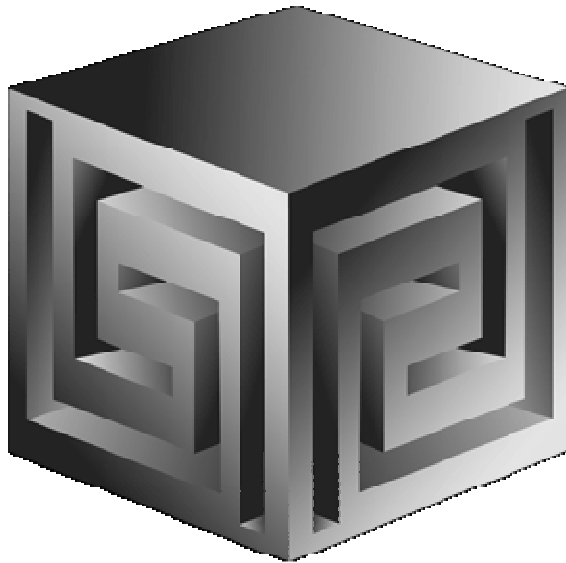


Using Oracle Business Intelligence Tools to Analyze Data Warehouses

presented at

Oracle Open World 2004 Conference



Presented by:

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and

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Vlamiis Software Solutions, Inc.

- Founded in 1992 in Kansas City, Missouri
- Provides business solutions to international and domestic clients based on Oracle technologies.
- Authorized software reseller
- Creator of the first Oracle 9i Business Intelligence and Analytics tool.
- Core competency include:
 - Certified designers,
 - Developers,
 - Implementers
 - Nationally recognized technical authors, speakers and publishers.



Agenda

- Historical background
- Comparison to Express
- Why Oracle OLAP?
- What is Oracle OLAP and how does BI Beans fit in?
- Oracle OLAP storage options
- Structure of Analytic Workspace
- Differences from Express
- Case studies



Requirements of OLAP Systems

- Multidimensional user view
- Drill down, rotate
- User-created measures
- Iterative discovery process
- Multiple levels (embedded totals)

Do these attributes imply a proprietary MDBMS?

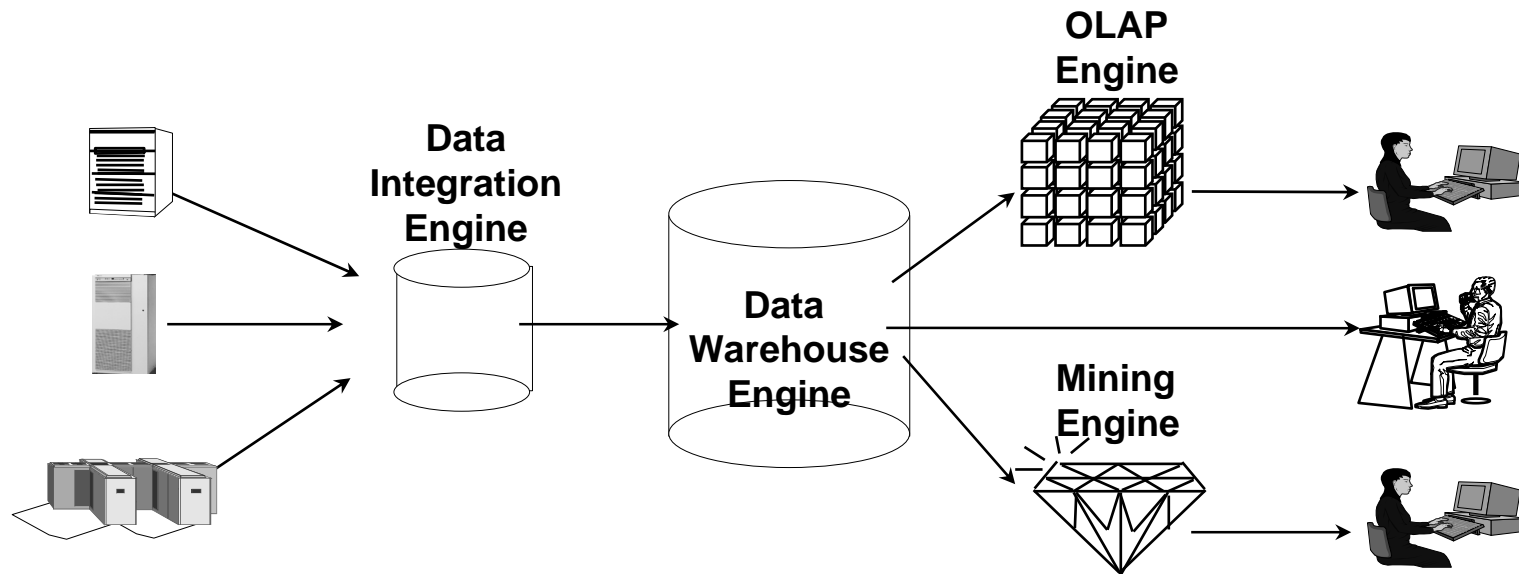
No.



In the Past

- Previous development of BI and OLAP Applications required proprietary development environment
- Each deployment model required a different tool
- Development effort very labor intensive
- Concept to Deployment takes long time
- Requires specialized skills

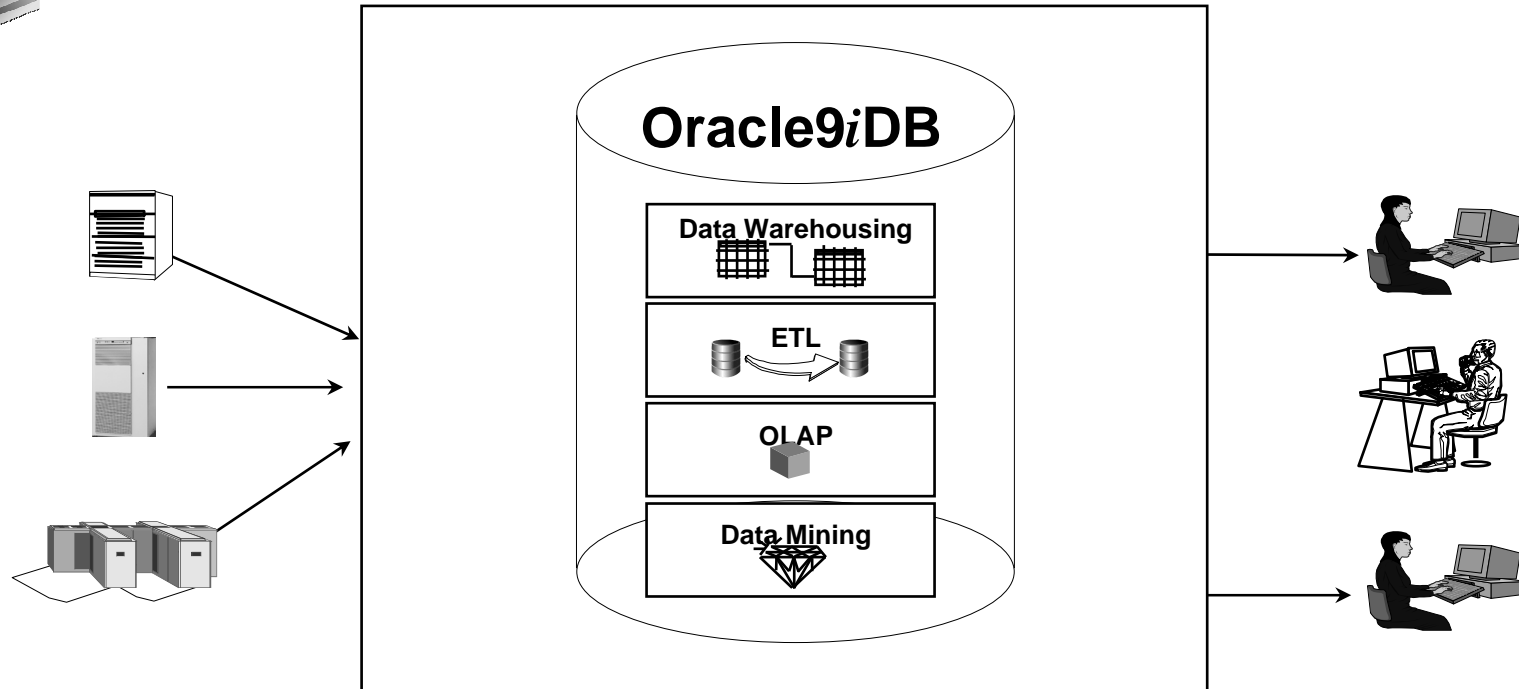
Business Intelligence the Old Way



- Special purpose engines for differing tasks
- Metadata migration tools ease replication
- User interfaces generally different for different tools



BI the New Way: Oracle9i DB



- Single business intelligence platform
 - Reduce administration, implementation costs
 - Faster deployment & Improved scalability and reliability

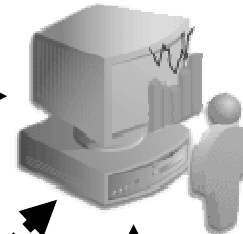
The Old Way Information & Data Fragmentation



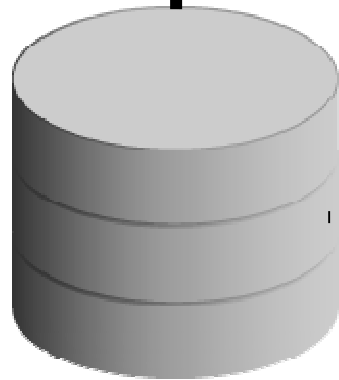
Cognos Impromptu
Brio



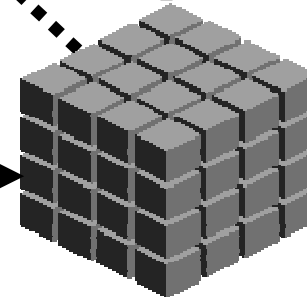
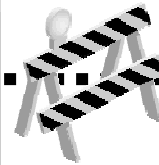
Cognos Powerplay
ProClarity
Express Analyzer



IBM
MS SQL Server



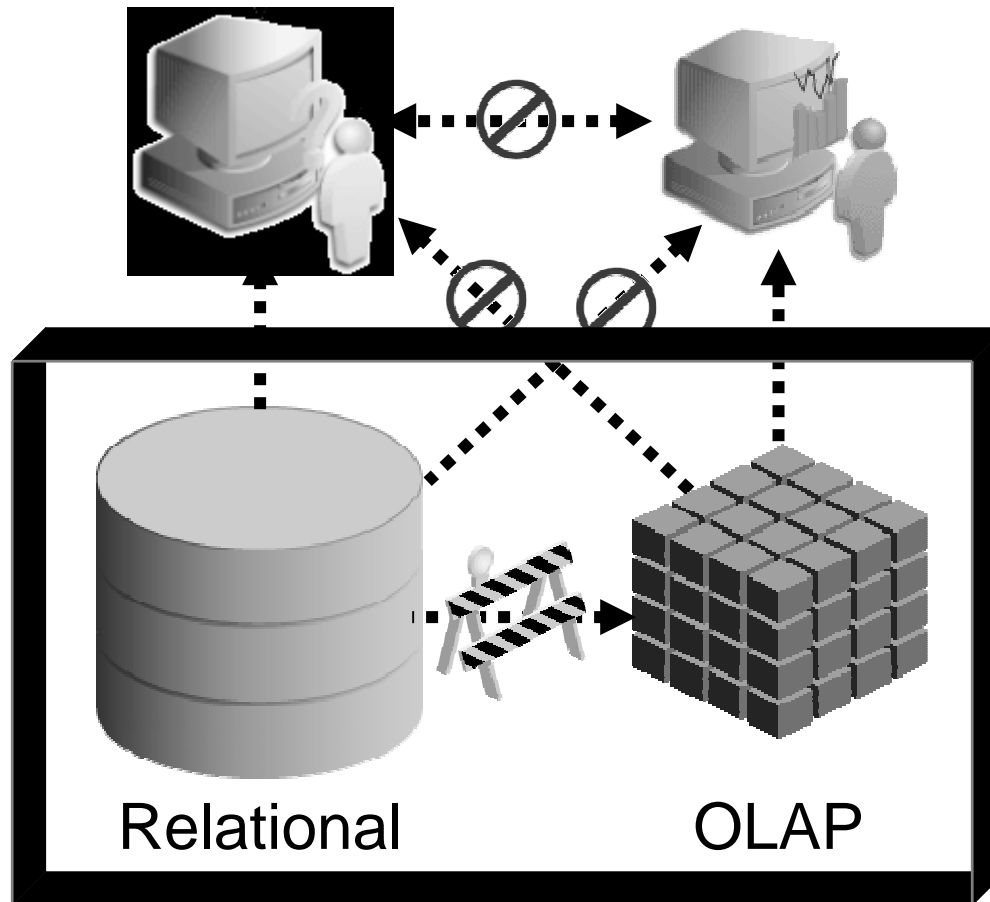
Relational



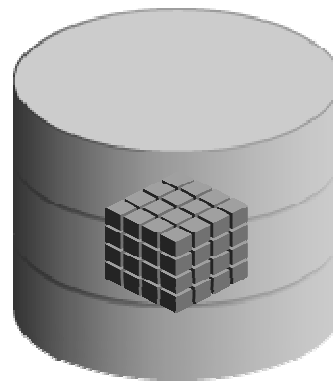
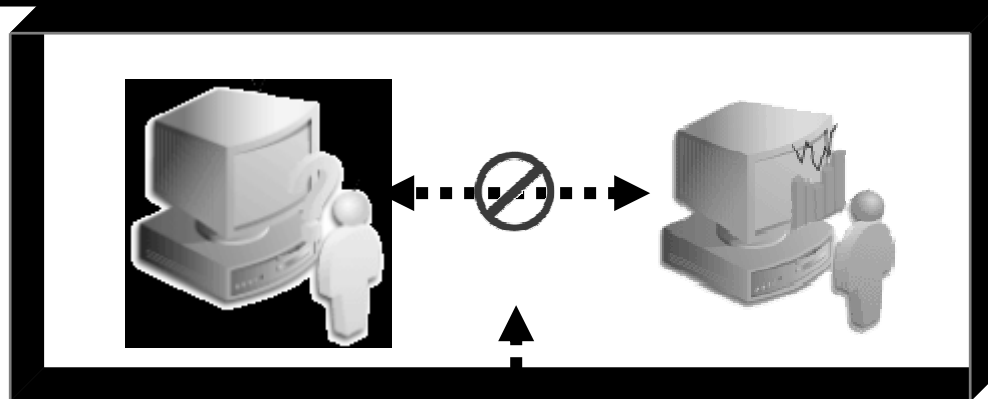
OLAP

Hyperion
MS Analysis Services
Oracle Express

The Oracle Way Information & Data Consolidation

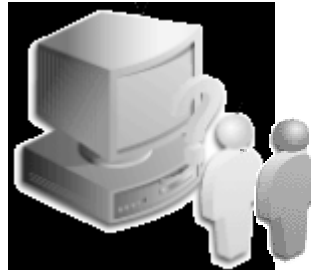


The Oracle Way Information & Data Consolidation



Relational & OLAP
Databases Unite

The Oracle Way Information & Data Consolidation



Relational & OLAP
Tools Unite



Relational & OLAP
Databases Unite



Key Developments

- Integrating Express Server team into Oracle Server team
- RDBMS gets OLAP functionality in SQL
- Data Warehouse features in Oracle 8i:
 - Bitmap and bitmap join indexes
 - Materialized views
 - Query rewrite
 - “N-pass” functions
- Increasing use of very sparse data
- Oracle focus on integration

Express Has Not Gone Away... It has just been absorbed



- Analytic Workspaces are Express DB files
- Oracle marketing will downplay Express
- Design considerations for Analytic Workspaces same as for Express DBs
- Express engine still there
- Express SPL still there (but only operates on storage in analytic workspaces)
- Analytic Workspaces better at complex calcs (for now)
- Use OLAP Worksheet for OLAP DML commands



Terminology Map

Express

Oracle OLAP

Express database	Analytic Workspace
Oracle Express Server	Part of Oracle OLAP
Express Instance Manager	Part of Oracle OLAP
Express SPL (or 4GL)	OLAP DML
RAA	OLAP folder of OEM
RAM	Automatic*

* Not necessary to use RAM any more since relational data directly accessible



Terminology Map (continued)

Express

Oracle OLAP

oesdba	olapdba
SNAPI	Java OLAP API
Oracle Express Objects	JDeveloper
Express Basic	Java
Express Administrator	AW Manager
OESCMD and Administrator command line	OLAP Worksheet



Components of Oracle OLAP

- OLAP folder of OEM defines multidimensional structure (replaces RAA)
- Query Processor processes Java OLAP API
- OLAP Worksheet provides command line to OLAP DML
- BI Beans provide linkage to Java OLAP API
- JDeveloper is environment for building apps (replaces OEO)

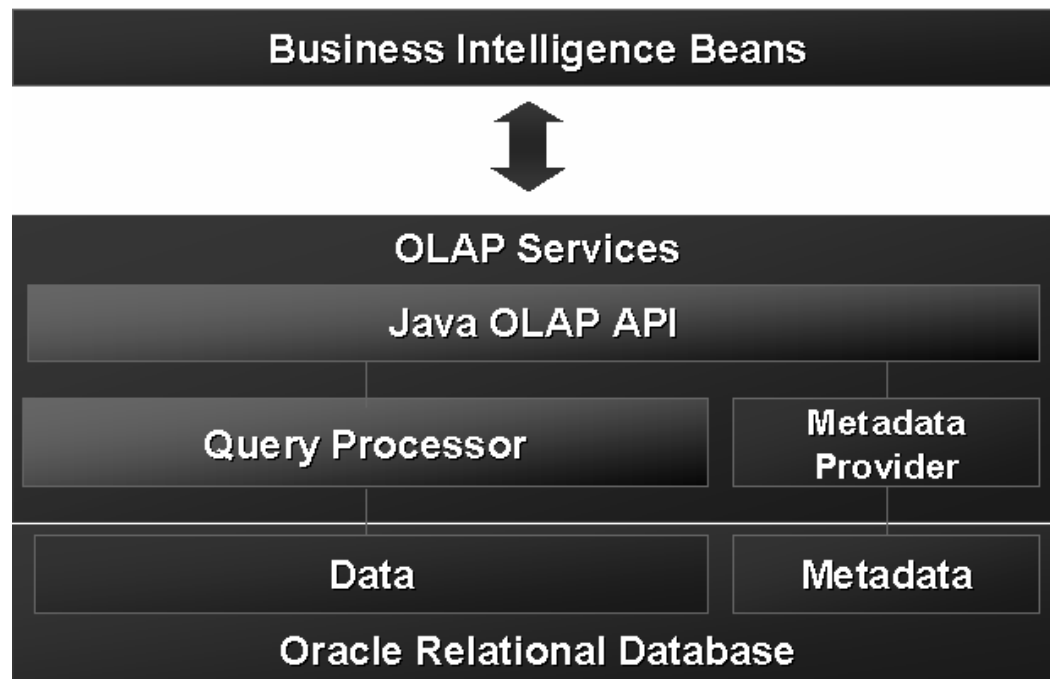


What Does Oracle OLAP Add?

- Multidimensional user view of data
- Users create own reports
- Users create own measures
- Easy drill-down, rotate
- Iterative discovery process (not just reports)
- Ad-hoc analysis
- Easy selection of data with business terms
- What-if, forecasting
- Platform for extensions
- Analytics (e.g. forecasting) built into server



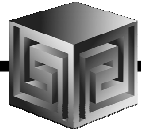
Oracle OLAP Architecture



**Rapid application development
Analysis ready**

**Java OLAP API
Predictive analysis functions**

**Scaleable data store
Integrated meta data
Summary management
SQL analytic functions**



Java OLAP API

- Object-oriented
- Mathematically consistent
- Java (industry standard)
- Compatible with JOLAP standard
- Declaratively (not procedure) based
- Data in relational or analytic workspace
- Multidimensional cursors
- Really designed for low-level access
- Most developers will use BI Beans instead

OLAP API Calculation Capabilities



- Multidimensional object model
- Totals broken out by multiple attributes
- Row and column calculations
- Union dimensions
- Measures as dimensions
- Calculated dimension members
(e.g. income 0-20K, 20-50K, 50-75K, >75K)
- Asymmetric queries
- Multiple measures per cell (e.g. color-coding)



Simple Java OLAP API Example

English

Select the products where the dollars measure is greater than 1,000,000 for geography KC for time period Oct2004.

Express

```
limit geography to 'KC'  
limit time to 'OCT2004'  
limit product to dollars gt 1000000
```

SQL

```
Select p.prod_name, g.geog_name, t.time_name, f.sales  
  from fact f, proddim p, geogdim g, timedim t  
  where f.prod_id = p.prod_id and f.geog_id = g.geog_id  
        and t.time_id = f.time_id and g.geog_id = 'KC'  
        and t.time_id = 'OCT2004' and sales > 1000000
```

Java OLAP API

```
Source geogSel = geography.selectValue("KC");  
Source timeSel = time.selectValue("OCT2004");  
Source dolByProd = dolSrc.join(geogSel).join(timeSel);  
Source prodSel = product.select(dolByProd.gt(1000000));  
Source dolGT1Mill =  
    dolSrc.join(geogSel).join(timeSel).join(prodSel);
```



Oracle BI – Getting the Data In

- Storing / calculating with the data
 - Oracle RDBMS
 - Oracle OLAP (an option to the RDBMS)
- Getting the data in / managing
 - Oracle Warehouse Builder
 - Oracle Enterprise Manager
 - Analytic Workspace Manager (part of OEM)

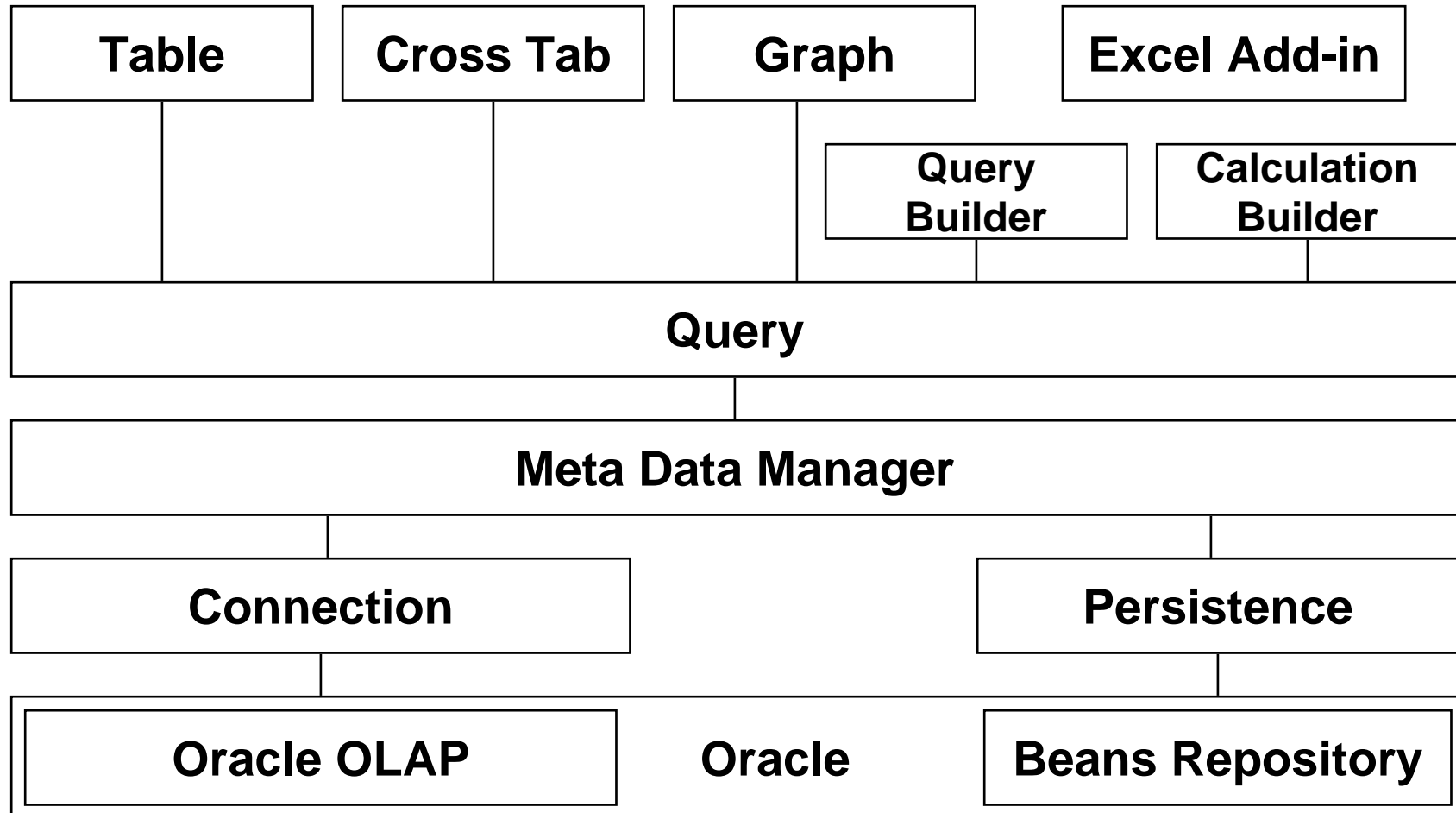


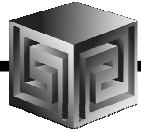
Getting the Data Out

- Once the Data is in OLAP how do we get the data out?
- Alternatives
 - BI Beans applications (Custom or pre-built)
 - Discoverer
 - Oracle Reports
 - SQL Access from any SQL tool
 - Spreadsheet Add-in
 - Any except Spreadsheet add-in can be in a portal and with web interface

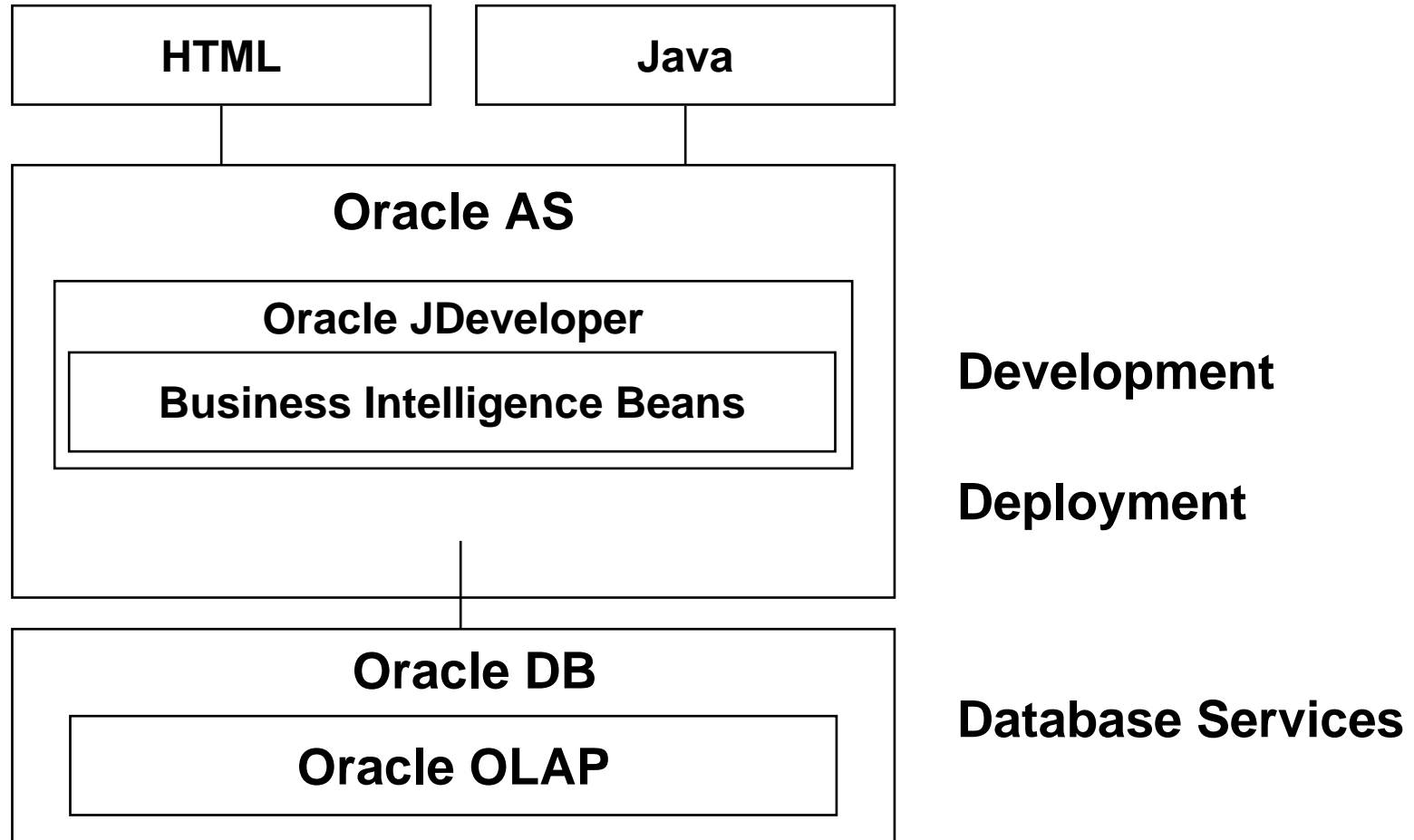


Business Intelligence Beans





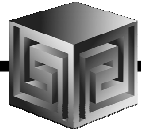
Java Development Environment





What Development Tool?

- Java OLAP API designed for products
- BI Beans for custom applications (using JDev)
- Oracle Reports for highly formatted reports
- Discoverer for ad hoc analysis
- Oracle Apps for analysis of Apps data
- 3rd Party tools fill in gaps



Executing OLAP DML From SQL

- DBMS_AW.EXECUTE procedure
- DBMS_AW.INTERP function (returns a CLOB with the log from the commands)
- DBMS_AW.GETLOG() function gets the log from the most-recently executing OLAP DML command or program or OLAP_TABLE function



OLAP DML Changes

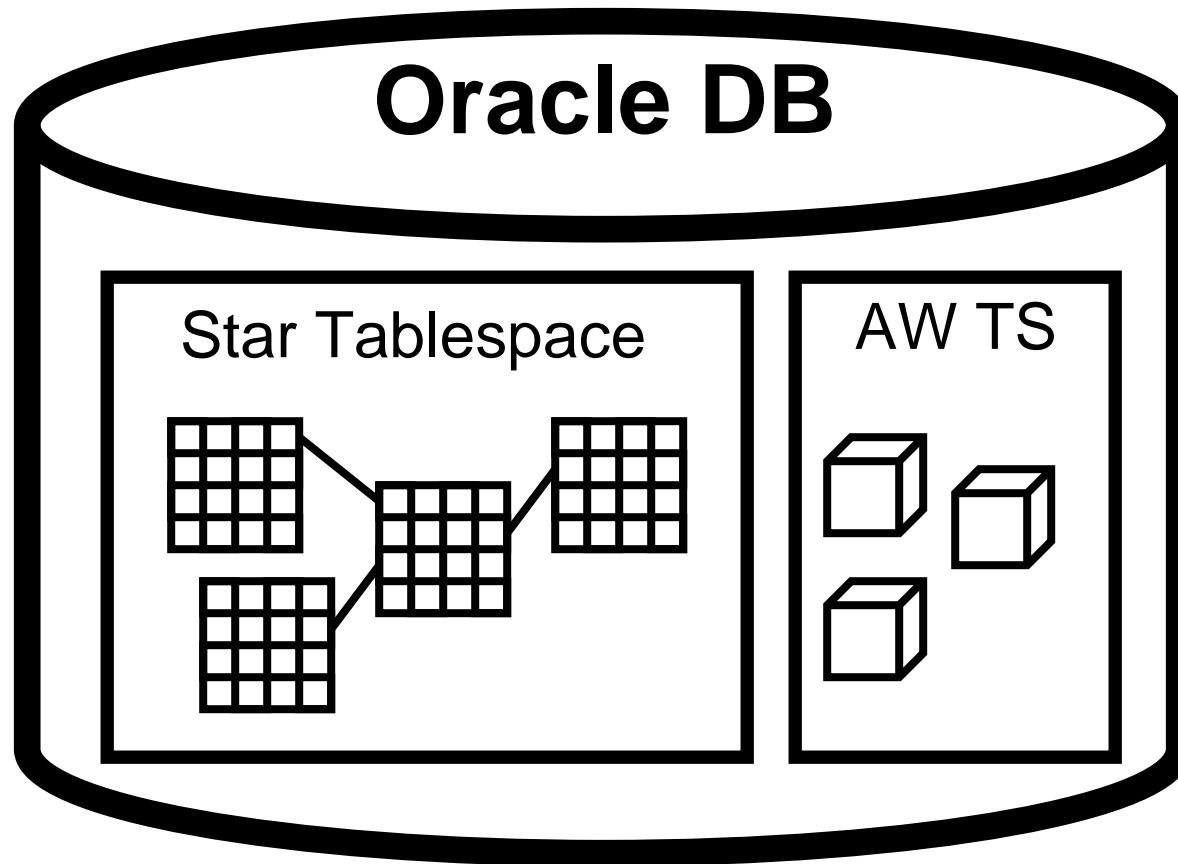
- All SPL functionality there:
 - Some operating and file system commands changed
 - XCA and SNAPI no longer applicable
 - External Call (EXTCALL) command
 - SQL CONNECT command and SQL.DBMS option not necessary
- Added support for:
 - Parallel aggregate
 - Allocate
 - Data conversion functions, new data types
 - Concat (union) dimensions
 - objects with same name attached multiple times
 - dynamic model execution
 - bulk data transfer with RDBMS



OLAP DML Changes (continued)

- Database is now Analytic Workspace
 - Stored in LOB in RDBMS
 - AW create command creates AW's
 - Can attach multiple AW's
 - Non-unique object names OK now
- Update AND THEN COMMIT
- SQL PREPARE for high-speed AW->RDBMS
- SQL access to AW via OLAP Table Function

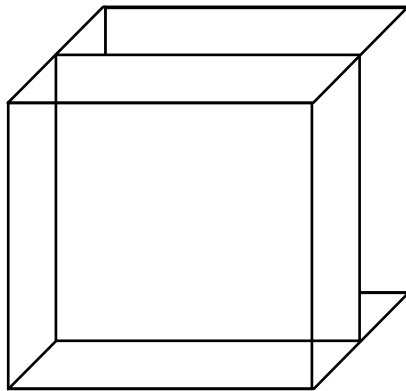
Analytic Workspaces Are Stored in Tablespaces in Oracle OLAP



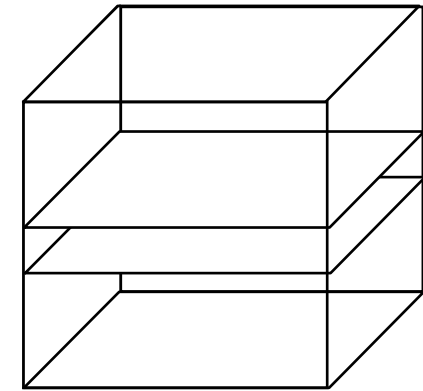
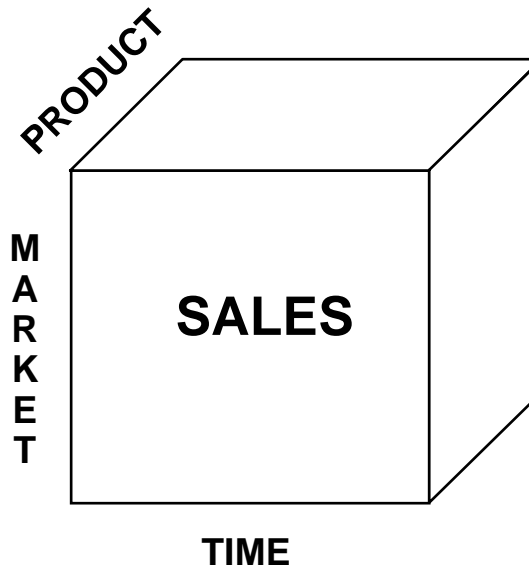
Oracle OLAP AW Stores Data in Cubes



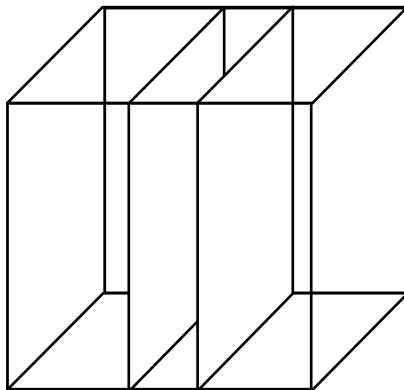
Fast Flexible Access to Summarized Data



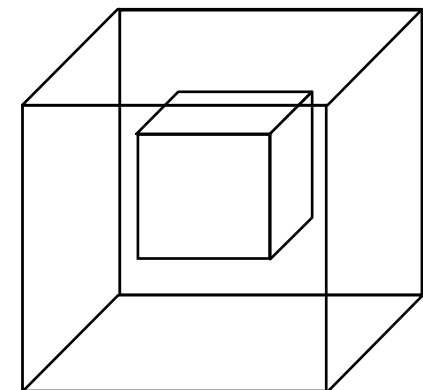
Product Mgr. View



Regional Mgr. View



Financial Mgr. View

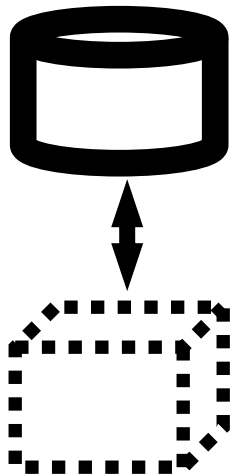


Ad Hoc View

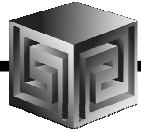


Advantages of RDBMS Storage

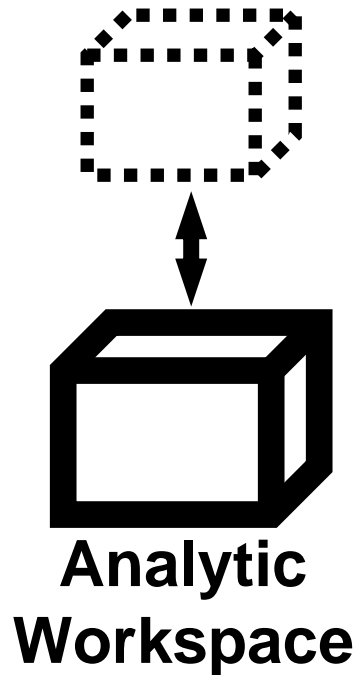
Oracle
Star Schema



- Store data in familiar RDBMS
- Easy access to data using SQL
- Can use materialized views
- Best for read-only applications
- Model with OWB
- Data may already be in schema



Advantages of AW Storage



- Faster multidimensional access
- Personal user workspaces
- Best for read/write applications
- Best for heavier analysis
- OLAP DML language



Oracle AW Tips

- Use separate tablespaces for AWs
- Keep out of SYS tablespace
- Stripe across drives with multiple pathnames
- Make sure they autoextend
- Users should use TABLESPACE keyword when creating AWs

AWs Allow Session Level Commit



- Want to concentrate on territories that underperformed last year (complex calc)
- Compute forecast for those territories
- Let me spread this forecast down organization
- Now adjust this value + 10%
- Re-run report
- Never mind
- Go back to prior scenario
- Submit THAT forecast for approval



AWs Allow for What-if

- Modeling organizational changes
 - territory realignments
 - product hierarchy changes
- Product new launches
 - model new products after established product
- Forecasting
 - multiple scenarios
 - personal overrides of forecast
 - spread down of higher-level overrides
 - locks



AWs for Personal Data

- DBAs often don't want users modifying data
- Modeling data
- User-created calculations
- Multiple scenarios for forecasts
- Allows for collaboration between users

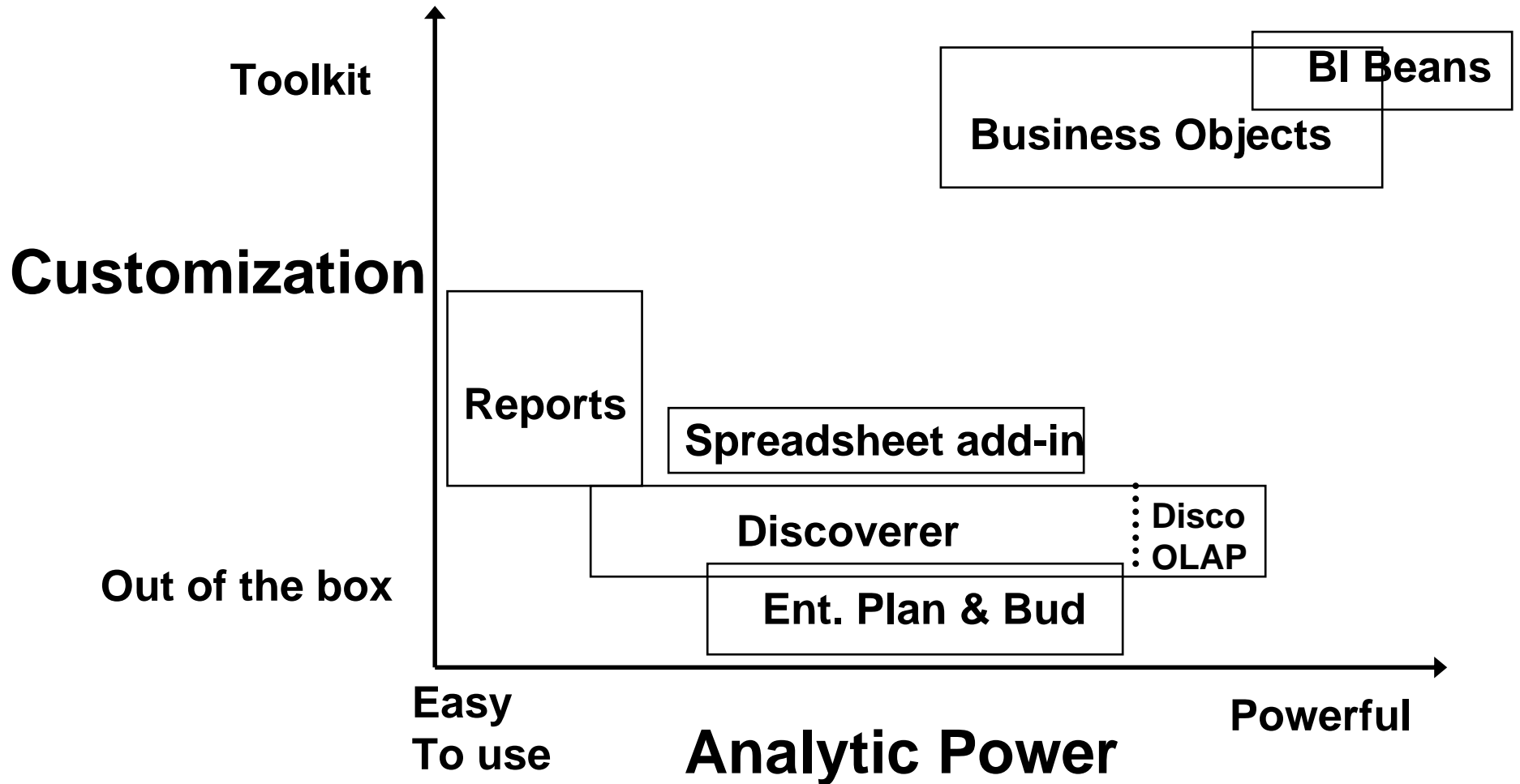


AWs Allow for Rules Based Apps

- OLAP DML for manipulating data in DB
- Aggregation
- Allocation
- Decision Trees
- Transform data via complex OLAP DML logic
- High-power statistical functions built-in
- Rules or logic that differs by organization
- Expert systems

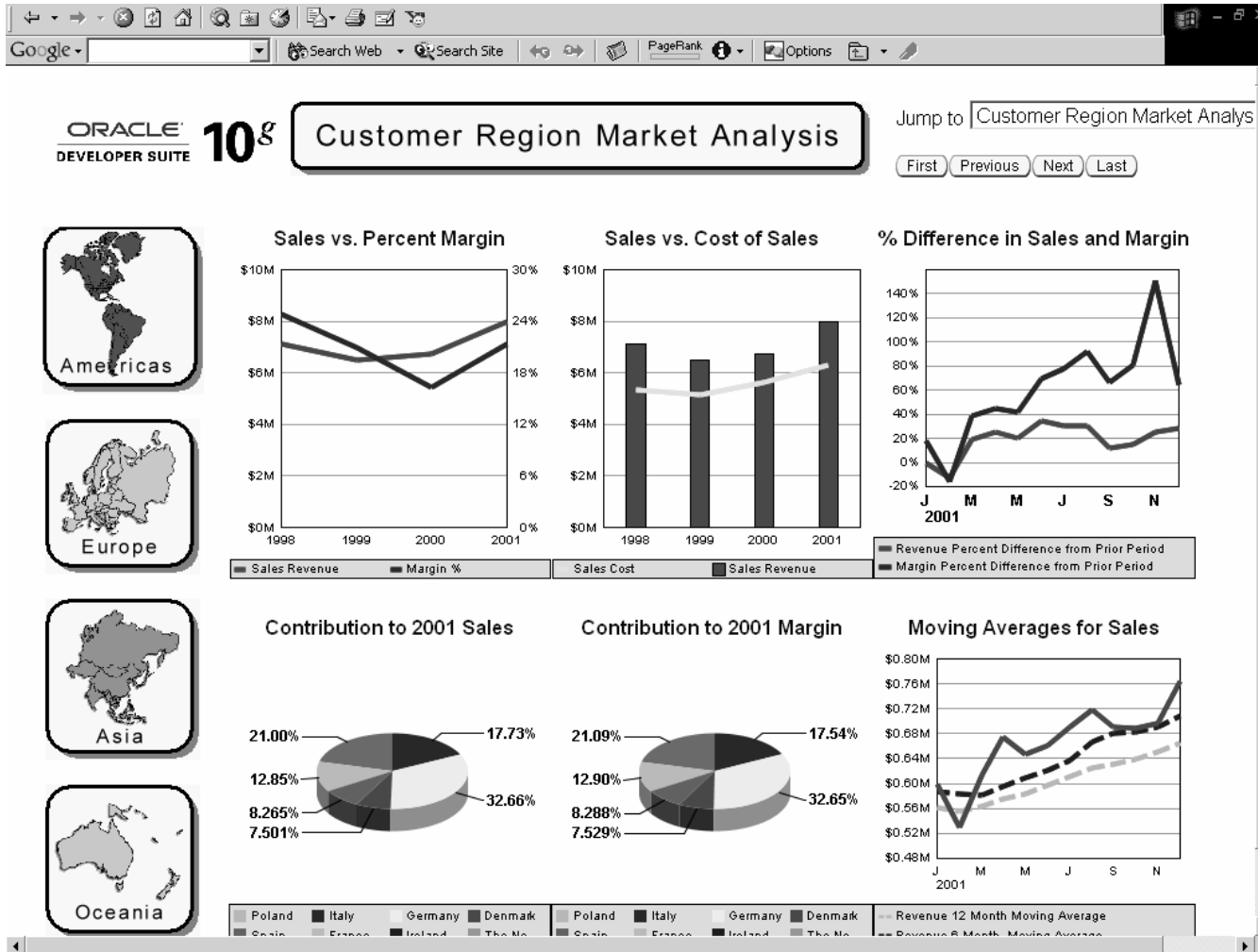


Choices for Viewing Data





Custom BI Application





Spreadsheet Add-In

The screenshot shows a Microsoft Excel spreadsheet with the following data:

	Sales	Quota	Quota Var %
2000	2000	2000	2000
CD Player	16,558,146	16,154,458	> 50%
Amplifier	14		
VHS Camcorders	13		
Receiver	13		
Digital Camcorders	12		
	70		

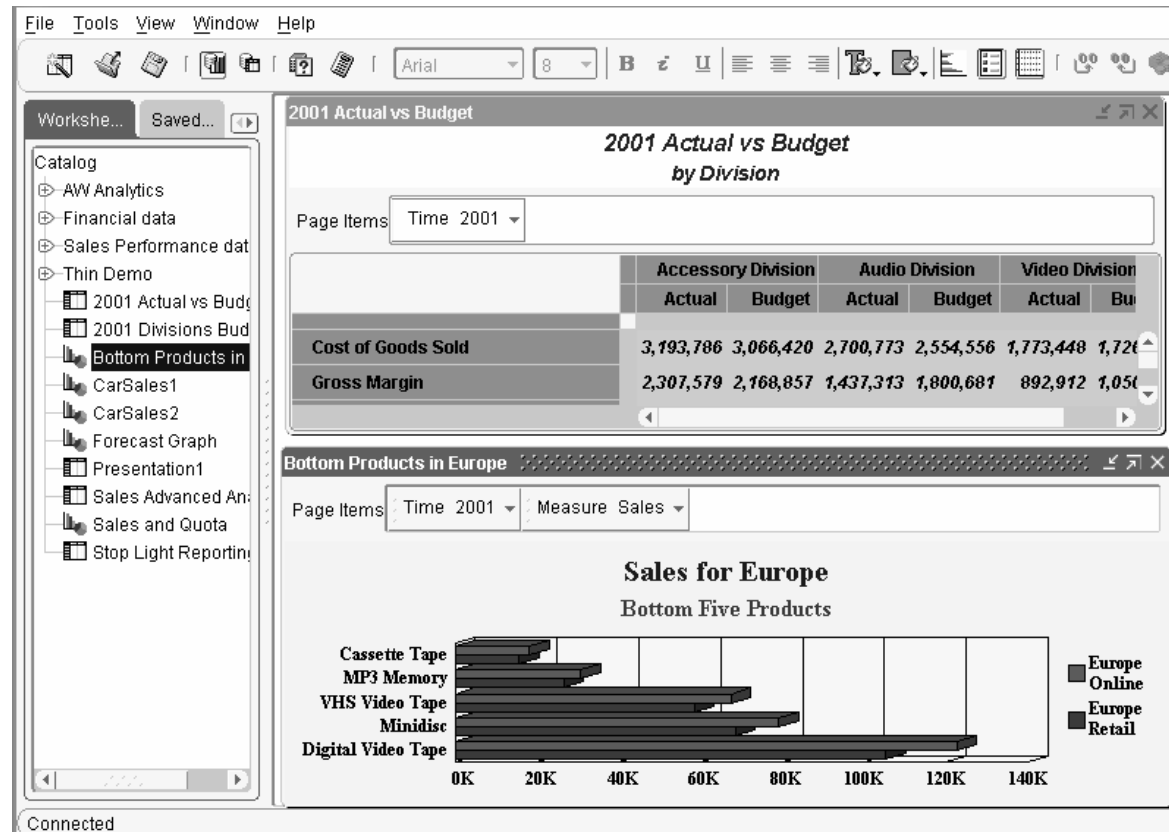
The 'Oracle OLAP Query Wizard' dialog box is open, showing the following configuration:

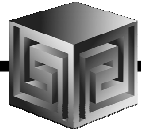
- Choose: Product
- From: Standard hierarchy
- Available: Exception, Top/Bottom, Top 10 based on Sales, Bottom 5.0% based on Quota, Making up top 3.0% of Quota, Hierarchy, Time/Ordinal, Match
- Selected: 1. Start with Equipment/Parts: Top 5 based on Sales

Discoverer 10g – Discoverer OLAP



- Currently AWM creates EUL for SQL Access
- Disco 10g adds Direct Access to OLAP





What Access Tool?

- Java OLAP API designed for products
- BI Beans for custom applications (using JDev)
- Oracle Reports for highly formatted reports
- Discoverer for ad hoc analysis
- Oracle Apps for analysis of Apps data
- 3rd Party tools fill in gaps



Managing a BI Project

- Involve end-users early on
- Prototype, pilot, then phase 1
- Recruit "champion" users
- Lead from user community, not IT
- Develop in phases
- Provide value early on
- Keep it simple (at first)
- Need forum for users to share ideas
- Provide user guide with user's data



Oracle OLAP Case 1

- Company needs to reduce inventory levels
- Uses OLAP DML Forecast command based on orders
- Users can override forecasts and add their own promotional campaigns
- Computes more accurate forecasts of production needs, reducing inventory levels
- Can compare accuracy of monthly forecasts by comparing various “scenarios” each month with actual shipments
- Application presented as JSP for business forecasters / managers



Oracle OLAP Case 2

- Customer is service organization
- Company wants to minimize hold time but not increase headcount
- Solution is to analyze hold time and customer resolution time for each support analyst
- Can rank support engineers / departments by customer satisfaction / resolution / callback rates



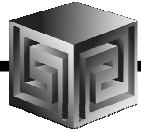
Oracle OLAP Case 3

- Company has complex GL and needs “business rules engine” for allocating costs and income
- Uses Oracle OLAP engine to develop models to allocate data based on rules analysts develop
- Users can develop their own way of analyzing the data rather than relying on IT
- IT sets up infrastructure, users develop actual analyses



Oracle OLAP Case 3 (continued)

- Company has existing Express application that meets user needs, but wants to modernize U/I and run with web interface
- Export/import existing Express databases to Oracle OLAP AWs
- Back-end code works as-is
- Front-end code rewritten in BI Beans (Java) or Oracle OLAP Web Agent (OLAP DML)
- Users can add and delete new objects



Oracle OLAP Case 4

- Company wants to an ad-hoc analysis and reporting tool against data warehouse
- Users need easy-to-use interface and limited custom analysis capabilities
- Develop star schema to address user needs
- Front-end is BI Beans custom JSP application
- Write "custom selector" to allow users to select which data to view in screens determined by users
- Present data in BI Beans crosstabs customized for use by users

How Get Started? / More Information

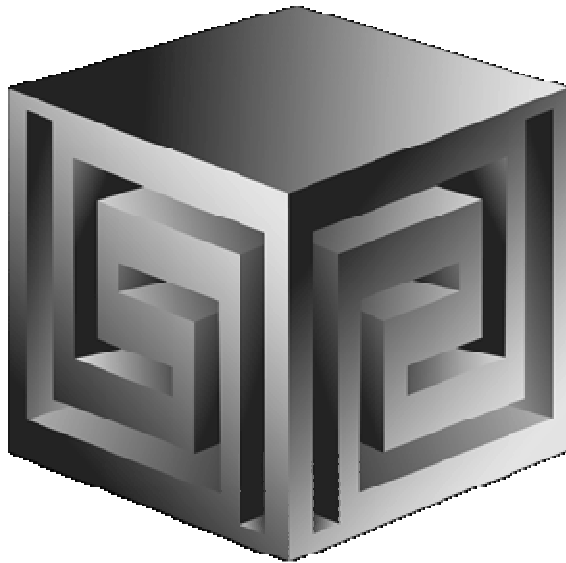


- Java programming
 - Start with JDeveloper (download from OTN)
- BI Beans
 - Tutorials (In JDeveloper)
 - Samples (on OTN)
 - Training (Web and Instructor Led)
- Oracle Technology Network
 - <http://otn.oracle.com/products/bib/content.html>

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