

# An Anytime-Anywhere-Anyone Architecture For a Customer- centric Oracle11g-based DW/BI Solution

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# Agenda

- The need for a Customer-centric solution
- Changing Trends In Customer-centric Dynamics
- Key Business Indicators of DW-BI Solution Architecture
- Key IT Indicators of DW-BI Solution Architecture
- User Perception of Data, Data Access and Data Integration
- Architectural Design Best-Fit Practice for Oracle11g-based DW-BI Solution – for A-A-A

# Why a “Customer-Centric” Solution?

- Famous Quote:
- No two snowflakes are the same

“Customer-Centric”:

No two customers are the same

No two end-users are the same

No two Business Solutions are the same

# Changing Trends in Customer-centric Dynamics

- Context-Specificity drives Content-Specificity
- Customer is different from (End-)User
- Customer-experience is different from (end-)user experience
- **Consistency of Information** that is exposed to the customer/end-user **takes precedence over consistence of functionality** – a key indicator of choice for the specific Solution Infrastructure (DB, DW, BI Tools etc.) and Solution Architecture (Customer-centric Design of the IT Solution)
- **Business Value** of a Solution is **better decided based on ROC (Return-On-Customer) than ROI (Return-On-Investment) and/or TCO – A Better-Business-Benefit (B-B-B) Value**
- **This means the business impact of the Solution measures the ROI, and not the IT impact – goes beyond Custom Implementation – the leveraging of Customer Experience and the User Experience to enable the Solution evolve beyond Intelligence.**

# Key Business Indicators of DW-BI Solution Architecture

**Anytime-Anywhere-Anyone Accessibility** – any user, any query, any time – right answer (that can lead to actionable decisions)

**Business Continuity** – Enterprise-wide

**Reliability, Availability, Security (R-A-S)**

**Enable Business Users to have “behind-the-wheel” control of the BI Solution**

- Understand the Customer/User Stand - Choice and Design of the Solution should be “organic” in that their key criteria must be based on the User perception of data - how the users and analysts peruse, reason, and use the data by turning it into information **based on fact-based analysis**.
- One size doesn't fit all anymore – as today there is more than one ALL – Solution Usability extends beyond the **current industry demands**
  - Requires Intelligent Solution Adaptability
  - i.e., As “current”, comprehensive and consistent as possible - way down the road – irrespective of changes in the Business Goals, Industry Trends, Technology, Customer-base - to not only cope with change, but also to leverage it to your advantage.

**Self-Service BI** -Self-Service Interactivity and Responsiveness with minimal IT intervention

**Unprecedented flexibility in terms of un-bounded and instantaneous “analyze-and-derive” action-response capability** – Pre-built KPIS do not always facilitate this, as all-KPI based reasoning doesn't promote new areas of discovery – e.g., for improvement, trends etc.

- **Share-ability of information and business results across the distributed enterprise.**
- **Information Assurance in addition to Information Security (both data and users) – anywhere, at anytime, by anyone – in terms of Risk Assessment and Mitigation and Quality Assurance.**

# Key IT Indicators of DW-BI Solution Architecture

**Anytime-Anywhere-Anyone Accessibility – Requires both real-time and right-time accessibility (instantaneous and continuous, yet intermittent and persistent)**

*A unified data centralization framework, a unified data integration framework at the source data level as well as at the data/content delivery stage, resulting in unified information presentation from the standpoint of anyone-anytime-anywhere accessibility without compromising on efficiency and productivity, and having the ability for SOA enablement as also having SOA-enabling capability by way of Data Services that can be embeddable in any existing SOA-based services and/or on-premise platforms.*

**The foundation for such a solution calls for a seamless workflow that is event-based and is in line with the infrastructure management, capable of real-time & on-demand data services, application services, and portability.**

- How the data flow is coordinated and synchronized also depends on how the code is written – this has a ripple effect – the security of data also depends on security of code and this in turn propagates to the security of sensitive and customer-specific data throughout the end-to-end solution – both internally & externally - protection from unauthorized user access (and insider threats) for both static data and data in-transit, data breaches, data loss prevention, and robust database, user, and network activity monitoring & audit-logging of the same (bi-directionally). Oracle 11g's pre-integrated Advanced Encryption and Masking, Secure Backup, and Advanced security; Oracle Database Vault & Label Security; and Oracle Configuration Management for Security, Audit Vault, and Total Recall provide a 'Defense-in-Depth' methodology in achieving bullet-proof security of data – end-to-end.

# Key IT Indicators of DW-BI Solution Architecture

- *The Key Indicators are the business drivers significant to the Solution*
- *– To know the specifics of the data – who, where, why, when, how. Based on this are the optimal performance indicators in terms of ability to handle high-volume data flows – instant response to query requests based on temporal effects in data, flattening unstructured content and merging it with external content, real-time availability, high-throughput in the case of transactional data updates, etc. This in turn ensures that information is available at the right time at the right place for the right user. Oracle11g database high-performance and high-availability features of group policy invocation, column-based fine-grained access control, fine-grained dependency control, transactional data consistency cross-databases, the implicit design and self-tuning capabilities can accelerate and automate data management & optimization. The best practice is to design the data flow in sync with the business process flow that not only aligns in terms of IT processes but also provides business agility, eliminating the need for IT intervention in the long run – and leaving some scope for extensibility and innovation. This adds to an ideal data infrastructure flow up to the end-user presentation layer for data availability and access. Oracle11g provides some of the greatest-and-largest technologies like enterprise data integration, dynamic data provisioning, Dynamic Data Services based on SOA-Web Services that provide both Agility and Mobility of Information within the enterprise and beyond, and in-memory data replication and processing for ultra-high performance.*
- Interactive search capabilities on all kinds of data/content – using declarative, direct SQL-based full-text or regular expression based searches that yield meaningful results, and having the least response time.

# Key IT Indicators of DW-BI Solution Architecture

**Anytime-Anywhere-Anyone Accessibility – Requires both real-time and right-time accessibility (instantaneous and continuous, yet intermittent and persistent)**

**Separate the DW and BI layers – Helps minimize/eliminate silos in the Solution architecture**, like middle-tiers and meta-data layers – Let the DB do most of this work as far as possible – Use IMDB Cache to eliminate a middle-tier for distributed data federation (on-premise and on-demand) – using in-memory data replication (of both operational data and historical data) – this distributed grid can be stitched in-memory to the application/solution layer.

- Flatten Cube-based Data into ROLAP Cubes, but preserving the “intelligent refresh” of the same – allowing the real-time & batch data changes to trickle-down to the ROLAP cubes on-the-fly.

**Combine Accessibility (Right Data at the Right Time to the Right User) & Availability (R-A-S) via a Unified Connectivity and Integration Framework** that comprises of comprehensive management and control over connectivity, all solution touch-points including end-user devices), security within and beyond the enterprise (Web-based SOA-appliance secure gateways, local policy enforcement and access control)

- **In perspective of the separation of DW and BI layers**

**Data Access and Data Integration are two symmetrically different processes. DI promotes DA.**

**The Key to Efficient Data Access is using the right Data Access connectors/adapters.**

- The challenges posed by **complex data for both DA and DI are eased – unstructured data requires Data Quality too.**

- **Incorporate operational BI to enable direct access to (source-system) data to the BI Solution bypassing the Data Warehouse –**

**Operational DI doesn't necessarily real-time, but right data any time – keeping the DW “current” for A-A-A.**

# Key IT Indicators of DW-BI Solution Architecture Contd....

Anytime-Anywhere-Anyone Accessibility – Requires both real-time and right-time accessibility (instantaneous and continuous, yet intermittent and persistent)

## R-A-S:

- **Introduce Virtual data federation by creating context-aware federated Data Views based on a virtual meta-data dictionary that is created via an “abstraction layer” (i.e., a single View) – and then federated downstream into Oracle11g.**
- **On-the-fly joins created based on different data sub-sets to populate this Federated Data View.**
- **Introduce Shared Services using SOA-based deployments (drives business agility & continuity using SOA connectivity and integration) – ability to share agnostically across multiple domains.**
- **Role-based Access Control and Fine-Grained Access Control augmented with Context-based Identity and Access management – The roles allocation and roles separation based on content-aware/solution-aware policies federated based on context-specific attributes/domains.**
  - **Role Based Access Control is more static in nature**
  - **Context-based Access Control is more dynamic in nature**

**Implemented using SOA-based security - Oracle ESB now supports XACML-enabled XML-threats (XSS, XSRF etc.) security.**

  - **Delegated Authentication coupled with Local Authorization**

# User Perception of Data, Data Access and Data Integration

- Self-Service enabled Interactivity via Controls
- Business-Savvy Language Semantics
- User-Friendly Presentation – High-Definition Data Visualization and Easy To Navigate
- Integrated Single View – Context-Specific, Time-Sensitive
- Actionable – Turn Data into Informative Decisions that can be put into Action – and beyond – **leveraging this Actionable Customer/User BI Insight to evolve/create NEW BI Analytics (that promotes the BI efficiency) beyond the IT-Solution Life-cycle – encompassing the Customer-Lifecycle.**

# User Perception of Data, Data Access and Data Integration

- *Data Access and Data Integration Are Two Symmetrically-Different Tasks*
- Data Integration lays the foundation for Data Access – Both contribute towards accelerating the BI Informatics
  - DI promotes interoperability of Data between disparate databases, applications, hosted data services etc.
  - Data Access is all about Data Availability in a unified manner that is consistent, comprehensive, and coherent – across all business domains – and context-specific too.
- Data Services & Data Integration Services are two separate Tasks
- **Data Integration Services**
  - DI Services are about processes that trigger a DI task based on events
  - Streamline a (new) DI Process into a DI Workflow.
- **Data Services**
  - Primarily related to Data Access (either data in-place or transformed/derived/aggregated/merged data from new and/or existing data)

**Both Data Services and Data Integration Services can be exposed as Web Services based on SOA (both provides and consumes Web Services using SOAP, WSDL, XML,**

**IN (DI) : INTEGRITY, CONSISTENCY, CONTINUOUS AVAILABILITY, UNIFICATION**

ata Sources --> Eliminate Data Silos.  
 n by means of consolidation of static  
 --> ELT/ETL for high-performance  
 Real-time data change Capture,  
 Events Capture and Conversion (to  
 ing => LOG-BASED, EVENT-DRIVEN,  
 luding Data batch processing).  
 sses to handle the performance  
 the GB-to-TB-to-PTB data growth  
 ng a streamlining approach that is  
 -design (SOA-based) & has the  
 : Virtualization for optimized Data  
 istribution.

oss Prevention and Security --->  
 ?rocess-Oriented Design for Data  
 & Cleansing) in both OLTP & OLAP

Service-driven Implementation of  
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- Cohorent View of Business Master Data spanning multiple domains, transparantly integrable with main-stream data for transactional and/or analytical purposes - using an Unified Meta-Data Design.
- Unlocking Value in Data that aids in insightful decision making which can be put into action.
- Achieved by Unified Information Presentation that enables seamless and dynamic mapping/merging/mash-up of Data/Content and delivered via Rich Visualization in pixel-picture perfect detail
- Greater Visibility into disparate content via a single, unified view that also enables end-user "live-wire" interactivity for customization - the way the user desires.
- Effective, Efficient, Scalable, Reliable and Resilient Data Management Strategy that is streamlined end-to-end and delivers Information using "business-specific" semantic terminology.
- Allows for information isolation by customer specifics, business domain sepcifics and/or any context-specics.

**1 that is adoptable and adaptable**

ective  
 c Provisioning of Data/Extensibility&Enhancement Code-or-Service Modules right into the Solution  
 e the need for wrappers to do the same

**ign promotes -**

- |             |                |   |
|-------------|----------------|---|
| ght Tuning  | - Flexibility  | - Reliability                                 |
| ght Results | - Re-usability | - Solution Productivity & Business Continuity |

**DATA ACCESS, MANIPULATION, MDM, META-DATA MANAGEMENT, MIGRATION, FED PROVISIONING, DATA QUALITY & ENHANCEMENT, DATA LINEAGE, SCALABILITY & CONCURRENCY**

**Query and Data Load/Update Performance should remain constant as data grows**

**Think Big, Start Small - Practical Best Practice for Design, Coding, Performance, Acceleration, Implementation (Leverage Existing Software Infrastructure as far as possible)**

**In-line, Unified, In-Memory & In-Database Co Sharable, In-bound & Out-bound Auditable, Lo**

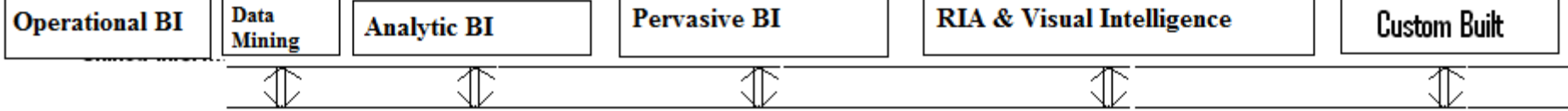
**Embedding content (images etc.) on-the-fly Similar and seamless for all types of users - deeveopers to power users to end-users (customers)**

**A unified Design format for Data I, Flow, Consolidation, Access, Update, Delivery, Presentation; Meta-data; Master Data**

Turning Data Into Information based on fact-based

**erception of Data & Information - Self-Serivce, Business-Savvy, User-Friendly, Integrated Single View, Actionabl**

**Enterprise BI Solution**     **Dynamic Dashboarding, Self-Service Interactivity, Dynamic & Interactive Data Visualization - VISUAL INTELLIGENCE**, Context-centric Attribute-based IAM



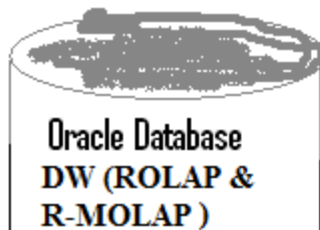
**Unified Information Delivery (Unification of All Relevant Data - Structured, Unstructured, Web (Data) Services)**

Federated Data Views w/ dynamic data population - Operational too

[Semantic Meta-Data Model] <-----> [ Using XML, XML Web Services , HTML, Mash-up/Merging ] <-----> [SQL-based Access & Availability]

**Data Querying, Intelligent Capture of real-time data on an "as-is" basis**  
**Distributed, Intermittent & Persistent Data Storage, 24/7 Data Availability & Durability, Data Scalability across Volume, Storage, Performance & Throughput, Data Validation & Security, Inside & Outside of Oracle**

**Optimized Data Access** - IMDB layer (stitched to the BI Solution layer)  
 - In-Memory dataset replication (BASE over ACID) and REST for Web Delivery



**Oracle Database  
 DW (ROLAP &  
 R-MOLAP)**

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**Oracle DB Solutions using in-built Query Optimizers, IMDB Cache, In-memory Data Replication, SQL Resultset Caching, XML in the DB, XML Data Services, Database Vault, Audit Vault, RBAC, FGAC, FGDC, Clustering (RAC), Partitioning; & Seamless Interaction with ODI/OWB, Oracle SOA Suite, Oracle ADF, Oracle MDM, & EDW DI**

**Optimized Source Data Integration (Oracle ELT/ETL, log-based CDC, Syncing, Data Quality, Federation, Consolidation etc.)**

**SOURCE DATA CAPTURE & INTEGRATION INTO**

Oracle Data

Non-Oracle Data

Legacy Data

Hosted Data

External Files And

**Unified DI metadata - [ETL/ T, DI, Data**

# Key Implementation Indicators

- Standardization
- Synchronization (& Streamlining)
- Virtualization (Enables real-time streaming of the BI Solution across all solution touch-points → from on-premise users to beyond-the-enterprise access via Remote Access Application Delivery, and end-point devices)
- Automation

# Key Implementation Indicators

- Eliminate solution silos like meta-data layers, middle-tiers etc.
- Keep an eye on pre-defined KPIS in O-O-B Solutions – They don't permit discovery of new analytical metrics.

# Key Prize-for-the-Price Indicators

- A Customer-centric BI Solution based on Commonality, Comprehensiveness and Coherency defined by industry-recognized standards
- Efficiency in terms of High-Performance & Unbreakable-ability
- Continuous BI in terms of
  - Business Continuity (Reliability, Availability, Security)
  - Continuous Event Processing
  - Self-Service Driven
  - (Sort of Self-) Adaptable - by enabling the solution to Evolve & Innovate - leverage the harvested Customer Experience to dynamically create new business analytics that provide far-sighted decision-making – that can be put into action

# Future Directions....

- The future of DW-BI is an Open Road....
- The Power of Predictive Analytics – Build enhanced Data Mining Models by leveraging the Self-Adaptability of the BI Solution that facilitate Customer Targeting in a more sophisticated manner.
- Leverage Hybrid DW-BI Solution Model - The DW & BI Layers separation enables.
- Open Source for BI Solution seamlessly integrated with the Oracle11g DW Solution.

# Q & A

- Additional Resources
  - Database Trends and Applications
  - IOUG.org (L-O-O-K)
  - Oracle Technet
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