Modernizing Workflow and Data Integration
The Future of Data Warehousing

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Speaker Qualifications

- Independent Consultant, and R & D
- Speaker at NYOUG meetings, IOUG, Quest, SEOUC, ECO and Oracle Open World Conferences
- 24 years of IT experience
- 20 years of Oracle experience, 16 as a DBA (v6 thru 11g)
- Grid, Cloud, and High-Availability experience with RAC, Data Guard, Streams AQ/Websphere MQ and IBM GPFS
- MS Computer Science, NJIT, 1993
- PhD CIS candidate, NJIT, 1997
- MBA MIS, Montclair State University, 2006
- College Math Professor and former HS Math Teacher Principal.
Objectives

- Provide a clear overview of workflow and data integration future direction driven by Big Data.
- Analyze existing administration and development approaches.
- Introduce Oracle Data Integrator and Oracle Golden Gate 11g R2 featured capabilities.
- Identify strategic advantages and pitfalls on every strategy used.
- Highlight the evolution of existing tools such as Oracle Streams AQ and IBM Websphere MQ.
Business Framework
According to the Workflow Management Consortium, workflow “represents the automation of a business process, in whole or in part, during which documents, information, or tasks are passed from one participant to another for action, according to a set of procedural rules.”

**Standards:** IDEF2, IDEF3. Beyond static IDEF1X data.
Workflow Viewed as Petri Nets

Workflow viewed as Petri Nets: cloud Database

Application Functionality 1

Database 1

Application Functionality 2

Database 2

Regional Datawarehouse

Application Functionality

Corporate Global Cloud Datawarehouse

Application Functionality

T1

T2

T3

T4
Modernization Goals

- **Agility**: More results faster, and more accurate.
- **Data Quality**: Improved Data Integrity and Consistency.
- **Enhanced Automation and provisioning**.
- **Improved Quality of Service (QoS)**.
- **Optimal middleware architecture integration** (as part of Oracle AIA), including integration with virtual environments and other cloud technologies.
Business Models Concepts

- Message Queuing (as in SCM, ERP, CRM)
- Data Replication (Logical Change Record)
- Data Protection
- Data Warehouse Loading
- Event Management and Notification
- Workflow
- Serializable Distributed Processing
MOM Queuing Infrastructure

Oracle Applications

Peoplesoft
Siebel
eBusinessSuite

Oracle Net

Oracle Integration Server Gateway (Gateway)

Oracle Net

Queues

MQ Series Applications

Websphere MQ Manager

Weblogic Server

SOA Framework

Oracle Net
Workflow in the Cloud

The customization of existing resources are driving cloud computing in a rather transparent way, due to the appropriate usage of file systems, physical, virtual, and hybrid, in alignment with storage networking innovation, clusters, and related topologies and protocols.

Key Decision Criteria

Data security and privacy, since workflow can included archiving data logging possibly proprietary and intelligence information.
Data Integration in the Cloud

The integration of data that is apparently volatile within public, private, and hybrid clouds can actually be simplified by the usage of MapReduce, message queuing and big data connectors models, which enable transparent gateways through the diversity of file system, operating system platforms, DBMS, and storage models.

Planning and costs associated with the actual architecture can determine a comprehensive integration model.
E-Business Process Innovation

• E-Commerce will be highly impacted by the modernization of workflow and data integration.
• B2B and B2C using SaaS, PaaS, and IaaS
• BPMaaS will be in itself a strong component in this modernization
ILCM/SDLC and Cloud Workflow

The WaterFall Model

- Requirements
- Design
- Construction
- Integration
- Testing
- Installation
- Maintenance

Public Clouds

Private Clouds

Hybrid Clouds

- Requirement Analysis
- Design
- Development
- System Integration
- UAT Testing
- SQA Testing
- Production Testing
- Deployment
- Maintenance

The Oracle Certified Professional (OCP) Certification Logo

Oracle Technology Network (OTN) Logo
Technical Framework
Defining Oracle Fusion

From the business perspective, Oracle Fusion Middleware is an umbrella of integrated robust customer-validated software that spans from grid infrastructure to SOA; portals and process managers to database, application infrastructure, content, message queuing, development tools, and business intelligence.
### Fusion’s MOM Relevance

<table>
<thead>
<tr>
<th>Oracle Fusion Component</th>
<th>MOM / AQ Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Server</td>
<td>High</td>
</tr>
<tr>
<td>Business Integration</td>
<td>High</td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>High</td>
</tr>
<tr>
<td>Business Process Management</td>
<td>Average</td>
</tr>
<tr>
<td>Coherence Data Grid Persistence</td>
<td>High</td>
</tr>
<tr>
<td>Collaboration Suite</td>
<td>High</td>
</tr>
<tr>
<td>Content Management</td>
<td>Average</td>
</tr>
<tr>
<td>Corporate Portal Technology</td>
<td>High</td>
</tr>
<tr>
<td>Data Integration</td>
<td>High</td>
</tr>
<tr>
<td>Enterprise Management (Grid Control)</td>
<td>Very High</td>
</tr>
<tr>
<td>Enterprise Service Bus</td>
<td>High</td>
</tr>
<tr>
<td>Development Tools</td>
<td>High</td>
</tr>
<tr>
<td>Identity Management</td>
<td>High</td>
</tr>
<tr>
<td>Middleware for Fast-Growing Companies</td>
<td>High</td>
</tr>
<tr>
<td>Oracle Fusion MOM for Applications</td>
<td>Very High</td>
</tr>
<tr>
<td>Service Delivery Platform</td>
<td>High</td>
</tr>
<tr>
<td>SOA Suite</td>
<td>Very High</td>
</tr>
<tr>
<td>Web Services</td>
<td>Very High</td>
</tr>
</tbody>
</table>
Oracle Fusion Architecture Model

Development Tools
- SOA Development
- ADF Framework

Workflow

User Interface
- Web 2.0 Portal, Content Rich Internet Apps, Mobile Search, Desktop, VOIP

Enterprise Performance Management
- Balance Scorecards, Budgeting, Financial Management & Reporting, Planning,

Business Intelligence
- Alert and Notification, Forecasting, Modeling, Information Integration, Reporting & Analysis, OLAP, Real-Time Feedback

Content Management
- Digital Assets, Document Management, Media Management, Intelligent Video, Records, Video Monitoring

SOA and Process Management
- ESB, BPEL Process Manager, Workflow, BAM Rules, B2B, SOA Governance, MDM, Registry

Application Server
- Java EE, Web Services, Complex Event Processing, XTP, RFID, SIP

Grid Infrastructure
- Application Server, In-Memory Data Grid,

Enterprise Management
- Configuration Management, Provisioning, Virtualization, Automation.

Identity Management

Oracle Fusion's MOM Relevance Architecture Model
Technical Concepts

- Queue (FIFO data structure)
- Message Queuing
- Header
- Payload
- Channel
- Port
- Propagation
Technical Concepts

- Producer (enqueueing)
- Consumer (dequeuing)
- Recipient
- Enqueue
- Dequeue
Technical Concepts

- Peer-to-Peer Mode
- Publish/Subscribe Mode
  - Broadcasting
  - Multicasting
- Streams AQ
- Model View Controller (Message-Driven Beans)
Types of Oracle Queues

- Based on Producer/Consumer Cardinality
  - Peer-to-Peer (P2P) Mode
  - Publish/Subscribe Mode
- Based on Persistency
  - Persistent
  - Non-Persistent
An application can enqueue messages that represent events into a queue explicitly, or a Streams capture process can capture database events and encapsulate them into messages called LCRs. These captured messages can be the results of DML or DDL changes. Propagations can propagate messages in a stream through multiple queues. Finally, a user application can dequeue messages explicitly, or a Streams apply process can dequeue messages implicitly. An apply process can reenqueue these messages explicitly into the same queue or a different queue if necessary.”
An application can either use this model or generate a message.
Streams AQ Capabilities

- Automatic Shared Memory Management of the Streams Pool
- Streams Tool in Oracle Enterprise Manager
- Procedures for Starting and Stopping Propagations
- Queue-to-Queue Propagations
- Declarative Rule-Based Transformations
- Commit-Time Queues
- Supplemental Logging Enabled During Preparation for Instantiation
- Configurable Transaction Spill Threshold for Apply Processes
- Conversion of LCRs to and from XML
- Retrying an Error Transaction with a User Procedure
- Enhanced Support for Index-Organized Tables
- Row LCR Execution Enhancements
- Information About Oldest Transaction in V$STREAMS_APPLY_READER
Architectural Considerations

- Oracle integration server
- Agent
- Queue table
- Queuing processes
- Listener configuration
- Database links
- Message-Oriented Middleware (MOM)/EM
- Cloud Integration
Architectural Considerations

Server Process 1

Server Process 2

Background Processes

PGA

PGA

PGA

Java Pool

Shared Pool

Streams Pool

Large Pool

Server Process 3

Oracle Process

Database Buffer Cache

Default
2k
4k
16k
recycle
keep

Redo Buffer

SYSTEM GLOBAL AREA (SGA)
Security Framework

- Rule-based Security
  - Object Level
  - Schema
  - Global
- Virtual Private Database Support
- Strategic Resilience Support
- Transparent Data Encryption (TDE).
Security Framework

- Enhancements:
  - Database Vault
  - LDAP Support
  - IDAP
  - XA Support

- Encryption Support via asymmetric authentication (PKI).

- Conjoint TDE and Wallet usage.
Setting the MOM/AQ Environment

- Oracle-based only or third-party, e.g., gateway-based or heterogeneous system involvement
- Transactional or non-transactional queue
- Peer-to-peer or Publish-Subscribe Mode (Broadcasting or Multicasting, i.e., custom recipient)
- Integration with Grid and OAIA.
Planning the AQ Environment

• Propagation-type (queue-to-queue or queue-to-database link)

• Payload format

• Sending Mechanism (Producer Application)

• Receiving Mechanism (Consumer Application)
MOM and AQ Environment

• Model View Controller
  • Data Source, domain, data model
  • Presentation
  • Controller/Mediator

• Payload content management for intelligent rule-based filtering or routing.
Planning the AQ Environment

- Queue browsing without consumption
- Queue consumption and removal
- Queue consumption without payload removal for auditing, non-repudiation, or logging.
System Requirements

• Configuring:
  • Create AQ user and administrator with appropriate privileges, namely, AQ_USER_ROLE and AQ_ADMINISTRATOR_ROLE
  • Database links accordingly
  • Heterogeneous Services, if applicable (involved package and instance configuration)
  • LD_LIBRARY_PATH, PATH
Software Requirements

- Certified OS Platform
- Oracle Streams AQ
- Oracle Streams AQ Gateway
  - Procedural Gateway (Websphere MQ/Tibco)
  - Transparent Gateway (SQL Server)
- Heterogeneous Services Gateway
- Configure Gateway homes with API provided.
```
CREATE OR REPLACE VIEW dba_queues AS
SELECT owner,
       name,
       queue_table,
       queue_type,
       retention,
       enqueue_enabled,
       dequeue_enabled,
       network_name
FROM dba_queues
ORDER BY 1,2,3
/
```

<table>
<thead>
<tr>
<th>OWNER</th>
<th>NAME</th>
<th>QUEUE_TABLE</th>
<th>QUEUE_TYPE</th>
<th>RETENTION</th>
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<tr>
<td>NETWORK_NAME</td>
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<td>ALERT_QT</td>
<td>NORMAL_QUEUE</td>
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<td></td>
<td>AQS_ALERT_QT_E</td>
<td>ALERT_QT</td>
<td>EXCEPTION_QUEUE</td>
<td>0</td>
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<td></td>
<td>AQS_AQS_MEM_MC_E</td>
<td>AQS_MEM_MC</td>
<td>EXCEPTION_QUEUE</td>
<td>0</td>
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<td>AQS_AQ_EVENT_TABLE_E</td>
<td>AQ_EVENT_TABLE</td>
<td>EXCEPTION_QUEUE</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>AQS_AQ_SRVNTFN_TABLE_E</td>
<td>AQ_SRVNTFN_TABLE</td>
<td>EXCEPTION_QUEUE</td>
<td>0</td>
</tr>
</tbody>
</table>
Heterogeneous Productivity

Diagram showing the integration of various components:

- **Oracle Database**
- **Messaging Gateway Administration PL/SQL Interface**
- **WebLogic Server**
- **OCI, PL/SQL, Java clients**
- **Internet Users**
- **Interface - Web Services and Application Adapters**
- **Application Servers**
- **Messaging Gateway Agent**
- **Propagation Engine**
  - **MQ Base Java Driver**
  - **MQ JMS Driver**
  - **TIB / Rendezvous Driver**
- **AES, TMC, TIB / Rendezvous**
# PL/SQL Supplied Packages

<table>
<thead>
<tr>
<th>ORACLE10g</th>
<th>ORACLE9i</th>
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<td>DBMS_APPLY_ADM</td>
<td>DBMS_AQ</td>
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<td>DBMS_AQ</td>
<td>DBMS_AQADM</td>
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<tr>
<td>DBMS_AQADM</td>
<td>DBMS_AQELM</td>
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<tr>
<td>DBMS_AQELM</td>
<td>DBMS_MGWADM</td>
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<tr>
<td>DBMS_AQIN</td>
<td>DBMS_MGWMSG</td>
</tr>
<tr>
<td>DBMS_CAPTURE_ADM</td>
<td>DBMS_MGWADM_DBMS_FLASHBACK</td>
</tr>
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<td>DBMS_FLASHBACK</td>
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</tr>
<tr>
<td>DBMS_MGWADM</td>
<td></td>
</tr>
<tr>
<td>DBMS_MGWMSG</td>
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</tr>
<tr>
<td>DBMS_PROPAGATION_ADM</td>
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<tr>
<td>DBMS_STREAMS</td>
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<td>DBMS_STREAMS_ADM</td>
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<tr>
<td>DBMS_STREAMS_MESSAGING</td>
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<tr>
<td>DBMS_TRANSFORM</td>
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## PL/SQL Supplied Packages

<table>
<thead>
<tr>
<th>ORACLE11g</th>
<th>ORACLE11g Updated Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBMS_RULES_ADM</td>
<td>DBMS_Advisor</td>
</tr>
<tr>
<td>DBMS_APPLY_ADM</td>
<td>DBMS_APPLY_ADM</td>
</tr>
<tr>
<td>DBMS_CAPTURE_ADM</td>
<td>DBMS_AQ</td>
</tr>
<tr>
<td>DBMS_COMPARISON</td>
<td>DBMS_AQADM</td>
</tr>
<tr>
<td>DBMS_STREAMS_ADM</td>
<td>DBMS_CAPTURE_ADM</td>
</tr>
<tr>
<td>DBMS_STREAMS_ADM</td>
<td>DBMS_Resource_Manager</td>
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<tr>
<td>DBMS_STREAMS_ADVISOR_ADM</td>
<td>DBMS_RLMGR</td>
</tr>
<tr>
<td>DBMS_STREAMS_MESSAGING</td>
<td>DBMS_RULES_ADM</td>
</tr>
<tr>
<td>DBMS_STREAMS_TABLESPACE_ADM</td>
<td>DBMS_STREAMS_ADM</td>
</tr>
<tr>
<td>UTL_SPADV</td>
<td>DBMS_STREAMS_TABLESPACE_ADM</td>
</tr>
</tbody>
</table>
## Programmatic Interfaces

### Oracle Streams AQ Programmatic Interfaces

<table>
<thead>
<tr>
<th>Language</th>
<th>Precompiler or Interface Program</th>
<th>Functions Supported</th>
<th>Oracle References</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL/SQL</td>
<td>DBMS_AQADM and DBMS_AQ Packages</td>
<td>Administrative and operational</td>
<td>Oracle Database PL/SQL Packages and Types Reference</td>
</tr>
<tr>
<td>C</td>
<td>Oracle Call Interface (OCI)</td>
<td>Operational only</td>
<td>Oracle Call Interface Programmer's Guide</td>
</tr>
<tr>
<td>Visual Basic</td>
<td>Oracle Objects for OLE (OO40)</td>
<td>Operational only</td>
<td>Online help available from Application Development submenu of Oracle installation.</td>
</tr>
<tr>
<td>Java (JMS)</td>
<td>oracle.JMS package using JDBC API</td>
<td>Administrative and operational</td>
<td>Oracle Streams Advanced Queuing Java API Reference</td>
</tr>
<tr>
<td>AQ XML servlet</td>
<td>Internet Data Access Presentation (IDAP)</td>
<td>Operational only</td>
<td>Oracle 11g Chapter 6, &quot;Internet Access to Oracle Streams AQ&quot;</td>
</tr>
</tbody>
</table>
Streams AQ Supported Datatypes

- VARCHAR2
- NVARCHAR2
- FLOAT
- NUMBER
- LONG
- DATE
- BINARY_FLOAT
- BINARY_DOUBLE
- TIMESTAMP
- TIMESTAMP WITH TIME ZONE
- TIMESTAMP WITH LOCAL TIME ZONE
- INTERVAL YEAR TO MONTH
- INTERVAL DAY TO SECOND
- RAW
- LONG RAW
- CHAR
- NCHAR
- UROWID
- CLOB with BASICFILE or SECUREFILE storage
- NCLOB with BASICFILE or SECUREFILE storage
- BLOB with BASICFILE or SECUREFILE storage
- XMLType stored as CLOB
Java Supplied Packages

javax.jms
Interface MessageConsumer

All Known Subinterfaces:
AQjmsQueueReceiver, AQjmsTopicReceiver, AQjmsTopicSubscriber, QueueReceiver, TopicReceiver, TopicSubscriber

All Known Implementing Classes:
AQjmsConsumer

public interface MessageConsumer

A client uses a MessageConsumer object to receive messages from a destination. A MessageConsumer object is created by passing a Destination object to a message-consumer creation method supplied by a session.

MessageConsumer is the parent interface for all message consumers.

A message consumer can be created with a message selector. A message selector allows the client to restrict the messages delivered to the message consumer to those that match the selector.

A client may either synchronously receive a message consumer's messages or have the consumer asynchronously deliver them as they arrive.

For synchronous receipt, a client can request the next message from a message consumer using one of its receive methods. There are several variations of receive that allow a client to poll or wait for the next message.
Monitoring Staging

• Message delay
• Message expiration
• Retry delay
• Garbage collection for the queue table
• Retention and Message History
• Cleaning Up Message Queues
• Tracking and Event Journals
• Non-repudiation
• Queue Forwarding
DECLARE

enqueue_options  DBMS_AQ.enqueue_options_t;
message_properties  DBMS_AQ.message_properties_t;
message_handle  RAW(16);
message  test.message_typ;

BEGIN

message := test.message_typ(001, 'MESSAGE 1', 'First message to adm_queue');

DBMS_AQ.ENQUEUE(

queue_name  => 'aqadmin.adm_queue',
enqueue_options  => enqueue_options,
message_properties  => message_properties,
payload  => message,
msgid  => message_handle

);

COMMIT;

END;
Programming AQ

PROCEDURE MqAddSubscriber(ipMqUser IN VARCHAR2,
  ipPropagType IN BINARY_INTEGER DEFAULT 1,
  ipQueue IN VARCHAR2 DEFAULT '0LSHIPSREG2',
  ipDest IN VARCHAR2 DEFAULT '0LSHIPSREG2' IS
BEGIN
  dbms_mqadm.add_subscriber(subscriber_id => ipMqUser,
    propagation_type => ipPropagType,
    queue_name => ipQueue,
    destination => ipDest );
EXCEPTION
  WHEN OTHERS THEN null;
END;

PROCEDURE setConnectInfo(ipUser IN VARCHAR2 DEFAULT 'MQMAKER',
  ipPwd IN VARCHAR2 DEFAULT 'MQMAKER',
  ipDatabase IN VARCHAR2 DEFAULT 'CDEMQUEV') IS
BEGIN
  dbms_mqadm.db_connect_info(
    username => ipUser,
    password => ipPwd,
    database => ipDatabase );
EXCEPTION
  WHEN OTHERS THEN
    DBMS_OUTPUT.put_line(SQLERRM);
END;

PROCEDURE create_queue_table(ipQueueTableName IN VARCHAR2,
  ipQueueName IN VARCHAR2) IS
BEGIN
  null;
EXCEPTION
  WHEN OTHERS THEN

Using AQ with MQ
Using AQ with Websphere MQ

- MQe
- IBM SMF
- IBM JVM

Secure transactions

Install and maintain software

Operate over secure, optimized, fragile network connections

IBM WAS

Server Side Application

IBM WAS: IBM WebSphere Application Server

IBM SMF: IBM Service Management Framework

IBM JVM: IBM Java Virtual Machine
DECLARE
  l_options  sys.mgw_properties;
  l_prop     sys.mgw_mqseries_properties;
  l_qtype_in VARCHAR2(12) := 'INBOUND';
  l_qtype_out VARCHAR2(12) := 'OUTBOUND';
BEGIN
  l_options := sys.mgw_properties(sys.mgw_property('MQ_SendExit', 'CDEMQDEVSendExit'));
  l_prop := sys.mgw_mqseries_properties.construct();
  l_prop.max_connections := 1;
  l_prop.queue_manager := 'MQ_NYCMGW_A7';
  l_prop.hostname := 'researchportal.adncorp.com';
  l_prop.port := 1724;
  l_prop.channel := 'OLSS.HIPAA1.UPDATE';
  l_prop.username := 'WEBMQUAT';
  l_prop.password := NULL;
  l_prop.inbound_log_queue := funGetQueueName(l_qtype_in);
  l_prop.outbound_log_queue := funGetQueueName(l_qtype_out);
  DBMS_MGWADM.CREATE_MSGSYSTEM_LINK(
      LINKNAME => 'MQS_CDEMQQUAT',
      PROPERTIES => l_prop,
      OPTIONS => l_options
  );
  DBMS_MGWADMREGISTER_FOREIGN_QUEUE(NAME => 'OLSS.HIPAA1.UPDATE.REQUESTQ2',
                                      LINKNAME => 'MQS_IPG_LINK1',
                                      PROVIDER_QUEUE => 'OLSS.HIPAA1.UPDATE.REQUESTQ2',
                                      OPTIONS => MGW_PROPERTIES(MGW_PROPERTY('MQ_openOptions', '1724'),
                                                   COMMENT => 'Websphere MQ Series Test on OLSS.HIPAA1.UPDATE.REQUESTQ2');
EXCEPTION WHEN OTHERS THEN
  DBMS_OUTPUT.put_line(SQLERRM);
END;
DECLARE
    lv_options    sys.mgw_properties;
    lv_prop       sys.mgw_mqseries_properties;
BEGIN
    lv_options := sys.mgw_properties(sys.mgw_property('MQ_SendExit', 'ADNMQDEVSendExit'));
    lv_prop    := sys.mgw_mqseries_properties.construct();
    lv_prop.max_connections := 1;
    lv_prop.queue_manager    := 'MQ_NYCGW_A10';
    lv_prop.hostname        := 'portal.adncorp.com';
    lv_prop.port            := 1414;
    lv_prop.channel        := 'MQIIH.ADN1.UPDATE';
    lv_prop.username       := 'WEBMQADN';
    lv_prop.password       := NULL;
    DBMS_MGWADM.CREATE_MSGSYSTEM_LINK(LINKNAME => 'MQS_IPC_LINK1',
                                        PROPERTIES => lv_prop,
                                        OPTIONS => lv_options);
    DBMS_MGWADM.REGISTER_FOREIGN_QUEUE(NAME => 'MQIIH.ADN1.UPDATE_REQUESTQ2',
                                         LINKNAME => 'MQS_IPC_LINK1',
                                         PROVIDER_QUEUE => 'MQIIH.ADN1.UPDATE.REQUESTQ2',
                                         OPTIONS => MGW_PROPERTIES(MGW_PROPERTY('MQ_openOptions', '1414'),
                                                      COMMENT => 'MQ Series Test on MQIIH.ADN1.UPDATE.REQUESTQ2');
EXCEPTION
    WHEN OTHERS THEN
        DBMS_OUTPUT.put_line(SQLERRM);
END;
Using AQ with Websphere MQ

DECLARE
  lv_options sys.mgw_properties;
  lv_prop sys.mgw_mqseries_properties;
BEGIN
  lv_options := sys.mgw_properties(sys.mgw_property('MQ_SendExit','CDEMODEVSendExit'));
  lv_prop := sys.mgw_mqseries_properties.construct();
  lv_prop.max_connections := 1;
  lv_prop.queue_manager := 'MQ_ALBUGS_09';
  lv_prop.hostname := 'rscdd01.empireblue.com';
  lv_prop.port := 1414;
  lv_prop.channel := 'OL33.HIPAA3.UPDATE';
  lv_prop.userid := 'WEBMODEV';
  lv_prop.password := NULL;
  lv_prop.inbound_log_queue := 'OLSS.HIPAA3.UPDATE.REQUESTQ2';
  lv_prop.outbound_log_queue := 'OLSS.HIPAA3.UPDATE.REQUESTQ2';
  DBMS_MGWADM.REGISTER_FOREIGN_QUEUE(NAME => 'OLSS.OLSSHIP3REQ2',
                                       LINKNAME => 'MGW_AGENT');
EXCEPTION
  WHEN OTHERS THEN
    DBMS_OUTPUT.put_line(SQLERRM);
END;

DECLARE
  lv_options sys.mgw_properties;
  lv_prop sys.mgw_mqseries_properties;
BEGIN
  lv_options := sys.mgw_properties(sys.mgw_property('MQ_SendExit','CDEMODEVSendExit'));
  lv_prop := sys.mgw_mqseries_properties.construct();
Using Database and Grid Control

Streams

<table>
<thead>
<tr>
<th>Select</th>
<th>Queue Name</th>
<th>Queue Table Name</th>
<th>Schema</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>ALERT_QUE</td>
<td>ALERT_QT</td>
<td>SYS</td>
<td>Normal Queue</td>
</tr>
<tr>
<td>☐</td>
<td>AQ$_ALERT_QT_E</td>
<td>ALERT_QT</td>
<td>SYS</td>
<td>Exception Queue</td>
</tr>
<tr>
<td>☐</td>
<td>AQ$_AQ$_MEM_MC_E</td>
<td>AQ$_MEM_MC</td>
<td>SYS</td>
<td>Exception Queue</td>
</tr>
<tr>
<td>☐</td>
<td>AQ$_AQ_EVENT_TABLE_E</td>
<td>AQ_EVENT_TABLE</td>
<td>SYS</td>
<td>Exception Queue</td>
</tr>
<tr>
<td>☐</td>
<td>AQ$_AQ_SRVNTFN_TABLE_E</td>
<td>AQ_SRVNTFN_TABLE</td>
<td>SYS</td>
<td>Exception Queue</td>
</tr>
<tr>
<td>☐</td>
<td>AQ$_DEF$_AQCALL_E</td>
<td>DEF$_AQCALL</td>
<td>SYSTEM</td>
<td>Exception Queue</td>
</tr>
</tbody>
</table>
Advanced Strategies

WebLogic Server
Advanced Strategies

• Information Dissemination Techniques
  • Queue Forwarding.
  • Apply Forwarding.
Advanced Strategies

• 1:N Replication/Multi-propagation Architecture
  • One source queue can propagate to multiple destination queues.
  • Useful for High-Availability and Load Balancing.
Advanced Strategies

• **N:N Replication Infrastructure**
  - Normally using several queues and databases, involving transactional, transformational and non-repudiation queues.
  - Usually, involving bidirectional information dissemination using inbox and outbox message propagation.
Advanced Strategies

- Hub-and-Spoke Propagation Architecture
  - One source queue can propagate to a hub, usually in a transactional or transformational fashion, which then propagates to multiple destination queues, thus minimizing overhead.
Advanced Strategies

- OCI- and Precompiler-based Custom Implementation
- RAC-Support (best strategy for the large enterprise)
- Message Priority
Managing Encryption

• Asymmetric authentication via PKI
  • The producer application encrypts the message payload prior to enqueuing.
  • The consumer application knows the key and decrypts the message.
  • Transparent Data Encryption (TDE), using also Oracle wallet.
  • Encryption can be congruent with payload transformation.
## AQ Background Processes

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Process Name</th>
<th>Description</th>
<th>Required for basic DB operation</th>
<th>Started by default</th>
<th>New in 11g</th>
</tr>
</thead>
<tbody>
<tr>
<td>QMNC</td>
<td>AQ Coordinator Process</td>
<td>Monitors message queues. Spawns Qnnn slave processes.</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Qnnn</td>
<td>AQ Server Class Process</td>
<td>Processes messages in the Streams AQ queue. Spawned by QMNC.</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Industries of Application

- Financial Sector
  - Banking
  - Trading
- E-Business (SCM, e.g., B2B transactions)
- E-Business (CRM, e.g., Order Entry)
- Direct Marketing
- Media and communications
Related Technologies

- Agile
- ADF
- SOA
- Web Services Security and Transaction
- Oracle Streams
- Oracle Data Integration
- Oracle Advanced Replication
- RPC
HS Data Warehousing

- ETL vs. E-LT
- ETL
  - Row-by-row processing
- E-LT
  - Bulk load and transformation
  - Load and transformation order as needed.
Oracle Data Integration

ODI Basic Model
Oracle Data Integrator

ODI Studio Physical Architecture

<table>
<thead>
<tr>
<th>Physical Architecture</th>
<th>Definition</th>
<th>Context</th>
<th>Version</th>
<th>Privileges</th>
<th>FlexFields</th>
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<tbody>
<tr>
<td>LDAP</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Microsoft Access</td>
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<tr>
<td>Microsoft Excel</td>
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<td></td>
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<tr>
<td>Microsoft SQL Server</td>
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<tr>
<td>MySQL</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>NetRexx</td>
<td></td>
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<tr>
<td>Netezza</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Operating System</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Oracle</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>ORACLE_CDC_SRC</td>
<td></td>
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<tr>
<td>ORACLE_CDC_PROD</td>
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<tr>
<td>ORACLE_DW</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>ORACLE_DR</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ORACLE_JOB</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Index Types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Datatypes</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Oracle BAM</td>
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<tr>
<td>Paradox</td>
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<tr>
<td>PostgreSQL</td>
<td></td>
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<tr>
<td>Progress</td>
<td></td>
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<tr>
<td>SAP Java Connector</td>
<td></td>
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<tr>
<td>SAS</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Schema [Data Server: ORACLE_DW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: ORACLE_DW.OOW_HOL_DW</td>
</tr>
<tr>
<td>Schema (Schema): OOW_HOL_DW</td>
</tr>
<tr>
<td>Schema (Work Schema): OOW_HOL_DW</td>
</tr>
<tr>
<td>Work Tables Prefix</td>
</tr>
<tr>
<td>Errors: E_</td>
</tr>
<tr>
<td>Loading: C_</td>
</tr>
<tr>
<td>Integration: I_</td>
</tr>
<tr>
<td>Temporary Indexes: IX_</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Journalizing elements prefixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datastores: J$</td>
</tr>
<tr>
<td>Views: JV$</td>
</tr>
<tr>
<td>Triggers: T$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Naming Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Object Mask: %SCHEMA.%OBJECT</td>
</tr>
<tr>
<td>Remote Object Mask: %SCHEMA.%OBJECT@%DSERVER</td>
</tr>
<tr>
<td>Partition Mask:</td>
</tr>
<tr>
<td>Sub-Partition Mask:</td>
</tr>
<tr>
<td>Local sequence mask:</td>
</tr>
</tbody>
</table>
ODI Workspace and Architecture
Oracle Data Integrator

ODI Studio Physical Architecture
Oracle Data Integrator
Oracle Data Integrator

ODI Studio Designer
Integrated Capture
Enabling customers to efficiently capture changed data in high-volume and high-throughput implementations.

Oracle Advanced Compression Support
Permitting the capture and delivery of compressed objects within Oracle Database 11g and Oracle Exadata environments, an important feature for virtual and cloud environments.
Oracle Golden Gate: Features

Best in class performance new features:

- **More Powerful Conflict Detection and Resolution**, enabling faster conflict resolution.
- **Increased Security**, support for the Federal Information Protection Standard (FIPS) and Blowfish encryption algorithms enabling secure data movement across systems and regions.
- **Increased support for business-critical and heterogeneous systems**, including multi-byte Unicode Support.
- **Expanded Platform Support**: Provides support for capture from, and delivery to, IBM DB2 on iSeries and enhanced support for MySQL, Microsoft SQL Server, Sybase, Teradata, and IBM DB2 z/OS.
- **Expanded management capabilities** via its Plug-In for Oracle Enterprise Manager 12c.
The conjoint usage of Oracle Data Integrator and Oracle Golden Gate provides a major data integration model, whose impact and benefit on business intelligence are rather unlimited. Some of the most important areas of application involve, namely:

- Business Intelligence Analytics
- Data Mining
- Forecasting
- Cloud Virtualization resource management, including support for VMWare Server and Oracle Virtual Box.
Oracle Golden Gate

[oracle@pts Oracle_GoldenGate]$ ggsci

Oracle GoldenGate Command Interpreter for Oracle
Version 11.1.1.0.0 Build 078
Linux, x86, 32bit (optimized), Oracle 10 on Jul 28 2010 13:24:18

Copyright (C) 1995, 2010, Oracle and/or its affiliates. All rights reserved.

GGSCI (pts.us.oracle.com) 1> start rmastr
REPLICAT RMASTR is already running.

GGSCI (pts.us.oracle.com) 2> start emastr
Sending START request to MANAGER ...
EXTRACT EMASTR starting

GGSCI (pts.us.oracle.com) 3> ![Console output]
## Oracle Golden Gate

### GGSCI Command Summary

<table>
<thead>
<tr>
<th>Object</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBDIRS</td>
<td>CREATE</td>
</tr>
<tr>
<td>ER</td>
<td>INFO, KILL, LAG, SEND, STATUS, START, STATS, STOP</td>
</tr>
<tr>
<td>EXTRACT</td>
<td>ADD, ALTER, CLEANUP, DELETE, INFO, KILL, LAG, SEND, START, STATS, STATUS, STOP</td>
</tr>
<tr>
<td>EXITTRAIL</td>
<td>ADD, ALTER, DELETE, INFO</td>
</tr>
<tr>
<td>GGSEVT</td>
<td>VIEW</td>
</tr>
<tr>
<td>MANAGER</td>
<td>INFO, SEND, START, STOP, STATUS</td>
</tr>
<tr>
<td>MARKER</td>
<td>INFO</td>
</tr>
<tr>
<td>PARAMS</td>
<td>EDIT, VIEW</td>
</tr>
<tr>
<td>REPLICAT</td>
<td>ADD, ALTER, CLEANUP, DELETE, INFO, KILL, LAG, SEND, START, STATS, STATUS, STOP</td>
</tr>
<tr>
<td>REPORT</td>
<td>VIEW</td>
</tr>
<tr>
<td>RMTTRAIL</td>
<td>ADD, ALTER, DELETE, INFO</td>
</tr>
<tr>
<td>TRACETABLE</td>
<td>ADD, DELETE, INFO</td>
</tr>
<tr>
<td>TRANDATA</td>
<td>ADD, DELETE, INFO</td>
</tr>
<tr>
<td>CHECKPOINTTABLE</td>
<td>ADD, DELETE, CLEANUP, INFO</td>
</tr>
</tbody>
</table>

### Commands without an object:

- **(Database)**
  - DBLOGIN, LIST TABLES, ENCRYPT PASSWORD
- **(DDL)**
  - DUMPDDL
- **(Miscellaneous)**
  - FC, HELP, HISTORY, INFO ALL, OBHEY, SET EDITOR, SHELL, SHOW, VERSIONS, ! (note: you must type the word COMMAND after the ! to display the ! help topic.)

  *i.e.: GGSCI (sys1)> help ! command*
GGSCI (pts.us.oracle.com) 5> HELP ADD REPLICAT

ADD REPLICAT

Use ADD REPLICAT to create a Replicat group. Unless SPECIALRUN is specified, ADD REPLICAT creates checkpoints so that processing continuity is maintained from run to run. Before creating a Replicat group, review the Oracle GoldenGate Windows and UNIX Administrator's Guide.

The Oracle GoldenGate GGSCI command interface fully supports up to 300 concurrent Extract and Replicat groups per instance of Oracle GoldenGate Manager. At the supported level, all groups can be controlled and viewed in full with GGSCI commands such as the INFO and STATUS commands. Beyond the supported level, group information is not displayed and errors can occur. Oracle GoldenGate recommends keeping the number of Extract and Replicat groups (combined) at 300 or below in order to manage your environment effectively.

Syntax:

ADD REPLICAT <group name>
{
  , SPECIALRUN | , EXTFILE <full path name> | , EXTTRAIL <full path name>
Oracle Golden Gate

OGG and Oracle database

ORAcle Technology NETWORK
# Key Recommendations

<table>
<thead>
<tr>
<th>Category</th>
<th>Feature</th>
<th>AQ</th>
<th>ODI</th>
<th>OGG</th>
<th>ODI-OGG</th>
<th>AQ-ODI-OGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>User's Skills</td>
<td>Programming Skills</td>
<td>Recommended</td>
<td></td>
<td></td>
<td></td>
<td>Recommended</td>
</tr>
<tr>
<td></td>
<td>Admin Skills</td>
<td></td>
<td>Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td>Data Center Size</td>
<td>Large Data Center and Cloud</td>
<td>Recommended</td>
<td></td>
<td></td>
<td></td>
<td>Recommended</td>
</tr>
<tr>
<td></td>
<td>Midsize IT environments</td>
<td>Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td>Workflow Type</td>
<td>Big Data from Social Media</td>
<td>Recommended</td>
<td>Recommended</td>
<td></td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transactional</td>
<td></td>
<td>Recommended</td>
<td></td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Archiving and Logging</td>
<td>Recommended</td>
<td>Recommended</td>
<td></td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mail and Document Management</td>
<td>Recommended</td>
<td></td>
<td></td>
<td></td>
<td>Recommended</td>
</tr>
<tr>
<td></td>
<td>Data Type Requirements</td>
<td>Recommended</td>
<td></td>
<td></td>
<td></td>
<td>Recommended</td>
</tr>
</tbody>
</table>


[Image: ORACLE CERTIFIED PROFESSIONAL LOGO]
IT Convergence

Oracle Database Appliance
IT Convergence

Middleware and Business Applications

- WebLogic
  - Exabus Integration
- Coherence
  - Exabus Integration
- Tuxedo
  - Exabus Integration
- Traffic Director
  - Exabus Integration
- Exalogic Control
  - Exabus Integration

Oracle Linux Guest OS
- Oracle VM 3.x for Exalogic

Exalogic Elastic Cloud X2-2 Hardware

Bare-metal
Oracle Linux/Solaris

Exabus

= Exalogic Elastic Cloud Software

Oracle Exalogic Elastic Cloud

Oracle Certified Professional

Oracle Technology Network

ADN
## IT Convergence

### Exadata Machine Capacity

<table>
<thead>
<tr>
<th></th>
<th>Database Machine X2-8 and X2-2 Full Rack</th>
<th>Database Machine X2-2 Half Rack</th>
<th>Database Machine X2-2 Quarter Rack</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exadata Smart Flash Cache</strong></td>
<td>5.3 TB</td>
<td>2.6 TB</td>
<td>1.1 TB</td>
</tr>
<tr>
<td><strong>Raw Disk Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High Performance SAS</td>
<td>100 TB</td>
<td>50 TB</td>
<td>21 TB</td>
</tr>
<tr>
<td>• High Capacity SAS</td>
<td>336 TB</td>
<td>168 TB</td>
<td>72 TB</td>
</tr>
<tr>
<td><strong>Useable Capacity</strong></td>
<td>Up to</td>
<td>Up to</td>
<td>Up to</td>
</tr>
<tr>
<td>• High Performance SAS</td>
<td>45 TB</td>
<td>22.5 TB</td>
<td>9.25 TB</td>
</tr>
<tr>
<td>• High Capacity SAS</td>
<td>150 TB</td>
<td>75 TB</td>
<td>31.5 TB</td>
</tr>
<tr>
<td>(without data compression)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Future Expectations

1. Define an integration model and underlying infrastructure topology
2. Define the set of data sources and data capture methods
3. Define the staging and propagation methods, including channels and workflow buses and baselines, if any is relevant
4. Predict model changes and relevant analytics for best integration

- Who
- Where
- When
- Extent
- How
- How much
Future Expectations

5. Provide a consumption model that is transparent to the cloud platform, operating systems, physical and virtual database environments, file systems, and even storage networking technologies involved. This model should support any of SaaS, PaaS, IaaS cloud paradigms.

6. Establish the collaboration, coordination, and enterprise management control models.

7. Maintain a secure big data workflow and integration model with a solid quality of service (QoS) and quality assurance (QA) approach.
Concluding Remarks

• Workflow and big data integration innovation and modernization convey the implementation of an agile business process model using ETL and E-LT for faster processing in a sustainable fashion through its life cycle.

• The Streams AQ message queuing paradigm can be integrated with tools such as Oracle Data Integrator and Oracle Golden Gate for successful workflow and big data integration, but it can also be surpassed due to increasing Big Data requirements from social media, mobile applications, web and cloud services.
Thank you!

• Please visit my blog at:
  » http://noriegaoracleexpert.blogspot.com
• anthonydnnoriega@gmail.com