Integrating XML Using Oracle SQL Developer 3.1 and Oracle Database 11g Release 2

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CV

- WMS Group – Fourteen years
- VAX Rewrite (.for) to UNIX (.c, .pc)
- VAX Forms to Oracle Forms
- TIFF file migration to Oracle
- XML Development
- WMS Development and Support
- IOUG Select Contributor
- IOUG Tips & Best Practices
- ODTUG Journal
- NYOUG WEB SIG Chair, Steering Committee
- IOUG Collaborate
- Oracle Open World
- IOUG Collaborate Conference Chair ‘12
- IOUG Board of Directors ‘ 12

ORACLE
Certified Professional

Presentation Objectives

- Oracle – XML
- Terminology
- Overview – EBS/~~SOA~~ - WMS
- XSD Design
- XML Terminology
- XML Development, Plus
- XML XPATH, SQLX Examples
- Questions

Oracle Products

- OpenOffice (Now Apache) – This Presentation
- VirtualBox
- Oracle by Example (OBE)

Oracle XML History

- 8i 1998 - XML Api
- 9i 2001 - XML Storage
- 10g 2004 - XPath, Index, Within
- 11g 2007 - Binary XML, Expressions
- 11g R2 - XMLSerialize (pretty print)
- 12c ???? - OOW12

Terminology

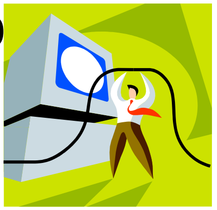
- XML[1] - Short for eXtensible Markup Language, a specification developed by the World Wide Web Consortium (W3C). It allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

- Warehouse Management System - a component of the movement and storage of materials within a warehouse
- Service Oriented Architecture[2] - (SOA) provides methods for systems development and integration where systems group functionality around business processes and package these as interoperable services.

1 http://en.wikipedia.org/wiki/XML
2 http://en.wikipedia.org/wiki/Service-oriented_architecture

WMS Architecture Changes

- Maintain existing fixed length messages – production environment
- Detect incoming XML varying length messages – development
- Convert fixed length data messages to XML varying length data messages - migration
- Follow OAGIS 9.2 Specification - **O**pen **A**pplications **G**roup **I**ntegration **S**pecification
- OAGIS - is an effort to provide a canonical[1] business language for information integration. It uses XML as the common alphabet for defining business messages, and for identifying business processes (scenarios) that allow businesses and business applications to communicate. Not only is OAGIS the most complete set of XML business messages currently available, b it also accommodates the additional requirements of specific industries by partnering with various vertical industry groups.



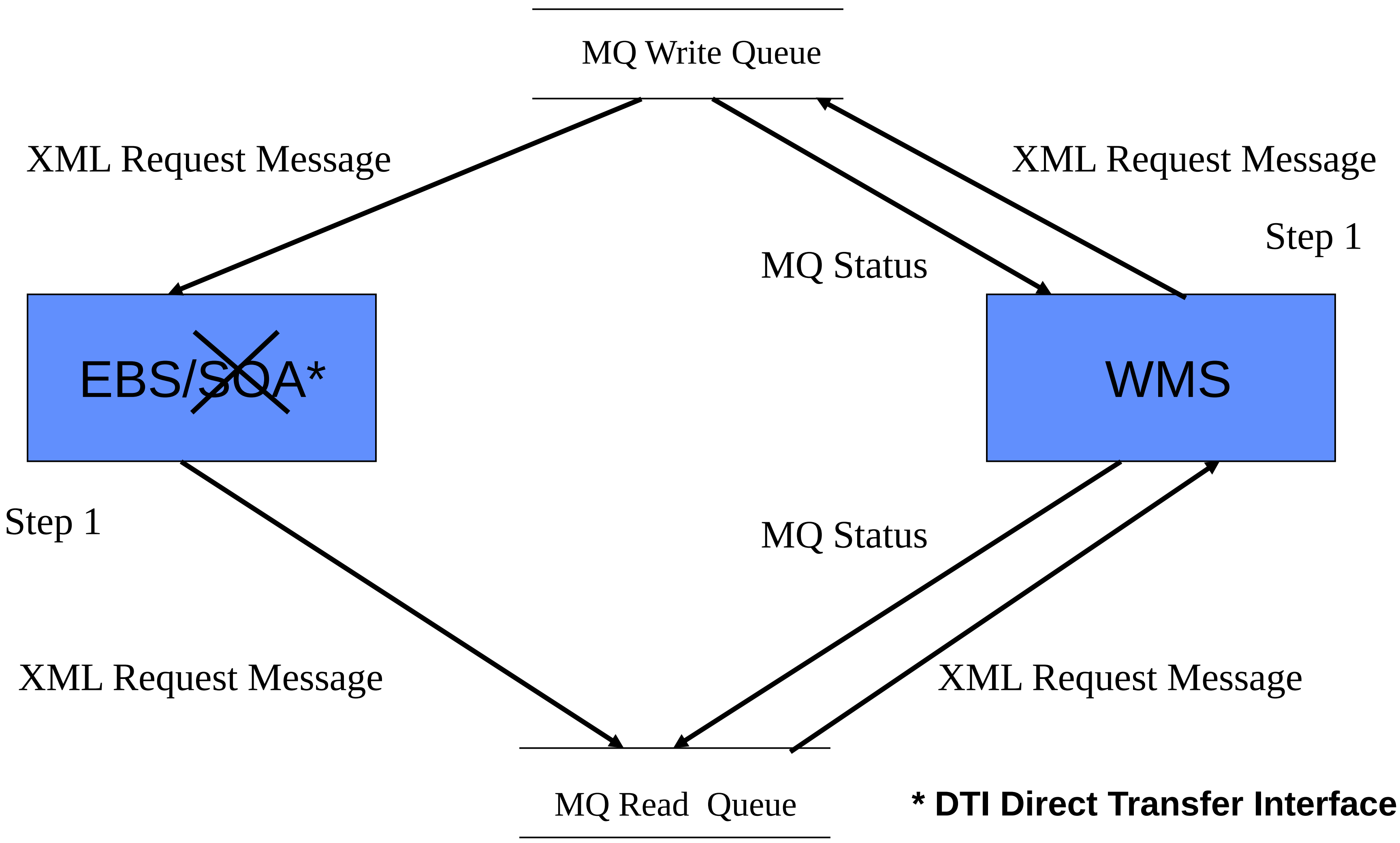
[1] Wikipedia, conforming to orthodox or well-established rules or patterns, as of procedure

Project Steps

- Develop XSD
- Use Oracle 10g XML DB for messages (leverage 9i development)
- Use MQ Series for the communications layer – guaranteed message delivery
- Oracle Database 10g Enterprise Edition Release 10.2.0.1.0 - 64bi

  PL/SQL Release 10.2.0.1.0 – Production

EBS/~~SOA~~*-WMS Data Flow



*** DTI Direct Transfer Interface**

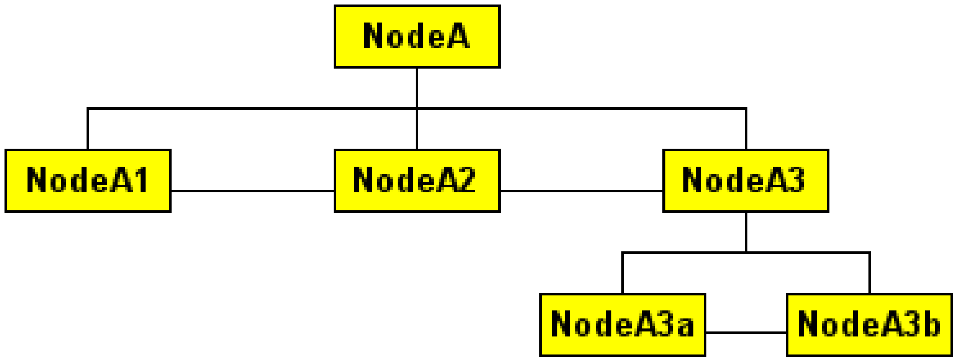
Document Object Module

- Document Object Module (DOM)
- Standard tree structure, where each node contains one of the components from an XML structure.
- The two most common types of nodes are element nodes and text nodes.
- DOM functions lets you create nodes, remove nodes, change their contents, and traverse the node hierarchy.
- pl/sql – procedure oriented, DOM – object oriented
- Package dbms_xmldom examples (most overloaded)
  - newdomdocument – returns a new domdocument instance
  - getelementsbytagname –
  - getlength – gets the number of nodes in the map
  - getattributes - retrieves a NAMEDNODEMAP containing the attributes of the node

Document Object Model (DOM)

- XML access defined as a tree structure
- Available with Oracle's 10g XDK (XML Devloper's Kit) JAVA/C/C+, PL/SQL
- Navigation

  NodeA.firstChild = NodeA1
  NodeA.lastChild = NodeA3
  NodeA.childNodes.length = 3
  NodeA.childNodes[0] = NodeA1
  NodeA.childNodes[1] = NodeA2
  NodeA1.parentNode = NodeA
  NodeA1.nextSibling = NodeA2
  NodeA3.nextSibling = null
  NodeA.lastChild.firstChild = NodeA3a
  NodeA3b.parentNode.parentNode = NodeA

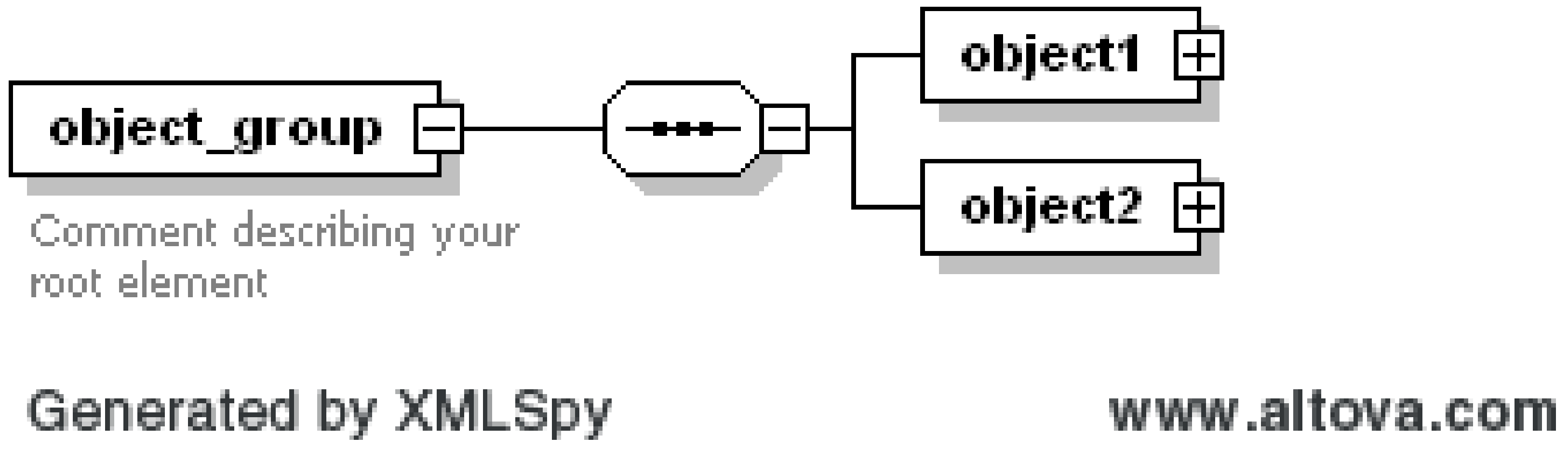


- Methods

  insertBefore()
  replaceChild()
  removeChild()
  appendChild()
  cloneNode()

XSD Design – XML SPY

- XML Schema Definition (XSD) language is the current standard schema language for all XML documents and data.



XSD Text View – XML SPY

```
<?xml version="1.0" encoding="UTF-8"?>
<object_group xmlns:xsi=
            “http://www.w3.org/2001/XMLSchema-instance”
            xsi:noNamespaceSchemaLocation=
            "G:\personal_files\nyoug_10\xml_example_object_thing.xsd">
  <object1>
      <thing/>
  </object1>
  <object2>
      <thing/>
  </object2>
</object_group>
```

XPath Definition - Shredding

- **XPath** (XML Path Language) is an expression language for extracting portions of an XML document, or for calculating values (strings, numbers, or Boolean values) based on the content of an XML document. Used for <u>document shredding.</u> Insert data into relational table.
- **Expression** **Description**

Expression	Description
nodename	Selects all child nodes of the named node
/	Selects from the root node
//	Selects all nodes in the document from the current node that match the selection no matter where they are
.	Selects the current node
..	Selects the parent of the current node
@	Selects attributes

- /A/B[1] Select the first B node from the A node

XML Xpath Terminology

- XPath is a language for finding information in an XML document. XPath is used to navigate through elements and attributes in an XML document. The primary purpose of XPath is to address parts of an XML document.
- Shred or extract parts of an XML Document
- The XML representation of schema components uses a vocabulary identified by the namespace name http://www.w3.org/2001/XMLSchema. For brevity, the text and examples in this specification use the prefix xs: to stand for this namespace; in practice, any prefix can be used.

//author - All <author> elements in the document.

author/* - All elements that are the children of <author> elements.

author[1] The first <author> element in the current context node.

author[first-name][3] - The third <author> element that has a <first-name> child.

my:book - The <book> element from the “my” namespace.

XML Xpath (shredding) Terminology

- EXTRACT(XMLTYPE_instance,XPath_string) or EXTRACT(XMLTYPE_instance,XPath_string, **namespace_string**)

  EXTRACT (XML) - It applies a VARCHAR2 XPath string and returns an XMLType instance containing an XML fragment. You can specify an absolute XPath_string with an initial slash or a relative XPath_string by omitting the initial slash. If you omit the initial slash, the context of the relative path defaults to the root node. The optional namespace_string must resolve to a VARCHAR2 value that specifies a default mapping or namespace mapping for prefixes, which Oracle Database uses when evaluating the XPath expression(s).
- getClobVal() - Returns a CLOB containing an XML document based on the contents of the XMLType.
- XMLTYPE (CLOB) – constructor; convert properly formed CLOB to XMLTYPE, raises an exception

  Oracle9i has a dedicated XML datatype called **XMLTYPE**. It is made up of a CLOB to store the original XML data and a number of member functions to make the data available to SQL.

XPATH Terminology

- **VALUE** takes as its argument a correlation variable (table alias) associated with a row of an object table and returns object instances stored in the object table. The type of the object instances is the same type as the object table.

- **Table** functions are functions that produce a collection of rows (either a nested table or a varray) that can be queried like a physical database table or assigned to a PL/SQL collection variable. You can use a table function like the name of a database table, in the FROM clause of a query, or like a column name in the SELECT list of a query.

XPATH Terminology

- XMLSEQUENCE - XMLSEQUENCE(XMLTYPE_instance)
- XMLSEQUENCE operator is used to split multi-value results from XMLTYPE queries into multiple rows.
- The first form takes as input an XMLType instance and returns a varray of the top-level nodes in the XMLType. This form is effectively superseded by the SQL/XML standard function XMLTable, which provides for more readable SQL code. Prior to Oracle Database 10g Release 2, XMLSequence was used with SQL function TABLE to do some of what can now be done better with the XMLTable function.

- Because XMLSequence returns a collection of XMLType, you can use this function in a TABLE clause to unnest the collection values into multiple rows, which can in turn be further processed in the SQL query.

Xpath Expression Syntax

XML Document (fully qualified)

<?xml version="1.0" encoding="UTF-8"?> <!– XML Declaration-->

```
<root>
      <parent>
          <child>robot</child>
          <child>ball</child>
      </parent>
      <parent>
           <child>airplane</child>
           <child>ipod</child>
      </parent>
</root>
```

Expression	**Refers to**
parent/child[1]	The first <child> of each <parent>.
(parent/child)[1]	The first <child> from the entire set of children of <parent> elements.
parent[1]/child[2]	The second <child> of the first <parent>.
parent/*	All elements that are the children of <parent> elements.

Namespaces Definition

- **Why Namespaces – http://www.w3.org/TR/REC-xml-names/**
- “Such documents, containing multiple markup vocabularies, pose problems of recognition and collision. Software modules need to be able to recognize the elements and attributes which they are designed to process, even in the face of "collisions" occurring when markup intended for some other software package uses the same element name or attribute name.
- These considerations require that document constructs should have names constructed so as to avoid clashes between names from different markup vocabularies. This specification describes a mechanism, *XML namespaces*, which accomplishes this by assigning expanded names to elements and attributes. “

  ☹ ☹ ☹

- So, in simple terms, it’s a technique to distinguish two elements with the same names from each other.
- The technique allows one to import (or define) another fully qualified XML document into an existing one without causing an element name collision**.**

XML Namespace Terms

- XML Namespaces - The “xmlns” Attribute

  When using prefixes in XML, a so-called namespace for the prefix must be defined.

  The namespace is defined by the xmlns attribute in the start tag of an element.

  The namespace declaration has the following syntax. xmlns:*prefix*="*URI*".

- A Uniform Resource Identifier (URI) is a string of characters which identifies an Internet Resource.

  The most common URI is the Uniform Resource Locator (URL) which identifies an Internet domain address.

SQL XML Query (SQLX) Terminology

- Create an SQL XML query
- Defined by ISO/IEC 9075-14:2003 [1]
- XMLELEMENT() takes an element name for *identifier*, an optional collection of attributes (XMLATTRIBUTES) for the element, and arguments that make up the content of the element
- XMLAGG() is an aggregate function. It takes a collection of XML fragments and returns an aggregated XML document.
- XMLFOREST() converts each of its argument parameters to XML, and then returns an XML fragment that is the concatenation of these converted arguments.

[1] ISO/IEC 9075-14:2003 defines ways in which Database Language SQL can be used in conjunction with XML. It defines ways of importing and storing XML data in an SQL database, manipulating it within the database and publishing both XML and conventional SQL-data in XML form

SQLX Examples – Table Contents (1_1)

```
SQL>  select * from myobject;

THINGS                QUANTITY PARENT
--------------------  ----------  ----------
BALL                  2           1
KEY                   3           1
TABLE                 1           1
FRISBEE               4           2
BBQ                   1           2
SWITCH                6           2

6 rows selected.
```

SQLX - XMLELEMENT Example (1_2)

- XMLELEMENT() takes an element name for identifier, an optional collection of attributes for the element, and arguments that make up the content of the element

```
 1  SELECT XMLELEMENT("thing", XMLATTRIBUTES( obj.quantity  AS
   "QTY"), obj.things )
  2  AS "Object_list"
  3* FROM myobject obj
  SQL> /

Object_list
--------------------------------------------------------------------------------
<thing QTY="2">BALL</thing>
<thing QTY="3">KEY</thing>
<thing QTY="1">TABLE</thing>
<thing QTY="4">FRISBEE</thing>
<thing QTY="1">BBQ</thing>
<thing QTY="6">SWITCH</thing>

6 rows selected.
```

SQLX - XMLFOREST Example (1_3)

- XMLFOREST() converts each of its argument parameters to XML, and then returns an XML **fragment** that is the concatenation of these converted arguments.

```
  SQL> SELECT XMLFOREST(obj.quantity, obj.things) "Object_list"
  2  FROM myobject obj;

Object_list
-------------------------------------------
<QUANTITY>2</QUANTITY><THINGS>BALL</THINGS>
<QUANTITY>3</QUANTITY><THINGS>KEY</THINGS>
<QUANTITY>1</QUANTITY><THINGS>TABLE</THINGS>
<QUANTITY>4</QUANTITY><THINGS>FRISBEE</THINGS>
<QUANTITY>1</QUANTITY><THINGS>BBQ</THINGS>
<QUANTITY>6</QUANTITY><THINGS>SWITCH</THINGS>
6 rows selected.
```

Prettyprint or Indenting

- Formatting Convention for Output
- XML Parent Child Relationship
- Changes from 10g, 11gR1, 11gR2
- SELECT XMLSERIALIZE (DOCUMENT --line one
- (<XML_Document>)
- AS CLOB indent) [<alias>] from dual; -- line three

SQLX - XMLAGG Example (1_4_3) (Pretty Print)

- XMLAGG() is an aggregate function. It takes a collection of XML fragments and returns an aggregated XML **document**.

```
  1  SELECT XMLELEMENT("OBJECT",
   XMLAGG(XMLELEMENT("Things",
  2  obj.things  ||' '||obj.quantity ) ORDER BY obj.things)) AS "Object_list"
  3  FROM myobject obj
   SQL> /
Object_list
------------------------------------------------------------------------
<OBJECT><Things>BALL 2</Things><Things>BBQ 1</Things>
<Things>FRISBEE 4</Things><Things>KEY
   3</Things><Things>SWITCH 6</Things><Things>TABLE
   1</Things></OBJECT>
```

SQLX Example – XMLAGG, XMLATTRIBUTES, Namespace (1_5)

```
DECLARE
   lcl_obj1      CLOB;  lcl_obj2      CLOB; lcl_full_xml  CLOB;

BEGIN
  SELECT XMLTYPE.getclobval(XMLELEMENT("obj1:object",
             xmlagg(xmlelement("obj1:thing",obj.things) ))  )
  INTO lcl_obj1 FROM  myobject obj WHERE obj.parent = '1';

  SELECT XMLTYPE.getclobval(XMLELEMENT("obj2:object",
      XMLATTRIBUTES ('http://www.w3.org/2001/XMLSchema/obj_2' AS "xmlns:obj2"),  /* obj2 */
      XMLAGG(xmlelement("obj2:thing",obj.things) ) ) )
  INTO lcl_obj2 FROM  myobject obj WHERE obj.parent = '2';
  SELECT ( '<?xml version="1.0" encoding="UTF-8"?>' ||
      '<ns1:object_group xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
       xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">'||                /* obj1 */
       lcl_obj1|| lcl_obj2|| '</ns1:object_group>' )     INTO lcl_full_xml    FROM dual;
  dbms_output.put_line(lcl_full_xml);
END;
```

XML Namespace Example – table contents or in-line (1_6_1)

Table: my_xml_table; Column: xmlcol XMLTYPE

Column: ref_id NUMBER

```
<?xml version="1.0" encoding="UTF-8"?>
<ns1:object_group
   xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
   xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
  <obj1:object>
    <obj1:thing>ball</obj1:thing>
    <obj1:thing>key</obj1:thing>
    <obj1:thing>table</obj1:thing>
  </obj1:object>
  <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
    <obj2:thing>frisbee</obj2:thing>
    <obj2:thing>bbq</obj2:thing>
    <obj2:thing>switch</obj2:thing>
  </obj2:object>
</ns1:object_group>
```

XML XPath – Cursor - obtain each row (1_7)

```
 DECLARE
  -- Cursor for parsing objects_group XML
  CURSOR obj_cur
  IS
     SELECT EXTRACT (VALUE
         (entire_things),'//*','xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"').getstringval() AS lcl_thing
     FROM my_xml_table mxt,
     TABLE(xmlsequence(extract(mxt.xmlcol,
          '//obj1:thing','xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"'))) entire_things
     WHERE mxt.ref_id = 1;
BEGIN
  FOR obj_row IN obj_cur
  LOOP
    dbms_output.put_line('each element thing  '|| obj_row.lcl_thing );
  END LOOP;
END anonymous_block ;

each element thing  <obj1:thing xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">ball</obj1:thing>
each element thing  <obj1:thing xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">key</obj1:thing>
each element thing  <obj1:thing xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">table</obj1:thing>

PL/SQL procedure successfully completed.
```

XPath – all data merged (1_8)

```
DECLARE
        -- Cursor for parsing objects_group XML
        CURSOR obj_cur
        IS
            SELECT EXTRACT (VALUE (entire_things),'//*/text()').getstringval ()  AS
   lcl_thing
        FROM my_xml_table mxt,
              table(xmlsequence(extract(mxt.xmlcol, '*'))) entire_things
        WHERE mxt.ref_id = 1;
   BEGIN
    FOR obj_row IN obj_cur LOOP
      dbms_output.put_line('each element thing  '|| obj_row.lcl_thing );
    END LOOP;
  END anonymous_block ;
SQL> /
each element thing _ballkeytablefrisbeebbqswitch
PL/SQL procedure successfully completed.
```

XML Shredding (XPATH) Example (1_9)

- XML Document

```
<objects>
  <thing>ball</thing>
  <thing>key</thing>
  <thing>table</thing>
</objects>
```

- SQLX (XML Query Xpath)

```
Select  value(tab).extract('/*').getStringVal() "This Column"
from  table ( XMLSequence(extract (
    XMLType('<objects><thing>ball</thing><thing>key</thing><thing>table</thing></objects>'),'/objects
    /*')  )    ) tab;
```

- Results

```
This Column
---------------------
<thing>ball</thing>
<thing>key</thing>
<thing>table</thing>
```

XPath Shredding Deux (1_10)

- XML Document

```
<objects>
  <thing>ball</thing>
  <thing>key</thing>  □ extract this data item
  <thing>table</thing>
</objects>
========================================
```

- SQLX (XML Query)

```
select   value(tab).extract('/objects/thing[2]/text()').getStringVal() "This Column"
from   table ( XMLSequence(extract (
XMLType('<objects><thing>ball</thing><thing>key</thing><thing>table</thing></objects>
   '),'*')    )   ) tab;
========================================
```

- Results

```
This Column
--------------------------------------------------------------------
key
```

XML Xpath Shredding Namespace Failure 1 (1_11)

```
SQL> select
  value(tab).extract('//obj2:thing/text()','xmlns:obj1="http://www.w3.org/2001/XMLSchem
  a/obj_1"').getStringVal() "This_Column",

  value(tab).extract('//obj1:thing/text()','xmlns:obj1="http://www.w3.org/2001/XMLSchema/
  obj_1"').getStringVal() "That_Column"
 3  from   table ( XMLSequence(extract
 4  (XMLType('<?xml version="1.0" encoding="UTF-8"?><ns1:object_group
  xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
  xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
 5  <obj1:object><obj1:thing>ball</obj1:thing><obj1:thing>key</obj1:thing>
 6  <obj1:thing>table</obj1:thing></obj1:object>
 7  <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
 8  <obj2:thing>frisbee</obj2:thing>
 9  <obj2:thing>bbq</obj2:thing>
10  <obj2:thing>switch</obj2:thing>
11  </obj2:object>
12  </ns1:object_group>'),'*')    )   ) tab;
```

XML Xpath Shredding Namespace Failure 2 **(1_11)**

select
 value(tab).extract('//**obj2**:thing/text()','xmlns:**obj1**="http://www.w3.org/2001/XMLSchema/obj_1"').getStringVal() "This_Column",

*

ERROR at line 1:

ORA-31011: XML parsing failed

ORA-19202: Error occurred in XML processing

LPX-00601: Invalid token in: '//**obj2**:thing/text()‘ **ob2 <> ob1**

ORA-06512: at "SYS.XMLTYPE", line 119

XML XPath Shredding 1 – data combined (1_12)

```
 1  select
    value(tab).extract('//obj1:thing/text()','xmlns:obj1="http://www.w3.org/2001/XM
    LSchema/obj_1"').getStringVal() "This_Column",
    value(tab).extract('//obj1:thing/text()','xmlns:obj1="http://www.w3.org/2001/XM
    LSchema/obj_1"').getStringVal() "That_Column"
  3  from   table ( XMLSequence(extract
  4  (XMLType('<?xml version="1.0" encoding="UTF-8"?><ns1:object_group
    xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_
1" xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
  5  <obj1:object><obj1:thing>ball</obj1:thing><obj1:thing>key</obj1:thing>
  6  <obj1:thing>table</obj1:thing></obj1:object>
  7  <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
  8  <obj2:thing>frisbee</obj2:thing>
  9  <obj2:thing>bbq</obj2:thing>
 10  <obj2:thing>switch</obj2:thing>
 11  </obj2:object>
 12* </ns1:object_group>'),'*')    )   ) tab
```

XML XPath Shredding 2 – data combined (1_12)

```
SQL> col this_column format a20;
SQL> col that_column format a20;
SQL> /

This_Column          That_Column
-------------------- --------------------
ballkeytable         ballkeytable
```

XML Example 1 **(1_13)**

select **value(tab).extract**('//obj1:thing/text()',
'xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"').getStringVal() "This_Column",
value(tab).extract('//obj2:thing/text()',
'xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2"').getStringVal()

"That_Column"

from table (XMLSequence(extract

(XMLType('<?xml version="1.0" encoding="UTF-8"?><ns1:object_group
xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
<obj1:object><obj1:thing>ball</obj1:thing><obj1:thing>key</obj1:thing>

<obj1:thing>table</obj1:thing></obj1:object>

<obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">

<obj2:thing>frisbee</obj2:thing>

<obj2:thing>bbq</obj2:thing>

<obj2:thing>switch</obj2:thing>

</obj2:object>

</ns1:object_group>'),'*'))) **tab**

XML Example 2 (1_13)

```
SQL> /

This_Column     That_Column
-----------------    --------------------
ballkeytable       frisbeebbqswitch
```

XML Xpath 1 – all data together (1_14_2)

```
SQL> select
   value(tab).extract('//*/text()','xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"')
   .getStringVal() "This_Column",
   value(tab).extract('//obj2:thing/text()','xmlns:obj2="http://www.w3.org/2001/XMLSchem
   a/obj_2"').getStringVal() "That_Column"

   from   table ( XMLSequence(extract

   (XMLType('<?xml version="1.0" encoding="UTF-8"?>

   <ns1:object_group
   xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
   xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
   <obj1:object><obj1:thing>ball</obj1:thing><obj1:thing>key</obj1:thing>

   <obj1:thing>table</obj1:thing></obj1:object>

   <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">

   <obj2:thing>frisbee</obj2:thing>

  <obj2:thing>bbq</obj2:thing>

  <obj2:thing>switch</obj2:thing>

  </obj2:object>

  </ns1:object_group>'),'/*')    )   ) tab;
```

XML Xpath 2 – all data together (1_14_2)

```
This_Column                          That_Column
------------------------------------ ------------------------------------
ballkeytablefrisbeebbqswitch         frisbeebbqswitch
```

Xpath 1 – extract data (1_15)

```
SQL> select
  value(tab).extract('//obj1:thing[2]/text()','xmlns:obj1="http://www.w3.org/2001/
  XMLSchema/obj_1"').getStringVal() "This_Column",
  value(tab).extract('//obj2:thing/text()','xmlns:obj2="http://www.w3.org/2001/XM
  LSchema/obj_2"').getStringVal() "That_Column"
   from   table ( XMLSequence(extract
   (XMLType('<?xml version="1.0" encoding="UTF-8"?>
   <ns1:object_group
  xmlns:ns1="http://www.w3.org/2001/XMLSchema/sample_namespace_1"
  xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
   <obj1:object><obj1:thing>ball</obj1:thing><obj1:thing>key</obj1:thing>
   <obj1:thing>table</obj1:thing></obj1:object>
   <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
   <obj2:thing>frisbee</obj2:thing>
   <obj2:thing>bbq</obj2:thing>
   <obj2:thing>switch</obj2:thing>
   </obj2:object>
   </ns1:object_group>'),'/*')    )   ) tab;
```

Xpath 2 – extract data (1_15)

```
SQL> col this_column format a40;
SQL> col that_column format a40;

This_Column                              That_Column
---------------------------------------- ----------------------------------------
key                                      frisbeebbqswitch
```

Xpath Parsing Error 1 (1_16_3)

```
SELECT extract(value(t), '//text()').getStringVal() AS obj_examp
 FROM my_xml_table mxt,
 TABLE(xmlsequence(extract(mxt.xmlcol, '*'))) t
 WHERE mxt.ref_id = 1

OBJ_EXAMP
----------------------------------------
ballkeytablefrisbeebbqswitch
```

Xpath Parsing Error 2 (1_16_3)

```
SELECT     extract(value(t), '//obj1:thing/text()').getStringVal() AS
   obj_examp
 FROM my_xml_table,
 table(xmlsequence(extract(xmlcol, '*'))) t
 WHERE ref_id = 1
```

```
SELECT  extract(value(t), '//obj1:thing/text()').getStringVal() AS
   obj_examp
*
ERROR at line 1:
ORA-31011: XML parsing failed
ORA-19202: Error occurred in XML processing
LPX-00601: Invalid token in: '//obj1:thing/text()‘   → namespace
   definition undefined
```

XML XPATH – no unique elements (1_17)

```
SELECT     extract(value(t),'//obj1:thing/text()',
  'xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"'
  ).getStringVal() AS obj_example
FROM my_xml_table,
         table(xmlsequence(extract(xmlcol, '*'))) t
WHERE ref_id = 1


OBJ_EXAMPLE
----------------------
ballkeytable
```

XML XPATH 1 – parse each element, using table (1_18)

```
DECLARE
 -- Cursor for parsing objects_group XML
 CURSOR obj_cur
IS
SELECT EXTRACT (VALUE (entire_things),'//obj1:thing/text()',
   'xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"').
                    getstringval() AS  lcl_thing
FROM my_xml_table,
TABLE(xmlsequence(extract(xmlcol, '//obj1:thing',   -- data
  xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"')))
  entire_things
WHERE ref_id = 1;
```

XML XPATH 2 – parse each element, using table (1_18)

```
BEGIN
    FOR obj_row IN obj_cur   LOOP
        dbms_output.put_line
             ('each element thing  '|| obj_row.lcl_thing );
    END LOOP;
END anonymous_block ;
```

```
each element thing  ball
each element thing  key
each element thing  table
```

UPDATEXML – 1st (1_19_2)

```
SQL> describe my_xml_table;
Name       Null?        Type
---------- --------     --------
REF_ID                  NUMBER
XMLCOL                  XMLTYPE
```

```
select xmlcol from my_xml_table where ref_id = 1;
```

```
XMLCOL
------------------------------------------------------------------------------
<?xml version="1.0" encoding="UTF-8"?>
<ns1:object_group
xmlns:ns1=http://www.w3.org/2001/XMLSchema/sample_namespace_1
                              xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
  <obj1:object>
        <obj1:thing>ball</obj1:thing>
        <obj1:thing>key</obj1:thing>
        <obj1:thing>table</obj1:thing>
  </obj1:object>
  <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
        <obj2:thing>frisbee</obj2:thing>
        <obj2:thing>bbq</obj2:thing>
        <obj2:thing>switch</obj2:thing>
  </obj2:object>
</ns1:object_group>
```

UPDATEXML 1 – 2nd **(1_19_2)**

```
SQL> UPDATE my_xml_table mxt
         SET mxt.xmlcol = UPDATEXML(mxt.xmlcol,
                          '//obj2:thing[1]/text()','FRISBEE',
             'xmlns:obj2=
               "http://www.w3.org/2001/XMLSchema/obj_2"')
         WHERE mxt.ref_id = 1;

1 row updated.


-- CHANGE TO CAPS
```

UPDATEXML 2 – 2nd (1_19_2)

```
select xmlcol from my_xml_table where ref_id = 1;
XMLCOL
--------------------------------------------------------------------------------
<?xml version="1.0" encoding="UTF-8"?>
<ns1:object_group xmlns:ns1=http://www.w3.org/2001/XMLSchema/sample_namespace_1
          xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
   <obj1:object>
     <obj1:thing>ball</obj1:thing>
     <obj1:thing>key</obj1:thing>
     <obj1:thing>table</obj1:thing>
   </obj1:object>
   <obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
     <obj2:thing>FRISBEE</obj2:thing>
     <obj2:thing>bbq</obj2:thing>
     <obj2:thing>switch</obj2:thing>
   </obj2:object>
</ns1:object_group>
========================================
```

XML XPATH 1 – parse each element, w/o table (1_20)

```
 -- Anonymous Block
DECLARE
        -- Cursor for parsing object_group XML
        CURSOR obj_cur
        IS  SELECT EXTRACT (VALUE (entire_things),
                '//obj1:thing/text()',
                 'xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1"').
                 getstringval() AS lcl_thing
        FROM TABLE ( XMLSequence(
                  extract  (XMLType('<?xml version="1.0" encoding="UTF-8"?>
        <ns1:object_group   xmlns:ns1=
                  http://www.w3.org/2001/XMLSchema/sample_namespace_1
                  xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_1">
```

XML XPATH 2 – parse each element, w/o table (1_20)

```
<obj1:object>
   <obj1:thing>ball</obj1:thing>
   <obj1:thing>key</obj1:thing>
   <obj1:thing>table</obj1:thing>
</obj1:object>
<obj2:object xmlns:obj2="http://www.w3.org/2001/XMLSchema/obj_2">
   <obj2:thing>frisbee</obj2:thing>
   <obj2:thing>bbq</obj2:thing>
   <obj2:thing>switch</obj2:thing>
</obj2:object>
   </ns1:object_group>'),
   '//obj1:thing','xmlns:obj1="http://www.w3.org/2001/XMLSchema/obj_
   1"'  )    )   ) entire_things;
```

XML XPATH 3 – parse each element, w/o table (1_20)

```
BEGIN
        FOR obj_row IN obj_cur LOOP
              dbms_output.put_line('each element thing  '||
                                                  obj_row.lcl_thing );
        END LOOP;
 END anonymous_block;
SQL> /
each element thing  ball
each element thing  key
each element thing  table
PL/SQL procedure successfully completed.
```

Oracle Text - XML Data Queries (1_21)

- Definitions
- “**contains**” operator is used when **index** is of type context
- returns a relevance score for every row selected
- select ref_id,score (1) , xmlcol
  from my_xml_table
  where **contains** (xmlcol, 'table',1) > 0
- Demo

DBMS_XML.CONVERT (1_22_3)

- DBMS_XMLGEN.CONVERT – converts XML data into the escaped or unescapes XML equivalent
- Example: the escaped form of the character “>” (without the “ characters) is “&gt;” (without the “ characters).
- Oracle’s suggested “workaround” was to:

1) append a space (CHR(32) to the end of the XPath string, then

2) DBMS_XMLGEN.CONVERT the string, finally

3) TRIM the string. The workaround resolved the issue.

DBMS_XMLDOM (1_23)

- Parse using XPath – define expression
- A lot of Metadata

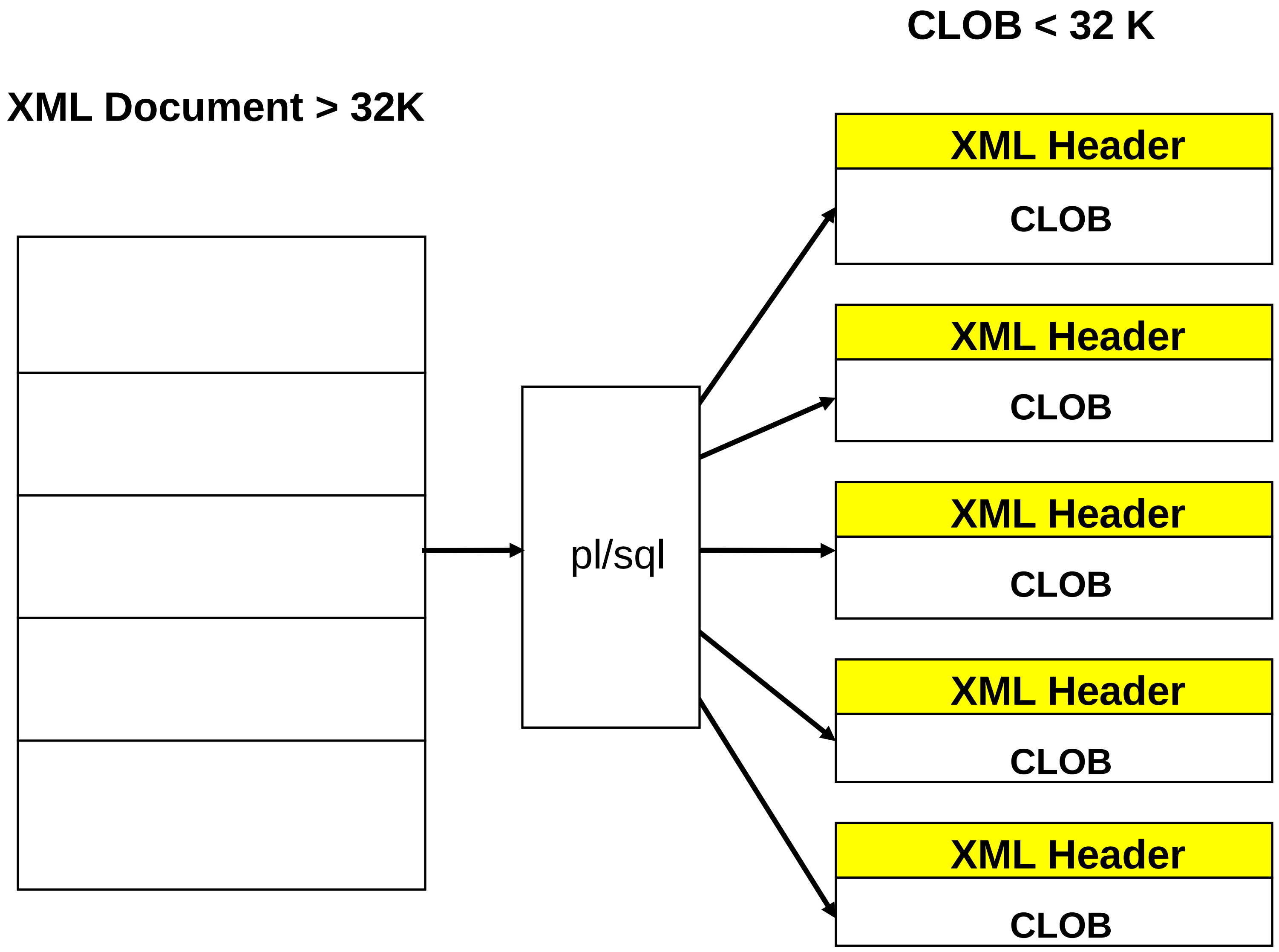
```
<?xml version="1.0" encoding="WINDOWS-1252"?>
<StandardHeader>
  <DateTime>12/08/2010 16:03:46</DateTime>
  <PacketNumber>1</PacketNumber>
  <AnyMorePackets>Y</AnyMorePackets>
  <TotalPackets>4</TotalPackets>
  <house>
    <room>
      <room_name name="kitchen"/>
      <room_item item="sink"/>
    </room>
        |
        |
        |
    <room>
      <room_name name="kitchen"/>
      <room_item item="table"/>
    </room>
  <house>
</StandardHeader>
```

DBMS_XMLDOM (1_24) (cont'd)

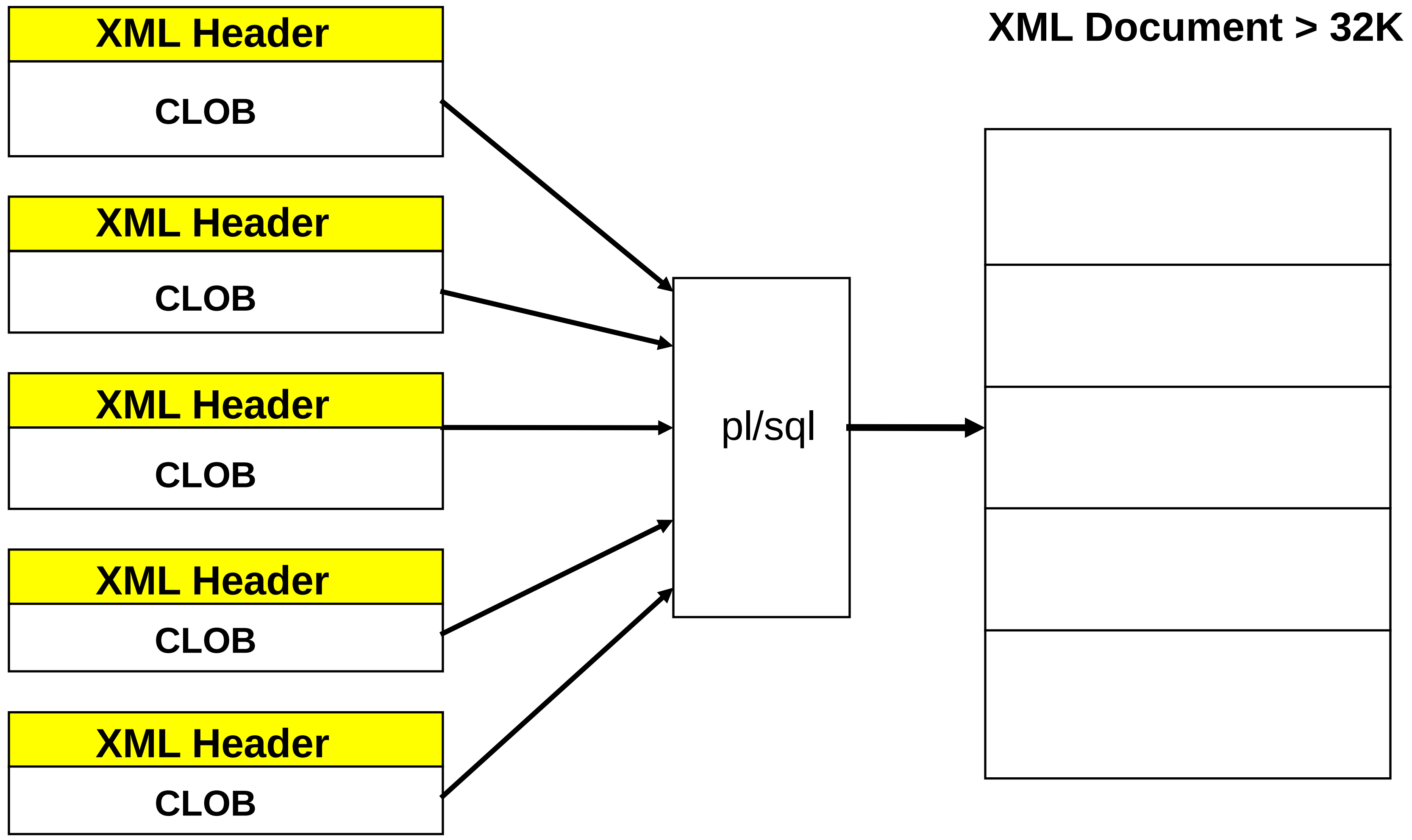
- Change XML and reduce metadata

```
<?xml version="1.0" encoding="WINDOWS-1252"?>
<StandardHeader>
   <DateTime>12/08/2010 16:03:46</DateTime>
   <PacketNumber>1</PacketNumber>
   <AnyMorePackets>Y</AnyMorePackets>
   <TotalPackets>4</TotalPackets>
  <house>
    <room room_name="kitchen" room_item="sink"/>
    <room room_name="kitchen" room_item="table"/>
    <room room_name="kitchen" room_item="counter"/>
    <room room_name="kitchen" room_item="microwave"/>
    <room room_name="kitchen" room_item="oven"/>
    <room room_name="kitchen" room_item="range"/>
    <room room_name="kitchen" room_item="refrigerator"/>
    <room room_name="living_room" room_item="pictures"/>
    <room room_name="living_room" room_item="chair"/>
    <room room_name="living_room" room_item="pictures"/>
    <room room_name="living_room" room_item="HDTV"/>
    <room room_name="living_room" room_item="couch"/>
    <room room_name="living_room" room_item="chandelier"/>
    <room room_name="den" room_item="surround_sound"/>
    <room room_name="den" room_item="fireplace"/>
    <room room_name="den" room_item="table"/>
    <room room_name="den" room_item="chair"/>
    <room room_name="den" room_item="lamp"/>
    <room room_name="den" room_item="étagère"/>
   <room room_name="den" room_item="HDTV"/>
  </house>
</StandardHeader>
```

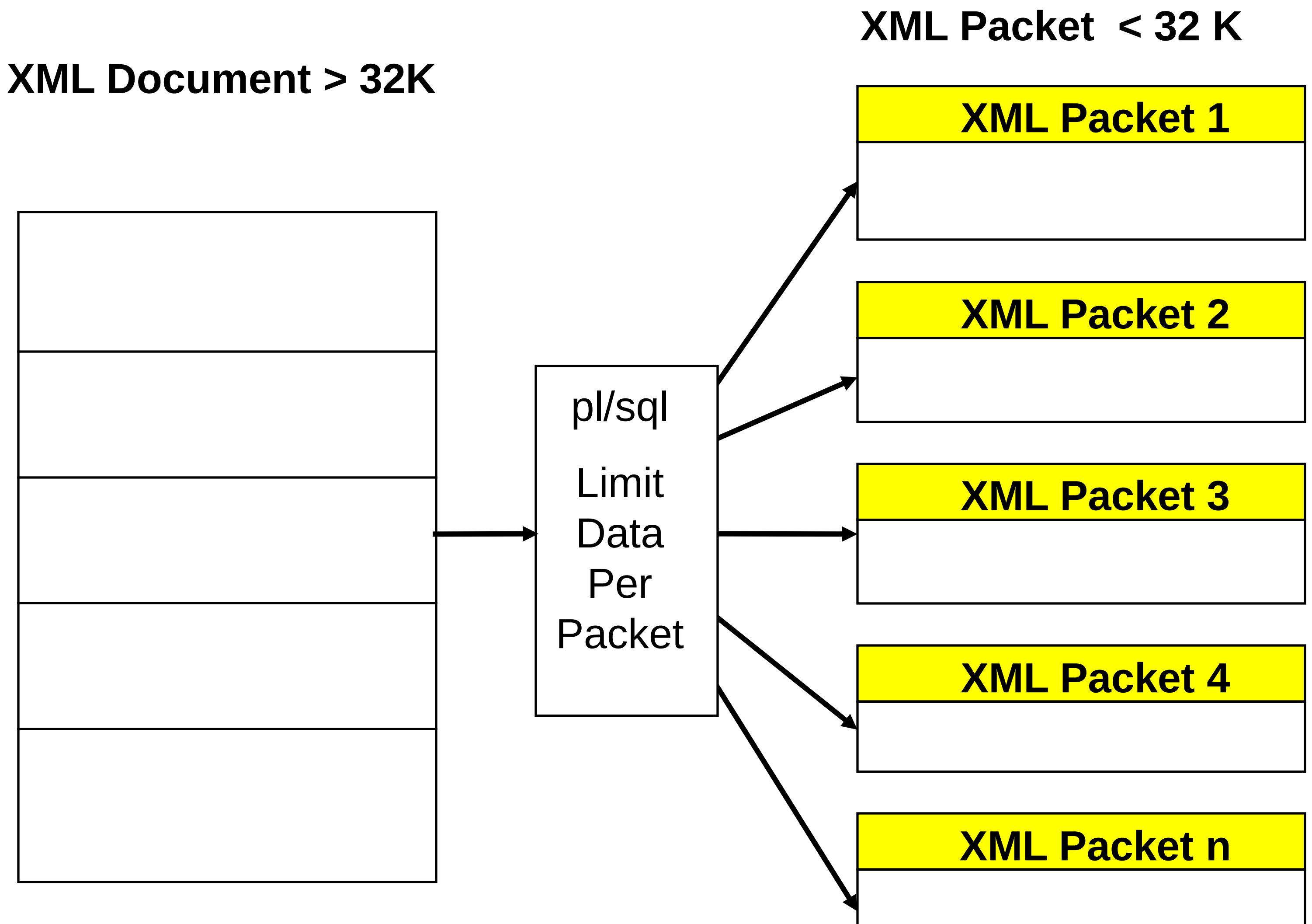
XML Packet Creation



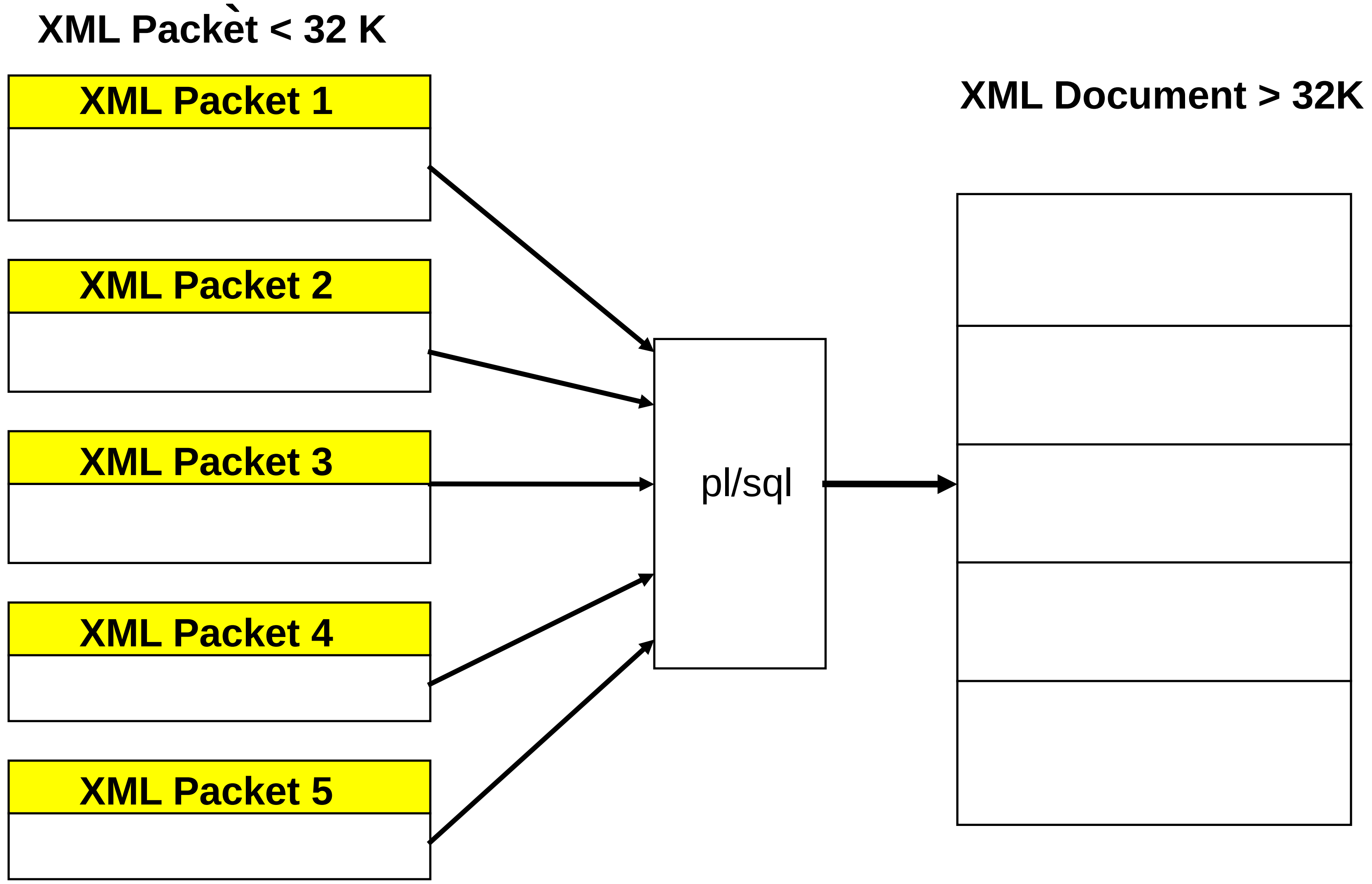
XML Document Construction



XML Packet Creation



XML Document Construction



References 1

Design Tools: XMLSPY – 30 day free trial

http://www.altova.com/simpledownload1.html?gclid=CJuhrey1m40CFRGsGgodPwqM5w

Oracle XML DB Docs: full implementation plus extensions of XML

http://www.oracle.com/technology/tech/xml/xmldb/index.html

Oracle's SQL 10g Doc
http://oraclesvca2.oracle.com/docs/cd/B14117_01/server.101/b10759/functions204.htm

Oracle Database 10g XML & SQL – Oracle Press

Wikipedia.com (xpath, xml, xmlelement, etc.)

http://www.oradev.com/xml_functions.jsp

References 2

W3.org

W3schools.com

oradev.com/xml_functions.jsp

Oracle Database 10g XML & SQL: Design, Build, & Manage XML Applications in Java, C, C++, & PL/SQL (Osborne ORACLE Press Series) (Paperback) by Mark Scardina (Author), Ben Chang (Author), Jinyu Wang (Author)

http://download.oracle.com/javase/tutorial/jaxp/dom/index.html

http://download.oracle.com/docs/cd/B19306_01/appdev.102/b14258/d_xml dom.htm

iso.org

Oracle® Text Reference, 10*g* Release 2 (10.2),
Part Number B14218-01

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Questions