How to Develop Multimedia-enabled Oracle 10g Applications

Oracle10$ interMedia
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Agenda

- Oracle’s Multimedia Capabilities
- Developing Multimedia Java Applications
- Dept. of Defense Portal Application Development
Objective

• Extend Oracle’s leadership as a platform capable of managing multimedia content as naturally as it does all other business information.

• Lower the cost and complexity of developing, deploying and managing business applications which make extensive use of multimedia data.
The Media-enabled Oracle Platform

• Oracle Database 10g
  – Storage, management, & retrieval of image, audio, video data
  – Native format understanding, metadata extraction, methods for image processing
  – Support for leading streaming media servers

• Oracle Application Server 10g
  – JSP, servlet and PL/SQL application development support
  – Media Adaptation Services for Wireless
  – JDeveloper (BC4J/UIX) and Portal integration

• Oracle Collaboration Suite
  – Metadata extraction for OCS Files
The Complete interMedia Architecture

- Thin Client Browser Protocol Plugin
- RTP/RTSP
- Application Servers
- Oracle Application Server 10g
  - Oracle JDeveloper
  - JAVACore
  - interMedia Java Classes
  - JSP Tag Libraries
  - PL/SQL Toolkit
  - Oracle Portal
- JDBC
- OCI
- Oracle Database 10g
  - JVM
  - Media Parser
  - Image Processor JAI
- External File Storage
- Third Party Media Processors
- Thick Clients
  - JAI/JMF
  - interMedia Java Classes
- Oracle Application Server 10g
- Oracle JDeveloper
- BC4J
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Common Schema
On-Line Media Table

PM.Online_Media table

- product_id INT
- product_photo ORDSYS.ORDIMAGE
- product_thumbnail ORDSYS.ORDIMAGE
- product_video ORDSYS.ORDVIDEO
- product_audio ORDSYS.ORDAUDIO
public OracleConnection connect(String user, String password) throws Exception {
    String connectString;
    DriverManager.registerDriver(new oracle.jdbc.OracleDriver());
    connectString = "jdbc:oracle:oci:@";
    OracleConnection conn = (OracleConnection) DriverManager.getConnection(connectString, user, password);
    conn.setAutoCommit(false);
    return conn;
}
Upload from File

1) public void upload(OracleConnection conn, String fileName, int productId) throws Exception
2) {
3)    OracleCallableStatement cstmt = null;
4)    String queryInit = new String("begin insert into pm.online_media " + " (product_id, product_photo, product_thumbnail) " + " values(?, ORDSYS.ORDImage.init(), ORDSYS.ORDImage.init()) " + " returning product_photo into ?; end; ");
5)    cstmt = (OracleCallableStatement)
6)        conn.prepareCall(queryInit);
7)    cstmt.setInt(1, productId);
8)    cstmt.registerOutParameter(2, OrdImage._SQL_TYPECODE,
9)        OrdImage._SQL_NAME);
10)   cstmt.execute();
11)   OrdImage=(OrdImage)cstmt.getORAData(2,OrdImage.
12)        getORADATAFactory());
Upload from File (con’t)

1) `cstmt.close();`
2) `img.loadDataFromFile(fileName);`
3) `String queryUpload = new String( "update pm.online_media
   set product_photo = ? where product_id = ?");`
4) `OraclePreparedStatement pstmt = (OraclePreparedStatement)conn.prepareStatement
   (queryUpload);`
5) `pstmt.setORAData(1, img);`
6) `pstmt.setInt(2, productId);`
7) `pstmt.executeQuery();`
8) `pstmt.close();`
9) `conn.commit();`
Set Properties

```java
public void setPhotoProperties(OracleConnection conn, int productId) throws Exception {
    String querySelect = new String( "select product_photo from pm.online_media where product_id = ? for update" );
    OraclePreparedStatement pstmt = (OraclePreparedStatement)conn.prepareStatement(querySelect);
    pstmt.setInt(1, productId);
    OracleResultSet rs = (OracleResultSet)pstmt.executeQuery();
    OrdImage img = null;
    if (rs.next() == true) {
        img = (OrdImage)rs.getORAData(1, OrdImage.getORADataFactory());
    } else throw new Exception("No row found for" + productId);
}
```
Set Properties (con’t)

1) `rs.close();`
2) `pstmt.close();`
3) `img.setProperties();`
4) `String queryUpdate = new String("update pm.online_media` 
   
   set product_photo = ? where product_id = ?");`
5) `pstmt = (OraclePreparedStatement)conn.prepareStatement(queryUpdate);`
6) `pstmt.setORAData(1, img);`
7) `pstmt.setInt(2, productId);`
8) `pstmt.execute();`
9) `pstmt.close();`
10) `pstmt.close();`
11) `conn.commit();`
12) `}`
public void getPhotoProperties(OracleConnection conn, int productId) throws Exception {
    String querySelect = new String( "select product_photo from pm.online_media where product_id = ?" );
    OraclePreparedStatement pstmt = (OraclePreparedStatement)conn.prepareStatement(querySelect);
    pstmt.setInt(1, productId);
    OracleResultSet rs = (OracleResultSet)pstmt.executeQuery();
    OrdImage img = null;
    if (rs.next() == true) {
        img = (OrdImage)rs.getORAData(1, OrdImage.getORADataFactory());
    } else throw new Exception("No row found for" + productId);
    rs.close();
    pstmt.close();
    System.out.println("MIME Type:" + img.getMimeType());
    System.out.println("Height:" + img.getHeight());
    System.out.println("Width:" + img.getWidth());
    System.out.println("Content Length:" + img.getContentLength());
}
Get Application Metadata

1) Public void parseMetadata() throws Exception;
2) try {
3)   oracle.xdb.XMLType[] metaArray = null;
4)   // request all types of metadata
5)   metaArray = imgObj.getMetadata( "ALL" );
6)   // no metadata found
7)   if( 0 == metaArray.length )
8)     { System.out.println(" No metadata found." ); } 
9)   else // print the root element name for each document 
10)      { for ( int i=0 i<metaArray.length; i++ )
11)          System.out.println("found metadata element:
12)            " +
13)              metaArray[i].getRootElement() );
14)      }
15) } catch( Exception e )
16) { System.out.println("metadata exception: " +
17)    e.toString() ); }
public void generateThumbnail(OracleConnection conn, int productId) throws Exception {
    String queryGetThumb = new String("select product_photo, product_thumbnail from pm.online_media " + " where product_id = ? for update");
    OraclePreparedStatement pstmt = (OraclePreparedStatement)conn.prepareStatement(queryGetThumb);
    pstmt.setInt(1, productId);
    OracleResultSet rs = (OracleResultSet)pstmt.executeQuery();
    OrdImage img = null;
    OrdImage imgThumb = null;
    if (rs.next() == true) {
        img = (OrdImage)rs.getORAData(1, OrdImage.getORADataFactory());
        imgThumb = (OrdImage)rs.getORAData(2, OrdImage.getORADataFactory());
    } else throw new Exception("No row found for " + productId);
1) rs.close();
2) pstmt.close();
3) img.processCopy("maxScale=64 64, fileFormat=GIFF", imgThumb);
4) String queryUpdate = new String( "update pm.online_media
set product_thumbnail = ? where product_id = ?");
5) pstmt = (OraclePreparedStatement)conn.prepareStatement(queryUpdate);
6) pstmt.setORADate(1, imgThumb);
7) pstmt.setInt(2, productId);
8) pstmt.executeUpdate();
9) pstmt.close();
10) conn.commit();
11) }
public void downloadThumbnail(OracleConnection conn, int productId, String fileName) throws Exception
{
    String queryGetThumb = new String("select product_thumbnail from pm.online_media where product_id = ?");
    OraclePreparedStatement pstmt = (OraclePreparedStatement)conn.prepareStatement(queryGetThumb);
    pstmt.setInt(1, productId);
    OracleResultSet rs = (OracleResultSet)pstmt.executeQuery();
    OrdImage imgThumb = null;
    if (rs.next() == true)
    {
        imgThumb = (OrdImage)rs.getORAData(1, OrdImage.getORADataFactory());
    }
    else throw new Exception("No row found for " + productId);
    rs.close();
pstmt.close();
    OrdMediaUtil.getDataInFile(fileName, imgThumb.getContent());
    System.out.println("Download thumbnail for product " + productId + " is successful");
}
Multimedia-Enabled Oracle 10g Applications
Through PL/SQL, Java, XML, Oracle Intermedia and Oracle Portal

Major Ramon Lao
Mr. Scot Greber
Co-Presenters

• Major Ramon Lao
  Information Technology Center Chief Information Officer (ITC CIO)

• Duties:
  – Active Duty Marine Major
  – Occupational Specialty – Judge Advocate
  – Oversees prime contractors delivery of services and products; ensures compliance with DoD IT policy requirements.
Co-Presenters

• Mr. Scot Greber
  Senior DoDITC System/Information Architect
  (Independent Oracle Consultant/Previously worked for Oracle Corporation)

• Duties:
  – DoDITC platform Architect, DBA, Web/Application Developer
  – DoDITC infrastructure Support
The DoDITC is the website and applications development support for the Office of the Under Secretary of Defense, Personnel and Readiness (Military Community and Family Policy) (OUSD, P&R (MC&FP)).

Sampling of over 25 websites and applications:

- www.commanderspage.dod.mil
- www.lifelines.navy.mil
- www.militaryhomefront.dod.mil
- www.usa4militaryfamilies.org
Application Architecture

• Content Management Component
  – Ingeniux CMS (XML File Based Content Management)

• Database Component (Pre-Production/Production)
  – PL/SQL (XML/XSL API’s)
  – Intermedia (ORDDOC, ORDVIDEO, ORDAUDIO, ORDIMAGE)
  – WEBDAV Storage Containers

• Presentation Component
  – Oracle Application Server 9i/10g
  – Oracle Portal
    • Portal Page Parameters
    • Portlets
  – J2EE Compliant Source Code
  – WEBDAV
    • Web-based Distributed Authoring and Versioning
Application Architecture

- Data Exchange Component
  - Oracle Collaboration Suite R2
    - Oracle Files (HTTP/WEBDAV)
Application Architecture
Application Architecture - Content

• Ingeniux CMS
  – Content Created as XML Files on Windows Server
    • Easy to use Interface
    • Data Entry Templates easily customizable
  – Custom hooks have been added to Interface w/ Oracle
    • Ingeniux/Oracle Interface provides
      - Ability to Read CMS Files into the Oracle database
        (Store XML files as XML Data in Oracle)
      - Ability to Update CMS Files with Database generated information
      - Ability to store and scale content images via Intermedia
Application Architecture - Content
Application Architecture - Database

- Two Databases (Pre-Production/Production)
  - CMS interfaces w/ Pre-Production Database (9i)
    - Washington Navy Yard
  - Oracle Replication pushes content to Production (9i/10g)
    - MOBCOM (Kansas City, Missouri)
    - Content replicates to Production every hour

- Database Components
  - PL/SQL Stored Packages/Procedures
    - Store CMS Content into Rows/Tables/XML Structures
    - Transform XML content into HTML via XSL
      - CONTENT Table
    - Content Display Business Rules
      - Approval/Expiration/Review/Disable Dates
Application Architecture - Database

- Components (Cont’d)
  - Intermedia Content
    - ORDDOC (4550) (Stores pdf, doc, xls, …)
    - ORDVIDEO (4381) Stores Microsoft and Real Media
    - ORDIMAGE (1926) Stores Images
      - 5 different image scales to meet Web Page design layouts
  - WEBDAV Storage Containers
    - Web-based Distributed Authoring and Versioning
    - Store pointers to the Intermedia Content for HTTP access
    - New quick way to upload Videos
      - LSNMEDIA Container
        - /Clipboard/servlet/Navigator?dad=lsnmedia
Application Architecture - Database
Application Architecture - Presentation

- Akamai Caching Services
  - Speed content Delivery
  - Control Failover

- Oracle Application Server (Platform)
  - 9i is currently Production
  - 10g is operational and undergoing testing and quality control
  - J2EE Compliant Source Code
    - 6 Application OC4J Containers in use
    - Application EAR (Enterprise Application aRchive) files
    - JAVA Code generated using JDeveloper
    - Used to extract and format Database Content for the Applications
  - WEBDAV
    - Web-based Distributed Authoring and Versioning
    - Used in XML/XSL to display Intermedia Content out of the Database
Application Architecture - Presentation

- Oracle Portal (Component)
  - Applications Displayed via Portal Pages
    - Separate Portal Pages for each application
      - Portal Pages contain Portlets
      - Portlet functionality based on Parameters
      - Portlets have evolved over the Development cycle
        - More Generic
Application Architecture - Presentation
Site (Portlet Occurances, Unique Portlets, Pages)

rev1 (Specific Portlets)
www.lifelines.navy.mil (349/58/80)
www.militarystudent.org (317/58/73)
wwwdeploymentconnections.org (349/58/15)
www.lifelines.navy.mil/Familyline (349/58/72)

rev2 (Generic Portlets)
www.unifiedexchange.org (52/19/19)
www.usa4militaryfamilies.org (20/19/8)
www.commanderspage.dod.mil (43/19/15)

rev3 (Generic Portlets w/ CMS XML)
www.militaryhomefront.dod.mil (108/6/17)
DOD Portal Sites
What is Data Exchange System (DES)?
- DES is a Methodology by which ITC Content can be shared
- Utilizes Oracle’s Collaboration Suite to Store HTML Content
  - HTML Content accessible via Oracle Files HTTP and WEBDAV Interfaces
    - HTTP (Upload/Download)
    - WEBDAV (Drag & Drop)

Why?
- To enable Partners to post ITC Content to their WebSites
  - Provide content in a structured format

How?
- Transform XML content into HTML via the Database and PL/SQL
  - Content XML and XSL is stored in the Database as XMLTYPE
  - HTML Content is stored as CLOB data
- FTP HTML Content from the Production Database into Collaboration Suite Storage Repository
Conclusion

- The ITC Platform utilizes interMedia support of storage of popular file formats, including desktop publishing image, and streaming audio and video formats in databases.

- Through interMedia the ITC is able to add audio, image, and video, or other heterogeneous media columns or objects to existing tables, and insert and retrieve multimedia data.

- This enables the Senior Architect to extend existing databases with multimedia data, or to build new end-user multimedia database applications (e.g., Data Exchange)