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Oracle Data Warehouse for Retail

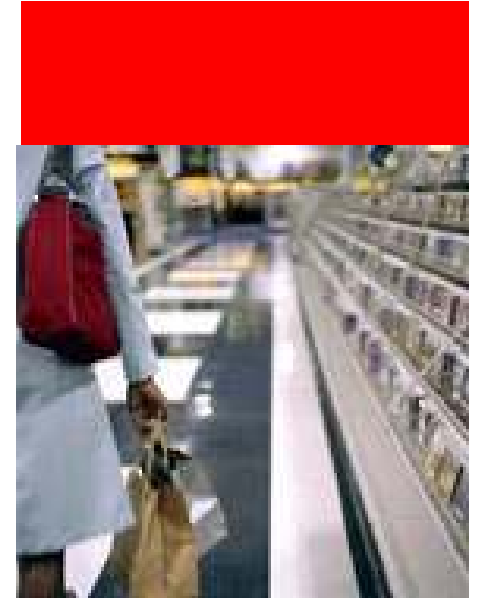
Donald Rome
Director, Retail Industry Strategy
14 April 2008



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Agenda

- Issues and Challenges in the Retail Industry
- Oracle Data Warehouse for Retail
- Retail Model Features
- Leveraging the Power of Oracle Database
- Business Areas
- Roadmap & Summary
- Appendix: Sample Reports



Issues and Challenges in the Retail Industry

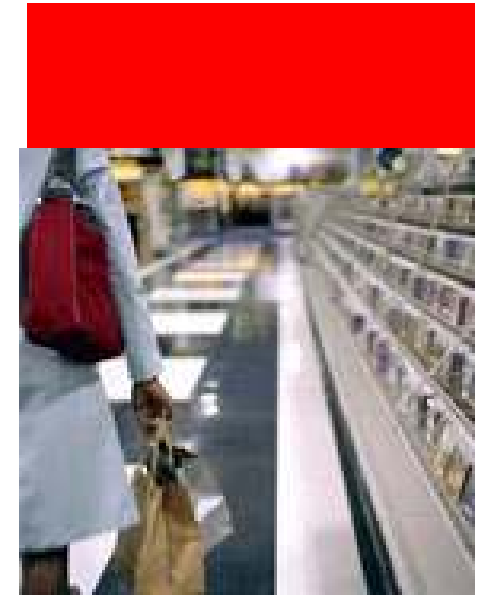




Retail Marketplace

- Retailers need to:
 - Improve profit
 - Manage costs
 - Know customers
- Retailers are seeking technology solutions:
 - Uncover hidden buying patterns
 - Increase customer retention
 - Develop customer affinity
 - Evaluate up-sell prospects
 - Analyze successful and missed channel opportunities
 - Identify customers' changing appetites

Oracle Data Warehouse for Retail





Key Messages for Oracle Data Warehouse for Retail



Speed to Value

Standards-based, prebuilt approach to retail data warehousing enabling retailers to realize the power of “insight” more quickly



Reduced Total Cost of Ownership

Reduced implementation, technology & 3rd Party costs for both immediate and on-going operations by leveraging Oracle Database



Best in class

Making world-class database and business intelligence technology solutions available with a retail specific data model



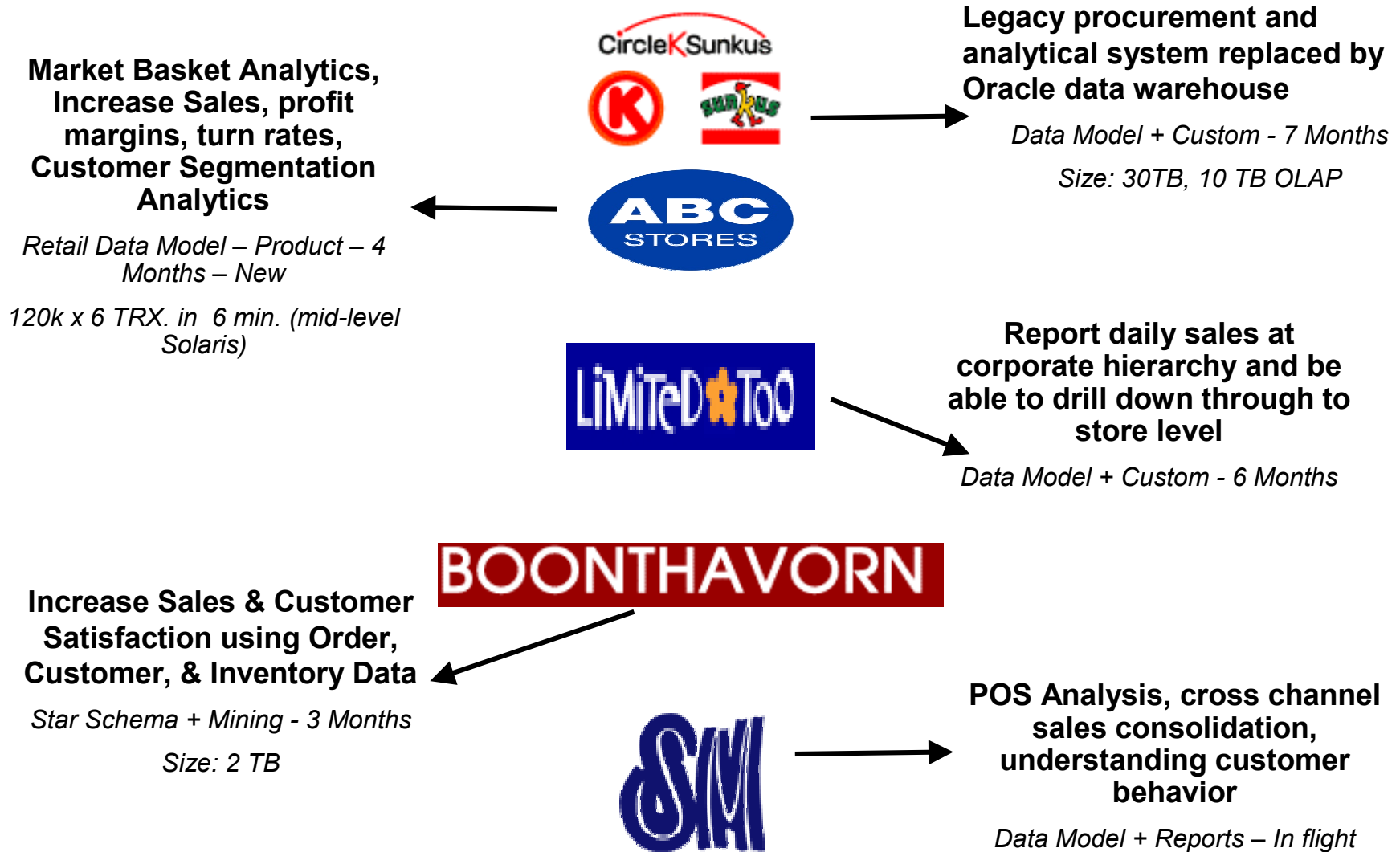
What is an Oracle DW for Retail?

- An integrated base for business information
 - Detailed and structured representation of business views of data
- Fully defined entities and attributes
 - Normalized model containing entities, their attributes identifier, relationships between them, ERD, standardized set of data attributes including definitions, names and formats, and supporting textual documentation
- Reduced development effort and maximize ROI
 - Modular architecture allows to implement a data warehouse strategy one business areas at a time
- Increased Flexibility and Accelerated time to market
 - Easily adaptable and extendable as the business grows and changes or as new subject areas, entities or set of attributes arise

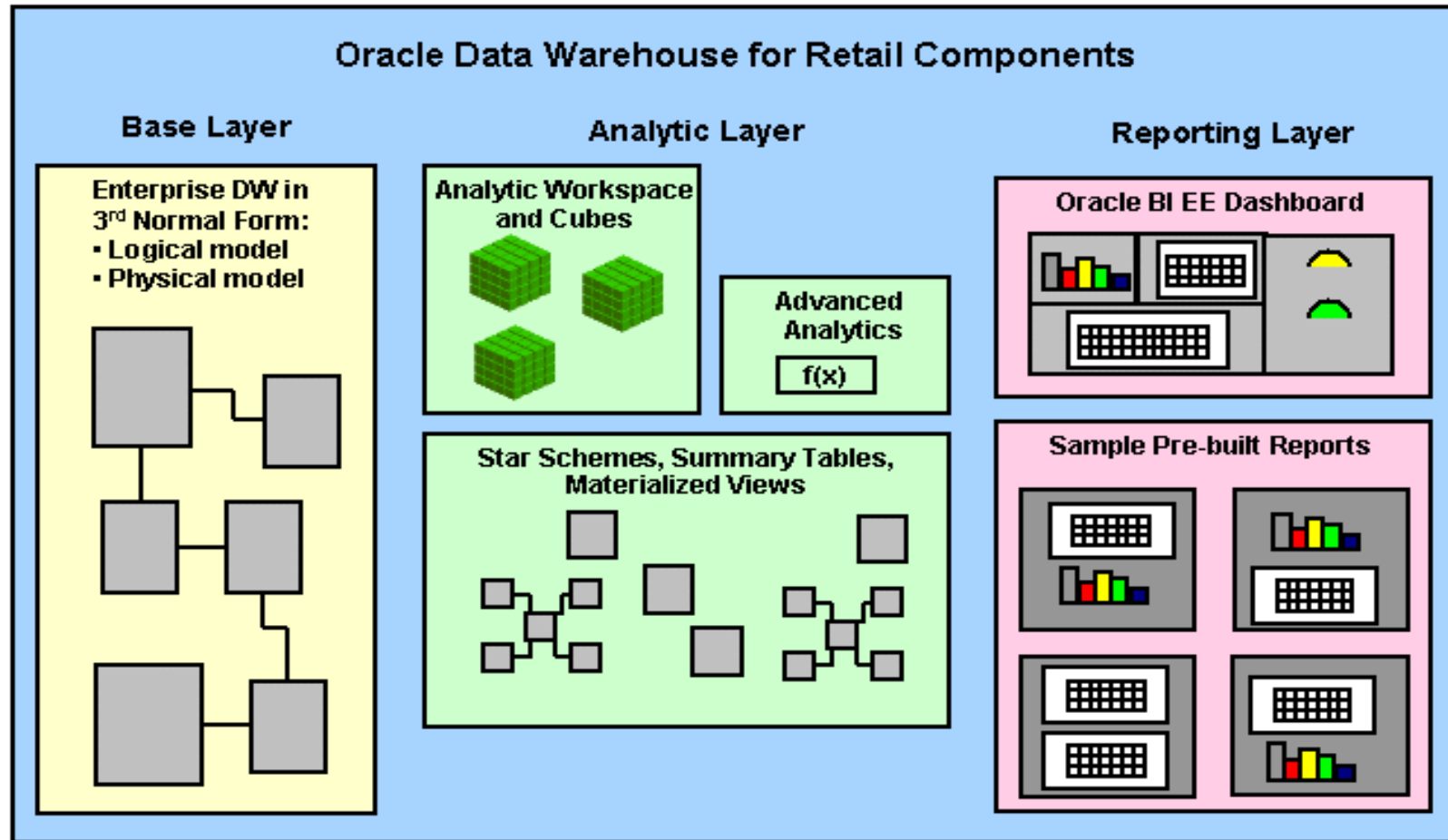
What is an Oracle DW for Retail?

- Based Industry Specific Enterprise DW Data Model and beyond
 - 3NF (LDM, PDM) Transaction Level and STAR Schema for Aggregate(s)
 - Pre-built OLAP Cubes, Data Mining Models
 - Metadata based Intra-ETL Between Schemas
 - Extensive set of Industry Specific KPIs
 - Sample Reports & Role-based Dashboards
- “Buy and Extend” rather than “Build from Scratch” DW/BI Solution
 - 80-90% “off-the-shelf”
 - Quickly (and with less risk) provides a rich integrated information models and related business definitions
- Convergence to a large scale ‘open’ data model
 - Can be used for SOA, ODS or other data integration effort
 - Improved precision due to common definition
 - Relevant (up-to-date) and Standard compliant
 - Repository driven, Foundation for Analytical applications

Highlights From Pilot Customer Base



Oracle Data Warehouse for Retail Platform



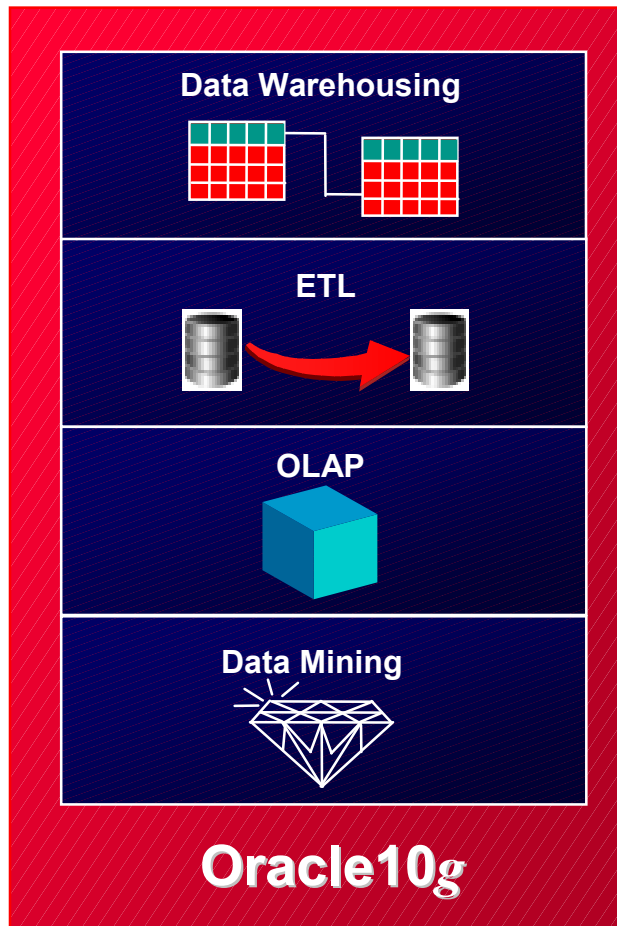
Business Intelligence - Functional

Integrated with DBMS

Query and Reporting	OLAP	Data Mining
Extraction of Detail & Rollup data	Summaries, trends, forecast	Knowledge discovery of hidden patterns
“Information”	“Analysis”	“Insight & Prediction”
Who purchased athletic gear last year?	What is the average income of athletic gear buyers? By region? By year?	Who is likely to buy a baseball bat and glove in the next 6 months and why?

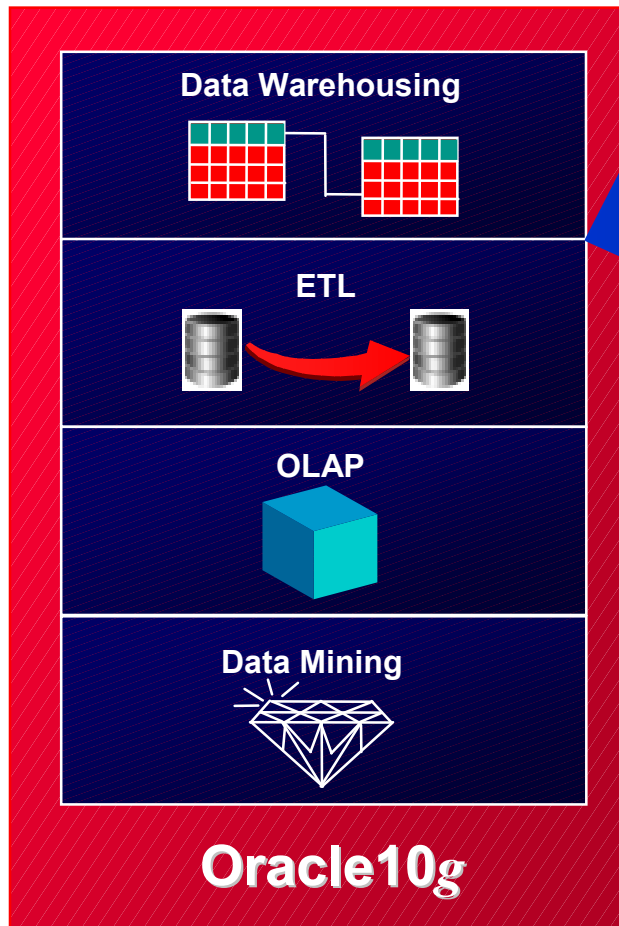
Business Intelligence - Technical

Integrated with DBMS



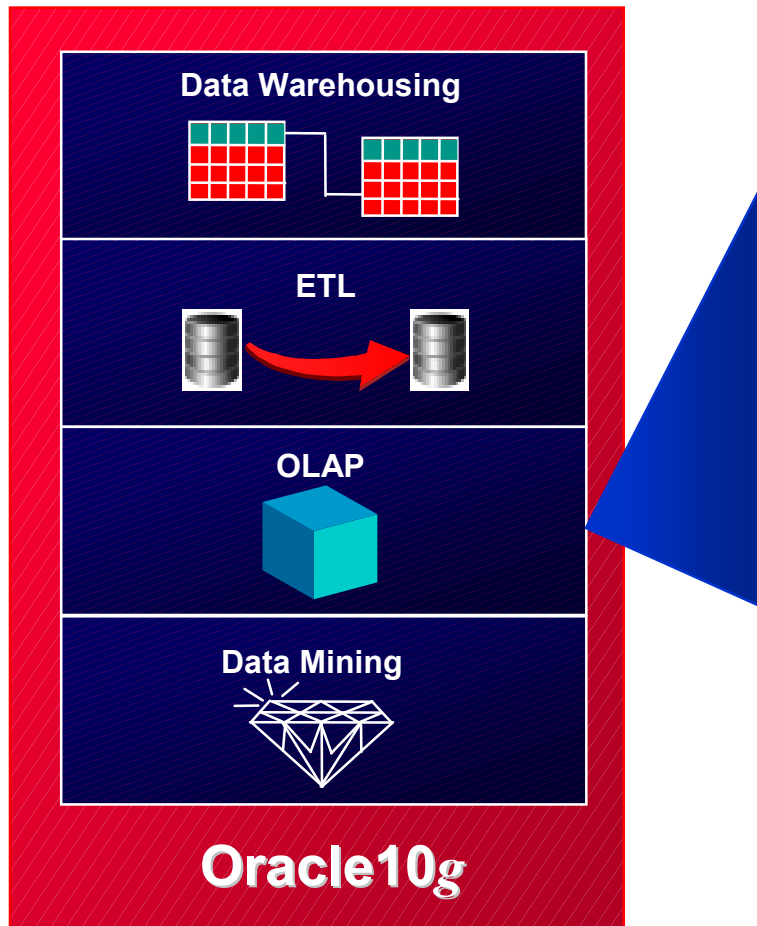
- **Relational Analytics**
 - Materialized Views, Custom SQL, Joins, ...
- **OLAP Analytics**
 - Custom Functions, Members, Aggregates, Analytic Workspaces, ...
- **Analytic Calculations**
 - Mathematical, Statistical, Forecasting, ...
- **Data Mining**
 - Models, Algorithms, Recommendations, ...
- **Performance & Scalability**
 - Fast Builds, Solves, Queries, Fast Load, ..
 - Partitioning, Workload Mgmt, Clusters, ..

Oracle DB: Relational & Intra-ETL



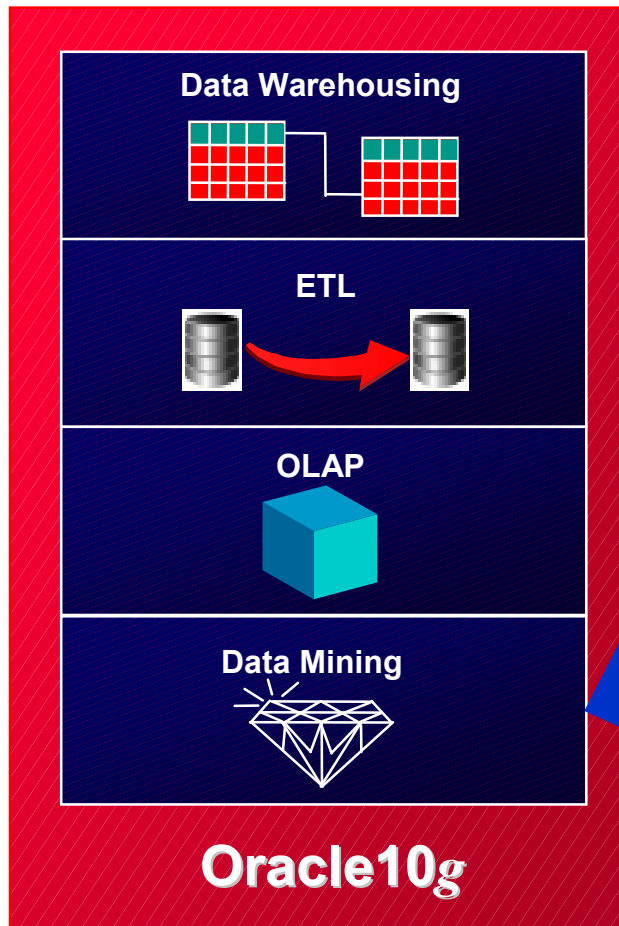
- Relational
 - Partitioning
 - Compression
 - Statistical Functions
 - Analytical SQL
- Intra-ETL
 - External File as Table
 - Pipelined-Table Functions
 - Exchange Partition
 - Partition-wise Outer Join
 - Advanced Workflow

Oracle DB: OLAP



- Full set of OLAP capabilities in the database natively
 - Multidimensional structures improves report performance dramatically
 - No exterior file storage or separate OLAP process saves space
 - Utilizes time series analysis to support
 - Skip-level (e.g. Item to class without subclass)
 - Comparative Analysis
 - Forecasting
 - Built-in technology offers numerous methods
 - Ad Hoc Queries
 - SQL access to multidimensional objects & calculations

Oracle DB: Data Mining



Process of sifting through massive amounts of data to find *hidden* patterns and discover *new* insights

- Data Mining can provide valuable results:
 - Identify factors more associated with a target attribute (*Attribute Importance*)
 - Predict individual behavior (*Classification*)
 - Find profiles of targeted people or items (*Decision Trees*)
 - Segment a population (*Clustering*)
 - Determine important relationships with the population (*Associations*)
 - Find fraud or rare “events” (*Anomaly Detection*)

Retail Model Features



Model Components

Reference

- ✓ Models the entities (things, people, etc) in a retail organization
- ✓ Translates into Dimensions

Base

- ✓ Lowest level transaction detail
- ✓ Enables detail data analysis
- ✓ Transaction history

Lookups

- ✓ Holds descriptions for common code lookups
- ✓ E.g: transaction type, reason code, etc
- ✓ Saves space, don't have to store long descriptions in each transaction record

Derived

- ✓ Low level combination of base tables
- ✓ Current state (inventory state, order state, etc.)
- ✓ Information that can only be obtained by derivation from base

OLAP

- ✓ Time Series
- ✓ Forecasting
- ✓ What-if

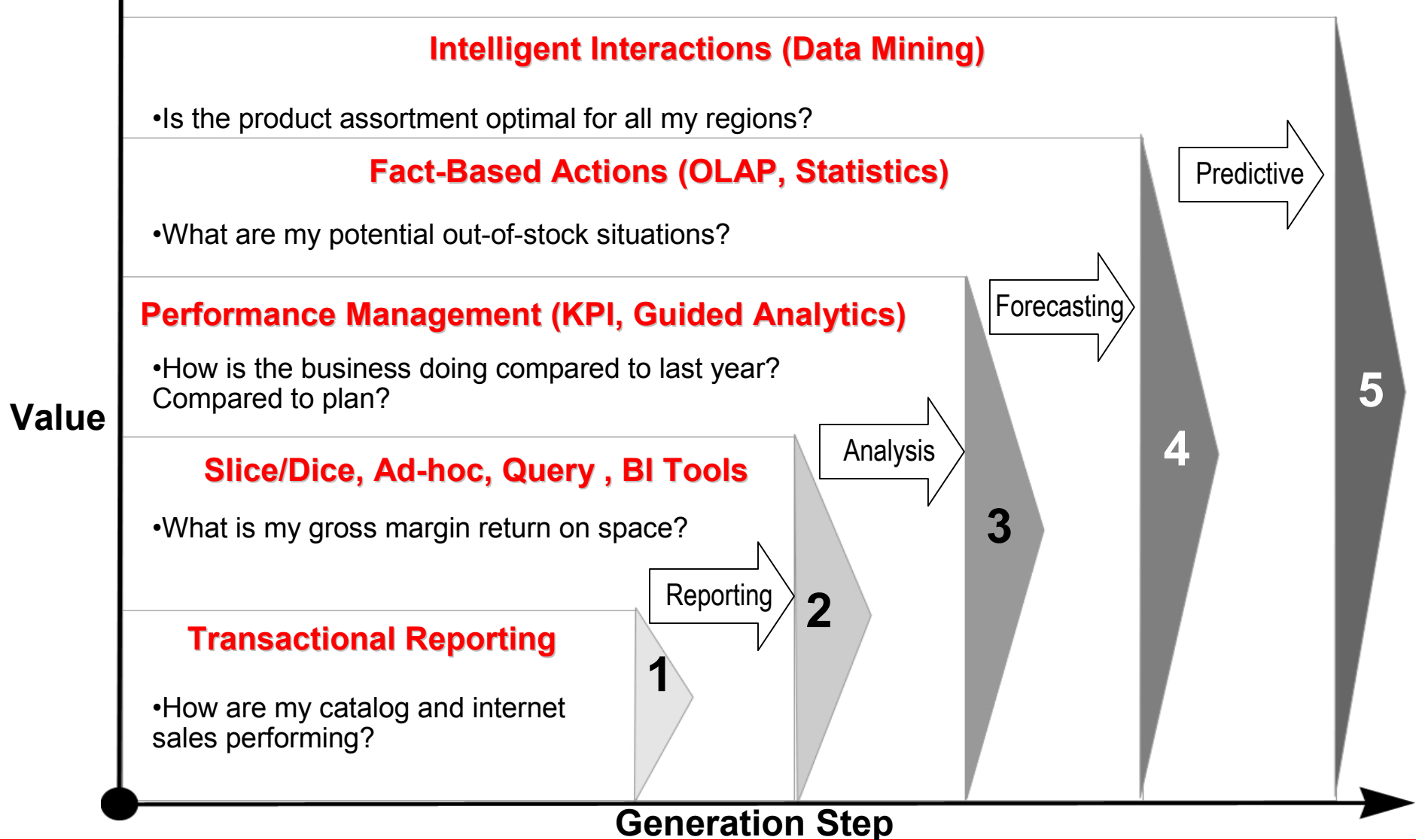
Aggregate

- ✓ Summary, Average, etc. of Base and Derived data
- ✓ Enables high level analysis, ROLAP

Data Mining

- ✓ Enables Statistical analysis of transactions
- ✓ Provides for both Supervised & Unsupervised Learning

Why so many layers ...



Oracle DW for Retail Includes

Industry Specific DW DW Data Model

- ✓ Industry Standard (ARTS) Compliant
- ✓ 3rd Normal Form -LDM, PDM
- ✓ Dimensional (STAR & OLAP)

Industry Specific DW Content

- ✓ Pre-built DW tuned for VLDB with 650+ Tables and 10500+ attributes
- ✓ Pre-built OLAP Cubes (15+)
- ✓ Pre-built Data Mining Models (10+)
- ✓ Sample Reports (~50) with Role-based Dashboards
- ✓ Intra ETL using OWB
- ✓ Leveraging 10gR2 DW features including Statistics & Advanced SQL
- ✓ IBM POS 4690 Adapter

Oracle Tech Stack

- ✓ Database 10GR2 EE With Options: Partitions, OLAP, Data Mining
- ✓ OBI EE or OBI SE1

Database EE 10g.R2 or 11g platform

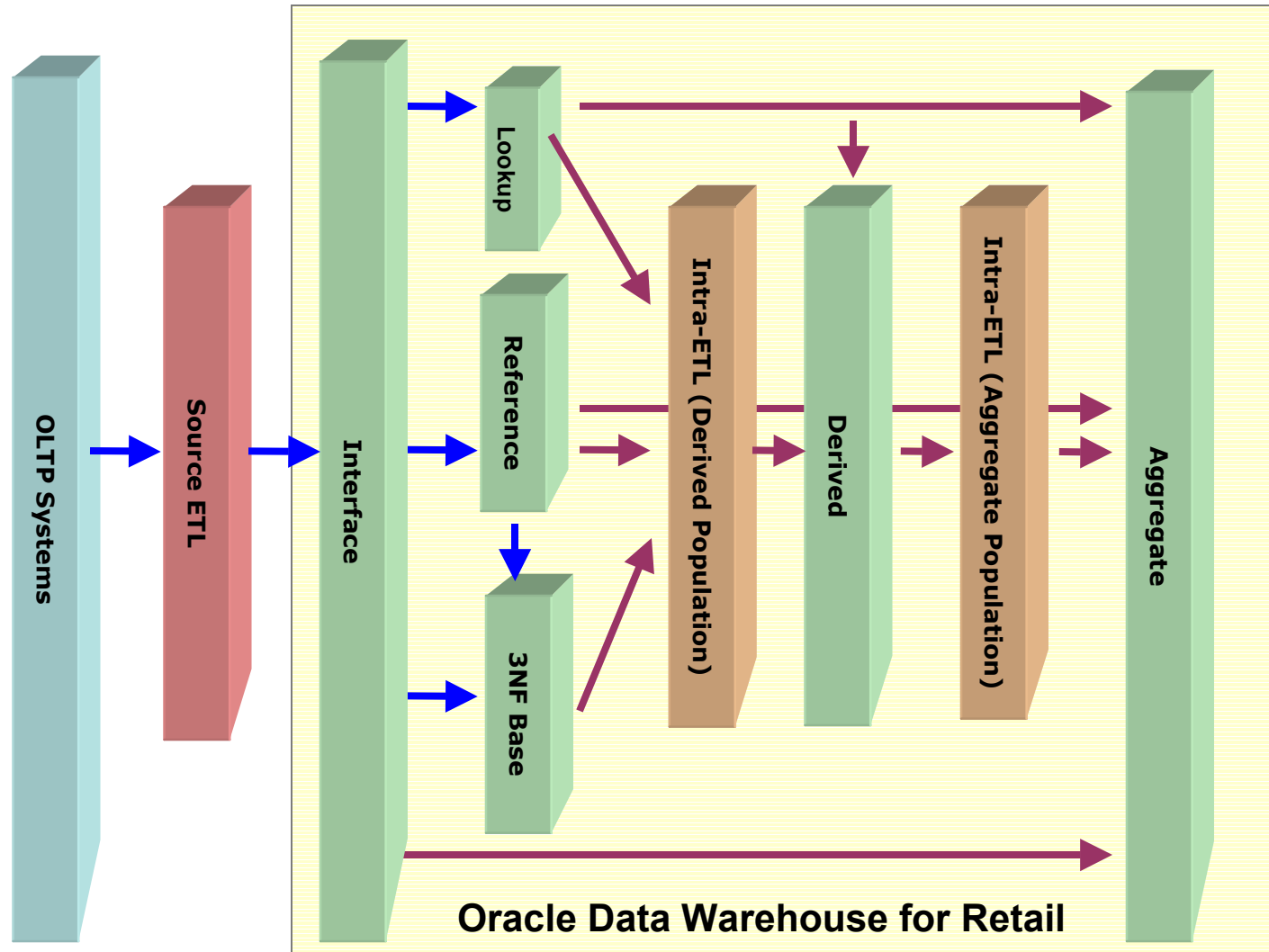
Role-Based Dashboard

Retail BI Warehouse Data Model

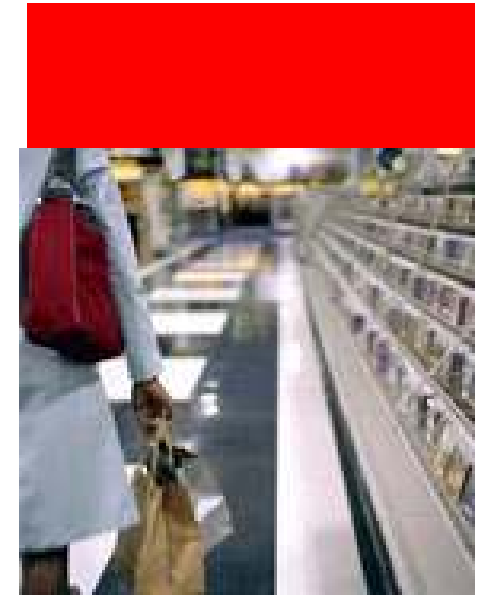
Oracle
Database
10g or 11g
(Enterprise
Edition)

OLAP
Data Mining
Partitioning
RAC
Spatial

The Complete Flow of the Intra-ETL



Leveraging the Power of the Oracle Database



Data Warehouse Features Leveraged

Embedded as part of VLDB design, not an afterthought

Partitioning

- ✓ Partitioned Outer Join is used to densify the sparse data
- ✓ Rolling Partition Window for Price File Loading

ETL Functions

- ✓ Table Function with Pipeline function for in memory processing
- ✓ Extensive usage of in-line and partition views

Statistical & SQL Function

- ✓ Stat function for exploring outliers
- ✓ Ranking
- ✓ FrequentItemSet, Lag / Lead, Ranking Clause

Compression, Materialized Views

- ✓ Table Compression
- ✓ Materialized View based Aggregation
- ✓ Dimension Objects Enables Query Re-write

OLAP Related

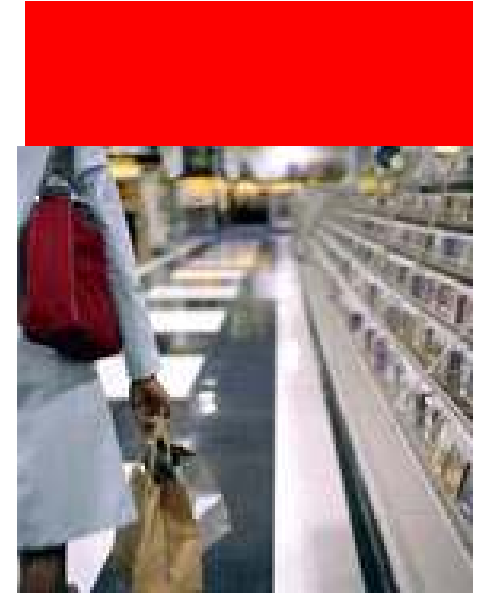
- ✓ Time Series Analysis
- ✓ Forecasting using various algorithm
- ✓ SQL Model Clause for What-if Analysis
- ✓ Linear Regression

Mining Related

- ✓ Clustering / A priori
- ✓ Classification / ABN
- ✓ Decision Tree



Business Areas



Ten Business Areas

Pre-Built Measures & KPIs

Store Operations

Workforce Management

Point-of-Sale

Order Management

Loss Prevention

Customer

Merchandising

Category Management

Inventory

Promotion

Types of Issues ODWR Could Address

High Degree of Breadth and Depth

Merchandising

- **Role:** Commonly a merchant or planner
- Product 'stars' and 'dogs'
- Inventory levels vs. planned inventory levels
- Suppliers that help / hinder performance
- Identifying locations that over/under perform

Store Operations

- **Role:** Commonly a store manager
- Store traffic patterns to determine staffing
- Understand opportunities to control loss
- Relative store performance rankings
- Identify what sells in the stores vs. doesn't
- Identifying potential risks for out of stocks

Category Management

- **Role:** Commonly a Category Manager
- Controlling purchase costs
- Reviewing supplier item coverage
- Understanding consumer purchases of new / current products vs. market data
- Determining store layouts and planograms

Marketing

- **Role:** Commonly a marketing analyst
- Identify consumer spending habits using market data
- Analyzing a retailer's loyalty program customers to better target campaigns
- Measuring customer promotion response rates

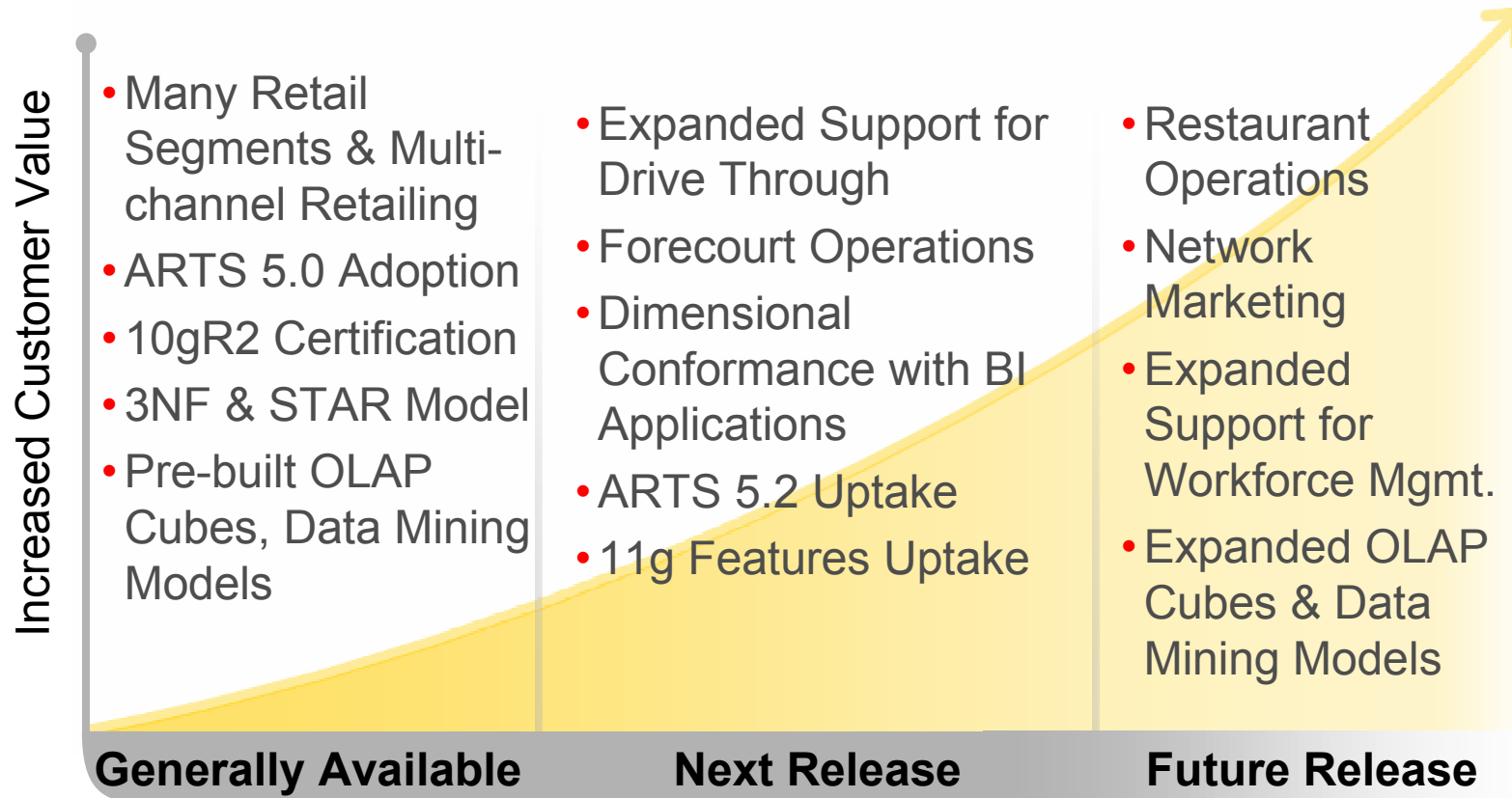


Roadmap & Summary





Product Roadmap Strategy



Who is a good candidate for ODW-R?

- Value implementation \leq 90 days
- Retailer has heterogeneous application environment
- Retailer is looking for “Buy & Extend” versus “Build from Scratch”
- Retailer is looking for implementing part of the Data Warehouse wherever the needs or opportunities in the organization are greatest
- Retailer is looking for either Transaction Level DW and prefers 3NF Model, or ODS, or SOA or other large integration projects
- Retailer wants to converge to a common semantic layer without being drawn into turf battle
- Retailer needs ARTS compliant Data Warehouse
- Retailer needs an optimized warehouse with built-in 10gR2 performance & scalability
- Multi-channel Retailers looking for integrating common components from other industry



Why Oracle? Top 10 Reasons

- 1 Data Warehouse leader
- 2 Scalable 'open' ARTS compliant model
- 3 Relevant and Topical (modernity)
- 4 High degree of depth & breadth
- 5 Easily Extendable & Customizable
- 6 Provides intelligent retail insight
- 7 Pre-built Dashboards
- 8 Pre-built intra ETL
- 9 Physical Model pre-tuned for VLDB
- 10 Enables powerful OLAP & Mining analysis

Contacts

Donald Rome	Retail Industry Strategy	<u>Don.rome@oracle.com</u>
Sudip Majumder	Server Technologies	<u>Sudip.majumder@oracle.com</u>

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Oracle Retail Data Warehouse



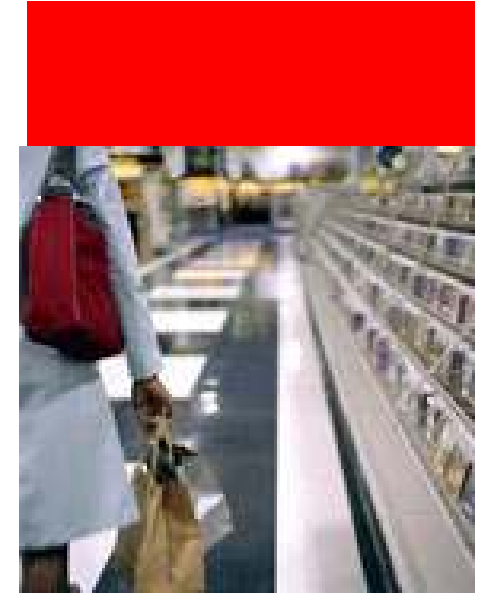
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Appendix: Sample Reports



Differentiator : Embedded Analytic

Item Basket Analysis (using pre-built mining model)

Analyzes attributes of items in high value vs. low value baskets. Baskets binned by value, then data mining determines statistically significant attributes that determine if an item will be in a particular bin.

Item Basket Analysis - Rules (DT)

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Performance Measure Avg Basket Value Quartile ▼

Item Features	Measure Value	% of Supporting Transaction	Probability
Allow Food Stamp Ind = 'Y' and Environment Type Code = 'EXTRA LIGHTING', 'NORMAL' and Frequent Shopper Points > 53	4	8.63	86.62
Allow Food Stamp Ind = 'Y' and Environment Type Code = 'EXTRA LIGHTING', 'NORMAL' and Frequent Shopper Points > 53Environment Type Code = 'NORMAL' and Frequent Shopper Points <= 499Frequent Shopper Points <= 103Hazardous Material Type Code = '118', '218', '999'	4	1.04	80.95
Allow Food Stamp Ind = 'Y' and Environment Type Code = 'EXTRA LIGHTING', 'NORMAL' and Frequent Shopper Points > 53Environment Type Code = 'NORMAL' and Frequent Shopper Points > 499	4	0.69	97.62
Allow Food Stamp Ind = 'Y' and Environment Type Code = 'EXTRA LIGHTING', 'NORMAL' and Frequent Shopper Points > 53Environment Type Code = 'EXTRA LIGHTING'	4	6.46	91.82
Allow Food Stamp Ind = 'N' and Coupon Restricted Ind = 'Y' and Frequent Shopper Points > 883.5Frequent Shopper Points <= 129.5Hazardous Material Type Code = '150', '162', '200', '201', '202', '228', '332', '402', '430', '505', '519', '527' and Hazardous Material Type Code = '150', '162', '200', '201', '202', '228', '332', '402', '430', '505', '519', '527' and Frequent Shopper Points <= 60Frequent Shopper Points <= 1.5	4	0.25	86.67
Allow Food Stamp Ind = 'N' and Coupon Restricted Ind = 'N' and Frequent Shopper Points <= 883.5Frequent Shopper Points <= 811.5Environment Type Code = 'HandLE WITH CARE', 'HOT', 'NORMAL', 'REFRIGERATED' and Frequent Shopper Points <= 502.5Environment Type Code = 'EXTRA LIGHTING', 'HOT', 'NORMAL', 'REFRIGERATED' and Department Name = 'GENERAL GROCERY' and Frequent Shopper Points <= 389Comp Item Promo Strcoupon Ind = 'Y'	1	0.66	97.50

Competitive Differentiator : Smart Industry Reports

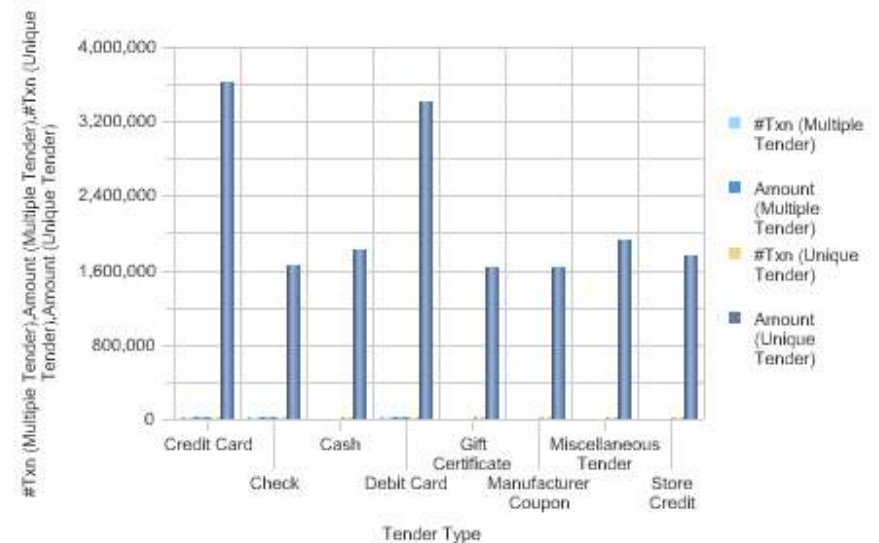
Tender Transactions (possible because of model being industry specific at xns level – not a tweaked ‘horizontal model’)

Tender Types accepted by store, and whether it was unique or used in combination with other tender type

Transactions by Tender

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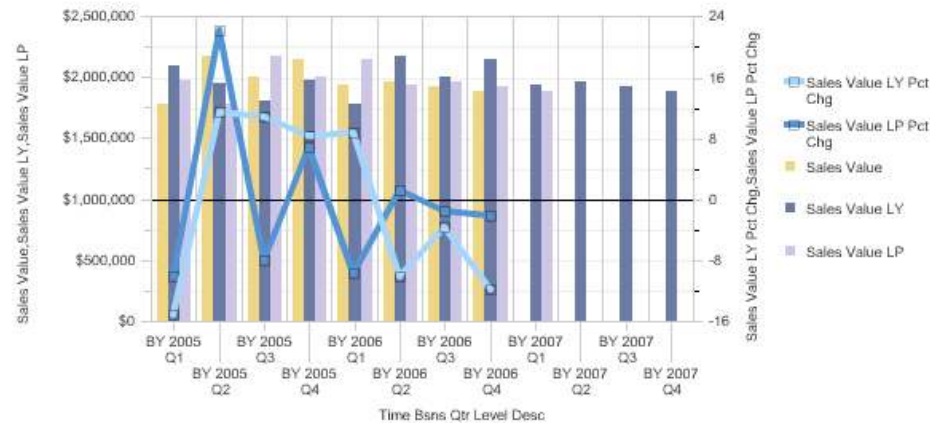
Tender Type	#Txn (Multiple Tender)	Amount (Multiple Tender)	#Txn (Unique Tender)	Amount (Unique Tender)
Credit Card	2	\$8,922	746	\$3,628,807
Check	1	\$10,000	348	\$1,653,281
Cash	0	\$0	387	\$1,814,376
Debit Card	1	\$8,232	721	\$3,418,275
Gift Certificate	0	\$0	335	\$1,633,712
Manufacturer Coupon	0	\$0	337	\$1,627,627
Miscellaneous Tender	0	\$0	383	\$1,928,192
Store Credit	0	\$0	362	\$1,750,298



Competitive Differentiator : Embedded Analytic

Sales Growth Analysis (using time series with OLAP cubes)

Sales vs last year, last period, year to date growth.
 OLAP Sales Analysis - LY, LP, YTD Measures

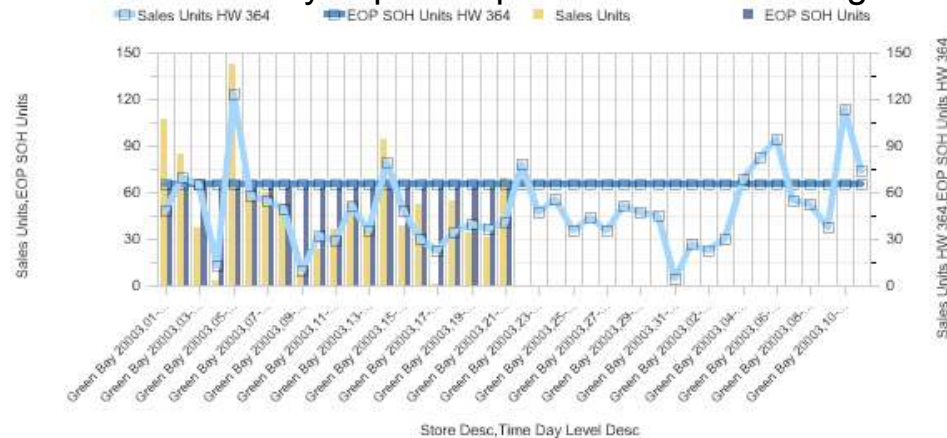


Org Area Level Desc	Product Dept Level Desc	Time Bsns Qtr Level Desc	Sales Value	Sales Value LY	Sales Value LY Pct Chg	How Is Sales Value G YOY	Sales Value LP	Sales Value LP Pct Chg	How Is Sales Value G POP	Sales Value YTD	Sales Value LY	Sales Value YTD LY Pct Chg	How Is Sales Value YTD G YOY
Area 41	Dry Grocery	BY 2005 Q1	\$1,779,976	\$2,095,287	-15%	ALERT	\$1,977,075	-10%	ALERT	\$1,779,976	\$2,095,287	-15%	ALERT
		BY 2005 Q2	\$2,176,868	\$1,950,358	12%	MODERATE	\$1,779,976	22%	GOOD	\$3,956,844	\$4,045,645	-2%	ALERT
		BY 2005 Q3	\$2,001,911	\$1,806,352	11%	MODERATE	\$2,176,868	-8%	ALERT	\$5,958,755	\$5,851,997	2%	ALERT
		BY 2005 Q4	\$2,141,735	\$1,977,075	8%	MODERATE	\$2,001,911	7%	MODERATE	\$8,100,490	\$7,829,072	3%	ALERT
		BY 2006 Q1	\$1,935,195	\$1,779,976	9%	MODERATE	\$2,141,735	-10%	ALERT	\$1,935,195	\$1,779,976	9%	MODERATE
		BY 2006 Q2	\$1,959,255	\$2,176,868	-10%	ALERT	\$1,935,195	1%	ALERT	\$3,894,450	\$3,956,844	-2%	ALERT
		BY 2006 Q3	\$1,930,320	\$2,001,911	-4%	ALERT	\$1,959,255	-1%	ALERT	\$5,824,770	\$5,958,755	-2%	ALERT
		BY 2006 Q4											

Competitive Differentiator : Smart Industry Reports

Out of Stock Forecast (using built-in Forecasting & OLAP cubes)

OLAP forecasting of sales & inventory to predict potential stock shortage



Product Item Level Desc	Store Name	Store Desc	Time Bsns Wk Level Desc	Time Day Level Desc	Sales Units	EOP SOH Units	Sales Units LY	How Is Sales Units G YOY	How Is Sales Units G POP	Sales Units HW 364	EOP SOH Units HW 364	OO Sales Units HW 364 Situation
			BY 2006 VW50	01-JAN-2007	107	65	4	+	GOOD	48	65	
				02-JAN-2007	85	65	63	+	GOOD	70	65	■ Out-of-Stock
				03-JAN-2007	37	65	98	-	ALERT	65	65	
				04-JAN-2007	3	65	25	-	ALERT	13	65	
				05-JAN-2007	142	65	130		MODERATE	123	65	■ Out-of-Stock
				06-JAN-2007	61	65	66	-	ALERT	58	65	
				07-JAN-2007	60	65	60	-	ALERT	55	65	
				08-JAN-2007	53	65	54	-	ALERT	49	65	
				09-JAN-2007	8	65	13	-	ALERT	10	65	

Competitive Differentiator : Smart Loss Prevention

Tender Statistical Outliers (using DB statistical function : possible due to the model being industry specific @xns level)

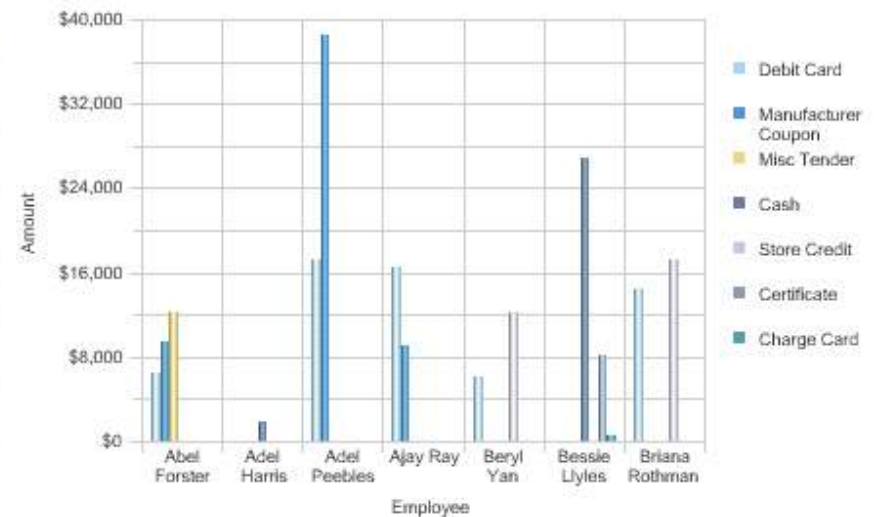
Statistical outliers of tender types accepted by associates for retail transactions

Business Year ... Business Qtr ... Business Month ... Employee ...

Tender by Associate Statistical Outliers

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Employee	Debit Card Amount	Manufacturer Coupon Amount	Misc Tender Amount	Cash Amount	Store Credit Amount	Certificate Amount	Charge Card Amount
Abel Forster	\$6,513 0	\$9,373 0	\$12,246				
Adel Harris				\$1,821 0			
Adel Peebles	\$17,156	\$38,592					
Ajay Ray	\$16,513	\$9,149 0					
Beryl Yan	\$6,137 0				\$12,285		
Bessie Lyles				\$26,940		\$8,183 0	\$490 0
Briana Rothman	\$14,465				\$17,264 0		





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