ORACLE
MASTER DATA
MANAGEMENT

An Oracle White Paper
January 2013

Overview: Oracle Master Data Management

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Executive Overview

Master Data is the critical business information supporting the transactional and analytical operations of the enterprise. Master Data Management (MDM) is a combination of applications and technologies that consolidates, cleans, and augments this corporate master data, and synchronizes it with all applications, business processes, and analytical tools. This results in significant improvements in operational efficiency, reporting, and fact based decision-making.

Over the last several decades, IT landscapes have grown into complex arrays of different systems, applications, and technologies. This fragmented environment has created significant data problems. These data problems are breaking business processes; impeding Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and Supply Chain Management (SCM) initiatives; corrupting analytics; and costing corporations billions of dollars a year. MDM attacks the enterprise data quality problem at its source on the operational side of the business. This is done in a coordinated fashion with the data warehousing / analytical side of the business. The combined approach is proving itself to be very successful in leading companies around the world.

This paper will discuss what it means to „manage master data and outlines Oracle's MDM solution. Oracle's technology components are ideal for building master data management systems, and these solutions critical to managing and consolidating key master data objects such as Product, Customer, Supplier, Site, and Financial data can bring real business value in a fraction of the time it takes to build from scratch. Oracle's MDM portfolio also includes tools that directly support data governance within the master data stores. What's more, Oracle MDM utilizes Oracle's Application Integration Architecture to create MDM aware applications and integrate the high quality authoritative master data into the IT landscape.

Introduction

How do you get from a thousand points of data entry to a single view of the business? This is the challenge that has faced companies for many years. Modern business analytics on top of terabyte sized data warehouses are producing ever more relevant and actionable information for decision makers, but the data sources remain fragmented and inconsistent. These data quality problems continue to impact operational efficiency and reporting accuracy. Master Data Management is the key. It fixes the data quality problem on the operational side of the business and augments the data warehouse on the analytical side of the business. In this paper, we will explore the central role of MDM as part of a complete enterprise information management solution.

Master Data Management has two architectural components:

- The technology to profile, consolidate and synchronize the master data across the enterprise
- The applications to manage, cleanse, and enrich the structured and unstructured master data

MDM becomes the central source for accurate fully cross-referenced real time master data. It must seamlessly integrate with data warehouses, Enterprise Performance Management (EPM) applications, and all Business Intelligence (BI) systems, designed to bring the right information in the right form to the right person at the right time.

In addition to supporting and augmenting SOA and BI systems, the MDM applications must support data governance. Data Governance is a business process for defining the data definitions, standards, access rights, quality rules. MDM executes these rules and enables strong data controls across the enterprise.

Oracle's market leading MDM solutions have all of these characteristics. With the broadest set of operational and analytical MDM applications in the industry, Oracle MDM is designed to support Governance, Risk mitigation, and Compliance (GRC) by eliminating inconsistencies in the core business data across applications and enabling strong process controls on a centrally managed master data store.

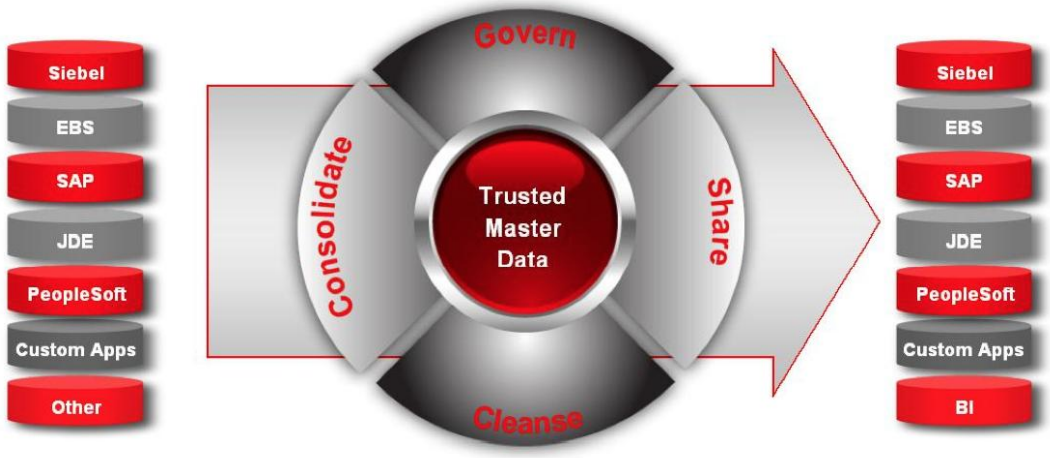

Figure 1. Trusted Master Data

Enterprise Data

An enterprise has three kinds of actual business data: Transactional, Analytical, and Master. Transactional data supports the applications. Analytical data supports decision-making. Master data represents the business objects upon which transactions are done and the dimensions around which analysis is accomplished.

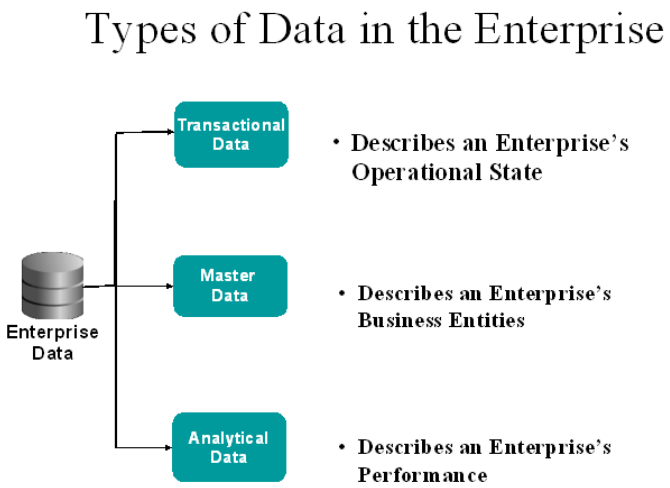

Figure 2. Data in the Enterprise

"To me, all the front-office systems such as customer relationship management (CRM), business intelligence and even enterprise resource planning (ERP) on the back end are all data. In the end, MDM is the key contributor to making sure all these systems have the right data and the right data quality."

— Hema Kadali, Director, Information Management

PwC

Transactional Data

A company's operations are supported by applications that automate key business processes. These include areas such as sales, service, order management, manufacturing, purchasing, billing, accounts receivable and accounts payable. These applications require significant amounts of data to function correctly. This includes data about the objects that are involved in transactions, as well as the transaction data itself. For example, when a customer buys a product, the transaction is managed by a sales application. The objects of the transaction are the Customer and the Product. The transactional data is the time, place, price, discount, payment methods, etc. used at the point of sale. The transactional data is stored in OnLine Transaction Processing (OLTP) tables that are designed to support high volume low latency access and update.

Operational MDM

Solutions that focus on managing transactional data under operational applications are called Operational MDM. They rely heavily on integration technologies. They bring real value to the enterprise, but lack the ability to influence reporting and analytics.

Analytical Data

Analytical data is used to support a company's decision making. Customer buying patterns are analyzed to identify churn, profitability, and marketing segmentation. Suppliers are categorized, based on performance characteristics over time, for better supply chain decisions. Product behavior is scrutinized over long periods to identify failure patterns. This data is stored in large Data Warehouses and possibly smaller data marts with table structures designed to support heavy aggregation, ad hoc queries, and data mining. Typically the data is stored in large fact tables surrounded by key dimensions such as customer, product, supplier, account, and location.

"High quality customer information was critically important for Areva's deployment of major new application suites, including SCM and CRM. Oracle Customer Hub provided the unique customer database that can be shared by all applications managing customer data and the critical data quality tools needed to increase our customer knowledge. With Oracle Customer Hub at the center of the Areva IT landscape, customer data is collected from all relevant applications, harmonized, merged, enriched with D&B data, and published to operational and analytical systems. ROI has been measured at 38% over 4 years with a 37 month payback."

— Florence Legacy, Project Manager, Bruno Billy, Data Manager

Areva T & D

Analytical MDM

Solutions that focus on managing analytical master data are called Analytical MDM. They focus on providing high quality dimensions with their multiple simultaneous hierarchies to data warehousing and BI technologies. They also bring real value to the enterprise, but lack the ability to influence operational systems. Any data cleansing done inside an Analytical MDM solution is invisible to the transactional applications and transactional application knowledge is not available to the cleansing process. Because Analytical MDM systems can do nothing to improve the quality of the data under the heterogeneous application landscape, poor quality inconsistent domain data finds its way into the BI systems and drives less than optimum results for reporting and decision making.

Master Data

Master Data represents the business objects that are shared across more than one transactional application. This data represents the business objects around which the transactions are executed. This data also represents the key dimensions around which analytics are done. Master data creates a single version of the truth about these objects across the operational IT landscape.

An MDM solution should to be able to manage all master data objects. These usually include Customer, Supplier, Site, Account, Asset, and Product. But other objects such as Invoices, Campaigns, or Service Requests can also cross applications and need consolidation, standardization, cleansing, and distribution. Different industries will have additional objects that are critical to the smooth functioning of the business.

It is also important to note that since MDM supports transactional applications, it must support high volume transaction rates. Therefore, Master Data must reside in data models designed for OLTP environments. Operational Data Stores (ODS) do not fulfill this key architectural requirement.

Maximum business value comes from managing both transactional and analytical master data. These solutions are called Enterprise MDM. Operational data cleansing improves the operational efficiencies of the applications themselves and the business process that use these applications. The resultant dimensions for analytical analysis are true representations of how the business is actually running. What's more, the insights realized through analytical processes are made available to the operational side of the business.

Oracle provides the most comprehensive Enterprise MDM solution on the market today. Oracle MDM spans analytical, financial, and transactional MDM with its variety of hubs for customer, product, site, supplier and operational data.

Master Data Management Processes

Now that we have identified the nature of master data and its place in the information architecture, we need to identify the key processes that MDM solutions must support.

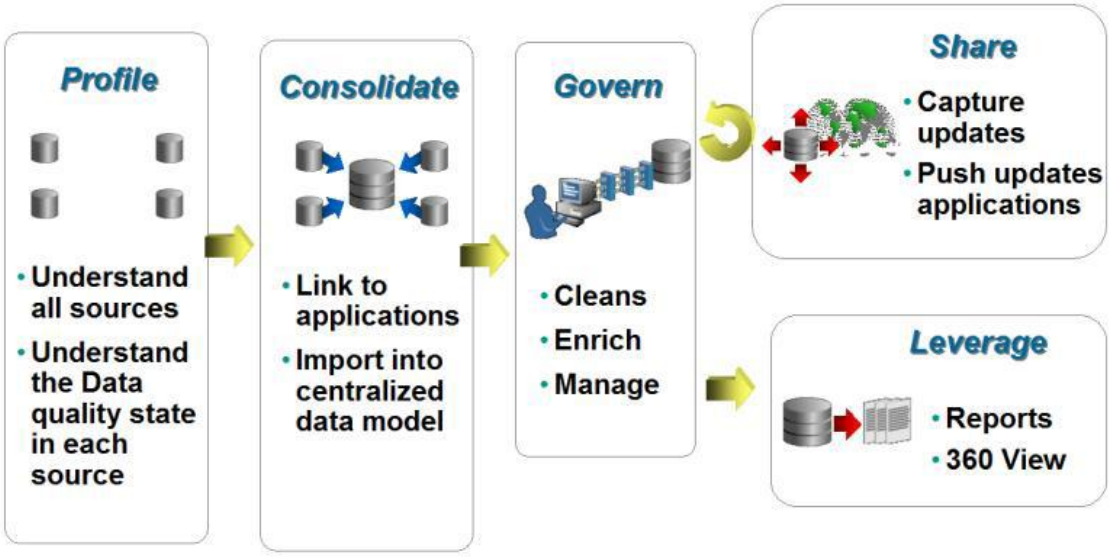

Figure 3. MDM Processes

"Qwest Communications needed to improve is customer information. Customer data was fragmented across a wide variety of applications making it difficult to answer event the simplest of questions like: Are we billing for all services provided? Consolidation of customer data was the answer. The selected solution would have to integrate into a complex IT landscape including all wireless and wireline applications and the data warehouse. Qwest chose Oracle Customer Hub because of: its deep functionality; ability to integrate with Ordering, Portal and Billing systems; and its straight forward mapping into the data warehouse."

— Bob Speer, Principal Architect

Qwest IT Enterprise Architecture

These are the key processes for any MDM system.

- Profile the master data. Understand all possible sources and the current state of data quality in each source.
- Consolidate the master data into a central repository and link it to all participating applications.
- Govern the master data. Clean it up, deduplicate it, and enrich it with information from 3rd party systems. Manage it according to business rules.
- Share it. Synchronize the central master data with enterprise business processes and the connected applications. Insure that data stays in sync across the IT landscape.
- Leverage the fact that a single version of the truth exists for all master data objects by supporting business intelligence systems and reporting

Profile

The first step in any MDM implementation is to profile the data. This means that for each master data business entity to be managed centrally in a master data repository, all existing systems that create or update the master data must be assessed as to their data quality. Deviations from a desired data quality goal must be analyzed. Examples include: the completeness of the data; the distribution of occurrence of values; the acceptable rang of values; etc. Once implemented, the MDM solution will provide the ongoing data quality assurance, however, a thorough understanding of overall data quality in each contributing source system before deploying MDM will focus resources and efforts on the highest value data quality issues in the subsequent steps of the MDM implementation.

Oracle Enterprise Data Quality provides a basis for understanding data quality issues and a foundation for building data quality rules for defect remediation and prevention. It provides the ability to understand your data, highlighting key areas of data discrepancy; to analyze the business impact of

"We will be adopting UCCnet standards using Oracle's product catalog as repository. Organizing these disparate data elements will pay huge dividends, beyond compliance with customer needs. It will streamline our product development process and offer huge process improvements throughout sales, marketing, and product engineering

— Jim Johnson, Director, Information Services

Master Lock

these problems and learn from historical analysis; and to define business rules directly from the data. Data Profiling is a critical first step in the data integration process to ensure that the best possible set of baseline data quality rules are included in the initial MDM hub.

Consolidate

Consolidation is the key to managing master data. Without consolidating all the master data attributes, key management capabilities such as the creation of blended records from multiple trusted sources is not possible. Oracle MDM utilizes state-of-the-art extensible data models. They are operational data models designed for OnLine Transaction Processing (OLTP). They are application neutral and capable of housings all corporate master data from all systems in all heterogeneous IT environments. This includes business objects such as Customer, Supplier, Distributor, Partner, Site, Product, Assets, Installed Base and more. The models support all the master data that drives a business, no matter what systems source the master data fragments. This includes (but is not limited to) SAP, Siebel, JD Edwards, PeopleSoft, Oracle E-Business Suite, Microsoft, Acxiom, Dun & Bradstreet (D&B), billing systems, homegrown systems, and legacy systems. Tools to load the data are also provided. Scalable batch load tools manage the history and mappings from source systems. Oracle provides powerful data quality techniques to standardize, cleanse, and match master data attributes during the load process. This insures that the loaded data is clean and duplicates are eliminated on the way in.

Cleanse and Govern

Master data is consolidated so that it can be cleansed and governed. Cleansing involves standardization, error correction, matching, de-duplication, and augmentation of the data. Governing involves data definition, data quality rule definitions, privacy and regulatory policies, auditing, and access controls. These two complementary processes represent the backbone of any MDM solution that creates authoritative data for sharing across the enterprise.

Specific business objects require specific management tools. Managing unstructured product data quality is very different than managing structured customer data quality. This is why Oracle provides Enterprise Data Quality servers for customer/party data and product/item data that are easily extended to suppliers, materials and assets. Data Governance refers to the operating discipline for managing data and information as a key enterprise asset. This operating discipline includes organization, processes and tools for establishing and exercising decision rights regarding valuation and management of data. Data governance is essential to ensuring that data is accurate, appropriately shared, and protected. Oracle MDM applications provide significant data quality and data governance capabilities.

Share

Clean augmented quality master data in its own silo does not bring the potential advantages to the organization. Oracle MDM maintains an integration repository to facilitate web service discovery, utilization, and management. In addition, Oracle MDM leverages Oracle Application Integration Architecture (AIA) to provide pre-built comprehensive application integration with the MDM data and MDM data quality services. AIA delivers a composite application framework utilizing Foundation Packs and Process Integration Packs (PIPs) to support real time synchronous and asynchronous events that are leveraged to maintain quality master data across the enterprise. We will cover this significant differentiating capability for Oracle MDM in more depth in later sections.

Leverage

MDM creates a single version of the truth about every master data entity. This data feeds all operational and analytical systems across the enterprise. Alternate hierarchies and what-if analysis can be performed directly on the master data.

Oracle MDM leverages Oracle BI tools such as OBI EE and BI Publisher to produce 360 degree views and cross-reference data to the Data Warehouse and maintain master dimensions in the master data store. Data quality and segmentation can be viewed directly from the master data repository. Out-of-the-box reports are provided and BI Publisher has full access to all master data attributes within constrains set up by the data security rules. Oracle's analytical MDM can create an enterprise view of analytical dimensions, reporting structures, performance measures and their related attributes and hierarchies using Oracle Data Relationship Management's (DRM) data model-agnostic foundation.

"We selected Oracle MDM because of its out-of-the-box, rich customer master functionality, its industry-specific best practices, and its ability to integrate many different applications."

— Shaun Coyne, CIO and Vice-President

Toyota Financial Services

Oracle Master Data Management High-Level Architecture

MDM creates a single version of the truth about every master data entity. This data feeds all operational and analytical systems across the enterprise. Alternate hierarchies and what-if analysis can be performed directly on the master data. The following figure identifies the major layers in the Oracle MDM architecture.

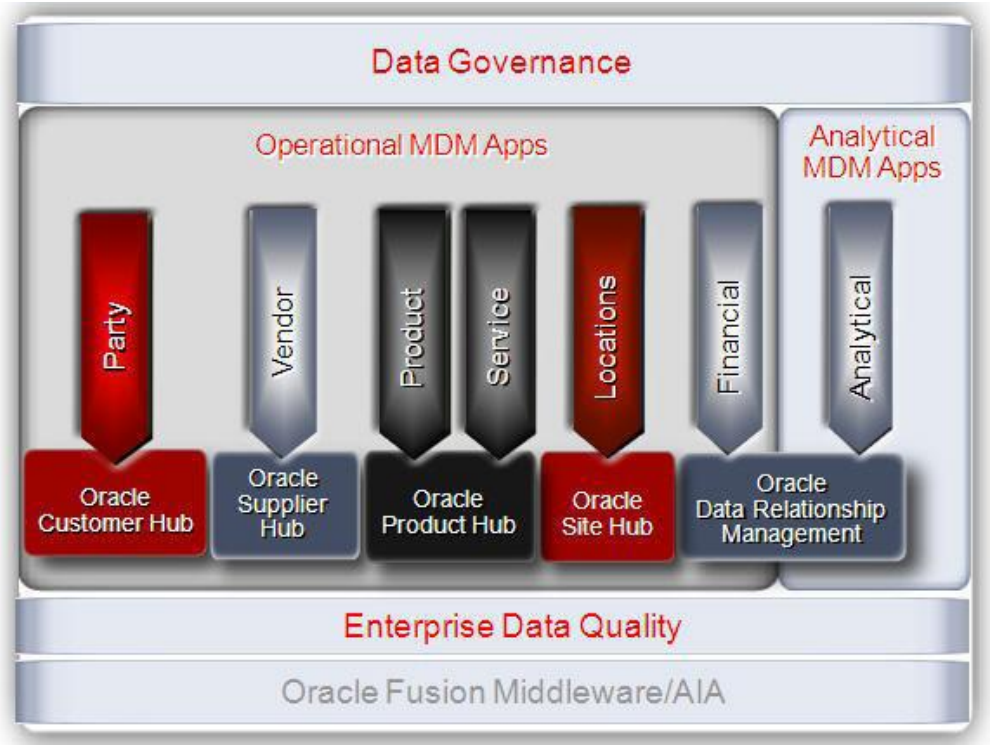

Figure 4. Oracle Master Data Management Architecture Layers

- Oracle Fusion Middleware provides supporting infrastructure
- Application Integration Architecture links MDM data to applications and business processes
- The MDM Applications layer contains all the base pre-built MDM Data Hubs and shared services
- The top layer includes MDM based solutions for Governance

Fusion Middleware

There are a number of Fusion Middleware (FMW) technologies used to support MDM Applications. These include application integration services, business process orchestration services, data quality & standardization services, data integration and metadata management services, business rules engine, business event system, web services management, user identity management, and analytic services.

Application Integration Architecture

AIA utilizes Oracle's SOA suite to build out-of-the-box Oracle Application integrations in the context of enterprise business processes. These integrations directly support MDM. There are multiple levels of integration between MDM and SOA.

- Connectors and transformations
- The MDM Applications layer contains all the base pre-built MDM Data Hubs and shared services
- Mutually understood data structures and access methods
- Pre-Built Application and Master Data synchronization
- Pre-Built SOA/MDM Enterprise Business Processes

All MDM vendors provide some level of connectors and templates for transformations. Only vendors that provide both MDM and SOA can integrate the two. Most of these vendors provide their SOA with knowledge of their MDM data structures and access methods. But only vendors who actually have applications can provide pre-built master data synchronizations and pre-built enterprise business processes.

Oracle has leveraged its ability to fuse applications and technology to incorporate MDM applications as a foundation component for its SOA Suite. Delivering more than just connectors and templates, Oracle's MDM-SOA combination delivers out-of-the-box, fully tested and extensible, pre-built SOA

"Poor quality product data was increasing new product lag times and driving up costs. Data standardization initiatives were launched. Emerson tried a number of approaches to solve the problem. Manual efforts did not scale. Custom code was too expensive. Traditional data quality tools were ineffective on unpredictable unstructured data. Then Emerson tried the semantic based Data Lens technology found in Oracle Product Data Quality. "It actually worked!"

— Phil Love, Manager, Data Quality

Emerson

enterprise business processes that synchronize MDM data stores with applications. Deploying Oracle MDM and connecting it to the common object model in the AIA integrations, provides a consolidated, cleansed, de-duplicated, authoritative "golden record" to every application and business process.

Oracle Enterprise Data Quality

Data cleansing is at the heart of Oracle Master Data Management's ability to turn data into an enterprise asset. Only standardized, de-duplicated, accurate, timely, and complete data can effectively serve an organization's applications, business processes, and analytical systems. From point-of-entry anywhere across a heterogeneous IT landscape to end usage in a transactional application or a key business report, Oracle MDM"s Data Quality tools provide the fixes and controls that ensure maximum data quality.

These differences between party and item data are fundamental to the data itself. This is why Oracle provides data quality tools specifically designed to handle these two kinds of data. They are all included in the Oracle Enterprise Data Quality (EDQ) solution. One subset of the family is designed for party data quality, and the other is designed for product data quality.

Conclusion

It has been said that data outlasts applications. This means that an organization's business data survives the changing application landscape. Technology advancements drive periodic application re-engineering, but the business products, suppliers, assets and customers remain. Oracle's Master Data Management (MDM) solution is a set of applications designed to consolidate, cleanse, govern, and share these key business data objects across the enterprise and across time. It includes pre-defined extensible data models and access methods with powerful applications to centrally manage the quality and lifecycle of master business data. Clean consolidated accurate master data seamlessly propagated throughout the enterprise can save companies millions of dollars a year; dramatically increase supply chain and selling efficiencies; improve customer loyalty; and support sound corporate governance.

In the MDM space, Oracle is a market leader. Oracle has the largest installed base with the most live references. Oracle has the implementation know how to develop and utilize best data management practices with proven industry knowledge. Oracle's heritage in CRM, SCM, PLM, and ERP development insures a leadership position for integrating master data with operational applications. In addition, Oracle MDM leverages AIA and the best in class SOA infrastructure with the award winning Fusion Middleware suite and the best EPM, Data Integration, and BI infrastructure with Oracle EPM, ODI, and the OBI EE suite. These strengths have lead to a large Oracle MDM ecosystem with a large number of partners. These are the reasons why Oracle MDM provides more business value than any other solution available on the market.

Utilizing Oracle MDM, companies around the world are governing their data assets, operationalizing their data warehouses; consolidating systems; modernizing applications; re-engineering business processes; improving their reporting; increasing target marketing effectiveness; improving customer loyalty scores; managing risk more efficiently; mitigating supplier risk; accelerating new product introductions; and creating solid data foundations for CRM, ERP, PLM and SCM implementations. Within Oracle MDM, there is Oracle Customer Hub, Oracle Product Hub, Oracle Site Hub, Oracle Supplier Hub and Oracle Data Relationship Management for financial MDM. These varied hubs solve a variety of costly data problems and help change the way business is done.

Oracle MDM delivers a single, well defined, accurate, relevant, complete, and consistent view of master data across channels, departments, and geographies. The results for companies who implement Oracle MDM solutions are dramatic. Over 1000 companies and organizations are managing billions of master data records with Oracle MDM. Companies such as Cisco, GE, Fidelity, Motorola, Dell, Symantec, Zebra, LG Telecom, Korean Air, Home Depot, Supermarchés Match, Toyota, Starbucks, Credit Suisse, and Scottrade to name a few are realizing the promise of consolidated, clean, consistent master data feeding their operational and analytical systems. Companies are achieving that elusive goal: a single version of the truth about their business across the enterprise.

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