aircraft-registration-or-unknown</td>
  </tr>
  ...
</table>
```

Exercise 5

Express the following XQuery query

- **Names of passengers of *EK140* flights with at least average number of sold tickets over all *EK140* flights**
- Respect the following output structure

```
<passengers date="flight-date" tickets="number-of-tickets">
  comma-separated-list-of-passenger-names
</passengers>
...
```