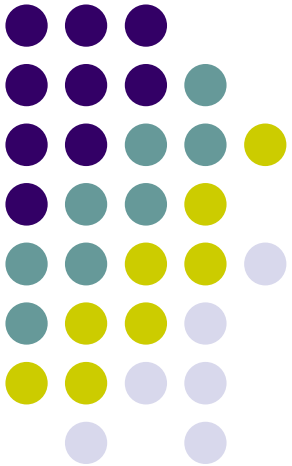
Node search

Node search preceding node construction – XQuery inviting non-XML technologies



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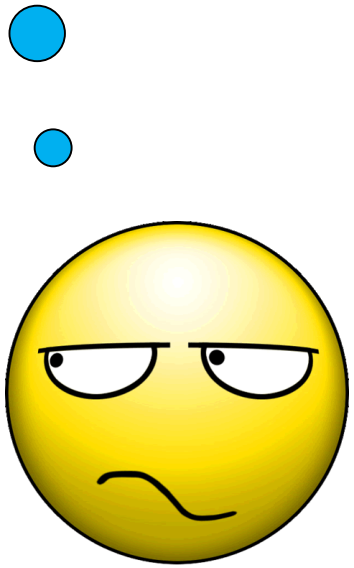
February 15, 2015

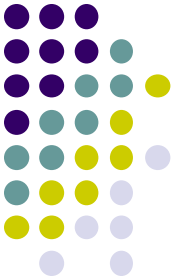
Node search - agenda

- Problem definition
- Key idea
- Elaboration



The problem

The alchemy of XPath ...



```
let $dir  := '/logs/'
let $logs := file:list($dir,true(),'*.xml')
               ! doc(concat($dir,.))
return
  $logs//booking[status='red']/agID
```

sum of all accessible XML resources

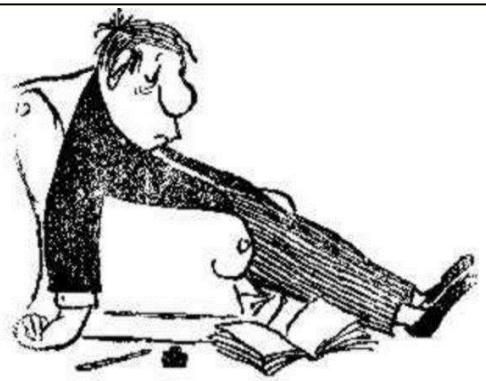
=

single space of information

(infospace)

REALITY FIGHTING BACK

```
let $dir  := '/logs/'
let $logs := file:list($dir,true(),'*.xml')
               ! doc(concat($dir,.))
return
  $logs//booking[status='red']/agID
```



out of Memory

Consider this trick ...

Query:

```
doc('logs.xml')//doc[@status = 'red']/
doc(@uri)/booking/agID
```

Catalog:

```
<logs>
   <doc status="green" uri="/logs/b0101.xml"/>
   <doc status="red"   uri="/logs/b0102.xml"/>
   <doc status="green" uri="/logs/b0103.xml"/>
   <doc status="red"   uri="/logs/b0104.xml"/>
   <doc status="green" uri="/logs/b0105.xml"/>
</logs>
```

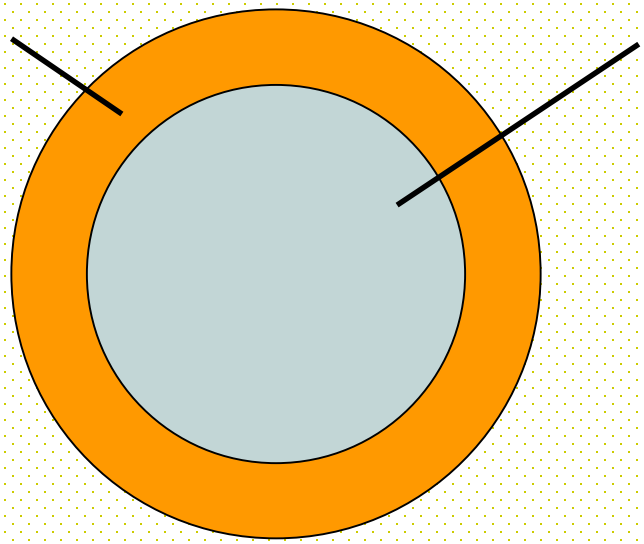
The secret of XPath

node

surface:

node properties

node-name
children
parent
attributes
...



core:

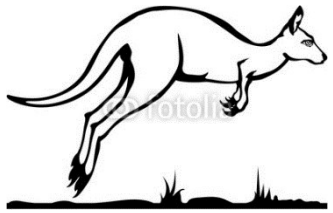
Information

characters

XML navigation vs. search

- Navigation

  node(s) → *a/b/c* → node(s)

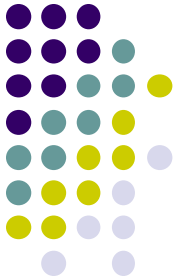


- Search

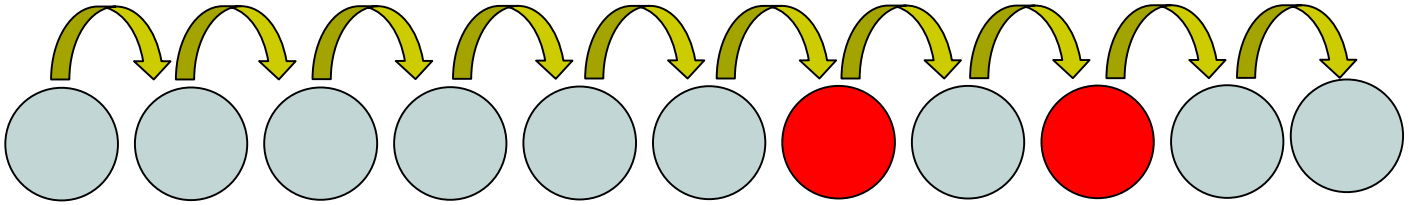
  query → *fn:doc($uri)* → node(s)

  fn:collection($uri)

The problem



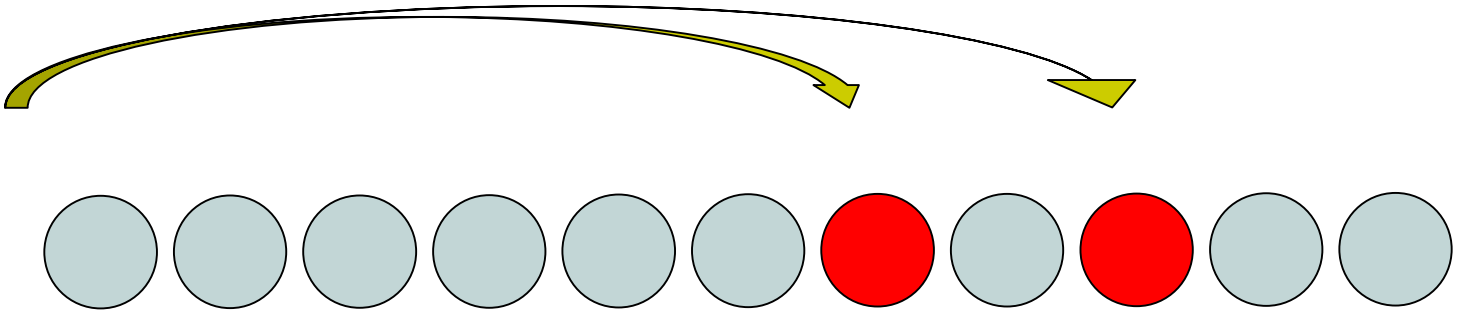
XPath navigation is based on node properties



Access to node properties requires node construction

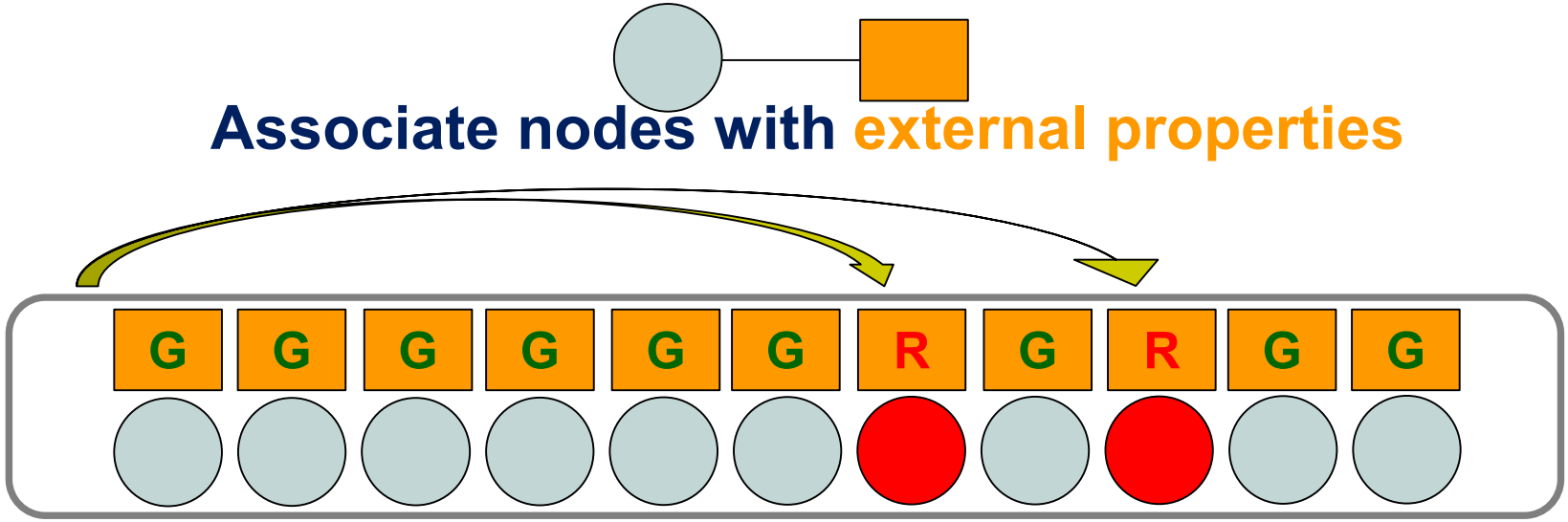
The goal

To complement XPath navigation with a node search



which does not require node construction (and is portable)

A solution



Node search = filtering nodes by external properties

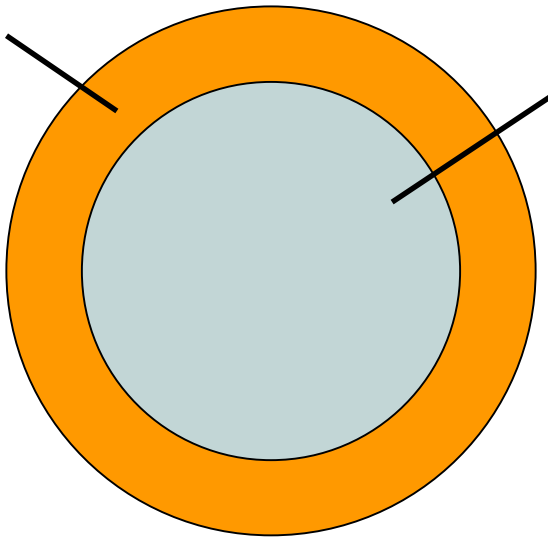
So add ...

node

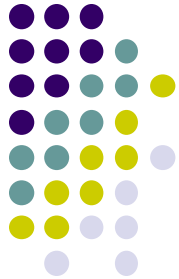
surface:
node properties

core:
Information

characters



... a second, detached surface!

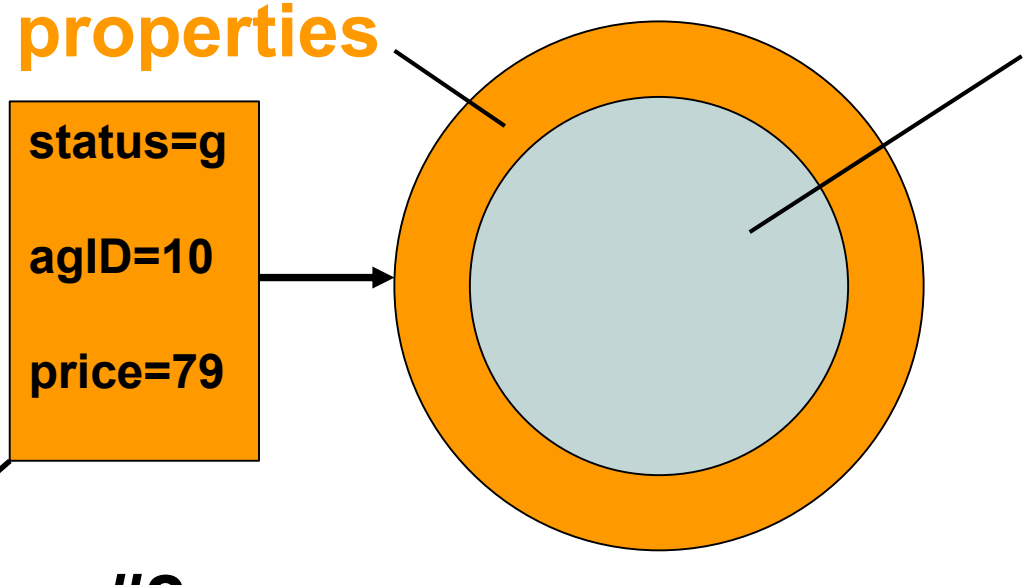


node

surface:
node properties

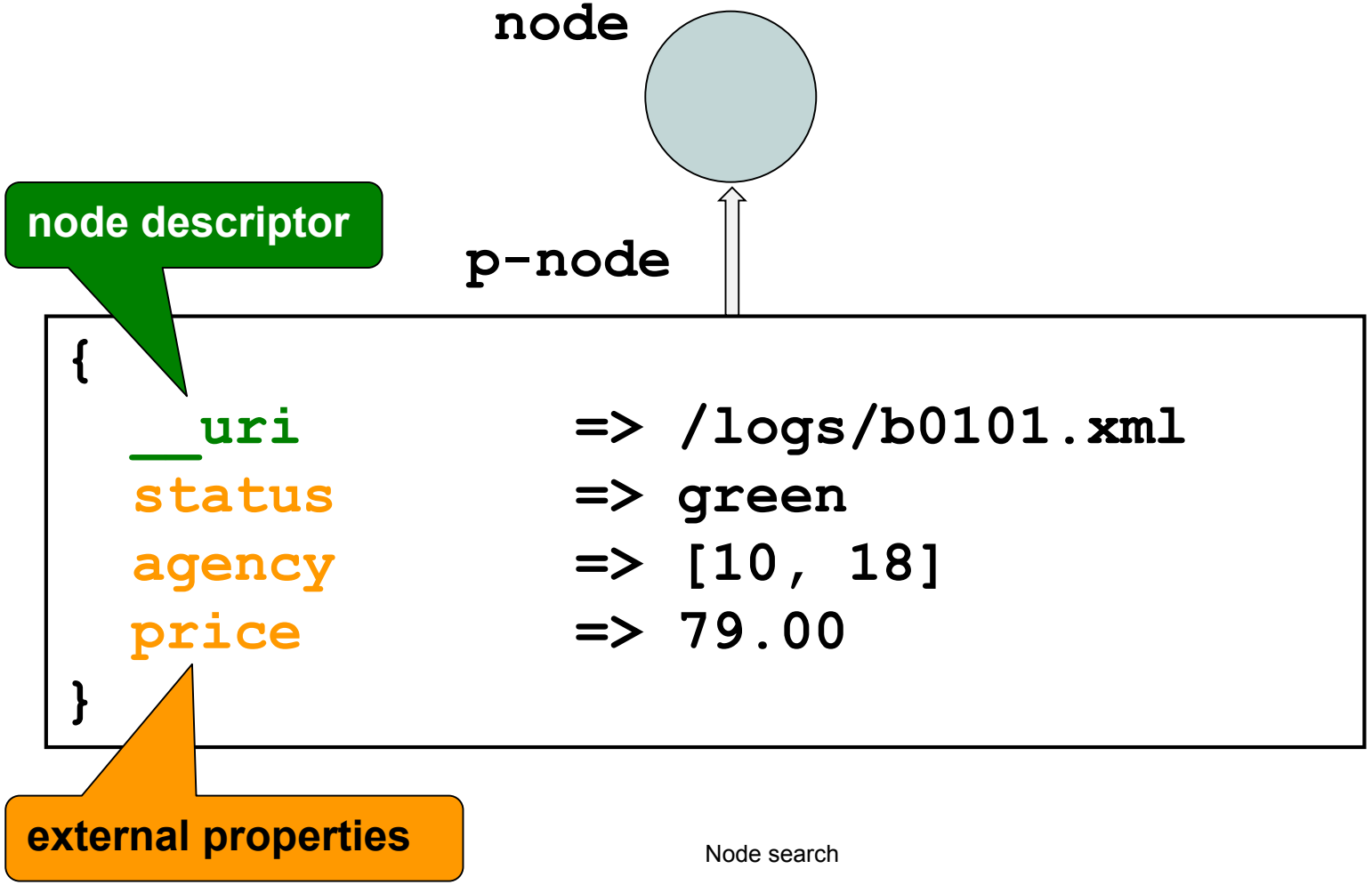
core:
Information

characters

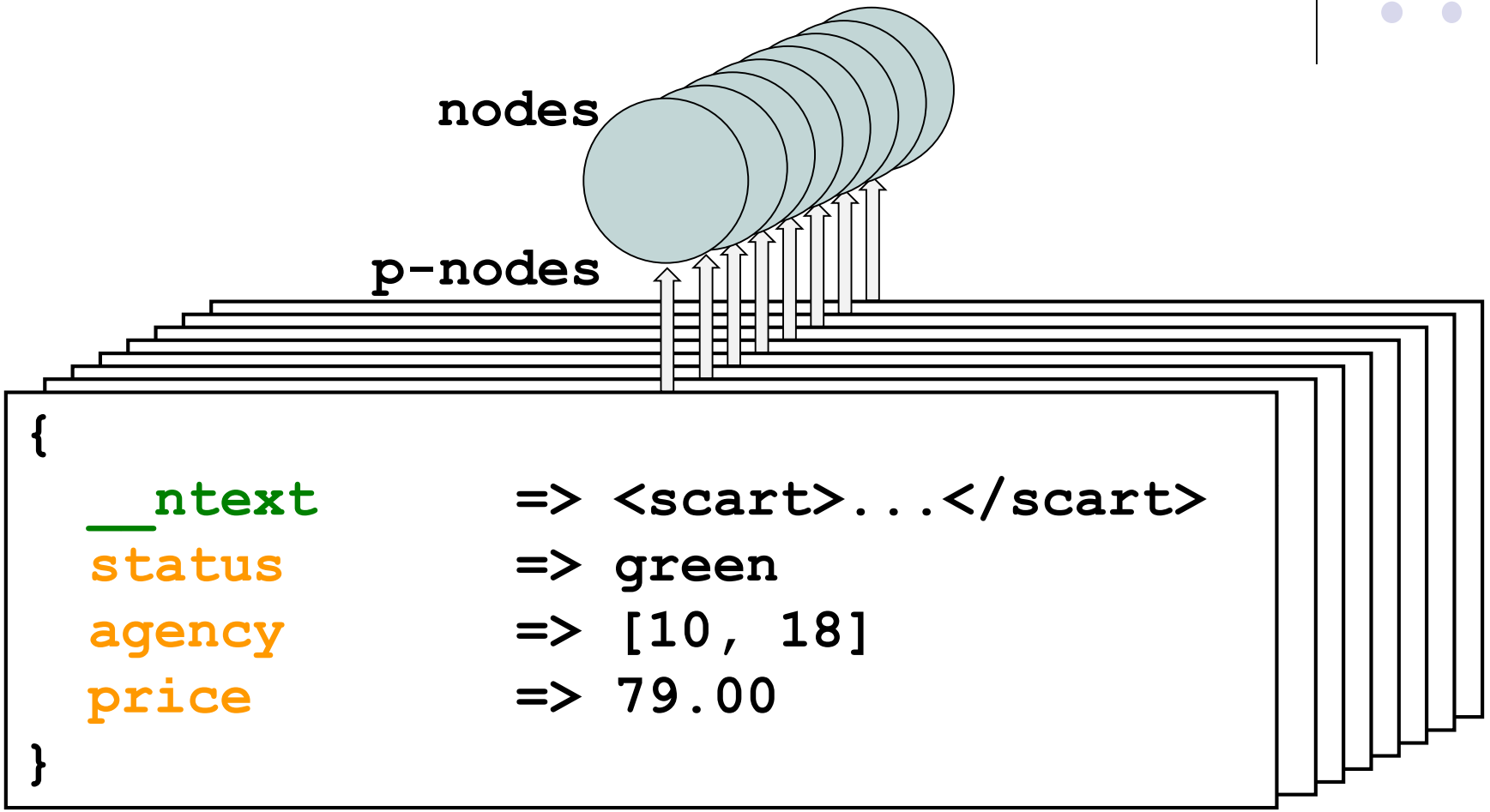


surface #2:
external node properties

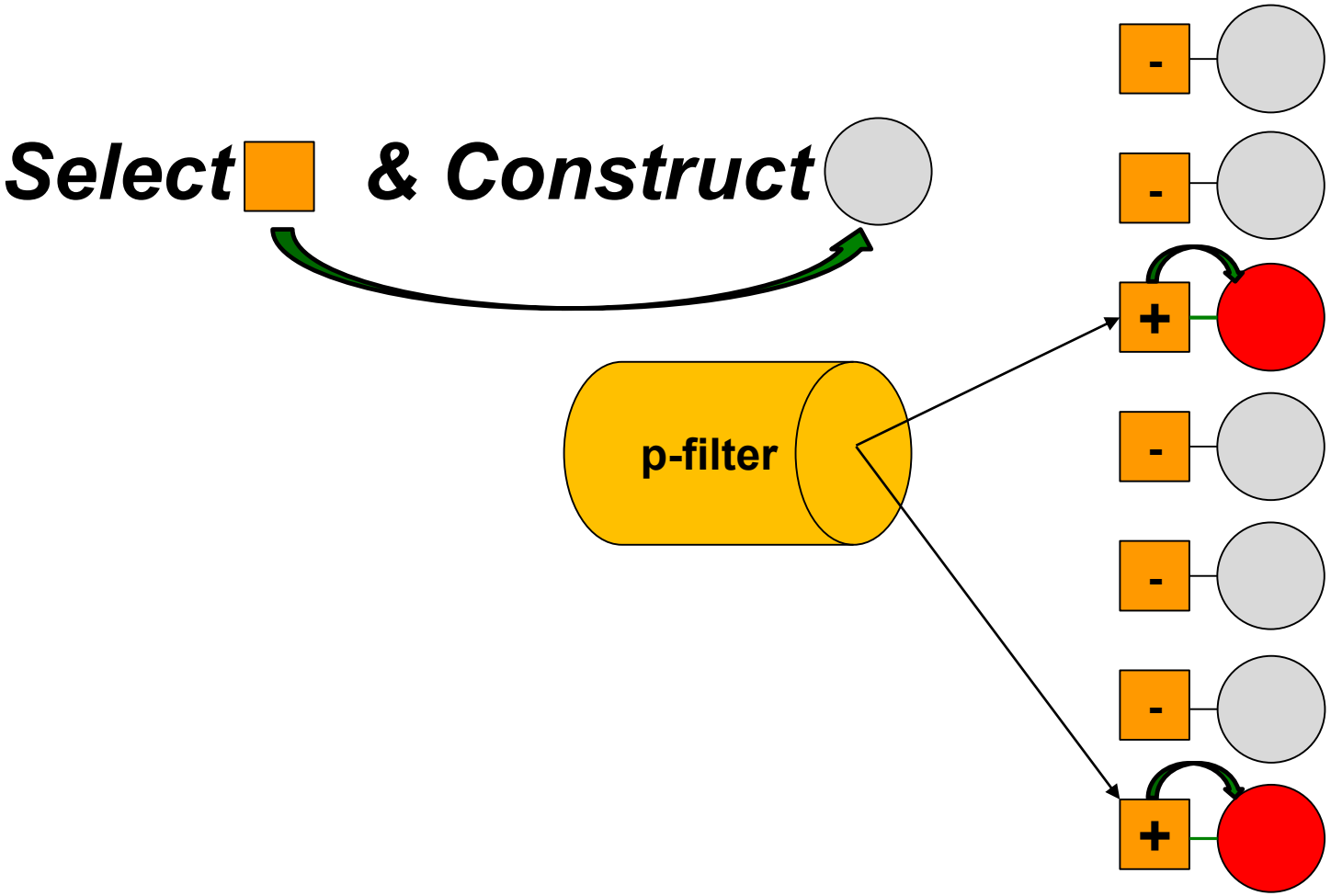
nodes & p-nodes



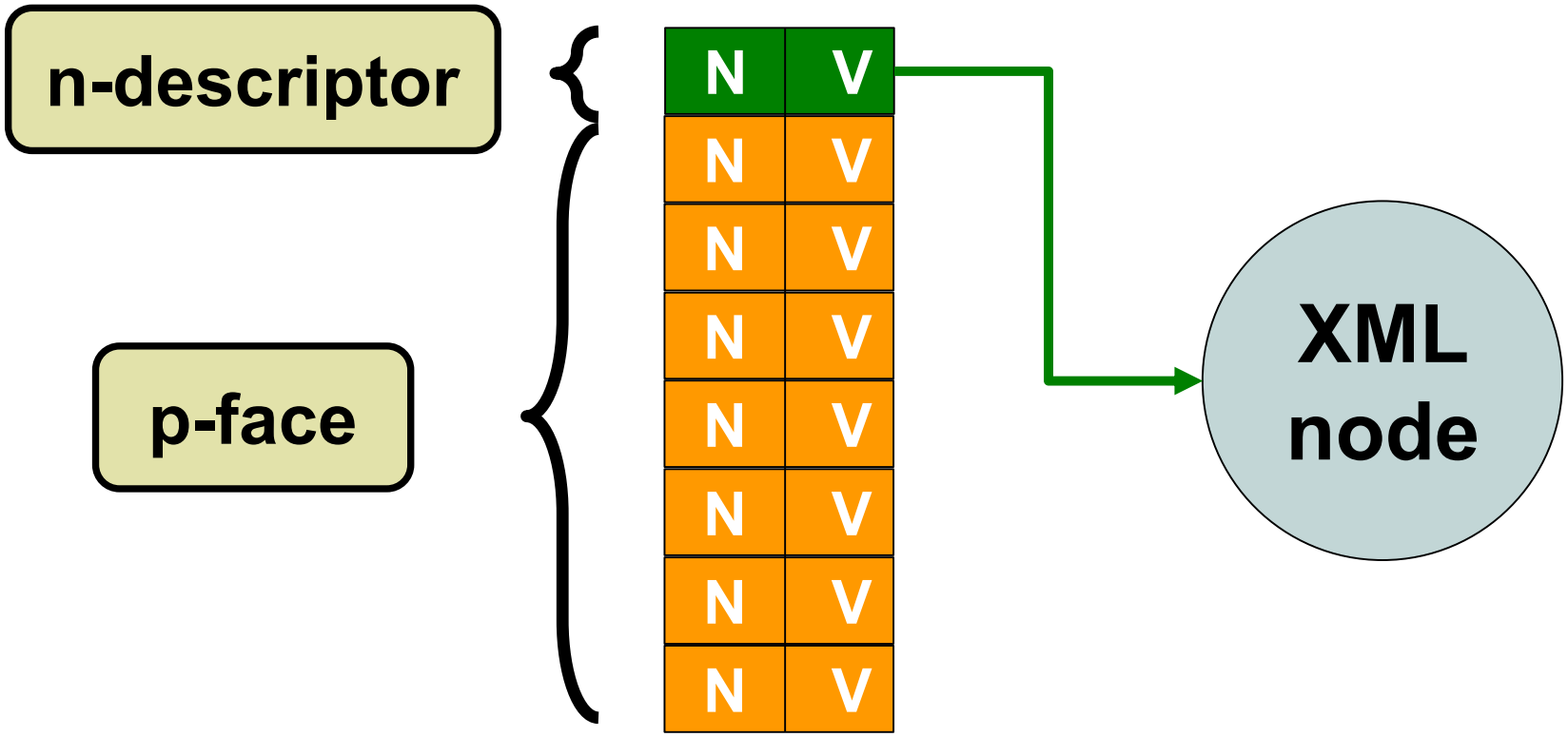
p-collection



Node search – the principle

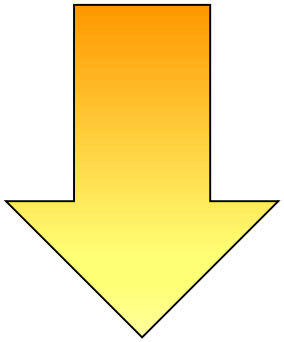


p-node = N/V pairs



Node search - is NOXml !

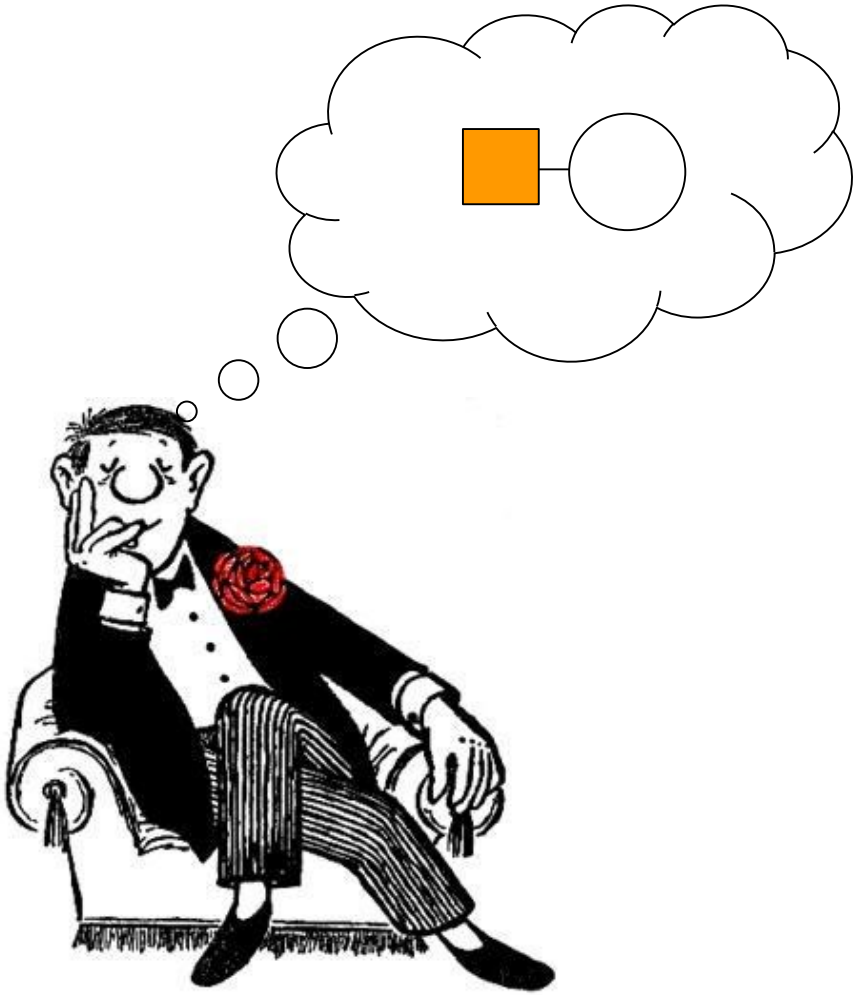
p-node = name/value pairs



storage & retrievel = **NOXml**

XML, SQL, NOSQL, ...

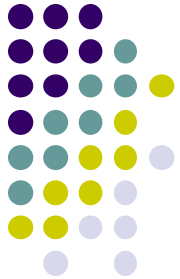
The idea.



The elaboration

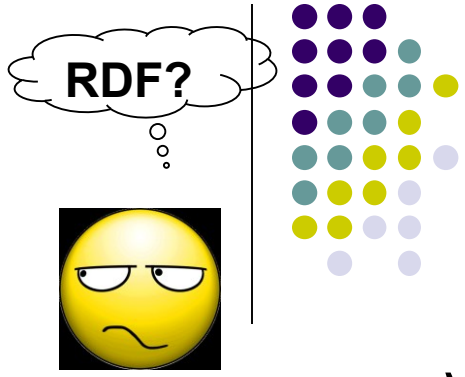
- grammar of concepts
- models
  - p-face, p-model, p-filter
- APIs
  - node search
  - collection management

Grammar of concepts



- node search: {p-collection, p-filter}
- p-collection: (p-node)*
- p-node: {node-descriptor, p-face}
- node-descriptor string
- p-face: (external-property)*
- external-property: {name, (atomic-value)*}
- p-filter: {p-test, and, or, not}+
- p-test: {p-name, operator, p-value}

External property

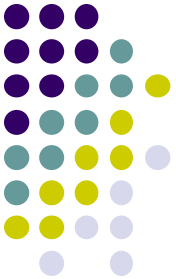


- Name: NCName *(or better QName?)*
- Value: sequence of atomic values

Analogy: XML attribute (QName, atomicValue*)

- Semantics:
  - The value of an XQuery-expression
  - *or* an arbitrary value (assigned during insertion)

p-face



- All external properties of a node
- Scoped to a particular p-collection

```
<pface>
  <property name='status' value='green'/>
  <property name='agency'>
    <item>10</item>
    <item>21</item>
  </property>
</pface>
```

p-filter

```
<pfilter>
  <and>
    <p name='status' value='red'/>
    <or>
      <p name='price' op='le' value='0'/>
      <p name='agency'>
        <item>10</item>
        <item>18</item>
      </p>
    </or>
  </and>
</pfilter>
```

status=red && (price<=0 || agency=(10,18))

Node search API

Example query:

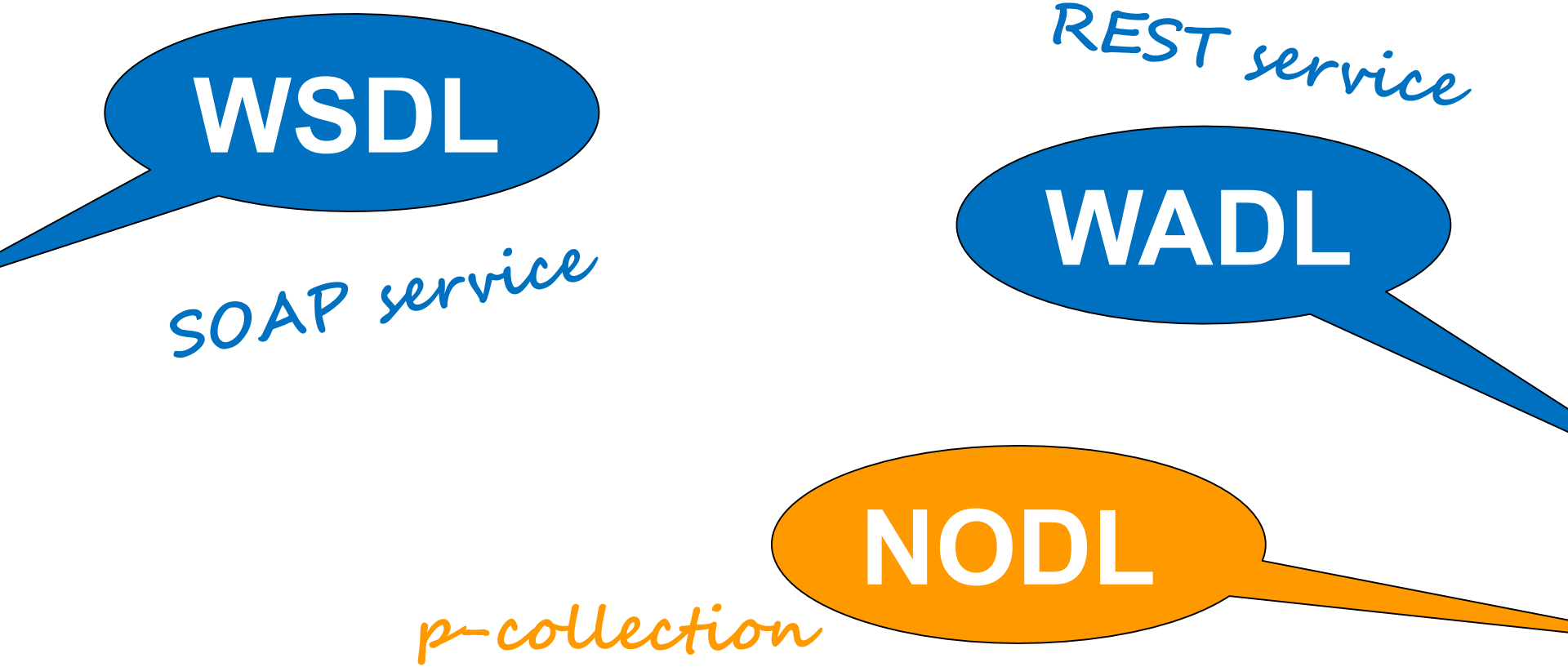
```
fcollection("logs.nodl","status=red")//agID
```

API:

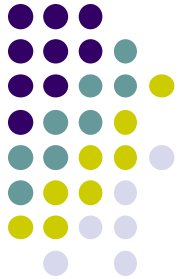
```
fcollection ($pcolURI as xs:string?,
             $pfilter as xs:string?)
                      as node()*

fcollection ($pcolURI as xs:string?,
             $pfilter as element(pc:pfilter)?)
                      as node()*
```

p-collection management

Lemon curry?

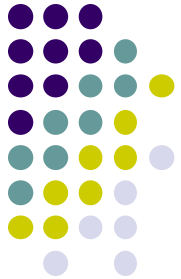


More concepts



- NODL - description of a p-collection
- p-model - rules how to construct a p-face
- NCAT - artifacts representing a p-collection
- NCAT model - rules how to construct an NCAT

NODL



Standardized description
enabling management & use of a p-collection

```
<nodl>
    <collection>...
    <pmodel>...
    <ndesc>...
    <ncatModel>...
</nodl>
```

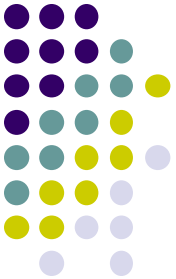
Collection name, URI, doc, ...

Property constructors

Node descriptor

Physical model of the collection

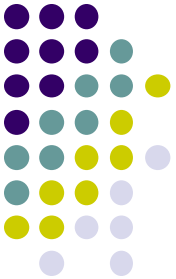
p-model



- Property assignment rules
- Standard: {name, type, XQuery-expression}*

```
<pmodel>
  <property name='status' expr='//status'
            type='xs:string'/>
  <property name='agency' expr='//agID,
            type='xs:integer*'/>
  <anyProperty/>
</pmodel>
```

NCAT model



```
<xmlNcat documentURI="/a/b.ncat"
         asElems="*"/>
```

```
<sqlNcat>
    rdbms="MySQL"
    rdbmsVersion="5.6"
    host="localhost" db="pcoll"
    user="abc" password="infospace"/>
</sqlNcat>
```

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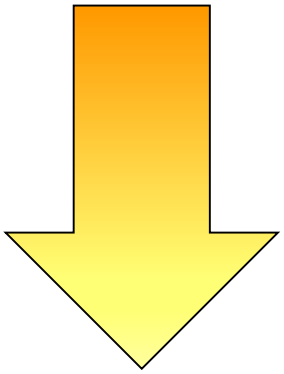
NCAT portability

XQuery processor supports an NCAT model ==

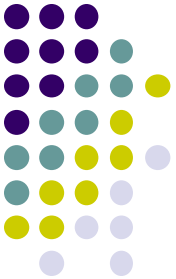
- Produces NCATs conforming to the model
- Can filter NCATs conforming to the model



NCATs are portable

(can be shared by XQuery processors)

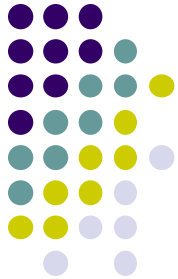
Node management API



API based on NODL =>
technology-independent

```
createNcat($nodl)
feedNcat   ($nodl, $nodes)
feedNcat   ($nodl, $pnodes)
feedNcat   ($nodl, $dirFilter)
copyNcat   ($nodl, $pfilter, $toNodl)
deleteNcat($nodl)
```

Technology hiding



XQuery code:

```
createNcat($nodlBooking)
```

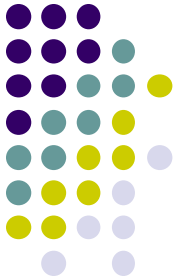
The NODL tells the implementation everything it needs to know!

Under the hood:

```
CREATE TABLE ...
```

Guided by the NODL, the p-model is translated into SQL *create table*

Technology hiding



XQuery code:

```
feedNcat($nodlBooking, "|/inventory/*.xml")
```

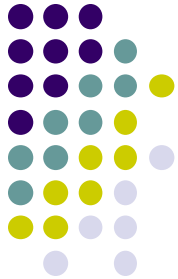
The NODL tells the implementation everything it needs to know!

Under the hood:

```
INSERT INTO ...
```

Guided by the NODL, p-faces are translated into SQL *insert*

Technology hiding



XQuery code:

```
fcollection($nodlBooking,
 "status=red && (price<0 || agency=(10,18))")
```

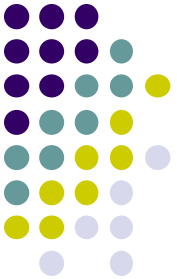
The NODL tells the implementation everything it needs to know!

Under the hood:

```
SELECT ...
```

Guided by the NODL, the p-filter is translated into SQL *select*

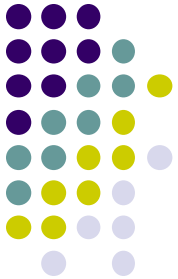
Implementation



https://github.com/hrennau/**TopicTools**

- Framework for developing
  XQuery command-line applications
- Implementation: 100% XQuery
- Two NCAT models: XML, SQL/MySQL

Three Benefits

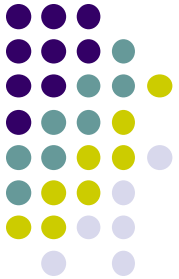


tt-managed applications ...

- Have access to both APIs
- Expose a command-line interface to the collection management API
- Can declare command-line parameters of type `nodeSearch`

evalLogs?logs=/nodls/logs.nodl?*status=red*

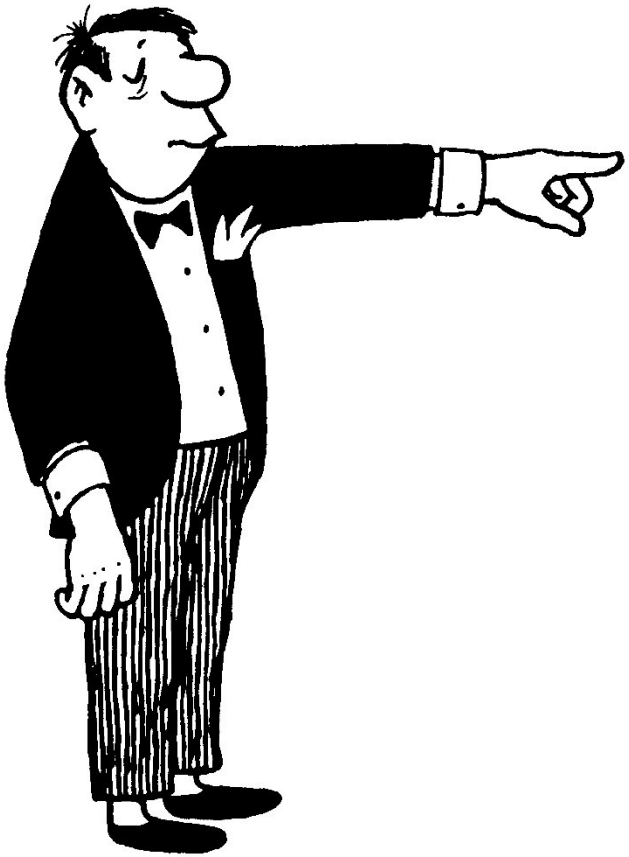
p-collections in spite of XML databases?

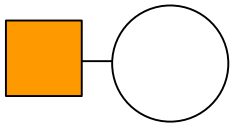


- Portability
  - Between XQuery processors
  - Between implementation technologies
- Generic framework for leveraging non-XML
  - Future friendly – can add new technologies
  - Protecting investment ...

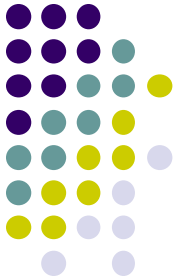
p-collections enable the reuse of existing IT infrastructure

Recommended!





Thought experiment ...



- *XQuery 3.0: dynamic context includes ...*

[Definition: Available node collections. This is a mapping of strings to sequences of nodes...]

- *XQuery _._: dynamic context includes ...*

[Definition: Available p-collections. This is a mapping of strings to sequences of p-nodes...]

Thank you, W3C!