

Customer Data Management: Single Source of Truth

TCA

Data Quality Management

Customer Data Hub

Fusion Middleware

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Introduction

Customer information is the lifeblood of any organization. Obtaining and maintaining that information is an increasingly complex task due to the expanding channels for customer interaction and expanding volumes of information to be managed. Lacking accurate and comprehensive customer data can directly result in lost sales or higher costs.

Given the broad user base for customer information, data is often stored across many systems. Sales representatives often use a completely different customer master than Order Administration, Marketing, or Customer Service. The common result is that nobody within an organization has a complete view of all customer data points.

This purpose of this paper is to explain how Oracle Applications can effectively be used to capture, cleanse, distribute and analyze customer data stored within the E-Business Suite, or across many disconnected systems. The primary application modules and functionality will be explained, and a sample process for customer data management will be outlined.

Modeling Customer Data in the TCA

What is TCA, the Trading Community Architecture? This is a common question, and there are often many answers given. Is TCA an Oracle Applications module? Is it functionality within an Oracle module? The TCA is a data model that supports the entry and management of entities that you interact with. These entities can include customers, individuals, customer locations, distributors, resellers, brokers, agents, etc. Additionally, the TCA model stores relationships between entities. Data can be stored about each entity, as well as the about the relationships between entities. Oracle Applications interact with the underlying TCA data model through various functions, such as entering contacts, or merging duplicate records. There are several application modules that interact with the data stored in the TCA, including Sales, Marketing, Receivables, Customers Online, etc.

Some of the key features of the TCA structure include the following:

- Provides a foundation for a single source for customer information.
- Ability to represent all business entities as a "Party" (organizations, people, groups, relationships) and to handle them the same way. This approach provides flexibility to accommodate all B2B, B2C and hybrid models in the same repository.
- Many-to-many relationships between Parties and Locations, that allows for less duplication and easier updating.
- Capability for advanced relationship modeling between entities within the trading community. Any party can figure in any number of Party Relationships even within matrix hierarchies (relationship networks).
- Ability to setup and maintain any number of party classifications which can be used for reporting and assignment purposes.
- Extensible data model to enable various business data requirements.

The primary types of entities stored in the TCA are Party, Account, and Relationships. Each of these is defined below.

Party

In the TCA model, a Party is an entity that exists independently from its business relationships but can enter into business relationships. For example, the party created to represent your customer would contain information about the customer that is unrelated to their business with your organization. This might include their physical address, standard industry classification, D&B number, or number of employees.

Using the party concept, TCA enables you to separate the independent characteristics of a customer, from the interactions you have with that organization. This structure allows you to restrict various people throughout your organization from access certain customer data. For example, someone in marketing or sales can be prevented from updating a customer's payment terms or credit limit. Additionally, by defining each entity in your Trading Community only once, regardless of the different interactions you might have with them, provides you with a full 360-degree view of your customer.

The TCA model contains profile characteristics of a party (who/what they are), what their association/relationship with other parties is, where they are located, what the locations are used for, how to get in touch with them, how they are classified and more.

TCA locations are addresses where your customers reside and/or conduct business. When a location is associated with a party, then it is referred to as a party site or address. Each party site can have a specific party site use or purpose (e.g. Bill-to, Ship-to, etc.). A Party Site Use denotes how a particular Party Site is to be used throughout the Oracle Applications.

Account

A customer account defines the characteristics of the selling relationship between you and your customer. The account has information about the terms and conditions of doing business with the party, where you do business with the party, whom you contact, etc.

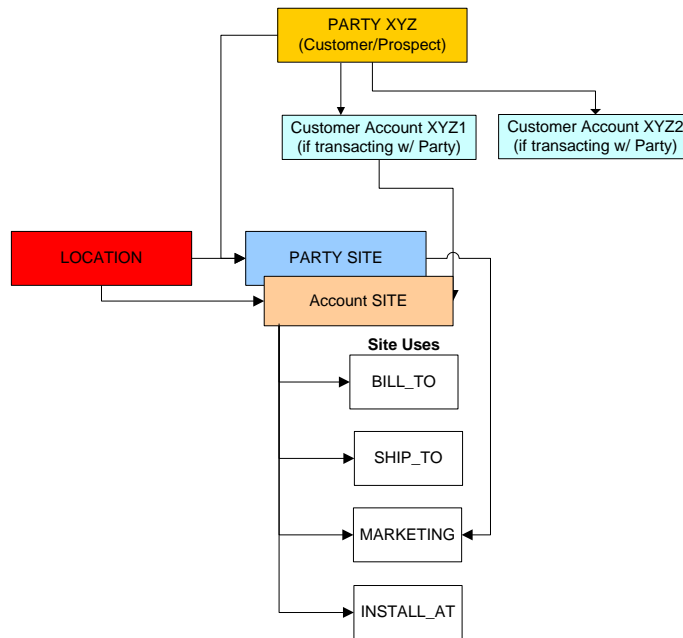
Prior to the TCA model being introduced, an Account is what was usually referred to as a Customer within Oracle terminology. Today, it is still common for Account and Customer to be used interchangeably. However, it is important to be clear that within the TCA structure, a customer account is really defining your selling relationship with a customer, not just the customer itself. The customer itself and their independent attributes are captured as a party entity, as described above.

You can create multiple customer accounts for a party to maintain information about categories of business activities. For example, you can also maintain multiple customer accounts for a customer that transacts business with more than one line of business in your organization. Within each line of business, you may have different customer profiles, addresses, and contacts for each customer account.

When party sites are used in the context of customer accounts for specific purposes, or uses, for example ship-to and bill-to, they are referred to as Account Sites. When an Account is created for a Party, Party Site can be pulled down to the Account level to be used as an Account Site.

For a given Account Site, one or more Account Site Uses can exist depending on how this site will be used in the context of Account level transactions.

The diagram below illustrates how parties and associated accounts can be structured within the TCA.

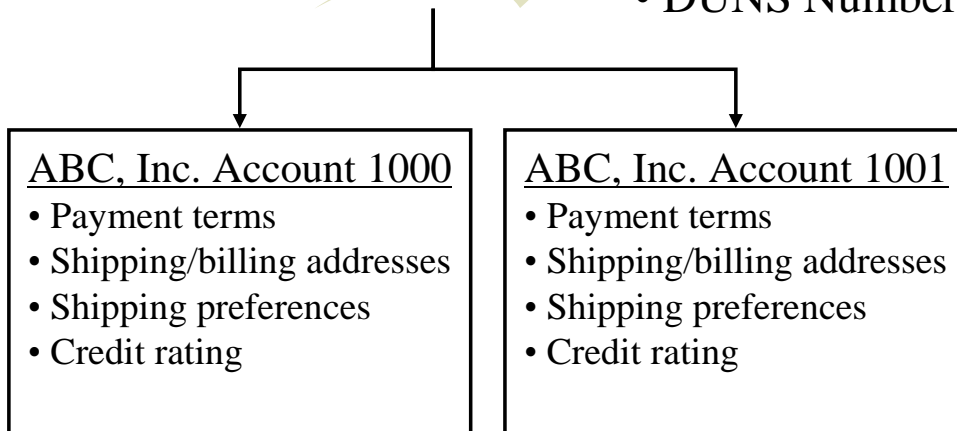


The diagram below illustrates how various party attributes and account attributes can be stored at their respective levels within the TCA.



ABC, Inc. Party Attributes

- Name
- Address
- Taxpayer ID
- Classifications
- DUNS Number



Party Relationships

The TCA relationship model lets you record complex, real-life relationships among entities in the TCA Registry. You can analyze not only direct relationships such as those with your competitors, but also indirect ones such as your customers' customers. You can also manage hierarchical relationships to better understand, for example, the management hierarchy within an organization.

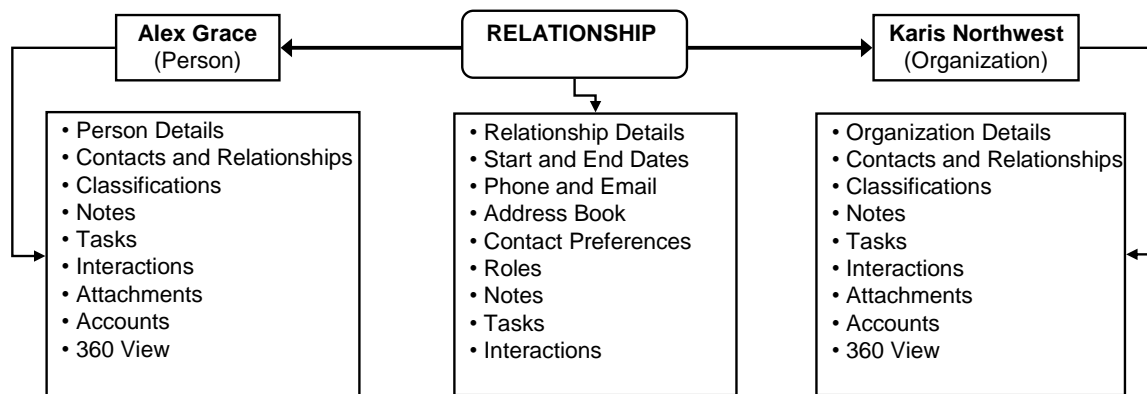
An example is the contact that is a TCA party of type 'Person' and who has a contact or employment relationship with an organization or person. Contact points are the means of contact, for example, phone and e-mail address.

A contact communicates for or acts on behalf of a party or customer account. A contact can exist for a customer at the account or address level. A person usually acts as a contact for an organization, but can also be a contact for another person. For example, an administrative assistant could be the contact for an executive.

A relationship represents the way two entities interact with each other, based on the role that each entity takes with respect to the other. For example, the employment relationship between a person and an organization is defined by the role of the person as the employee and the organization as the employer.

Attributes can be stored about a relationship itself. This allows you to interact with a party differently, depending on whether another party is also involved in a transaction. For example, if Joe is an agent for Company A and Company B, you may wish to interact with Joe differently depending on which company he is representing. Within the TCA, you can store data attributes that are specific to Joe, as well as attributes specific to Joe's relationship with Company A and his relationship with Company B.

The diagram below illustrates an example of how two entities can be related within the TCA, and how data about that relationship can be stored.



Examples of Relationship Types

Karis Northwest ~ *Subsidiary of* ~ Karis Enterprises, Inc.

Karis Northwest ~ *Partner of* ~ Fisher, Inc.

Karis Northwest ~ *Competitor of* ~ AG Corporation

Andrew Stoughton ~ *Employee of* ~ Karis Northwest

Michael Arnold ~ Reseller for Alex Grace

Michael Arnold ~ Reseller for ~ Karis Northwest

Customer Data Management

All activities associated with compiling and maintaining the customer master data is described as Customer Data Management (CDM). The best-practice implementation of the CDM process should to address four critical characteristics of enterprise customer data as much as possible and practical:

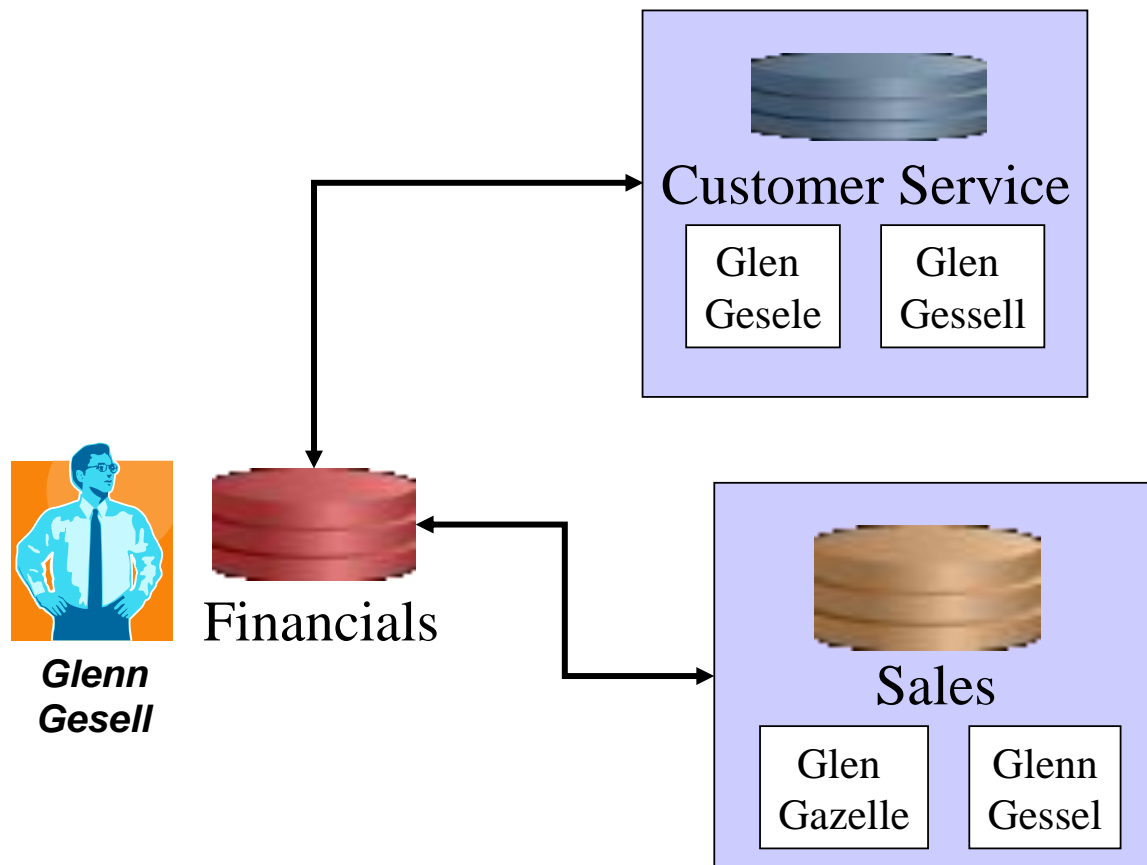
- Consolidated
- Clean/Standardized
- Complete
- Coordinated/ Synchronized

For many organizations, customer data fragmentation, resulting redundancies and inaccuracies have been some of the greatest challenges in maintaining meaningful customer knowledge. Customer data is available in a number of different enterprise applications, but is not dependable in many cases. Additionally, costs of maintaining separate customer masters can be significant.

Disparate customer masters result in:

- Inaccuracies
- Duplicates
- Fragmentation

The diagram below illustrates a common scenario in which multiple records stored across several applications are really representing the same customer. However, because of the duplication and inconsistency of the data, the records do not provide useful information.



In order to address this most fundamental requirement for Customer Data, Oracle provides a common data model that is accessible by all Oracle and non-Oracle business applications.

Several Customer Data Management (CDM) components are utilized for to maintain and manipulate the customer data stored within the TCA. The primary CDM components include Customers Online, Data Quality Management, and Customer Data Hub. Each of these is described below.

Oracle Customers Online (OCO)

Oracle Customers Online lets you view, create, import, and maintain your customer records. It is one of two primary user interfaces provided by Oracle for manually viewing and updating customer data (The other interface is the Customer Entry form within the Receivables module).

Several key features and uses of Customers Online are outlined below.

- View, create, or update any information within the TCA, such as customers, contacts, addresses, relationships, or classifications.

Customer Inquiry Screen

- View comprehensive list of customer transactions captured throughout the E-Business Suite, including sales orders, invoices, service requests, etc. The supporting data model allows for the storing of transactions processed in external systems as well.

- Overview
- Profile
- Classifications
- Addresses
- Contact Points
- Relationships
- Accounts
- Transactions**
- Notes
- Tasks
- Attachments
- Interactions
- Source Systems

Customers: Organizations: Classifications > Assign Customer 1987 edition of U.S. Industrial Classification Codes: Select Dates >

Business World: Transactions

You may select a particular transaction type to view a specific transaction history or click on List View button to see a complete list of business transactions.

Select

* Transaction Type **ALL**

Campaigns

Campaign Name	Time	Source Code	Start Date	End Date	Activity	Objective	Target Group
No data exists.							

Events

Name	Event Type	Source Code	Start Date	End Date	Venue	Invited	Registered	Attended	Contact
Broken Promises	Trade Show	AMER02020003	01-JAN-2002	30-JUN-2004	DUMMY	Yes	No	No	Brenda Johnson
Vision Computers Expo 2002	Trade Show	AMER02020003	01-JAN-2002	30-JUN-2004	DUMMY	Yes	No	No	Lisa Branch
Vision Computers Expo 2002	Trade Show	AMER02020003	01-JAN-2002	30-JUN-2004	DUMMY	Yes	No	No	Michelle Baker
Vision Computers Expo 2002	Trade Show	AMER02020003	01-JAN-2002	30-JUN-2004	DUMMY	Yes	No	No	Albert King
Vision Computers Expo 2002	Trade Show	AMER02020003	01-JAN-2002	30-JUN-2004	DUMMY	Yes	No	No	Jim Yen

Leads

Lead Name	Contact Name	Creation Date	Status	Source	Timeframe	Budget Amount	Budget Status	Rank	Channel	Accepted	Qualified	Close Reason
KK_Lead	Andre Beaulie	31-JAN-2007	Converted to Opportunity		Within 1 Week		Pending	Hot Lead	Direct	N	N	N
DD_Lead	Andre Beaulie	31-JAN-2007	Converted to Opportunity		Within 1 Week		Pending	Hot Lead	Email	N	Y	N
New Business World Assembled Computer Lead		25-FEB-2002	Converted to Opportunity		6 - 12 Months		Pending	Cold Lead	Direct	N	Y	Y
Call Center Special		28-FEB-2002	Converted to Opportunity	Sentinel Peripherals Promotion	1 - 3 Months	100,000.00 USD	Approved		Direct	N	Y	N
Network Sales Solution	Fabrizio Verdi	08-FEB-2002	Converted to Opportunity		Within 1 Month	50,000.00 USD	Not Approved	Hot Lead	Direct	N	Y	N

Opportunities

Customer Transactions Inquiry Screen

Orders

Account Number	Customer Name	Sales Order	Customer PO	Order Type	Category	Date Ordered	Requested Ship Date	Status
1608	Business World	51854		Order Only	Order	02-APR-2002	02-APR-2002	Closed
1608	Business World	51860		Order Only	Order	02-APR-2002	02-APR-2002	Closed
1608	Business World	10638		Web	Mixed	02-APR-2002	02-APR-2002	Closed
1608	Business World	10666		Web	Mixed	04-APR-2002	04-APR-2002	Closed
1608	Business World	51872		Order Only	Order	03-APR-2002	03-APR-2002	Closed

Debit Items

Account Number	Transaction Number	Type	Status	Transaction Date	Due Date	Purchase Order	Sales Order	Currency Code	Original Amount	Remaining Amount
1608	10008335	Invoice	Closed	20-FEB-2002	22-MAR-2002		10263	USD	20,605.42	0.00
1608	10008311	Invoice	Closed	20-FEB-2002	22-MAR-2002		51309	USD	36,179.32	0.00
1608	10008325	Invoice	Closed	20-FEB-2002	22-MAR-2002		51334	USD	21,445.75	0.00
1608	10008347	Invoice	Closed	21-FEB-2002	23-MAR-2002		51336	USD	36,179.32	0.00
1608	10008367	Invoice	Closed	21-FEB-2002	23-MAR-2002		51359	USD	21,445.75	0.00

Customer Sales Orders and Invoice Details

- Visualize relationships for any entity. Graphical representations of relationships between entities can be displayed, and users can navigate throughout relationships.

ORACLE [Home](#) [Logout](#) [Preferences](#)

Business World: Has Contact

Relationships

Competitor Of

Employer Of

Has Contact

Display Options

Rings: - +

Details

Right click on a node to display overview page

Focus on Root

Left-click on a node to navigate and display relationships. Right-click on a node to view the specific customer overview page

Customer Relationship Visualization Screen

Data Quality Management

Data Quality Management (DQM) provides functionality to establish and maintain an accurate, duplicate-free, and complete customer database. DQM also includes tools to ensure completeness of your customer data by integrating to best-in-class enrichment content providers like Dun & Bradstreet.

Two primary functions within DQM are data transformations and word replacements. Each of these is described in more detail below.

- Transformations – Oracle EBS includes approximately 40 seeded DQM transformations. Custom transformations can also be added. Transformations are used to improve queries of customer data and identification of duplicate data. Each transformation is associated with a program that transforms input values to a simpler character string that is used for comparison purposes during queries. For example, the CLEANSE transformation is used to catch incorrect vowel usage in names. This transformation strips the vowels from a name and stores the resulting character string in a separate set of staging tables that will be used to when running queries.

For example, if Oracle is stored in the TCA as a customer, the CLEANSE transformation will strip the vowels from the name and store ORCL for use in queries. When a user initiates a query with Oricle, Orucle, or Oracle, the string will be transformed to ORCL and any “matching” hits will be returned. In this case Oracle (transformed to ORCL) will be returned.

The most commonly used seeded transformations are listed in the table below.

Transformation	Purpose
CLEANSE	Correct vowel usage and typing errors
CLEANSED WORD REPLACE	Clean and replace words in names and addresses
CLUSTER	Correct spelling errors at the end of a word
EXACT	Catch formatting errors

- Word Replacements – Oracle EBS includes approximately 3000 seeded word replacements in English. Additional word replacements can be added in English or in other languages. Word replacements are used to catch common misspellings and abbreviations for various words.

For example, word replacements can be used to catch the duplicate entry of Blvd, Boulevard, and Boulv, all for the same address. Similarly, a user can enter Boulv as a search string, and return an address that is actually stored in the TCA as BLVD.

The screen shots below shows how word replacements are defined and executed.

Word Replacements

Search

Previous 10 21-30 Next 10

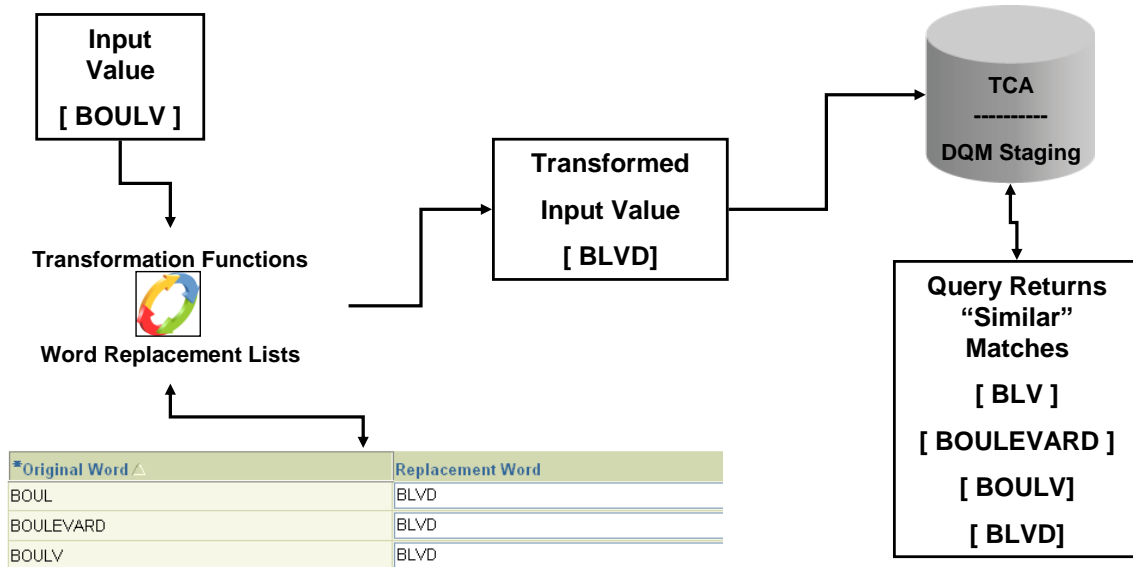
*Original Word <small>△</small>	Replacement Word
BOTTOM	BTM
BOUL	BLVD
BOULEVARD	BLVD
BOULV	BLVD
BOX	PO
BRANCH	BR
BRDGE	BRG
BRIDGE	BRG
BROOK	BRK
BROOKS	BRK

Add 5 Rows

Previous 10 21-30 Next 10

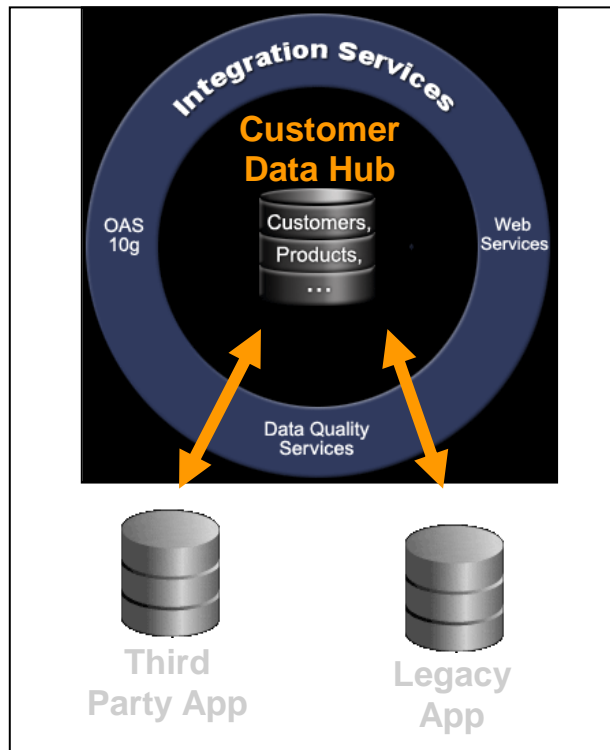
Word Replacement Setup Screen

The diagram below illustrates how word replacements are processed when entering data or queries.



Oracle Customer Data Hub (CDH)

Oracle Customer Data Hub provides the repository to centralize customer data from various source systems, providing a single view of your customers. The links between each source system and the Hub are operational and real-time. CDH includes all the TCA features, for example, to maintain source systems, and cleanse and enrich data, and also includes Oracle Customers Online. In CDH your customer data is continuously synchronized to unify all your operational and analytical systems. With the hub, your whole enterprise benefits from using a single customer identity and capturing transactions against this identity. This improves reporting accuracy, employee productivity, reliability of customer analytics and customer relationships.



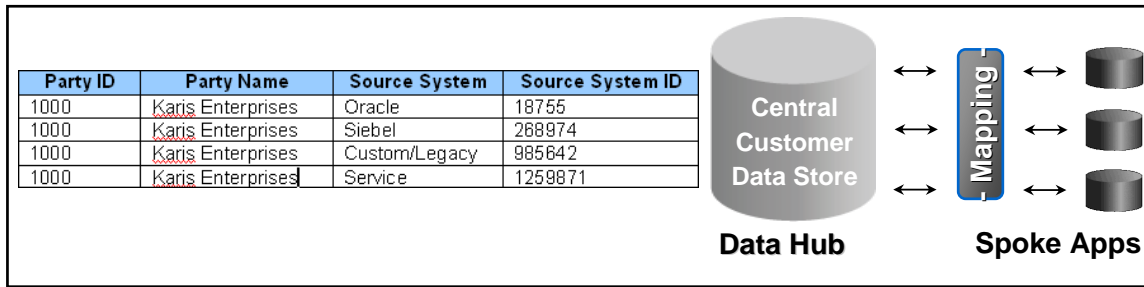
The TCA enabling infrastructure supports the business applications that interact with data stored in the CDH. This includes the EBS and external applications. The enabling infrastructure ensures that data is entered into, or extracted from, the CDH in a consistent manner, increasing data quality. The components of the enabling infrastructure include the following:

- Public APIs which ensure the integrity of the data entered into and retrieved from the database tables.
- Data Quality Management (DQM) tools which use sophisticated match rules to detect and/or resolve potential duplicate data, as outlined above.
- Third Party Content Integration which enriches or validates party data to ensure usefulness and correctness.
- Source System Management (SSM) enables linkages to any data system or application outside EBS to provide information to the TCA model.

External systems that will integrate with CDH are defined within Oracle. Adapters for transferring data to/from CDH and the external systems are then defined for each data element. Integration details are outlined in the section below.

Data stored in CDH can have multiple sources for various attributes. The tracking of each of these

attributes is managed by Source System Management.



Tracking of Data Attributes Across Systems

Source System Name	Description	Source System Code	Update
CSV Source System	CSV Source System	CSV	
D&B Source System	D&B Source System	DNB	
FND OID Synchronization	Internally used by APPS-OID Synchronization	FND_OID_SYNCH	
Default Source System Name	Default Source System Name	UNKNOWN	
Siebel	Legacy Siebel Application	SBL	

Source System Setup Screen in EBS

Source System Header

* Source System Name **Siebel**

Description **Legacy Siebel Application**

* Source System Code **SBL**

Entities

TIP Even though the source system must have at least one assigned entity, you can inactivate all entities to disallow any data from the source system.

TIP Check the box in the "Multiple Source References" column to allow multiple records from the same source to reference a single record in TCA. Once data has been loaded from a content source that allows multiple records to reference a single record in TCA, it can never be changed to only allow one record to refer a single record in TCA.

*Entity	*Status	Multiple Source References
HZ_CUST_ACCOUNTS	Active	<input type="checkbox"/>
HZ_CUST_ACCT_SITES_ALL	Active	<input checked="" type="checkbox"/>
HZ_CUST_SITE_USES_ALL	Active	<input checked="" type="checkbox"/>
HZ_ORG_CONTACTS	Active	<input checked="" type="checkbox"/>
HZ_ORG_CONTACT_ROLES	Active	<input checked="" type="checkbox"/>
HZ_PARTIES	Active	<input checked="" type="checkbox"/>
HZ_PARTY_SITES	Active	<input checked="" type="checkbox"/>

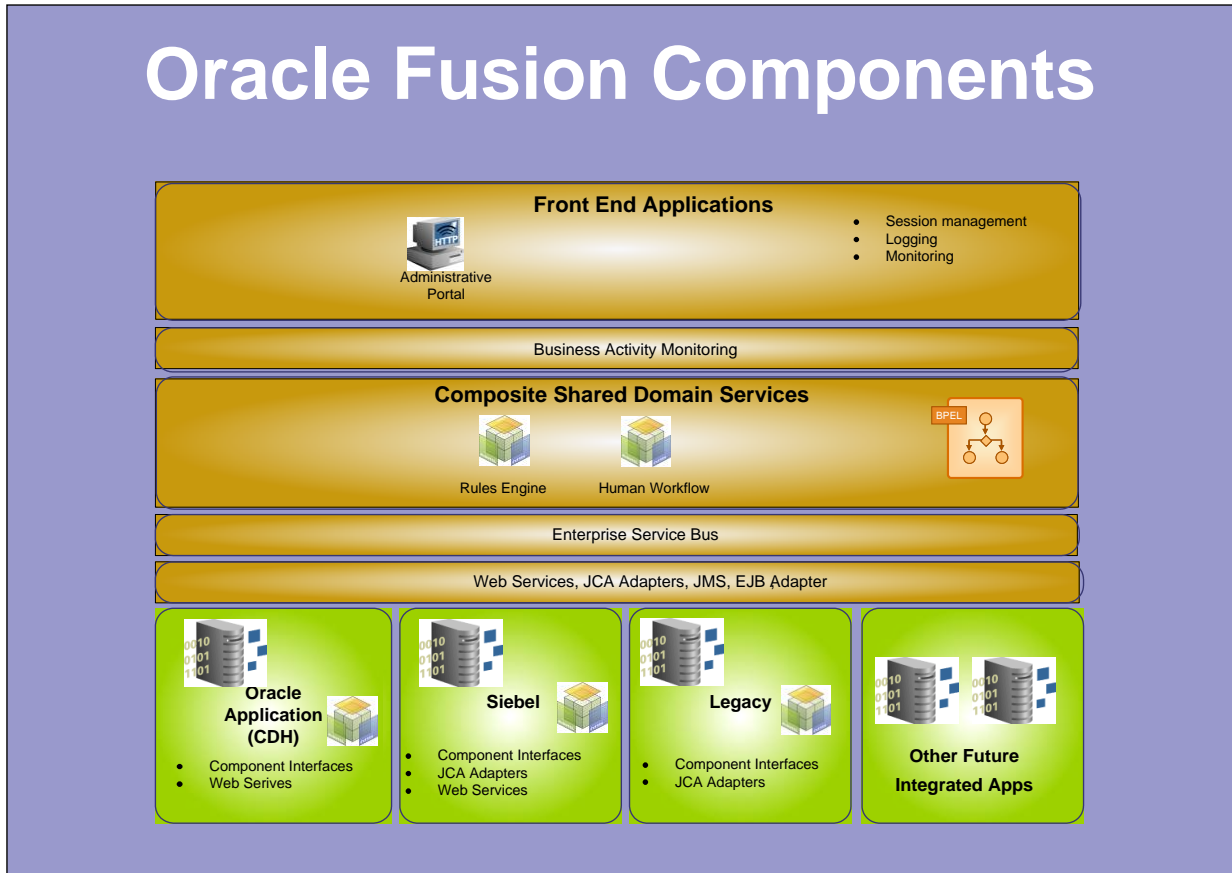
[Add Another Row](#)

Source System Setup Details – Siebel

Integration of Customer Data Hub with External Systems

The Customer Data Hub (CDH) is not only meant to support customer data within the E-Business Suite, but also to serve as a central repository of data across many systems. This section outlines the Fusion Middleware components utilized to deploy CDH integration with multiple systems.

Server Oriented Architecture (SOA) and Event Driven Architecture (EDA) principals, coupled with open standards have been used to design and implement the Customer Data Hub (CDH) integration layer with other heterogeneous systems. The diagram below shows the various components of the Oracle Fusion Middleware used to integrate applications in which customer data may be stored.



Composite Shared Domain Services

This is the layer used to define business processes by mixing functionalities of various distributed applications. Each application/system will expose its functionalities as services. This layer will assemble these services together and create a new business process. This new business process may include human intervention or be fully automated.

Further, complex business rules may be created to allow a business process to dynamically adapt itself based on message content or other variables (e.g. a customer record could be sent to one or multiple target systems depending on the customer type). This layer is also the core component of the integration layer as it allows the ability to provide both complex business flows based on the business rules and data transformations from one integration end point to the next.

Oracle Business Process Execution Language (BPEL) Process Manager is the major component of this layer. The BPEL Process Manager is used to build, deploy and execute new business processes that are integrating services/functionality of various applications.

Enterprise Service Bus

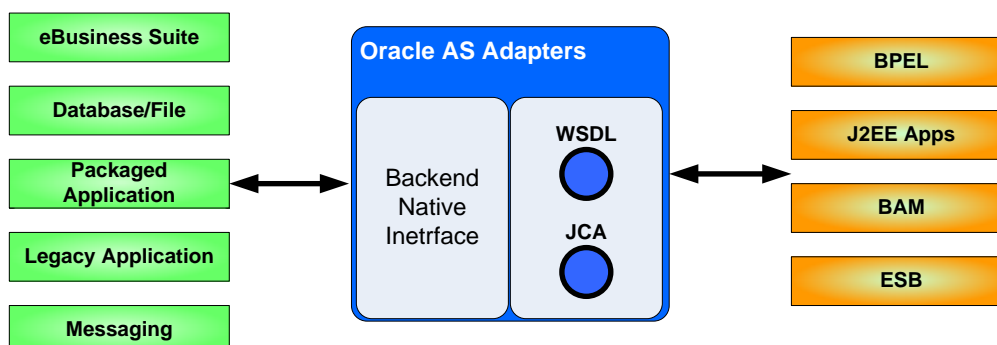
The ESB layer provides the necessary plumbing to transport messages in secure and guaranteed fashion from one application (e.g. Customer Data Hub) to other applications and vice versa. This layer provides a common interface to access the messages and ensures that messages are routed in an orderly fashion to their destination. Further, the messaging system supports both point to point and publish/subscribe communication methods. Point to point messaging is suited when the sending application needs to send messages to a specific destination and ensure that messages are consumed before it resumes its work. In the case of publish/subscribe messaging, the publishing application (e.g., Customer Data Hub) publishes messages. Applications that are interested in receiving the published messages, subscribe to them. The publish and subscribe model allows the sending application to publish a message and then continue its work without waiting for the subscriber.

The Customer Data Hub Integration layer is using Oracle Advance Queuing (AQ) for its messaging. Oracle AQ provides the necessary functionality to manage and monitor the messages. Oracle AQ supports both point-to-point and publish/subscribe models. AQ also provides the required functionality for persistency and retention of the messages.

Standards Based Interfaces and Adapters

This layer defines a way in which applications are wired into the integration platform. The integration platform is responsible for the transformation, as well as transportation of output from one application to the desired input of another application.

Oracle Provide several Application Server (AS) adapters that serve as a gateway for the Fusion middleware to communicate with underlying applications. The adapters expose the application functionalities using open standards such as a web services. BPEL processes communicate with these applications through exposed Web Services.



Oracle Business Event System

Oracle Business Event system is part of Oracle Event Driven Architecture Suite, and provides the capabilities to easily create, process, analyze and manage events. The Business Event System is used for bi-directional integration with Oracle Applications. It exposes key business integration points as Business Events. It uses the Oracle Advanced Queuing (AQ) infrastructure to communicate business events between various modules of Oracle Applications and 3rd party applications.

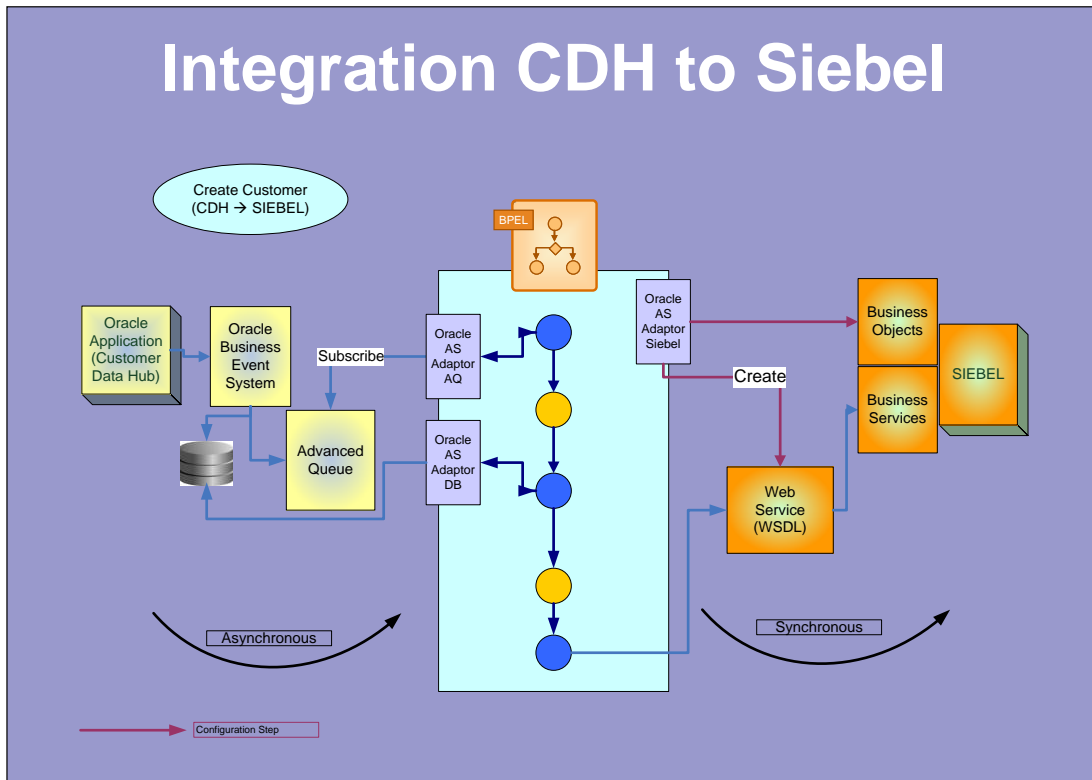
When a customer record is added or modified in Customer Data Hub, an event is triggered. The interested application could subscribe to this event and be notified when the event has occurred. Oracle E-Business suite has approximately 1000 seeded business events and BPEL processes can subscribe to these events.

Customer Create Use Case Integration

There are several business processes that create or modify customer data. All of these business processes need to be integrated and customer data needs to be consolidated in order to build and present a single view of the customer.

The Customer Create use case, as depicted in a diagram below, shows the high level flow and the Fusion middleware used to build the integration layer between Customer Data Hub and a Siebel application.

For example, when a new customer is added to the Customer Data Hub, a specific event is triggered and the related customer data are stored/queued in a specific location/queue. A BPEL process is notified about the event and the corresponding message. The BPEL process retrieves the message, in this case customer data, and routes the customer data to its destination Siebel application. Customer Data Hub does not have to wait for the BPEL process to complete its processing. The messaging subsystem is ensuring that messages are delivered and processed in order.



Sample Data Flow of CDH Integration to Siebel

The fusion middleware components configured and deployed to implement the customer create use case integration include:

- BPEL Process Manager to create a process that is triggered when an event has occurred, to route the customer data to the Siebel application.
- Oracle AS adapter for Advanced Queuing to enable BPEL process to receive the event.
- Oracle AS Adapter for DB to read the customer data from database where the Advanced Queue stores its message content.
- Oracle AS adapter for Siebel is used by BPEL process to communicate with Siebel and update Siebel customer information using Siebel services.

Fusion Middleware configuration Steps

The key configuration steps to implement integration between Customer Data Hub and Siebel are described below:

1. Configure the Oracle AS adaptor for AQ to listen/subscribe to a BES event on a particular queue. BES writes to specific queue, for example "WF_DEFERRED" queue. The consumer of this event has to implement subscription code to receive the event. A JDeveloper plug-in that comes with BPEL Process is used to configure the AQ adapter Wizard to listen to particular event on a specific Queue. Only the key fields of the event are written to the queue; a subsequent request is needed to obtain the entire data associated with the event. This step generates an adapter WSDL for a particular event on a specific queue.

2. Configure a BPEL Receive activity to consume the BES Event. BPEL Receive activity is configured to point to the adapter WSDL created in the previous step. BPEL Receive activity de-queues the message header/key fields from the specific queue.
3. Configure Oracle AS adaptor for DB to retrieve the entire message associated with the BES event. This step generates an adapter WSDL file for a stored procedure that retrieves the entire data associated with the event.
4. Configure BPEL Invoke activity to retrieve entire message payload. BPEL Transform activity creates an input message for Oracle AS adapter for DB. This BPEL Transform activity receives key fields from AQ and uses them as an input parameter for a stored procedure to retrieve the entire message payload.
5. Configure Oracle AS adaptor for Siebel by connecting to Siebel and selecting the appropriate Business Object Nodes in this case Contact/Account object. Several operation are available for a specific object; the adapter can be used to create a Web Service for the Insert operation. An adapter WSDL file will be created that can be invoked by BPEL Process.
6. Configure a BPEL Invoke activity to call Siebel Insert Service using WSDL adapter created in step-5. Configure BPEL transformation activity to connect stored-procedure output (Step 4) to the input parameter of the Siebel Service.

Acknowledgements

- Screen shots taken from Oracle Vision instance
- Oracle product details sourced in part from Oracle documentation