

Data Warehouse

D03. OLAP



- Code: 164323-03
- Course: Information Policy
- Period: Spring 2013
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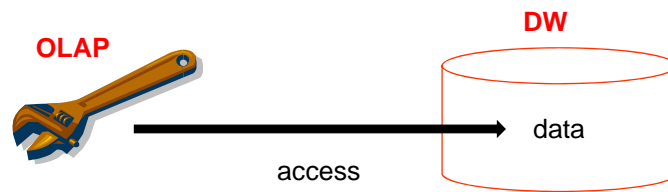
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01. OLAP

- OLAP(On-Line Analytic Processing)
 - A tool for a user to access data in DW
 - OLAP is affected by DW structures and extraction methods.



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01. OLAP

- Classification of OLAP
 - ROLAP(Relational OLAP)
 - MOLAP(Multi-dimensional OLAP)

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01. OLAP

- Merits of OLAP
 - Reduction of time, cost, human resources
 - Making possible unstructured documentation
 - User-oriented computing

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02. MOLAP

- Background of the Advent of MOLAP
 - RDB(Relational DB, 2-dimension)
 - Difficult to analyze multi-dimensional data.
 - SQL(Structured Query Language)
 - Difficult to analyze complex queries.
- → MDB(Multi-dimensional DB) was invented for private use of OLAP.
- → MOLAP(Multi-dimensional OLAP) is OLAP with MDB.

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02. MOLAP

- Merits of MOLAP
 - The structure of MDB is relatively simpler than that of RDB.
 - (Comparatively) simple structure rather than RDB
 - With different methods of query, update, store
 - With same methods of backup, recovery, tuning
 - Speedy and various analysis is possible.
 - Retrieving dimensional values by use of hashing method
 - Storing much data in memory

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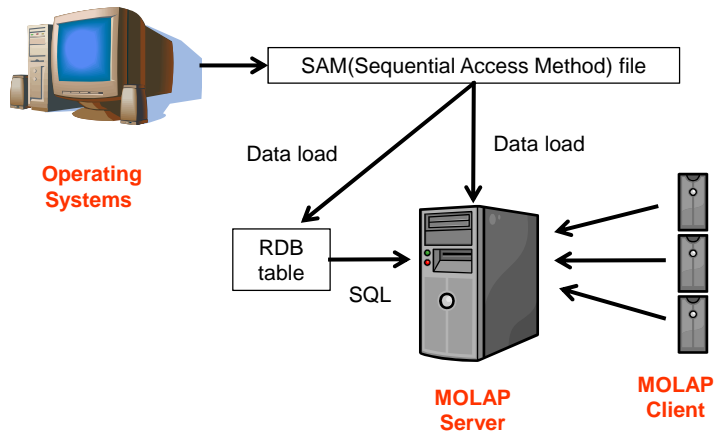
02. MOLAP

- Demerits of MOLAP
 - It cannot see the original data.
 - It is unfit to implement a large-volume DB.
 - It takes long to load data.

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02. MOLAP

- Basic Structure of MOLAP



02. MOLAP

- Procedure to Implement MOLAP
 - 1) Tasks are analyzed according to user's requirement at MOLAP server.
 - Defining dimensions, variables, and functions.
 - 2) Data are taken from operation systems according to defined formats.
 - SAM file
 - RDB + SQL
 - 3) At MOLAP server, data are calculated according to defined dimensions.
 - 4) MOLAP client accesses data at MOLAP server.

02. MOLAP

- Structures of N-tiers
 - 1-tier: MOLAP client + personal MDB
 - Generally used
 - Also called DOLAP(Desktop OLAP)
 - 2-tier: MOLAP client + MOLAP server
 - Implementing data marts by departments
 - 3-tier: MOLAP client + MOLAP server + DW server
 - Accessing data not in MOLAP but in DW with SQL
 - 4-tier: Web browser + Web server + MOLAP server + DW
 - Transform data at MOLAP server into HTML formatted data

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03. ROLAP

- Background of the Advent of ROLAP
 - MOLAP has the following demerits.
 - Scant flexibility
 - Poor handling of large volume of data
- → RDB(Relational DB) was widely used.
- → ROLAP(Relational OLAP) is OLAP with RDB.

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03. ROLAP

- Merits of ROLAP
 - It is a program which internally makes SQL.
 - It analyzes data multi-dimensionally by use of RDB.
 - Joining b/t fact tables and dimension tables
 - Based on RDB, it acquires handling/flexible power of large data.

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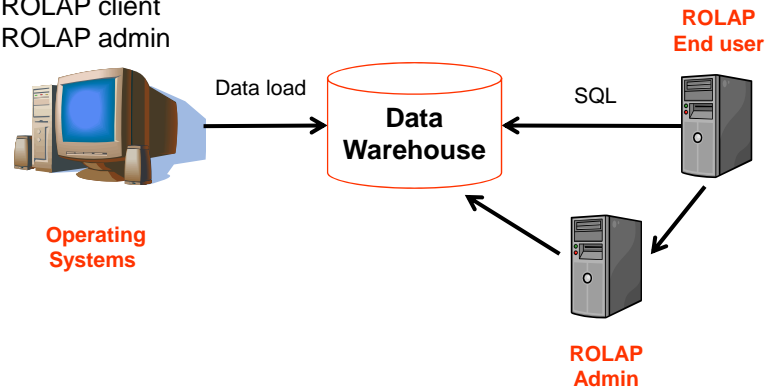
03. ROLAP

- Demerits of ROLAP
 - It lacks high functions of statistics(regression, time series, ...) with using only SQL for data analysis.

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03. ROLAP

- Basic Structure of ROLAP
 - DW
 - Metadata
 - ROLAP engine
 - ROLAP client
 - ROLAP admin



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03. ROLAP

- Procedure to Implement ROLAP
 - 1) Extracting user's requirements.
 - 2) Multi-dimensional modeling
 - Star schema, Snowflake schema
 - 3) Creating fact tables and dimension tables.
 - By use of results of Multi-dimensional modeling
 - 4) Extracting data from operation systems.
 - Loading data to fact tables and dimension tables.
 - 5) Inserting data about fact tables and dimension tables.
 - By use of ROLAP admin
 - 6) Accessing data.
 - By use of ROLAP end user

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03. ROLAP

- Structures of N-tiers
 - 1-tier: ROLAP client + Personal RDB
 - For demonstration
 - 2-tier: ROLAP client + DW server
 - For small users
 - Large users → bottleneck at DW server
 - 3-tier: ROLAP client + ROLAP server + DW server
 - Form-predefined documents should be stored at ROLAP server
 - 4-tier: Web browser + Web server + ROLAP server + DW
 - For thousands of users
 - It is proper for a user to access only form-defined documents.

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03. ROLAP

- Major Functions of ROLAP Client
 - High easiness for a user
 - Enterprise DW preferentially adopts ROLAP.
 - End-user reporting
 - Condition, dimension, fact
 - Drill down/up
 - Basic function of OLAP
 - Drill across/anywhere
 - Across: adding some dimensions and analyzing data
 - Anywhere: analyzing another data
 - Drill to detail
 - Detail: source data
 - Retrieving detailed data while summary data
 - Drill down/up/across/anywhere

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03. ROLAP

- Major Functions of ROLAP Client
 - Various Graphing
 - Pivoting
 - Retrieving data with modifying axes
 - Summary
 - Automated-creating summary tables
 - Ex. Create summary table periodically after setting up time.
 - Applicable to spreadsheets
 - Calculation

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03. ROLAP

- Major Functions of ROLAP Server
 - All actual data exist at DW.
 - ROLAP Server has No data.
 - ROLAP Server performs only caching.
 - Cf. MOLAP server has its MDB.
 - Document booking and caching
 - Creating basic documents in advance and caching them to server
 - → declining overloads on DW
 - Operating asymmetric queries

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03. ROLAP

- Major Functions of ROLAP Server
 - Monitoring
 - Checking time or the number of table access
 - Tuning fact tables and summary tables
 - Limitation of queries
 - Limiting the maximum of time or the number
 - Preventing unnecessary system resources
 - Security

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03. ROLAP

- ROLAP Operation
 - 1) Inputting metadata
 - 2) Creating or storing metadata by ROLAP admin
 - 3) User's accessing
 - 4) Referring to metadata by ROLAP engine
 - 5) Making SQL dynamically by ROLAP engine
 - 6) Processing SQL at DW
 - 7) Returning the results of SQL at DW to ROLAP engine
 - 8) Formatting data at a user's disposal

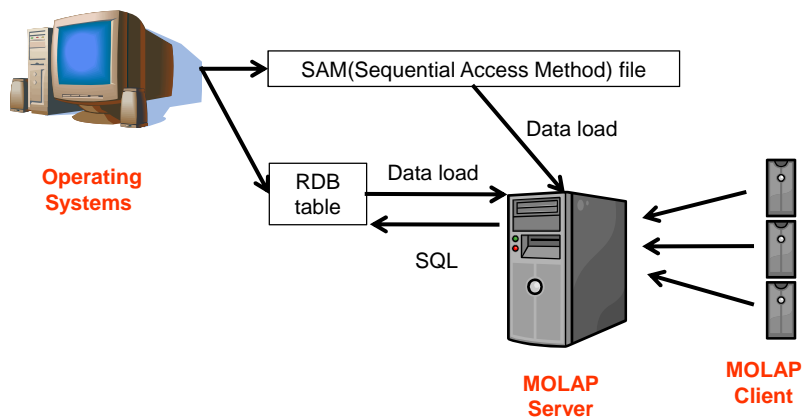
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04. HOLAP

- HOLAP
 - Hybrid OLAP
 - MOLAP with a function to access data of RDB
 - Demerits
 - Taking long to access RDB
 - Multi-dimensional modeling

04. HOLAP

- Basic Structure of HOLAP



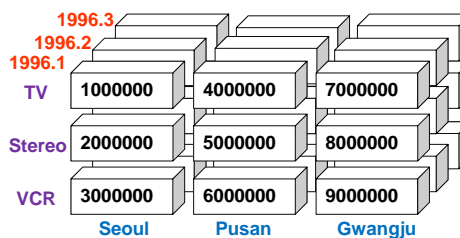
04. HOLAP

- Procedure to Implement HOLAP
 - 1) Loading data in MOLAP server by use of SAM file or RDB.
 - RDB: not ER modeled but multi-dimensional modeled.
 - 2) Inputting fact tables and dimension tables to MOLAP server by use of MOLAP admin.
 - 3) Taking data by use of MOLAP client.
 - If MOLAP server has data, take them.
 - Unless MOLAP server has data, take data from fact tables and dimension tables of RDB.

05. MOLAB vs. ROLAP vs. HOLAP

- Cf. RDB vs. MDB
 - Excessive redundancy in RDB
 - MDB: Scarce matrix, real data (only price)

Month	Region	Product	Price
1996.1	Seoul	TV	1000000
1996.1	Seoul	Stereo	2000000
1996.1	Seoul	VCR	3000000
1996.1	Pusan	TV	4000000
1996.1	Pusan	Stereo	5000000
1996.1	Pusan	VCR	6000000
1996.1	Kwangju	TV	7000000
:	:	:	:



05. MOLAP vs. ROLAP vs. HOLAP

- How to Choose OLAP!

	MOLAP	ROLAP	HOLAP
Basic Structure	MDB	RDB	MDB+RDB
Large Volume of Data	X	O	O
Check Original Data	X	O	O
Analysis Function	O	X	O
Implementation Time	Short	Long	Long
Core Technology	Multi-dimensional DB	Multi-dimensional Modeling	Multi-dimensional Modeling + Multi-dimensional DB
Adaptation	Data Mart, EIS	Enterprise DW	Data Mart, EIS
Examples	Cognos Powerplay	Oracle Discoverer, Microstrategy DSS Agent, Informix Metacube	Oracle Express, Arbor ESSBASE

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05. MOLAB vs. ROLAP vs. HOLAP

- How to Choose OLAP!
 - It is not proper to adapt it uniformly.
 - Original data → Important to DB marketing → Choose OLAP!
 - Analysis of trend & regression → Choose MOLAP!
 - Analysis of variable transformation → Choose MOLAP!
 - Adding analysis function → Choose MOLAP!
 - Short implementation time → Choose MOLAP!
 - Low cost → Choose MOLAP!
 - Full-scale DW → Choose ROLAP!
 - Data mart by the unit of department → Choose MOLAP!

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06. Web OLAP

- Web OLAP
 - Similarity of OLAP and Web
 - Pull model: based on retrieving
 - Unnecessary to maintain session b/t server and client

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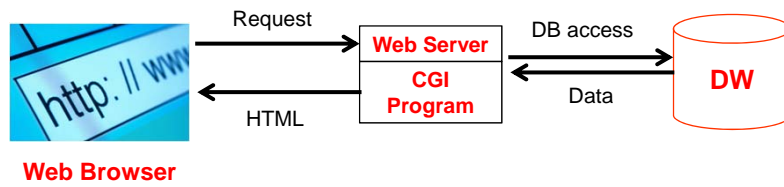
06. Web OLAP

- Merits of Web OLAP
 - Low cost of implementation
 - Unnecessary to purchase software for client
 - Easy to maintain and support users
 - Easy to maintain
 - Necessary to maintain only OLAP server upgrade
- Demerits of Web OLAP
 - Scant of high-level functions rather than client/server

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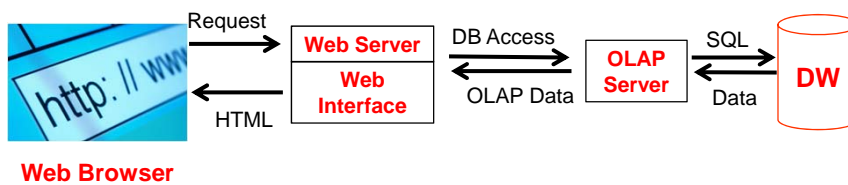
06. Web OLAP

- Methods to Implement Web OLAP
 - CGI(Common Gateway Interface)
 - Low performance



06. Web OLAP

- Methods to Implement Web OLAP
 - Dynamic HTML(Hyper Text Markup Language)
 - Web interface: OLAP vendor product



06. Web OLAP

- Methods to Implement Web OLAP
 - Java/Active-X
 - Creating SQL dynamically and transmit it to DW

