

EFFECTIVE STORAGE OF XBRL DOCUMENTS

An Oracle & UBmatrix Whitepaper

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Introduction

Today's business world requires the ability to report, validate, and analyze business information efficiently, accurately and in a scalable manner. Through the eXtensible Business Reporting Language (XBRL), financial institutions and regulators have established a standard language to describe reported data and business rules surrounding that data.

XBRL is an open standard based on XML that is currently supported by over 400 global organizations. It promises enterprises and government agencies a cost-effective method to deliver a 100% compliant communication process for both external and internal reporting. However, to deliver on this promise XBRL documents must be able to be generated, stored and queried seamlessly and effectively alongside other information in the enterprise.

Oracle XML DB is a high-performance, native XML storage and retrieval technology available with Oracle Database. Oracle XML DB enables XML-centric application development allowing developers use the Oracle Database to store, manage and manipulate XML Content using XML access paradigms. It provides support for most of the common XML Standards including XML, XML-Namespaces, XMLSchema, XML Query, XSLT, SQL/XML, XLink and XInclude. It provides organizations with the best of both worlds, allows SQL centric access to XML content and XML centric access to SQL content. All of the standard tools and API used to access relational data in an Oracle database can be used to access XML content stored in Oracle XML DB. Oracle XML DB also includes a unique XML repository which allows XML content stored in Oracle Database to be organized using a familiar File/Folder metaphor and accessed from Desktop tools such as Microsoft Office.

These features make it an ideal platform for managing XBRL documents. The XBRL standard is based on XML Schema, and XLink. Oracle XML DB is optimized for storing and querying XML content that is based on XML Schema, like XBRL. In addition the latest version of Oracle Database, Oracle Database 10g includes specific optimizations for processing some classes of XLink.

UBmatrix has been at the forefront of developing software that takes advantage of the XBRL standard to deliver robust and effective financial reporting systems to government agencies, market regulators and enterprises alike. The UBmatrix XBRL Processing Engine (XPE) is recognized as one of the leading engines for generating, converting, validating, and consuming XBRL documents.

The UBmatrix platform and products are in production today on projects such as the Federal Financial Institutions Examination Council ("FFIEC") Call Reporting system - the first major XBRL based reporting system for 8,600 banks in the United States and at Microfinance Information Exchange (the MIX) an information hub tracking the performance of over 900 microfinance lending institutions. In Europe, the Banque de France is implementing a Basel II reporting infrastructure for its 620 member banks based on the UBmatrix XPE and UBmatrix products are at the core of the Dutch National Taxonomy Project, which aims to save organizations \$350 million Euros a year in administrative costs for business-to-government reporting. In Asia, the KOSDAQ Stock Exchange has made available its company reports in XBRL format using UBmatrix technology, so that analysts can better understand and compare financial results

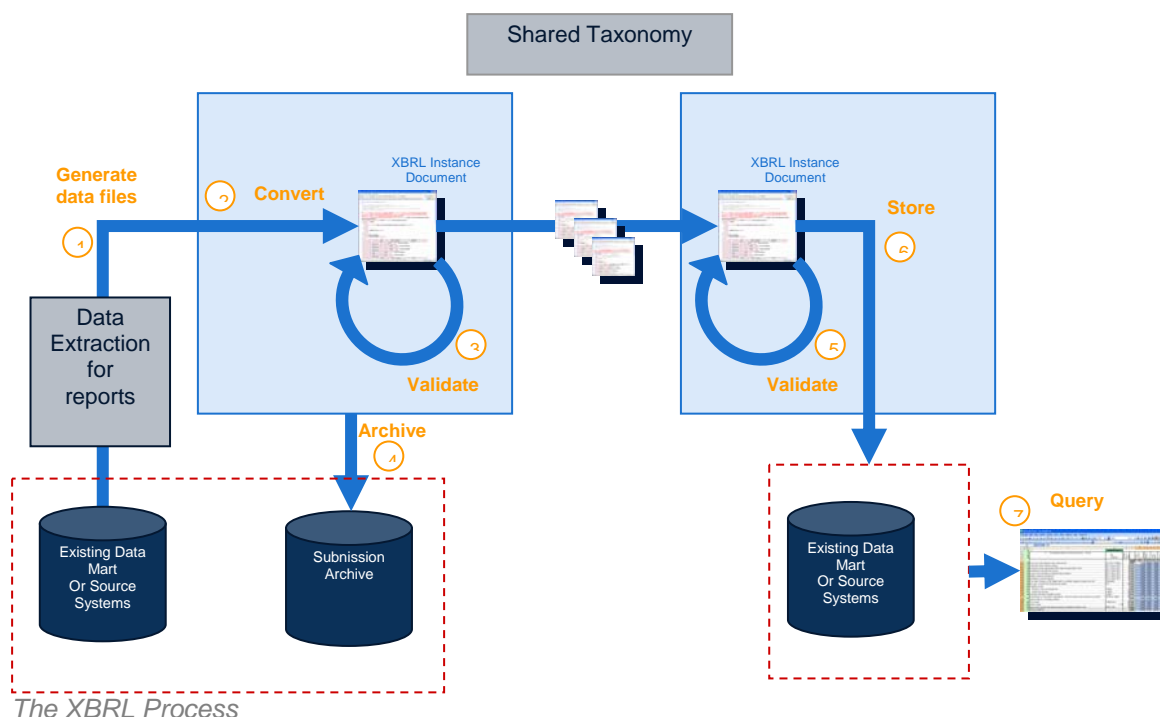
The combination of these two powerful technologies, XML DB and a state-of-the-art XBRL processing engine represents the most powerful and effective method for managing, storing, and analyzing XBRL data. It fulfills the database storage requirements that provide the speed, scalability, and security required by organizations looking to implement a XBRL based reporting system.

The XBRL Process

XBRL grew from a very simple idea, that to share financial information, each party has to have a common understanding of what each piece of information means. In essence, XBRL builds upon the XML standard, using data tags to describe information an approach, which has been accepted in the IT industry for many years. This tagging of data elements, allows reports to be converted into a document, which is machine-readable and understandable by a receiving application that has the relevant 'dictionary' by which to read it. This dictionary is known as a taxonomy in XBRL.

However, XBRL adds much more than simple data tagging to financial information. It also allows for the relationships between data elements to be defined and business rules to be established. This enables the data being sent and received to be 100% validated against a transparent set of rules. The improvement in the quality of reported data is a significant factor in the growing adoption of XBRL.

In an XBRL based reporting system, the data to be reported is extracted from the source systems as usual. The data is then converted into an XBRL document using an XBRL processing engine and the relevant taxonomy that defines the shared view of the concepts and the context of the data to be shared. The receiver of the XBRL document can use the same taxonomy to fully understand and validate the data sent.



XBRL is currently being used in a variety of application areas:

- **Regulatory Reporting Frameworks** - Those organizations who oversee regulatory compliance and thus collect large amounts of reported data, -- like national banks -- need a scalable XBRL solution for viewing and analyzing thousands of complex financial report submissions each quarter. The scalability of Oracle 10g and the UBmatrix XBRL processing engine enables reporting against both submitted data and the metadata describing each submission.
- **Enterprise Data Consolidation** - Enterprises who need to create annual company reports and prepare industry compliance statements in XBRL are adopting Oracle 10g's XMLDB and UBmatrix's XBRL processor to consolidate information from multiple systems, such as Oracle Financials, banking systems, etc. This architecture provides built-in support for organizations to combine XBRL output from various systems and easily report on the data using familiar tools via SQL and XQuery.
- **Internal Reporting** - To support the corporate reporting process, enterprises can extend their Oracle database systems with the ability to export in XBRL. This information can then be fully validated against the standard business rules and the recipient's reporting guidelines.

Storing XBRL Documents

Today, most XBRL processors store documents in a file system. However, for the data to be analyzed and made available to a wider audience, these systems are not ideal from a security, scalability or quality

of service perspective. So organizations often extract the data from the XBRL document into a relational database schema, thus creating two copies of the same data, each with system benefits but also weaknesses:

- The XBRL document is a clear 'statement of record' of what has been sent and can be used to recreate the original document.
- While the data in the relational database is easily accessible and analyzed using standard query tools, but cannot be used to recreate the original document.

As the volume of XBRL documents being processed grows, and developers consider the costs of constant regeneration of XBRL documents, there arises the question whether these storage methods can effectively accommodate an effective XBRL based reporting system.

It is clear that a much better solution would be for databases to be able to effectively store XBRL documents in their 'native' format, so that the core capabilities of a strong relational database management system can be used to manage them, and also so that both storage and generation of XBRL can be done with the efficiencies that accrue from understanding the inherent structure of XBRL.

Effective Storage of XBRL Documents

XBRL is based upon XML and inherits most of its attributes and benefits. Storing XBRL instance documents in a database, such as Oracle Database 10g, provides user organizations looking to implement XBRL reporting systems with the benefits of both worlds.

To achieve this, the XBRL processor needs to be able to effectively use the functionality provided by the database, while the relational database needs to provide an optimized XML query platform that can scale linearly. UBmatrix and Oracle development teams have worked together to make this happen.

One Engine, for Scalability and Ease-of-Use

With Oracle XMLDB and the UBmatrix XBRL Processing Engine, XBRL and SQL are fully integrated. It is possible to perform SQL operations on XBRL data, while the UBmatrix XBRL processor can fully recreate the original instance document including stylesheets. This 'Duality' reduces the cost of storing XBRL documents and enhances the flexibility with which they can be used.

The Benefits of XML

The XML Schema type system is rich enough to address 'structured' relational data, as well as 'unstructured' documents (where the structure is flexible, and the document interleaves some data with regular structure and large portions of un-typed annotations or text which has irregular structure.) In addition, XML Schema can be used to specify semi-structured documents (in whom structure exists, but this structure is variable between instances.) Oracle XML DB is the first mainstream commercial database to natively support the XML Schema data model. This means users can create XML Schemas using any popular schema authoring tool and register them to the database. Users can 'annotate' XML Schemas to direct specific layouts of storage, or have the database determine default storage layouts. When XML instances are inserted, Oracle XML DB can check the validity of each instance according to a registered schema. Various kinds of constraints specified in a XML Schema (ordering, cardinality, referential integrity) can be automatically enforced by the database.

Key Benefits

The joint development effort between Oracle and UBmatrix provides key enhancements over existing solutions, which can be broken down into 3 key areas:

- Processing, validating, viewing, and storing of instance documents
- Management of taxonomies
- Analysis and reporting

Processing, validating, viewing, and storing of instance documents:

- Scalable viewing of instance documents – allows a large number of users to be connected to the XBRL processor while viewing and analyzing instance documents.
- Predefined views – the UBmatrix XBRL processor stores a number of pre-defined views, such as a balance sheet or an income statement. These views are extended links that can be utilized in conjunction with existing taxonomies.
- Storage – Instance documents are stored, and optimally indexed within the database.
- Versioning - Instance data is versioned at a document-level.

Management of taxonomies:

- Taxonomies are stored, and optimally indexed in the database.
- These taxonomies can then be linked to the specific instance document.
- Versioning – Taxonomies can be versioned at a document level.

Analysis and reporting:

- Dashboard reporting – Ability to create a dashboard of consolidated reported data.
- Ad hoc reporting – Ability to construct ad hoc queries across reported data.
- Exception reporting – Ability to perform ratios and averages across one or more instance documents.
- Data discovery – Ability to discover a defined set of entities and periods where reported data exists, or where it does not exist. Ability to know which entities still need to submit data.

Conclusion

Most analysts agree that XBRL will revolutionize the way organizations share information both internally and externally over the next 5 years. To extract the potential value of this new standard, organizations will need to be able to store and manage XBRL documents effectively.

- Oracle XML DB offers the best platform for storing and querying XBRL content. It's powerful, flexible native XML storage is highly optimized for processing XML documents like those found in XBRL. The Oracle XML DB Repository integration enables document centric access, security and integrity allowing Taxonomy Editors and filing preparers to use the Oracle Database to store and access XBRL content without needing to learn complex query languages like SQL or XQuery. When necessary, Oracle XML DB provides application developers with access to all of the tools they need to store and manipulate XBRL documents while protecting them from having to spend time and resources on mapping between the XBRL documents and a format which enables efficient querying and analysis of the XBRL.
- Oracle XML DB is the only product that truly delivers performant SQL/XML duality. This allow developers and DBA to enable full SQL access to XBRL content. By creating a few view simple views on top of XBRL content stored in Oracle XML DB, developers and DBA can allow all wealth of Business Intelligence and Decision Support tools, available for the Oracle Database to used in conjunction with XBRL documents
- The UBmatrix Processing Engine offers the leading XBRL technology, which understands how to utilize the advanced functions of Oracle XML DB.

Together Oracle & UBmatrix have delivered an effective solution that delivers the benefits of XBRL without compromises in storage and scalability

Further Information

Oracle XML DB at: <http://www.oracle.com/technology/tech/xml/xmlldb/index.html>

UBmatrix Processing Engine and Applications at: <http://www.ubmatrix.com/>