


Unit -3

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#

 **Learning Objective**


- Demand for Online analytical processing
- Major features and functions
- OLAP models and implementation considerations

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#

 **Demand of On Line Analytical Processing**


- Need for multidimensional analysis
- Fast access and powerful calculations
- Limitations of other analysis methods
- OLAP is the answer
- OLAP definitions and rules
- OLAP characteristics

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#

 **Demand of On Line Analytical Processing**


OLAP:-On line Analytical Processing
 It covers a Wide Spectrum of Complex multidimensional Analysis involving Complex Calculations and Requiring Fast response times.
 As the above definition of OLAP describe Demand for OLAP is increases because it covers a wide spectrum of Complex multidimensional Analysis.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Demand of On Line Analytical Processing cont..**


The data marts must be able to support dimensional Analysis. These Data Marts seem to be adequate for basic analysis. However, in today's business conditions, we find that users need to go beyond such basic analysis. They must have the capability to perform far more complex analysis in less time.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Need for Multi-Dimensional Analysis**

If we just look at daily sales, we soon realizes that the sales are interrelated to many business dimensions. The daily sales are meaningful only when they are related to the dates of the sales, the products, the distribution channels, the stores, the sales territories, the promotions, and a few more dimensions.


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Need for Multi-Dimensional Analysis cont..**

Multidimensional view are inherently representative of any business model. Very few models are limited to three dimension or less.

Decision makers are no longer satisfied with one-dimensional queries such as “How many units of Product A did we sell in the Store in Delhi, India?”


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Need for Multi-Dimensional Analysis cont..**

Consider the following more useful query, How much revenue did the new Product X generate during the last three months, broken down by individual months, in the South Central Territory, by individual stores, broken down by promotions, compared to estimates and compared to the previous version of Product?

The Analysis does not stop here. The user may continues to ask for further comparisons to similar products, comparisons, among territories etc.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Fast Access and Powerful Calculations**


In order to perform fast Access and also implements power in Calculations we may use the following list of typical calculations that get included in the query requests.


Roll-Ups to provide summaries and aggregations along the hierarchies of the dimensions.


Drill-downs from the top level to the lowest along the hierarchies of the dimensions, in combinations among the dimensions.


Simple Calculations, Such as Computations of Margins (Sales minus Costs).

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

	Fast Access and Powerful Calculations cont..
<ul style="list-style-type: none"> • Share Calculations to compute the percentage of Parts to the whole. • Algebraic Equations involving key performance indicators. • Moving Averages and Growth percentages. • Trend Analysis using Statistical Methods. 	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	Limitations of Other Analysis Methods
<p>The other Analysis Methods Such as Reports, Spread Sheets etc.</p> <p>Main Problem in reports is that reports writers do not support multidimensionality with basic report. We cannot drill down to lower levels in the dimensions. Secondly once the reports is formatted we cannot alter the presentation of the result data.</p>	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	

	Limitations of Other Analysis Methods cont..
<p>We requires some third party tools in order to represent data in 3D formats this is also an disadvantages for using third party tool in spread sheet to provide 3D viewing, these third party tools involves some Cost.</p>	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	

 **OLAP is the Answer**

User need the ability to perform multidimensional analysis with complex calculations, but we find that the traditional tools for report writers and spread sheets are distressfully in adequate. We need different set of tools and products that are specifically meant for serious analysis. We need OLAP in the Data Ware house.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **OLAP is the Answer cont..**

Let us List the basic virtues of OLAP to justify our proposition.


Enables analysts, executives and managers to gain useful insights from the presentation of data.

Supports multidimensional analysis.

Is able to drill down or roll up with in each dimensions.


Complements the use of other information delivery techniques such as data mining.


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1


 **OLAP is the Answer cont..**


- Improves the comprehension of result sets through visual presentations using graphs and charts.
- Can be implemented on the web.
- Designed for highly interactive analysis.


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1


	OLAP Definitions and Rules
<p>In 1993, E.F. Codd “Father” of The RDBMS Published 12 rules or guide lines for an OLAP system in a paper entitled “ Providing On-Line Analytical Processing to User Analysts”. Later in 1995 few additional rules were included.</p> <p>First, let us consider the initial 12 rules or Guidelines for an OLAP Systems.</p>	
© Bharati Vidyapeeth’s Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	OLAP Definitions and Rules cont..
<ol style="list-style-type: none"> 1. Multi Dimensional Concept View: Business user’s view of an enterprise is multi-dimensional in nature. Provide a multidimensional data Model that is intuitively analytical and easy to use. 2. Transparency: Make the Technology, underlying data repository, Computing architecture, and the diverse nature of source data totally transparent to user. 3. Accessibility: Provide access only to the data that is actually needed to perform the specific analysis, presenting a single, consistent view to the user. 	
© Bharati Vidyapeeth’s Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	OLAP Definitions and Rules cont..
<ol style="list-style-type: none"> 4. Consistent Reporting Performance: Ensure that the users do not experience any significant degradation in reporting performance as the number of dimensions or the size of the data base increases. 5. Client/Server Architecture: Conform the System to the principles of C/S Architecture for optimal performance, flexibility etc. 6. Generic Dimensionality: Ensure that every data dimension is equivalent in both structure and operational capabilities. 	
© Bharati Vidyapeeth’s Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	OLAP Definitions and Rules cont..
<p>7. Dynamic sparse Matrix handling: When encountering a sparse matrix the system must be able to dynamically deduce the distribution of the data and adjust the storage and access to achieve and maintain consistent level of performance.</p> <p>8. Multi user support: Provide support for end users to work concurrently. In Short, provide concurrent data access, data integrity, and access security.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	OLAP Definitions and Rules cont..
<p>9. Unrestricted Cross: dimensional Operations: Provide ability for the system to recognize dimensional hierarchies and automatically perform rollup and drill down operations with in a dimension or across dimensions.</p> <p>10. Intuitive Data Manipulation: Enable Consolidation Path reoriented drill down and roll up, and other manipulations to be accomplished intuitively and directly via point-and-Click and drag-and-drop actions on the cells of the analytical model.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	OLAP Definitions and Rules cont..
<p>11. Flexible Reporting: Provide capabilities to the business user to arrange columns, rows, and cells in a manner that facilitates easy manipulation, analysis and synthesis of information.</p> <p>12. Unlimited Dimensions and Aggregation levels: Accommodate at least fifteen, preferably twenty, data dimensions with in a common analytical model. Each of these generic dimensions must allow a practically unlimited number of user defined aggregation levels with in any given consolidation path.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	OLAP Characteristics
<p>Let us see the list of the most fundamental characteristics of OLAP:</p> <p>Let business users have a multidimensional and logical view of the data in the data warehouse.</p> <p>Facilitate interactive query and complex analysis for the users.</p> <p>Allow user to drill down for greater details or rollup for aggregations of metrics along a single business dimension of across multiple dimensions.</p> <p>Provide ability to perform intricate calculations and comparisons, and</p> <p>Present results in a number of meaningful ways, including charts and graphs.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	Conclusion
<ul style="list-style-type: none"> • OLAP is critical because its multidimensional analysis, fast access, and powerful calculations exceed that of other analysis methods. • OLAP is defined on the basis of Codd's initial twelve rules. • OLAP characteristics include multidimensional view of data, interactive and complex analysis facility, ability to perform intricate calculations, and fast response time. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	OLAP Major features and functions
<ul style="list-style-type: none"> • General features • Dimensional analysis • What are hyper cubes • Drill-down and roll-up • Slice-and-dice or rotation 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	General features
<p>Very often, we are faced with the question of whether OLAP is not just data warehousing in nice wrapper? Can we not consider online analytical processing as just an information delivery technique and nothing more? Is it not another layer in the data warehouse , providing interface between the data and the user? In some sense, OLAP is an information delivery system for the data warehouse. BUT OLAP is much more than that. A data ware house stores data and provides simpler access to the data. An OLAP system complements the data ware house by lifting the information delivery capabilities to new height.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	Dimensional Analysis
<p>What are Hyper Cubes? We now have a way of representing 4 dimensions as a hypercube. The next question relates to display of 4dimensional data on the screen.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	Drill Down and Roll Up features of OLAP
<ul style="list-style-type: none"> • Drill Down feature of OLAP provides the capability to Drilling down to the lower levels of details. • Roll up feature of OLAP shows the rolling up to higher hierarchical level of aggregation. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

Slice-and-Dice or Rotation

This approach provides capability to the user can view the data from many angles, understand the numbers better and arrive at meaning full conclusions, for this we have to perform various rotations along the 3-axis.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

Fig. -1

Store: New York

	Hats	Coats	Jackets
Jan	200	550	350
Feb	210	480	390
Mar	190	480	380

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

Fig. -2

Product: Hats

	Jan	Feb	Mar
New York	200	210	190
Boston	210	250	240
San Jose	130	90	70

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

Fig.-3

Month: January

	New York	Boston	SanJose
Hats	200	210	130
Coats	550	500	200
Jackets	350	400	100


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

Conclusion

Dimensional analysis is not confined to three dimensions that can be represented by a physical cube. Hyper cubes provide a method for representing view with more dimension.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1


- OLAP models and implementation considerations**
- MOLAP model
 - ROLAP model
 - ROLAP versus MOLAP
 - OLAP implementation considerations
- © Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **OLAP Models**

In OLAP there exists mainly two models:-
-> ROLAP- Relational Online analytical Processing
-> MOLAP- Multidimensional Online analytical Processing


There is one other variation DOLAP->(Desk top OLAP). DOLAP is variation of ROLAP, In DOLAP, Multidimensional datasets are created and transferred to the desktop machine.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **Overview of Variations**

In MOLAP model, online analytical processing is best implemented by storing the data multi dimensionally, that is, easily viewed in a multi dimensional way, for these **MDDBs** (Multi Dimensional Databases) are used, while on the other hand the ROLAP model relies on the existing relational DBMS of the data ware house.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

 **The MOLAP Model**

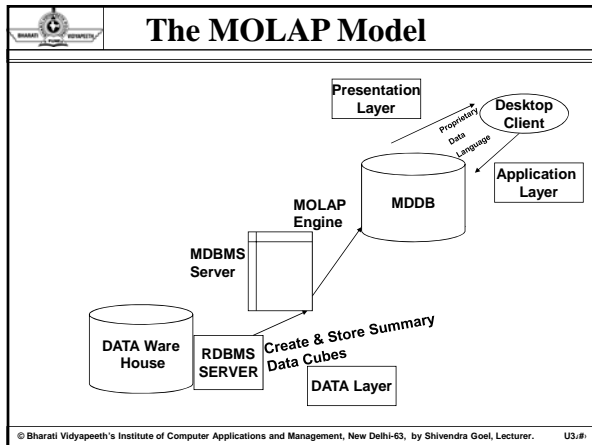
In the MOLAP model, data for analysis is stored in specialized multi dimensional databases. Large Multidimensional arrays form the storage structures. The array values indicate the location of the cells for example if a store is closed on Sundays, then the cell representing Sundays will all be nulls.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

The MOLAP Model cont..

MOLAP model uses the multi dimensional data base management systems. These systems provide the capability to consolidate & fabricate summarized cubes during the process that loads data into the MDDBs from the main data ware house.

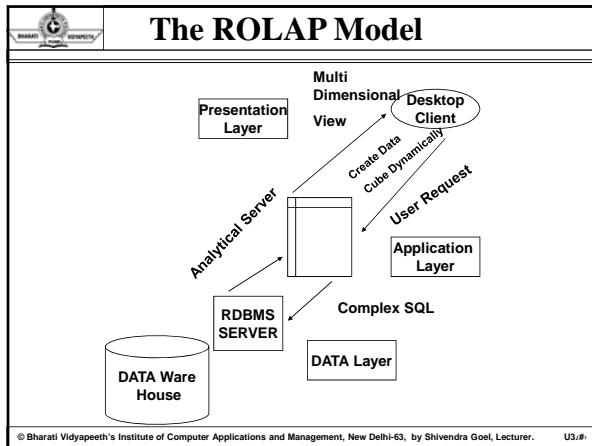
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1



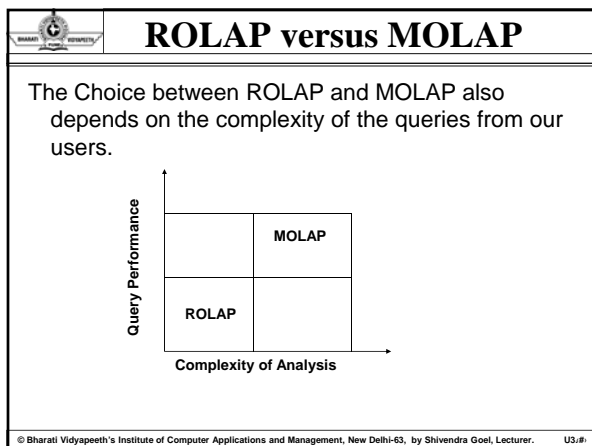
The ROLAP Model

In the ROLAP model, data is stored as rows and columns in relational form. This model presents data to the users in the form of business dimensions. In order to hide the storage structure to the user and present data multi dimensionally.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1



- ### ROLAP Characteristics:
- Supports all the basic OLAP features & functions.
 - Stores data in a relational form
 - Supports some form of aggregation.
- © Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1



ROLAP versus MOLAP cont..

The Figure based on the consideration of query performance and Complexity of queries. MOLAP is the choice for faster response and more intensive queries.

© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1

ROLAP versus MOLAP cont..

	MOLAP	ROLAP
Data Store	<ul style="list-style-type: none"> •Various Summary Data Kept in MDDBS •Data Volume is Moderate 	<ul style="list-style-type: none"> •Data store in Relational tables •Large Volume of Data
Technology	MDDBS to store data	Use of Complex SQL to fetch data from ware house
Function/ Features	<ul style="list-style-type: none"> •Large library of functions for Complex calculations •Extensive drill-down 	<ul style="list-style-type: none"> •Limitations on Complex analysis functions •Drill-through to lowest level easier.


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1


OLAP Implementation Consideration


Before Considering implementation of OLAP in our data warehouse, we have to take into account two key issues with regard to MOLAP model.


The first issue relates to the lack of standardization. Each vender tool has its own client interface. The second is scalability.


© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1


	OLAP Implementation Consideration cont..
<p>Now, we examine some design consideration for example, ROLAP model or MOLAP model. We Know that where our purpose is solve by ROLAP or by MOLAP model.</p> <p>In order to prepare data for the OLAP system, we give an overview to the characteristics of data in this system.</p> <p>In OLAP system Data is summarized OLAP data is more flexible for processing & analysis In OLAP data tends to be more departmental wise.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	Administration Issue
<p>Let us briefly understand few of these consideration</p> <p>Expectations on what data will be accessed and how.</p> <p>Selection of the right filters for loading the data from the data warehouse.</p> <p>Choosing the aggregation etc.</p> <p>Size of the Multi Dimensional data base.</p> <p>Access & Security Privileges</p> <p>Back Up and Restore facilities</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	Performance Issue
<p>Performance issue is one of the most important issue for OLAP implementation as for example, performance improves when the multi dimensional data bases are use, provided a reasonable fast, consistent response to every complex query.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h2>OLAP Platforms</h2>
<p>The Data warehouse & OLAP system start out on the same platform. When both are small, it is cost-justifiable to keep both on the same platform. With in a year, it is usual to find rapid growth in the main data ware house. The trend normally continues. As this growth happens, we may want to think of moving the OLAP system to another platform in order to provide ease. BUT how exactly would we know whether to separate the platforms & when to do so? below are few guidelines</p> <p>When the size & usage of main data ware house increase and reach the point where the warehouse requires all the resources of the common platform, start acting on the separation.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h2>OLAP Platforms cont..</h2>
<p>If too many departments need the OLAP system, then the OLAP requires additional platform to run.</p> <p>In Case routine transactions applicable to data ware house begin to disrupt the stability and performance of the OLAP system, then move the OLAP system to another platform.</p> <p>In decentralized enterprises the OLAP users spread out geographically, one or more separate platforms for OLAP system become necessary.</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h2>OLAP Tools & Products</h2>
<p>Let us get the selection criteria for Choosing OLAP tools & products.</p> <ul style="list-style-type: none"> Multi Dimensional representation of Data. Aggregation, Summarization etc Formulas & complex calculation in an extensive library. Cross-dimensional Calculations Drill-down & roll-up along single or multiple dimensions Interface of OLAP with applications and software such as spread sheets etc. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	Implementation Steps
<ul style="list-style-type: none"> • Here is the major step for Implementation: • Dimensional Modeling • Design & Building of the MDDB • Selection of the Data to be moved in to OLAP system • Data extraction for the OLAP system • Data Loading into the OLAP server • Computation of Data aggregation • Implementation of application on the desktop • Provision of user training 	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	Conclusion
<ul style="list-style-type: none"> • ROLAP and MOLAP are the two major OLAP models. The difference between them lies in the way the basic data is stored. Ascertain which model is more suitable for your environment. • OLAP tools have matured. Some RDBMS include support for OLAP. 	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	Summary
<p>User need the ability to perform multidimensional analysis with complex calculations, but we find that the traditional tools for report writers and spread sheets are distressfully in adequate. We need different set of tools and products that are specifically meant for serious analysis. We need OLAP in the Data Ware house. OLAP provide Hypercube a method for representing views with more dimensions.</p>	
© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1	


	<h2>Review Questions</h2>
<p>Objective Questions:</p> <p>1) Which of the following is the most important factor when defining an OLAP cube?</p> <ul style="list-style-type: none"> a) Number of measures b) Number of dimensions c) Number of source data transactions d) Number of referential integrity constraints <p>2) A client has an application that was written in-house. What is the most important factor when defining the mapping for data extraction?</p> <ul style="list-style-type: none"> a) The layout and format of the data b) The source system network connectivity c) The OLAP tools used to access the extracted data d) The source system application programming language 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h2>Review Questions cont..</h2>
<p>3) An international marketing executive uses an OLAP query which displays sales information by country. What is the OLAP feature that would allow the executive to breakdown the sales by city?</p> <ul style="list-style-type: none"> a) Pivot b) Roll up c) Drill down d) Dynamic calculation <p>4) Which of the following is true of an OLAP data structure?</p> <ul style="list-style-type: none"> a) Comprised of normalized dimension and fact tables. b) Organizes dimension tables into hierarchies and levels. c) Allows "real time" analysis against disparate data sources. d) Cardinality between tables is typically configured as inner joins. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h2>Review Questions cont..</h2>
<p>5) An OLAP tool provides for:</p> <ul style="list-style-type: none"> a) Multidimensional Analysis b) Roll-up and drill-down c) Slicing and dicing d) Rotation <p>6) A business intelligence system will have the following tools:</p> <ul style="list-style-type: none"> a) OLAP tool b) Data mining tool c) Query tool d) Reporting tool 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h3>Review Questions cont..</h3>
<p>7) The ROLAP model that treats data as if they were stored in</p> <ul style="list-style-type: none"> a) hierarchical DBMS. b) hybrid DBMS. c) relational DBMS. d) network DBMS. <p>8) The main technique for multidimensional reporting is:</p> <ul style="list-style-type: none"> a) SQL. b) multiple relationships in large quantities of data. c) OLAP. d) data mining. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	


	<h3>Review Questions cont..</h3>
<p>9) What are databases that support OLTP?</p> <ul style="list-style-type: none"> a) OLAP b) OLTP c) A database d) An operational database <p>10) What do data warehouses support?</p> <ul style="list-style-type: none"> a) OLAP b) OLTP c) OLAP and OLTP d) Operational databases 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	<h3>Review Questions cont..</h3>
<p>Short answer type Questions</p> <ol style="list-style-type: none"> 1. Briefly explain multidimensional analysis. 2. Name any four key capabilities of an OLAP system 3. What is meant by slice-and-dice 4. Explain MOLAP model of OLAP 5. Explain ROLAP model of OLAP 6. Differentiate ROLAP and MOLAP? Which model is best if the complexity of analysis is high and why. 7. What are hyper cubes 8. What are the uses and benefits of OLAP 9. List the selection criteria for OLAP tools and Products. 10. Explain Drill-Down and Roll-Up analysis 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	<h3>Review Questions cont..</h3>
<p>Long answer type Questions</p> <ol style="list-style-type: none"> 1. Pick any six of Dr. Codd's Rules for OLAP. Give your reasons why the selected six are important for OLAP 2. What is the need of Rotation in OLAP explains with an example? Differentiate between Drill Down and Roll Up features of OLAP? 3. Explain in detail all the factors that made OLAP environment standardized 4. What are multidimensional databases? How do these store data? 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	<h3>Review Questions cont..</h3>
<ol style="list-style-type: none"> 5. As a senior analyst on the project team of a publishing company exploring the options for a data warehouse, make a case for OLAP and how it will be essential in your environment. 6. Discuss various factors for consideration in OLAP implementation. 7. Discuss at least two reasons why feeding data into the OLAP system directly from the source operational systems is not recommended. 8. What are the various OLAP Characteristics. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	<h3>Review Questions cont..</h3>
<ol style="list-style-type: none"> 9. You are asked to form a small team to evaluate the MOLAP and ROLAP models and make your recommendations. This is part of the data warehouse project for a large manufacturer of heavy chemicals. Describe the criteria your team will use to make the evaluation and selection. 10. Discuss the need for Online Analytical Processing in detail. 	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#1</small>	

	Suggested Reading/References
<p>[1]. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.</p> <p>[2]. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley, 2004</p> <p>[3]. W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley, 1999.</p> <p>[4]. Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd.,2001</p> <p>[5]. Shivendra and Divya Goel, "Distributed Database Management System", Sun India Publication., 2009</p>	
<small>© Bharati Vidyapeeth's Institute of Computer Applications and Management, New Delhi-63, by Shivendra Goel, Lecturer. U3.#</small>	
