XML plays a key role in modern B2B e-business and e-reporting solutions. Meta Integration® Works is an ETL (Extract-Transformation-Load) development environment producing and managing XML data movement components for the Active Data Warehouse by Teradata. The toolset is built upon a 3-tier architecture with a web enabled multi-users GUI (Java), and a powerful repository server running on top of Teradata (or any RDBMS). The toolset provides support for metadata import/export (popular design tools and standards like CWM XMI), version management, comparison, integration, mapping, and generation of the C++ code for MP-RAS or any Windows/Unix OS. This presentation will include a demo.
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✓ Business Case (strategic importance) of XML for the Active Data Warehouse Warehouse by Teradata

☐ Introduction to the Meta Integration’s XML Data Movement Solution.

☐ Technology Overview of Meta Integration® Works & Repository Toolset

☐ Live Demo of the development environment and the produced XML data movement component on Teradata (on a simple B2B e-business scenario)

☐ Conclusions, Q&A
XML Reality Check

- You’ve heard it and you’ve read it, XML solves everything, right! Did you try it?
- XML files contain up to 80% noise (XML tags) vs. only 20% data (according to recent analysis).
- Therefore:
  - XML is not an efficient way to transfer large amounts of data between corporate databases/systems, as required in:
    - Legacy Data Migrations (LDM),
    - Data Extraction Transform & Load (ETL) from the operational systems to the Data Warehouses (DW).
  - XML is sometimes not as efficient as some conventional EDI or RPC mechanisms for Enterprise Application Integration (EAI).
  - Your systems will most likely have to deal with many small XML files (online transactions, reports), rather than a few large XML files (complete database dump or updates).
XML Is Powerful

- XML can carry complex data structures, especially as the XML modeling evolves from DTD to Schema.
- The XML technology was designed for today’s network based architectures: intranet integration, internet browsers, etc.
- Therefore,
  - XML is becoming popular in Internet Application Integration (IAI) with technology like Microsoft SOAP.
  - XML is becoming popular at the back-end of Data Warehouses, that’s the Active Data Warehouse by Teradata!
    - To populate Enterprise Information Portals (EIP),
    - To interface with Reporting tools,
    - To generate the personalized data required on alerts and reports to wireless devices like PDA, pagers, and cellular phones.
    - To integrate with Office tools, see the role of XML in Office 2000 or XP.
  - XML can also be used at the front-end of Data Warehouses to acquire live data from e-business systems.
The Active Data Warehouse by Teradata

Needs for XML based Data Movements

**E-Business & CRM:**

- Online PO
- Electronic Invoices

**XML at the heart of the Active Data Warehouse by Teradata:**

<table>
<thead>
<tr>
<th>Inter-Active</th>
<th>Re-Active</th>
<th>Pro-Active</th>
</tr>
</thead>
</table>
| • Automated customer interfaces  
  • Integrated customer channels  
  • Integrated data analysis | • Manage inventory  
  • Manage product cycles  
  • Manage Costs | • Generate alerts  
  • Automated marketing campaigns  
  • Automated replenishment |

**XML brings critical data to the decision maker:**

- Custom reports (web portals)
- Custom alarms (pagers, PDA)

**XML adapts to today’s network architectures:**

- Intranet
- Extranet
- Internet
- VPN
- Wireless

Teradata Active Data Warehouse
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XML Data Movement Components for Teradata

Meta Integration® Works (MIW) is an ETL Generating XML Data Movement Components

METADATA IMPORT:
- Physical model (data types, table & column definitions) directly from live Teradata databases via JDBC,
- Complete Logical / Physical models via design tools like ERwin,
- Teradata MDS Repository

Step 1
Model Conversion
Acquisition

Step 2
Model Mapping

Step 3
Code Generation

C++ Code Generation and Maintenance of the Data Movement Components (for Windows and Unix)

Data Import

Data Movement Component

Data Export

XML DTD or Schema

Data Extraction, Transformation & Load (ETL)

METADATA IMPORT

From XML DTD or Schema

XML Documents

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Introduction to Meta Integration’s
Data Movement Solutions: What it does…

- **Meta Integration® Works (MIW)** integrates well with today's best practices in software development, as it provides a unique component based approach to the **Data Extraction, Transformation, & Load (ETL)** tool market.

- Indeed, the MIW software development environment generates fast **C++ based data movement components** that can be easily integrated (plug & play) with any Windows or Unix based business applications.

- Multiple data movement components can be produced for **various purposes** such as:
  - Legacy Data Migration (LDM),
  - Data Warehousing (DW) & Data Marts (DM),
  - Enterprise Application Integration (EAI),

- The code of the produced data movement components can be reviewed through any Quality Assurance (QA) processes, and does not depend on any middleware (**free of any run-time cost at deployment time**).
XML Data Movement Components for Teradata

Introduction to Meta Integration’s Data Movement Solutions: What it is...

- MIW is a Metadata Repository driven development environment with support for metadata acquisition, conversion, browsing, comparison, integration, mapping, and sophisticated version & configuration management (with mapping migrations, etc.)

- MIW has been designed to support the perpetual changes in the source and destination data stores. Indeed, one of the key features of MIW is the built-in support for change management facilitating the maintenance and/or generation of new versions of the data movement components as needed.

- The MIW development environment has entirely written in Java 2, and is based on a modern 3-tier architecture portable to many platforms.

- Data Connectors are available for most popular databases via ODBC:
  - e.g. Teradata, Oracle, IBM DB2, Microsoft SQL Server,
  - as well as for XML data sources:
    - e.g. HL7 for the Health Care, ebXML, etc.
  to service the expanding needs in the fields of:
    - E-Business (B2B or B2C), Internet Application Integration (IAI), Enterprise Information Portals (EIP),

- A Data Connector SDK allows to write native data connectors (e.g. Teradata CLI), or access to data from any business application via its API (e.g. ERP BAPI)
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XML Data Movement
Components for

Meta Integration® Functionalities
A Metadata (Model) Driven Development Environment!

Most Popular Data/Object Modeling Tools:
- Rational Rose
- CA ERwin

Model Browser
Model Converter
Model Comparator
Model Integrator
Model Mapper
Data Bridge Builder

Source
Application Server #1
DB Server

Target
Application Server #2
DB Server

Import Source & Target Models:
- Database data model
- XML DTD or schema,
- other metadata,

Browse
Check-out
Check-in

Select Source Model
Select Target Model

New Integrated Model

XLS
HTML reports

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THE FUTURE 2002
XML Data Movement Components for Teradata Products

Meta Integration Solutions for Teradata Products

Model Manager
Model Converter
Model Browser
Model Comparator
Model Integrator
Model Mapper
Data Bridge Builder
CA ERwin
Teradata Repository Meta Data Services (MDS)
Teradata Repository
Meta Data Services (MDS)
XML DTD or Schema
XML Documents
New Integrated Model
Check-out
Check-in
Browse
Select Source Model
Select Target Model
Model Bridges
XLS reports
HTML reports
Select Source Model
Select Target Model
Active Warehouse
Data Bridge
Check-out
Check-in
Browse
ACCELERATING
THE FUTURE 2002
Christian Bremeau
www.metaintegration.com
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Meta Integration®
Architecture Overview

Model Manager
Model Comparator
Model Integrator
Model Browser
Model Acquisition, Conversions & Re-engineering (Model Bridges)
Live DB, Rational Rose, CA ERwin, Oracle Designer, Sybase PowerDesigner, etc.

Meta Integration® Works © (MIW)

Enterprise Editions:
- OS: Sun Solaris 2.5 to 9.0, Microsoft Windows NT, 2K, XP, Linux
- DB: Oracle 7 to 9i, MS SQL Server 6.5 to 2000, or Teradata

Personal Editions: MS Windows 9x to XP, with Access 97, 2000, XP

Meta Integration® Repository C++ & Java Software Development Kit © (MIRSDK)

MIR DB Repository Persistency Portability Layer

MIR Java Server (includes C++ to Java Layer)

Meta Integration® Repository © (MIR) supports UML & IDEF

Win32 (C++) Utility

Model Integrator
Model Mapper
Data Bridge Builder

Java 2 (Swing based) Front End

3rd Tier: Web Enabled Clients

2nd Tier: Application Server

1st Tier: Database Server

RDBMS

Accelerating The Future 2002
XML Data Movement Components for Teradata

Possible Architecture Configurations of the Meta Integration Development Environment

**MIW**
- Client
- Java
- Application downloaded in the Web Browser
- **No installation Anywhere on the web!**

**MIW**
- Client
- Standalone
- Installed on Windows
- **Desktop on the LAN**

**MIRW**
- Standalone
- Personal Edition for Windows
- **Laptop on the road or at home**

**MIR**
- App. Server
- **Solaris Compatible**
- Linux

**MIR**
- App. Server
- **Oracle**
- **MySQL**

Soon Available
Summary of Meta Integration’s Teradata Everywhere Solutions

- **Meta Integration® Works (MIW)** as an ETL development environment generating Teradata / XML data movement components for Windows and Unix platforms (including MPRAS soon).

- **Meta Integration® Repository (MIR)** persistent metadata storage on Teradata database.

- **Meta Integration® Model Bridge (MIMB)** integrating Teradata Repository known as the Meta Data Services (MDS) product with most popular design tool vendors like CA ERwin and Rational Rose, as well as most popular standards like (IDEXF, or OMG UML and CWM).
The “Model Converter” functionality of MIW has been bundled as a separate utility called Meta Integration® Model Bridge (MIMB) for:
  - legacy model migration and,
  - metadata integration.

The need for data movement and data integration solutions is driven by the fact that data is everywhere underneath business applications.
  - The same applies for metadata: metadata is also everywhere underneath the data and object modeling tools, as well as within the repositories of the ETL, DW, and EAI products used for Business Intelligence (BI & KM).

With over 40 bridges, MIMB is the most complete metadata movement solution on the market:
  - MIMB supports most popular standards from UML Object Modeling to IDEF1X data modeling, including the new OMG CWM XMI.
  - MIMB integrates the market leading design tool and repository vendors.

The model bridges are also available as add-ins or (plug & play) metadata movement components for other repositories & tools like Rational Rose.
XML Data Movement Components for
Live Database Schemas via JDBC/ODBC

Teradata
Oracle
Sybase
Informix
IBM DB2
MS Access
MS SQL Server etc.

W3C XML
DTD
Schema

Data Modeling Tools:
Rational Rose Data Modeler
CA All Fusion ERwin Data Modeler
CA Advantage Gen (COOL:gen)
CA (Sterling) COOL:Enterprise (ADW)
CA (Sterling) COOL:BizTeam (GroundWorks)
CA (Sterling) COOL:DBA (Terrain)
Oracle Designer
Sybase PowerDesigner
Popkin System Architect
Select SE
Silverrun RDM
Visible IE:Advantage
Intersolv AppMaster Designer

Object Modeling Tools:
Rational Rose C++/Java (MDL)
CA (Platinum) ParadigmPlus (CDF)

Repositories
Teradata MDS Repository (native API)
Microsoft MDS Repository (XIF or MDC XML standard)

OMG CWM XMI Standard
Data Warehousing & Business Intelligence Tools:
Adaptive Repository / Unisys UREP
IBM DB2 Warehouse Manager
Oracle Warehouse Builder
Hyperion Analytic
SAS Warehouse Admin.

BI Tools:
Business Objects
Cognos

OMG UML XMI Standard
Object Modeling Tools:
Rational Rose
IBM VisualAge and WebSphere
TogetherJ
Telelogic Tau (COOL:JexObjectTeam)
SoftTeam Objecteering
ArgoUML

ETL Tools:
Ascential
Informatica

Supporting Multiple Vendors & Standards
XML Data Movement Components for

**Meta Integration’s Meta Data Movement Solutions**

The OMG’s Common Warehouse Metamodel (CWM)

---

**Meta Object Facility (MOF)**

M3 Meta-metamodel

M2 Metamodel, Meta-metadata

M1 Model, Metadata, (also Schema)

M0 Data, Object, instance, (also record, row)

---

**Unified Modeling Language (UML)**

**Common Warehouse Metamodel (CWM)**

Warehouse Management

Warehouse Process

Warehouse Operation

Analysis

Transformation

OLAP

Data Mining

Information Visualization

Business Nomenclature

Resources

Object-Oriented

Relational

Record-Oriented

Multi Dimensional

XML

Foundation

Business Information

Data Types

Expressions

Keys

Index

Type Mapping

Software Deployment

Object Core

---

XML Metadata Interchange (XMI)
XML Data Movement Components for

CWM Enablement Showcase
Meta Data Conference / DAMA Symposium
March 4-8 2001 – Hilton Anaheim California

Common Warehouse Metamodel
Enablement Showcase

- IBM Common Warehouse Metadata Interchange Server
- IBM DB2 Warehouse Manager
- SAS Enterprise Warehouse Administrator
- Oracle Warehouse Builder
- Unisys UREP/CIM CWM Server
- Hyperion Application Builder/ Essbase
- Oracle Sales Analyzer
- IBM DB2 Warehouse Manager
XML Data Movement Components for Teradata

CWM Enablement Showcase
Meta Data Conference / DAMA Symposium
April 28 – May 2, 2002 / San Antonio, Texas.

Common Warehouse Metamodel (CWM) XMI

Adaptive Repository

Hyperion Application Builder

IBM DB2 UDB

Meta Integration Model Bridge

SAS Data Builder

Popular RDBMS: DB2, Oracle, SQL server, etc.

Database Schema Extraction

CA ALFFusion ERwin Data Modeler

Rational Rose Data Modeler

Sybase PowerDesigner

Oracle Designer

ACCELERATING THE FUTURE 2002
XML Data Movement Components for Teradata

Architecture & Connectivity of the Data Movement Components

Multiple Source Data Stores

Data Bridge

Visual or Command Line Bridge Executable

Data Bridge Library (code generated from mapping)

Data Transformations Libraries

WORK data connector library

SOURCE data connector library

DESTINATION data connector library

Data Connector

Data Connector

Data Connector

Possibility to access to the destination as a source

Destination Data Store

Work Data Store
(for robustness reasons e.g. restart after power failure)

Data Connectors for multiple technologies:
RDBMS via ODBC
B2B & Web XML
Application Servers via API
XML Data Movement Components for Teradata

Packaging & Usage of the Generated Data Movement Components

**Data Bridge Library** (code generated from mapping)
- MIDBDataBridge.dll

**Data Transformation Libraries**
- Basic: e.g. text to integer
  - MIDDBasicTransformations.dll
- Classic: e.g. address to street, zip, city
  - MIDBClassicTransformations.dll
- XML specific: unique id generation
  - MIDBXMLTransformations.dll

**Data Connector Libraries**
- ODBC (Teradata, Oracle,)
  - MIDBODBCConnector.dll
- XML Files
  - MIDBXMLConnector.dll
- In Memory
  - MIDBMemoryConnector.dll

**MIDB-SDK Manager Operations**
- LoadOptions(MyDataBridge.ini), getOptions, Options.get() and set() run(), reset()

**MIDB-SDK Connector Operations**
- open()
- getView(), View.next(), View.insert(), View.remove(), View.remove()
- close()

**Web Apps & Services**
- Command Line Data Bridge
  - MIDBDataBridge.exe
- Java Class Component
  - MIDB.class MIDBJava.dll

**Business Applications**
- Microsoft COM Component
  - DataBridgeCOM.dll

**Active Warehouse by Teradata**
- Teradata Warehouse Builder Operator
  - DataBridgeTeradataOperator.dll

**End Users**
- Unix Shell Scripts
- Windows DOS Scripts
- Web CGI, ASP Scripts
- Java based Application
- Unix C++ based Application
- Windows C++ or Visual Basic based Application

**System Administrators**
- Windows Visual Data Bridge
  - MIDBVisualDataBridge.exe

**Administrators**
- Business Applications

**Warehouse Administrators**
- Web Apps & Services
- App. Specific
  - MyTransformations.dll

**End Users System**
- Administrators
- Business Applications
- Warehouse Administrators
- Web Apps & Services

**Warehouse**
- Active Warehouse by Teradata

**Active Warehouse**
- App. Specific
  - MyTransformations.dll
- Data Bridge Library
  - MIDBDataBridge.dll
- MIDB-SDK Connector Operations
  - open()
  - getView(), View.next(), View.insert(), View.remove(), View.remove()
  - close()

**MIDB-SDK Manager Operations**
- LoadOptions(MyDataBridge.ini), getOptions, Options.get() and set() run(), reset()
XML Data Movement
Components for
Teradata
a division of
NCR

XML Data Movement
Components for

Architecture of Meta Integration’s
XML Data Connector

Apache Xerces C++ 1.4
(DOM XML Parser)

Meta Integration Data Bridge (MIDB)
Software Development Kit (SDK)

Write/Update/Delete API
Read API
(SQL Query support)

for complex
SQL query support
(where clause)

Work Data
Connector

XML File

RDBMS
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Conclusions, Q&A…

• Meta Integration Total Solutions for Teradata include:
  - Meta Integration® Works (MIW) as an ETL development environment generating Teradata / XML data movement components for Windows & Unix platforms (MPRAS).
  - Meta Integration® Repository (MIR) persistent metadata storage on Teradata.
  - Meta Integration® Model Bridge (MIMB) integrating Teradata Meta Data Services (MDS) product with most popular tools like ERwin, and standards like OMG UML/CWM.

• Meta integration provides a “Data Extraction, Transform & Load” (ETL) development environment generating “data movement components”:
  - Multiple purposes: LDM, DW ETL, EAI, EDI, E-Business, Web Portals, etc.
  - Multiple technologies: RDBMS, XML, API, (Data Connector SDK)
  - Generates fast C++ based data movement components for Windows or Unix.
  - No run-time fees to deploy, no servers to maintain on the operational sites.
  - Application builders can design, maintain, and generate multi-purpose data movement components to be embedded in their software applications.
  - Metadata repository driven development environment with support for model acquisition, conversion, browsing, comparison, integration, mapping, and sophisticated version & configuration management focused on supporting change in the enterprise datascape…

Thank you!