

Temporal XML

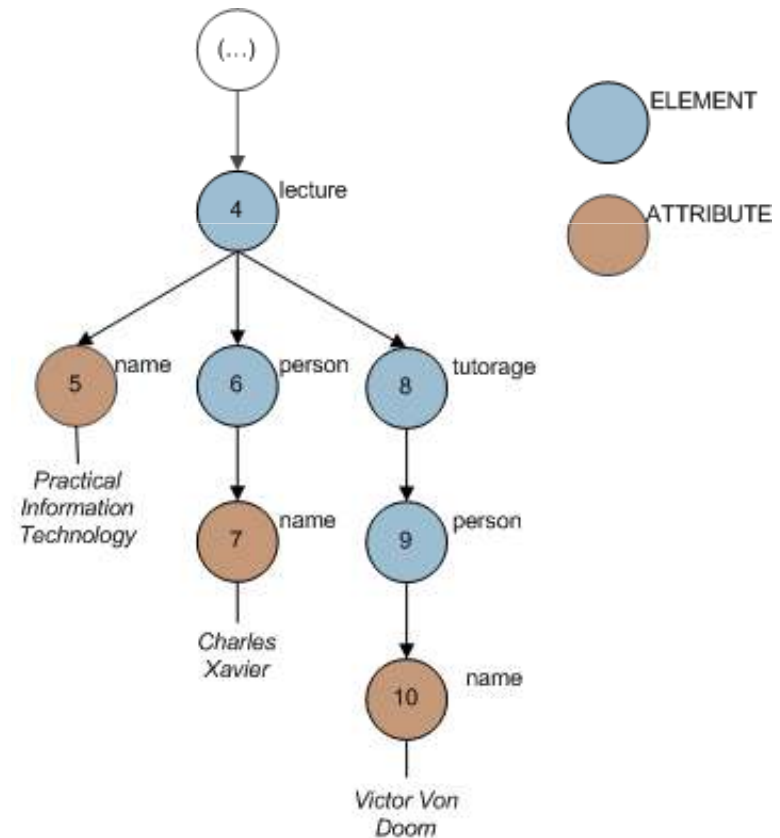
The approach of F. Rizzolo and A.
Vaisman

eXtensible Markup Language

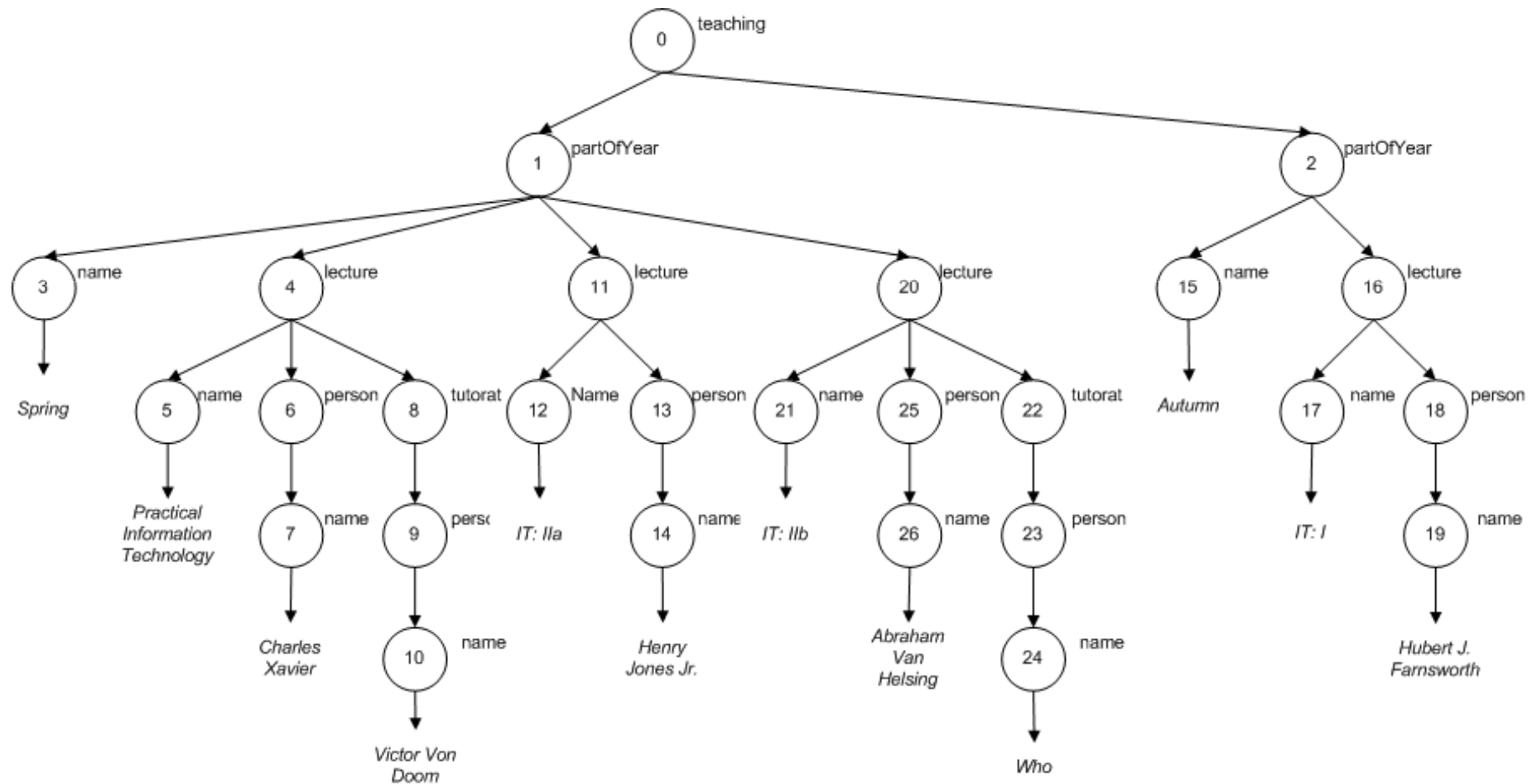
Implementation

```
(...)  
  <lecture ID="4">  
    <name>Practical Information  
    Technology</name>  
    <person ID="6">  
      <name>Charles Xavier</name>  
    </person>  
    <tutorage ID="8">  
      <person ID="9">  
        <name>Victor Von Doom</name>  
      </person>  
    </tutorage>  
  </lecture>  
(...)
```

Data model



XML document





Temporal XML

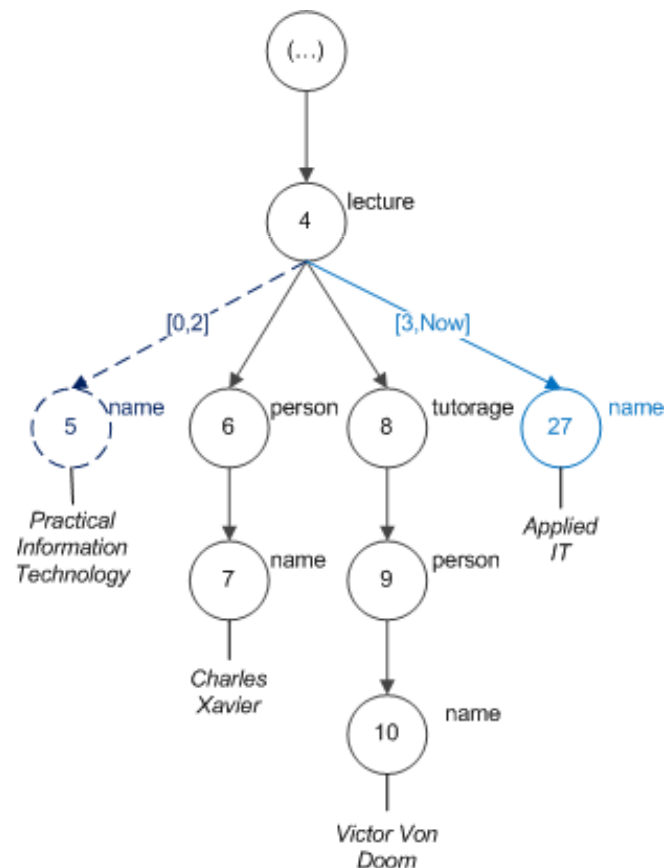
Storing historical changes

Temporal Interval

Implementation

```
(...)  
<lecture ID="4" Time:FROM="1990-01-01"  
  Time:T0="Now">  
  <name Time:FROM="1990-01-01" Time:T0="1992-12-  
    31">Practical Information Technology</name>  
  <name Time:FROM="1993-01-01" Time:T0="Now">  
    Applied IT</name>  
  <person ID="6" Time:FROM="1990-01-01" Time:  
    T0="Now">  
    (...)  
  </person>  
  <tutorage Time:FROM="1990-01-01" Time:T0=  
    "1994-12-3">  
    (...)  
  </tutorage>  
</lecture>  
(...)
```

Data Model

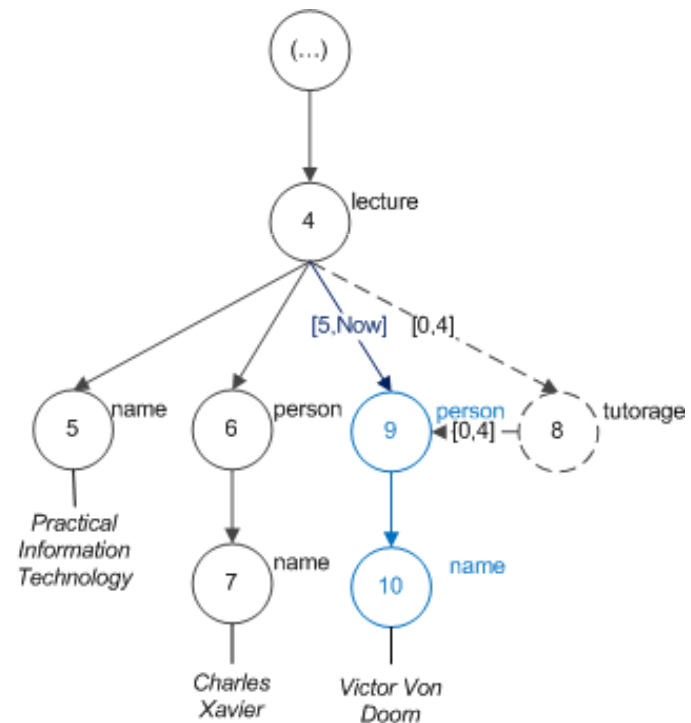


Temporal Interval

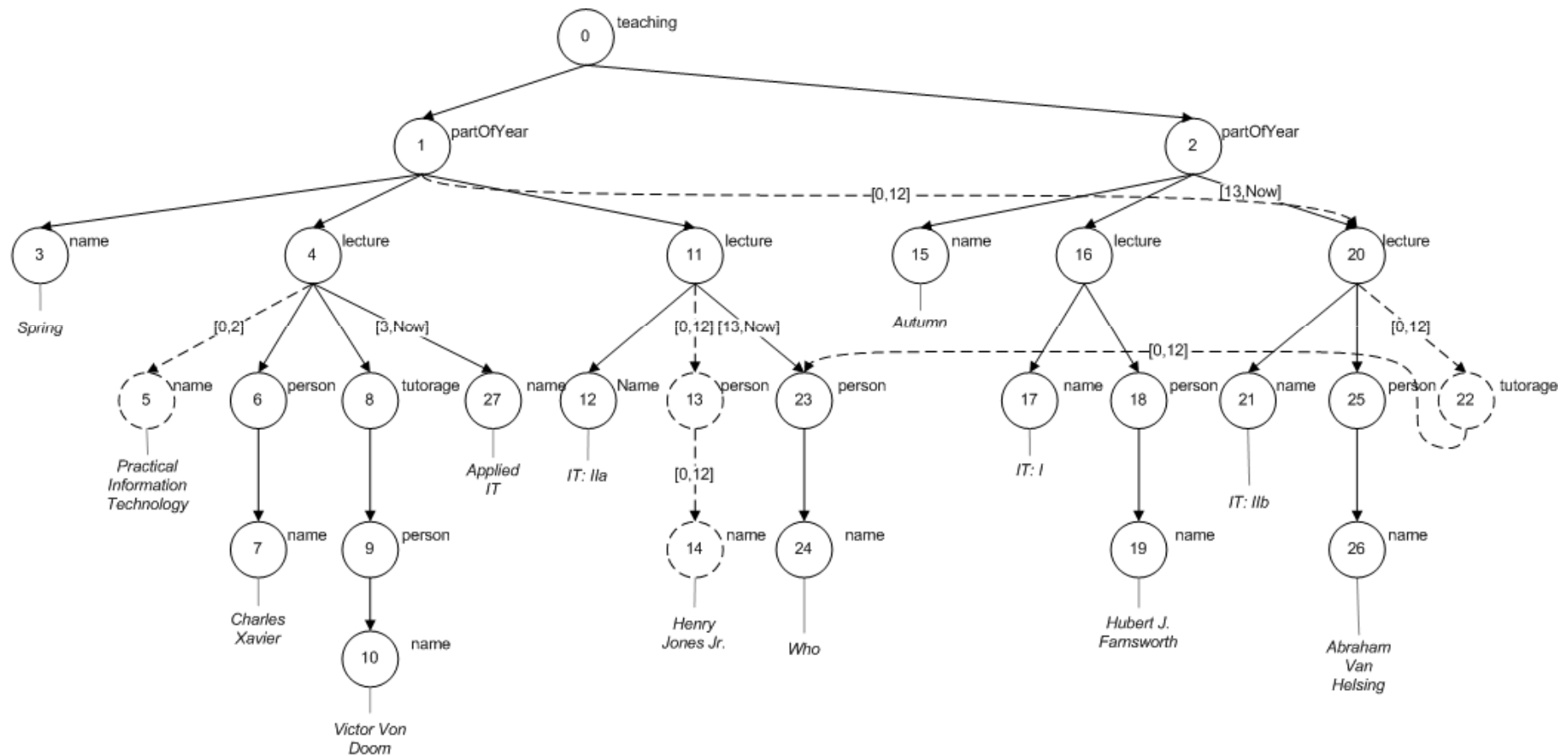
Implementation

```
(...)  
<lecture ID="4" Time:FROM="1990-01-01"  
  Time:T0="Now">  
  (...)  
  <person ID="6" Time:FROM="1990-01-01" Time:T0=  
    "Now">  
    (...)  
  </person>  
  <person Time:FROM="1995-01-01" Time:T0="Now"  
    IN = "9"/>  
  <tutorage Time:FROM="1990-01-01"  
    Time:T0="1994-12-3">  
    <person ID="9" Time:FROM="1990-01-01"  
      Time:T0="1994-12-31">  
      <name Time:FROM="1990-01-01"  
        Time:T0="Now">Victor Von Doom</name>  
    </person>  
  </tutorage>  
</lecture>
```

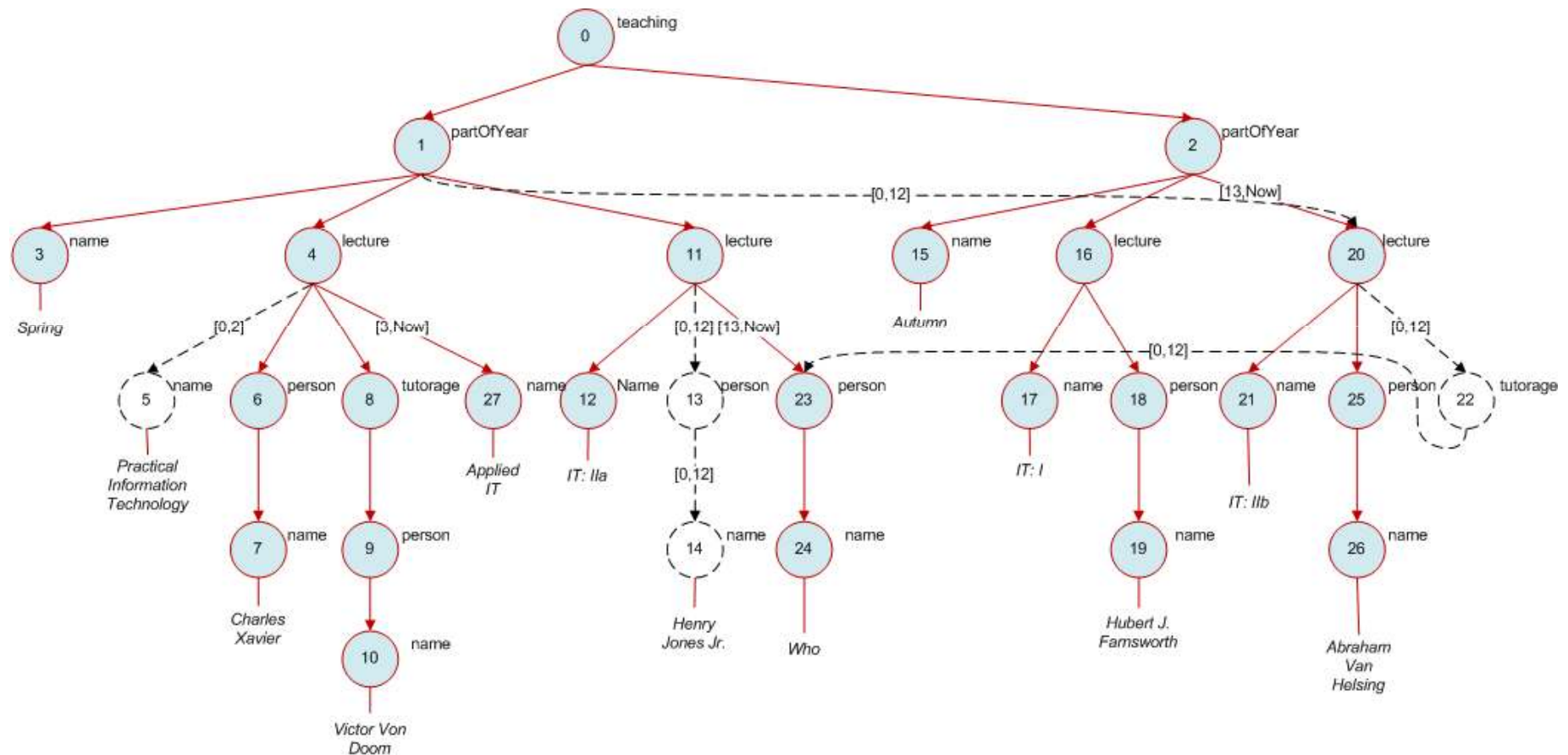
Data Model



Temporal XML document



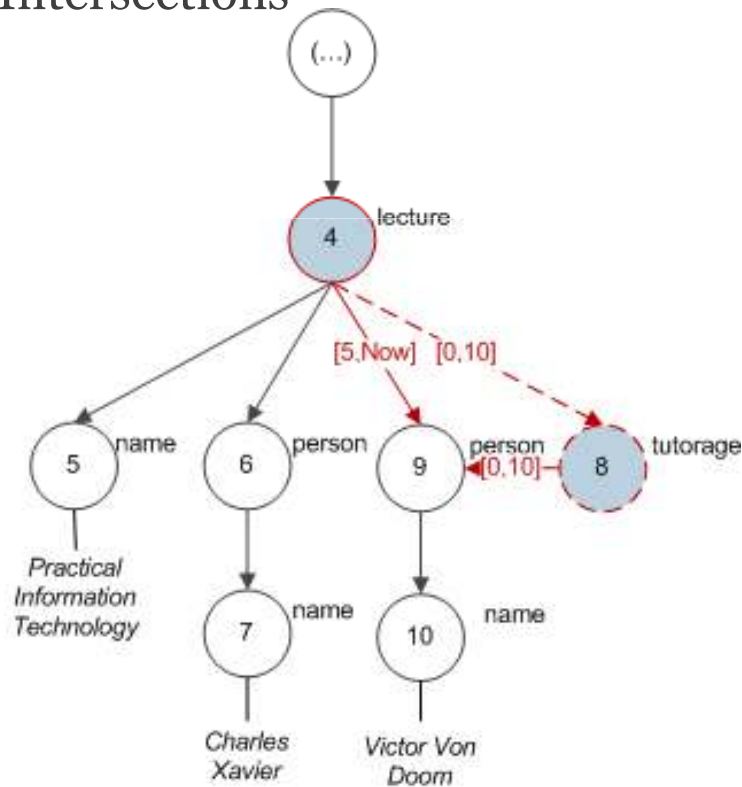
Temporal XML document



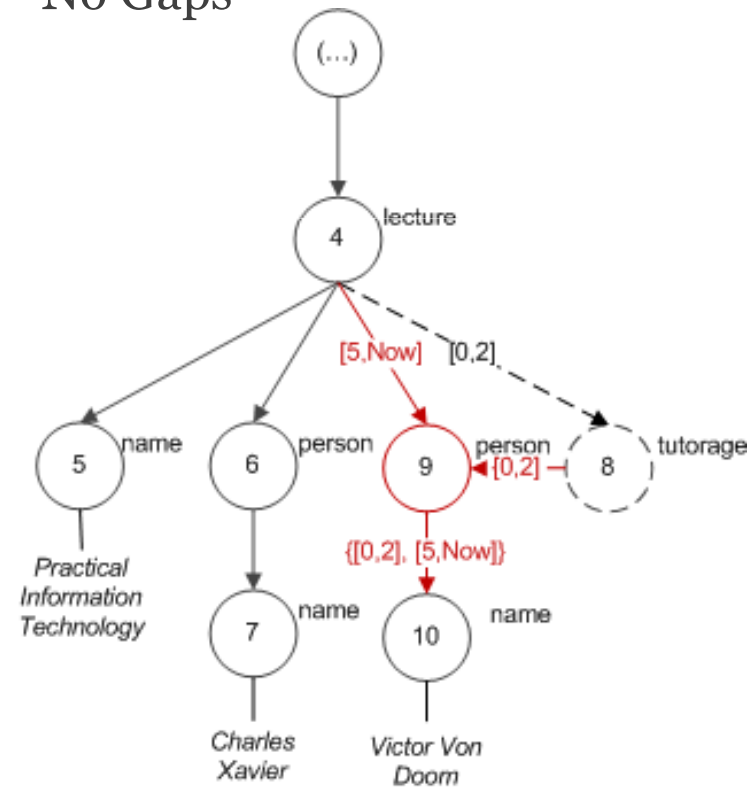
Restrictions

Temporal Interval of all incoming edges need to be consecutive

No Intersections



No Gaps



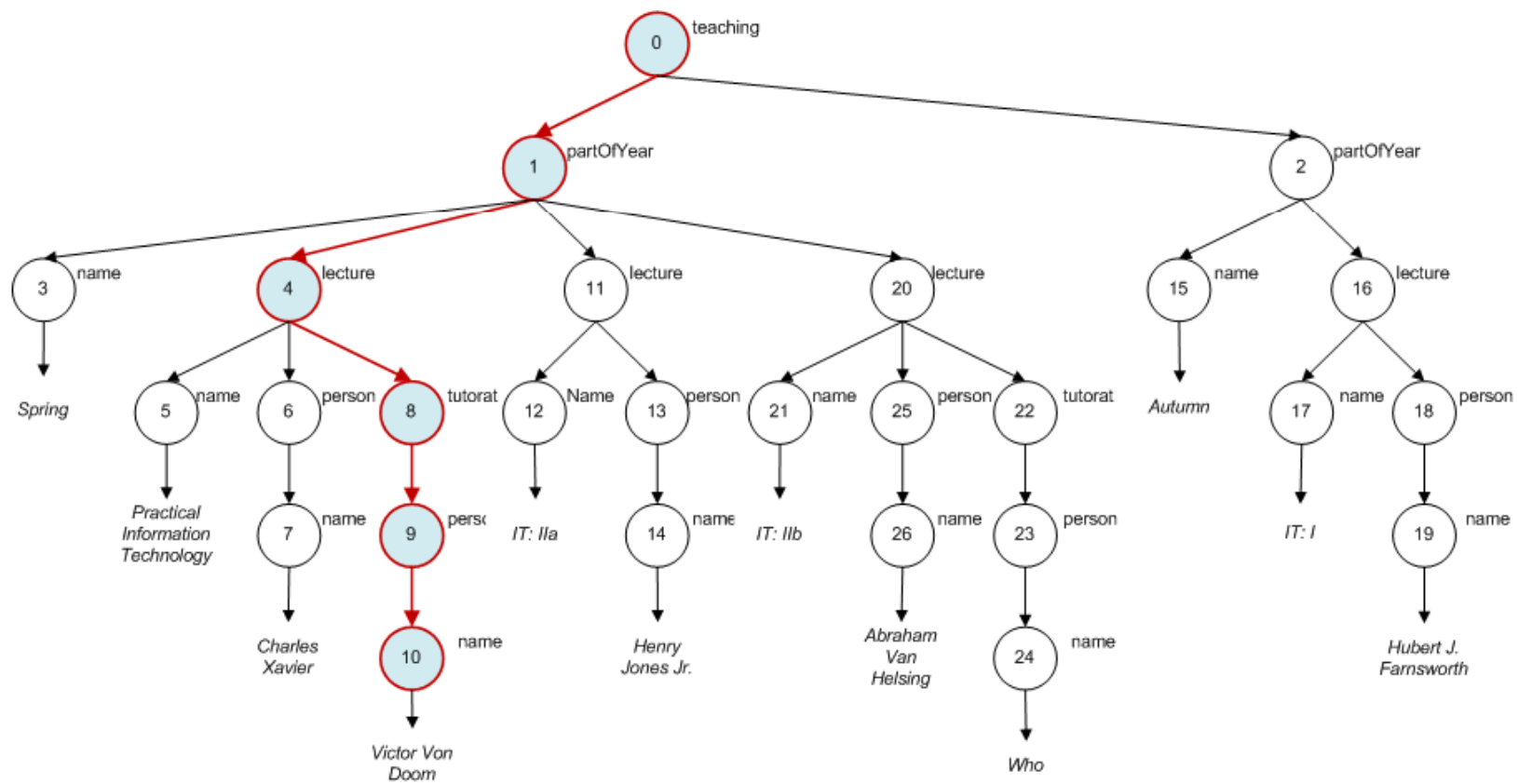


Queries

Extracting information out of a temporal XML document

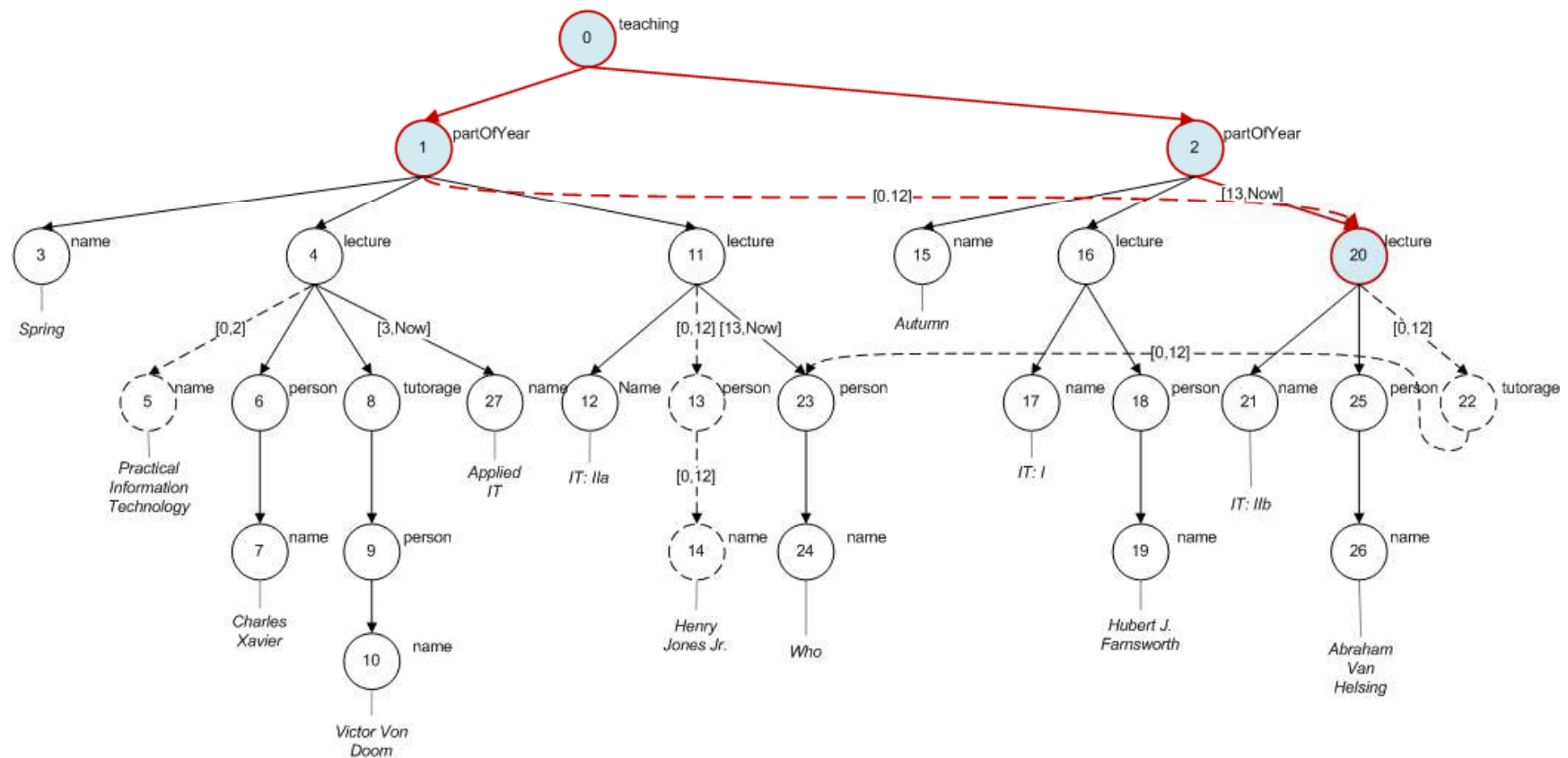
Paths

Context node: (10) Path: 0, 1, 4, 8, 9, 10



Paths

Context node:	Path:
(20)	0, 1, 20
(20)	0, 2, 20



Continuous Paths

Context pair:

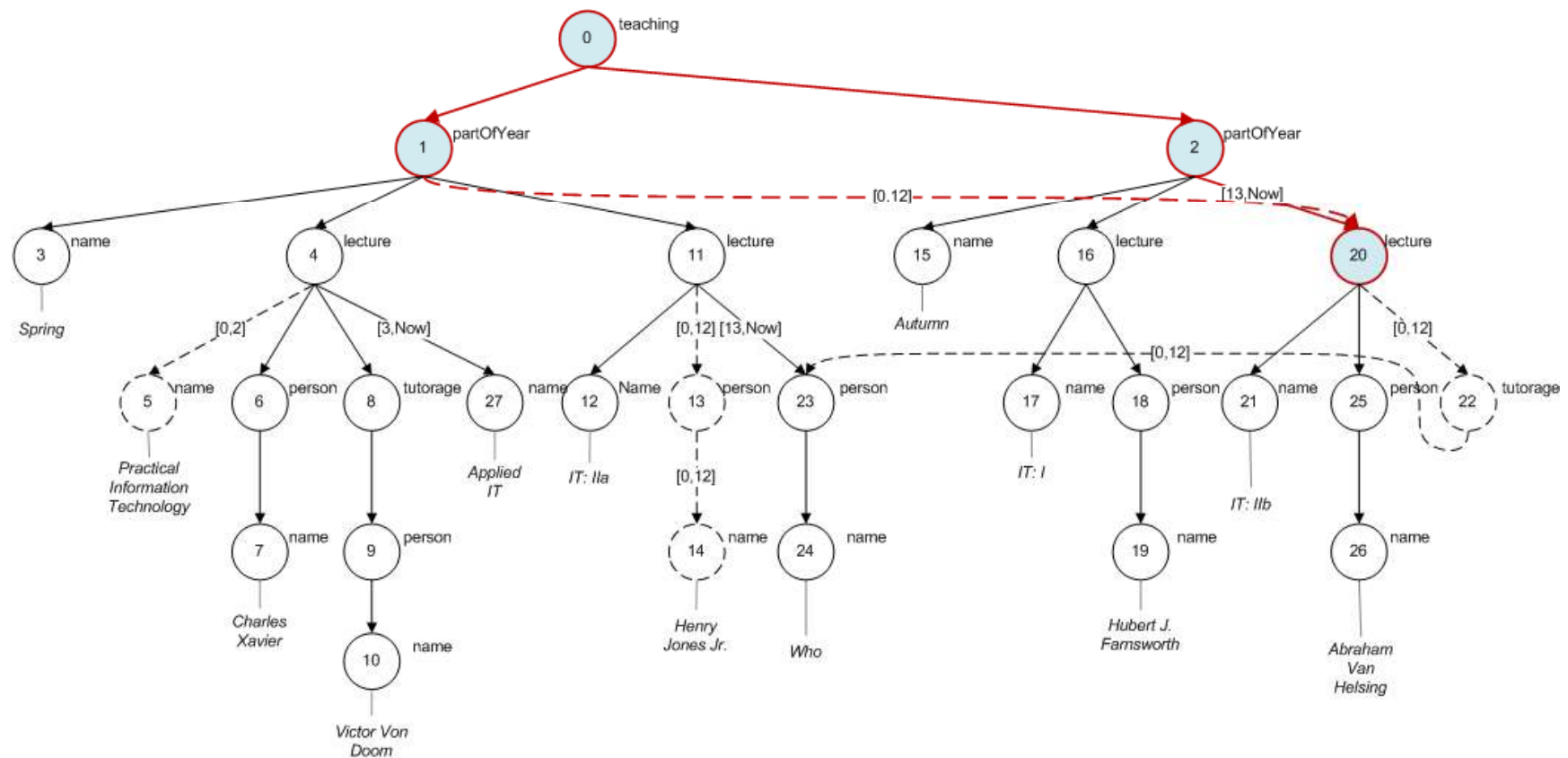
(20, [0,12])

(20, [13, Now])

Path:

0, 1, 20, [0,12]

0, 2, 20, [13,Now]



TXPath

teaching//person/name[@to = "Now"]

Context pair:

(7, [0, Now])

(10, [0, Now])

(14, [0,12])

(19, [0, Now])

(24, [0,12])

(24, [13, Now])

(29, [0, Now])

Value:

Chales Xavier

Victor Von Doom

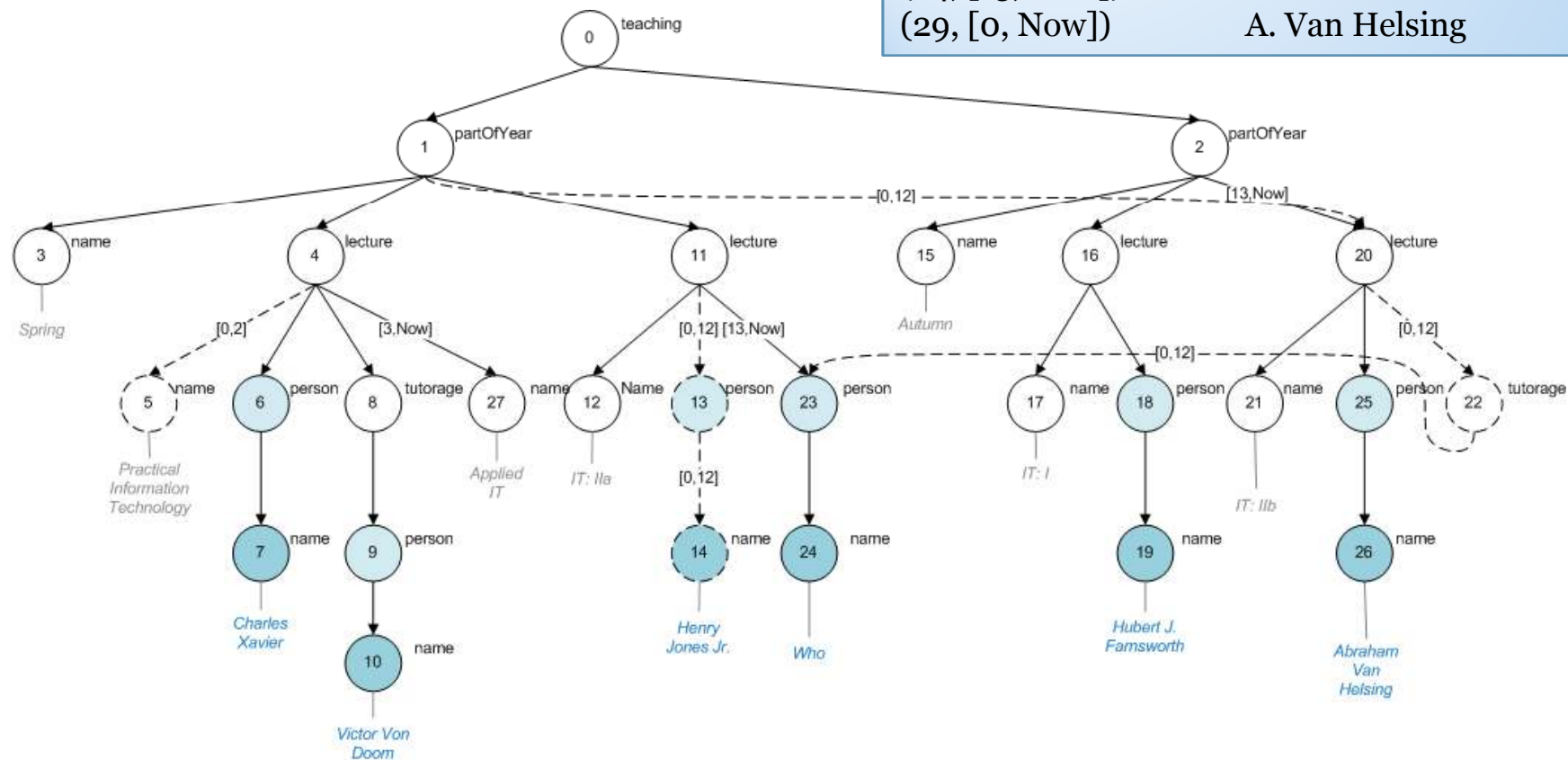
Henry Jones Jr.

H. J. Farnsworth

Who

Who

A. Van Helsing



TXPath

teaching//person/name[@to = "Now"]

Context pair:

(7, [0, Now])

(10, [0, Now])

~~(14, [0, 12])~~

(19, [0, Now])

~~(24, [0, 12])~~

(24, [13, Now])

(29, [0, Now])

Value:

Chales Xavier

Victor Von Doom

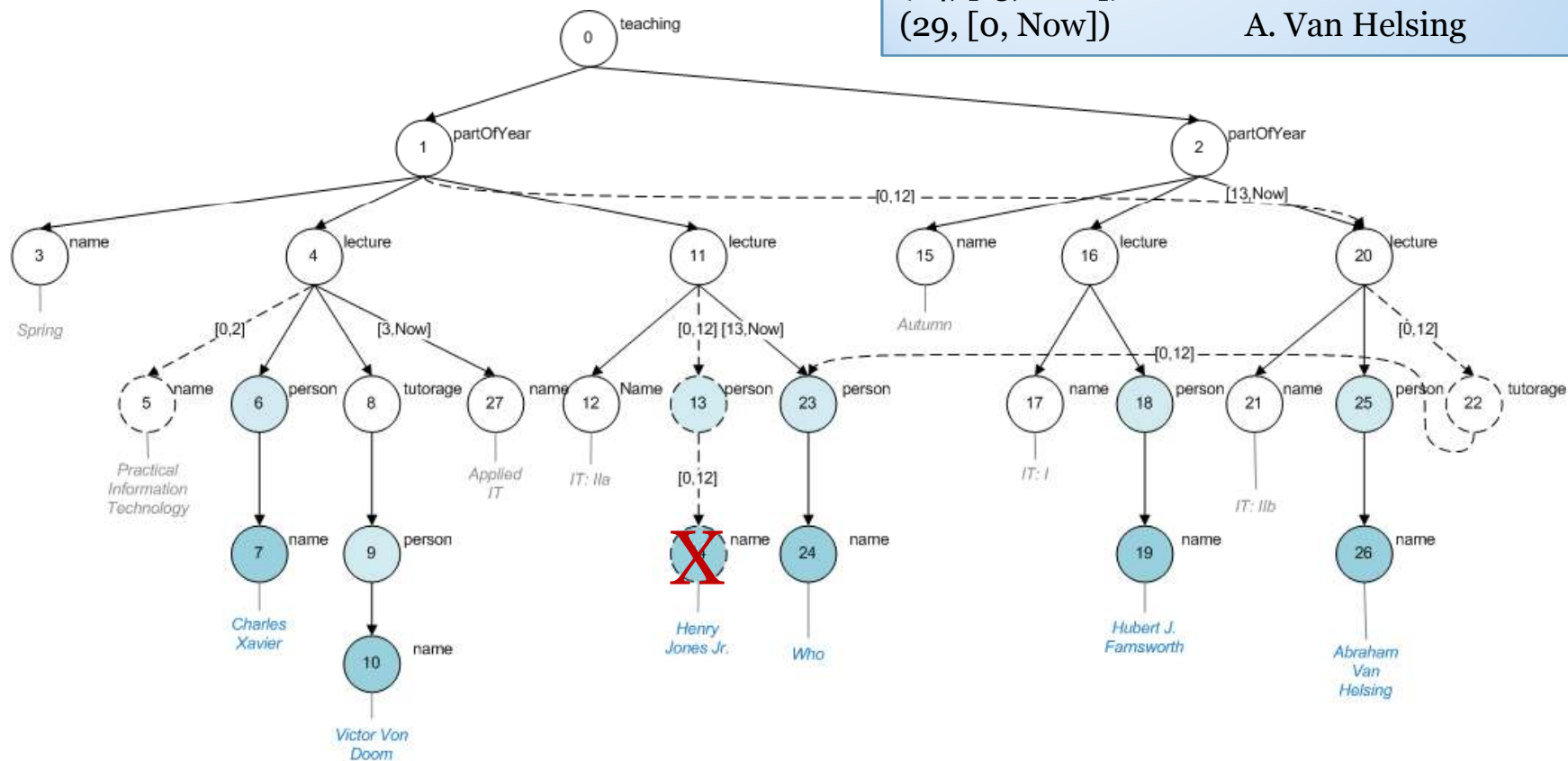
~~Henry Jones Jr.~~

H. J. Farnsworth

~~Who~~

Who

A. Van Helsing



Conclusion

XML

- Application
 - XML Document
 - `<element />`
- Querying
 - Paths (*Component*)
 - (n_k)
 - XPath (*Language*)

Temp.
Interval

Temporal XML

- Application
 - Temporal XML Document
 - `<element`
`Time:FROM="xy"`
`Time:TO="z"/>`
- Querying
 - Continuous Paths
 - $(n_k, [From, To])$
 - TXPath
 - `tempFilter(tempPred)`
 - `[@to < Now]`