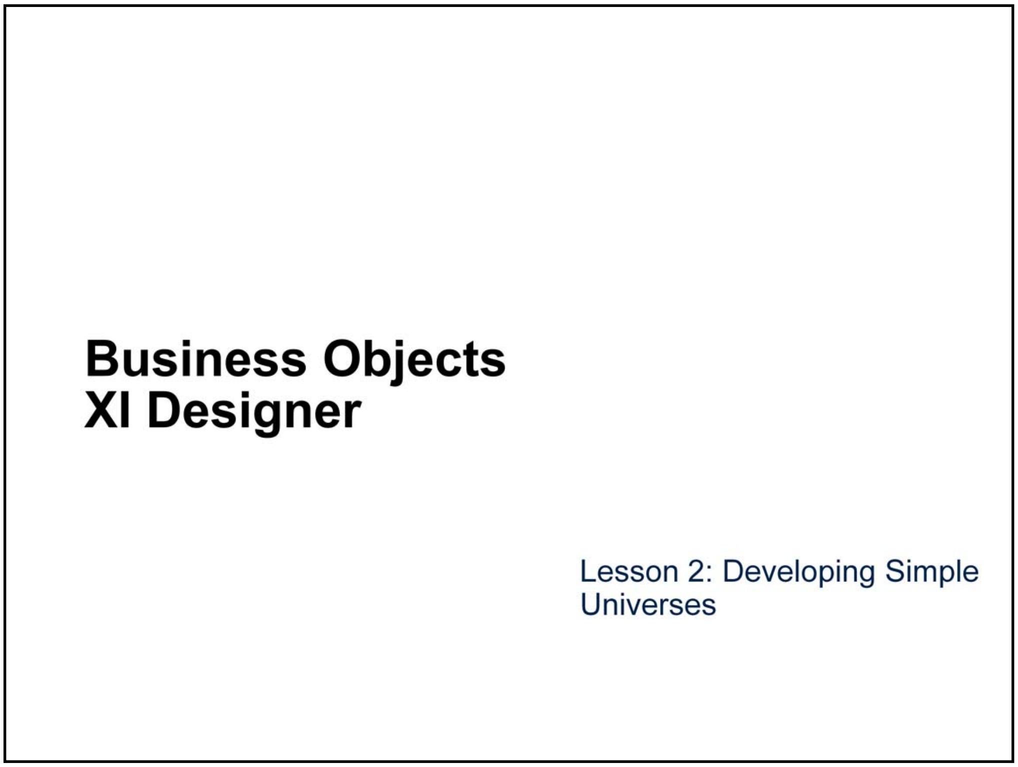
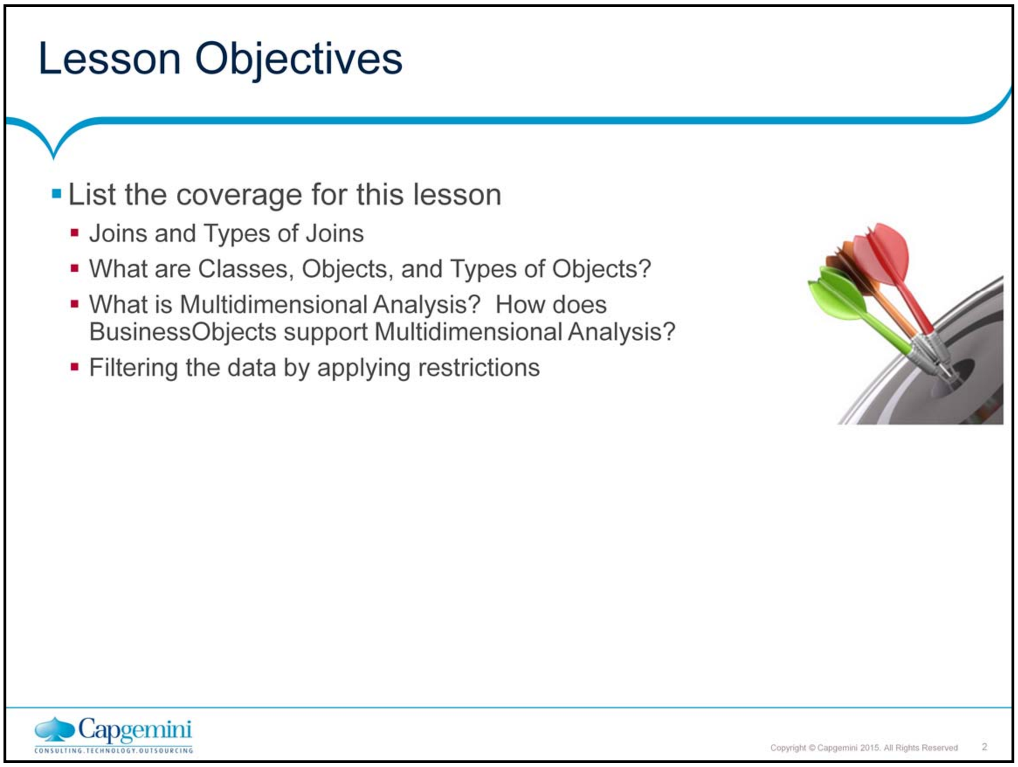


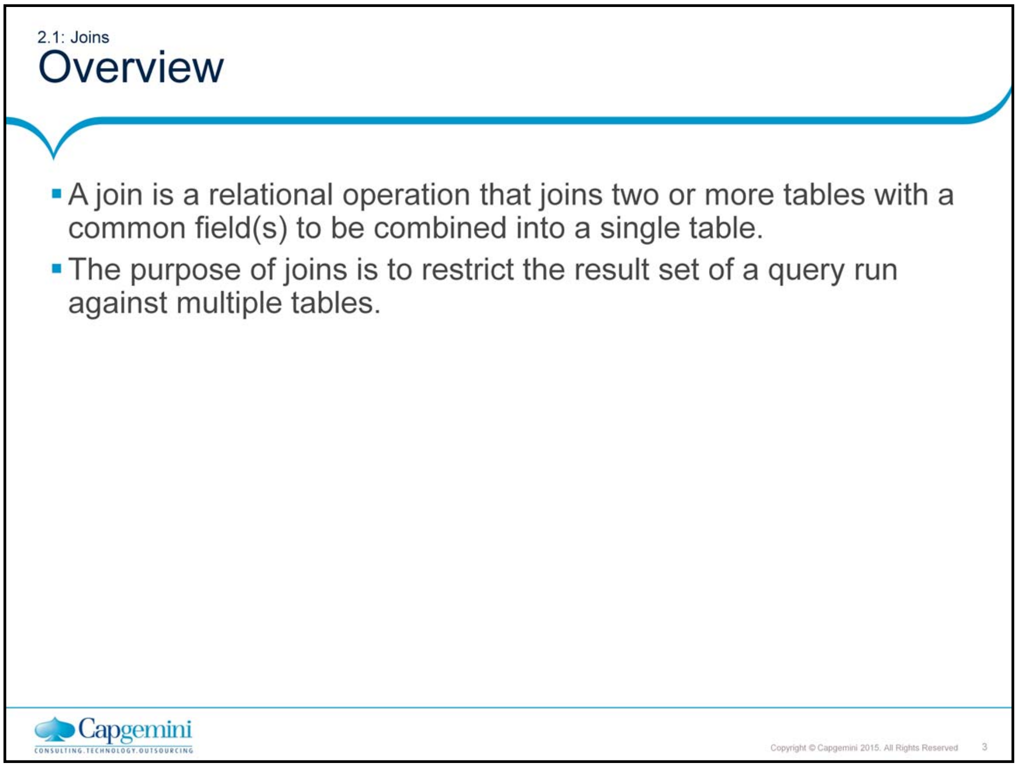
Business Objects XI Designer

Lesson 2: Developing Simple Universes



Lesson Objectives

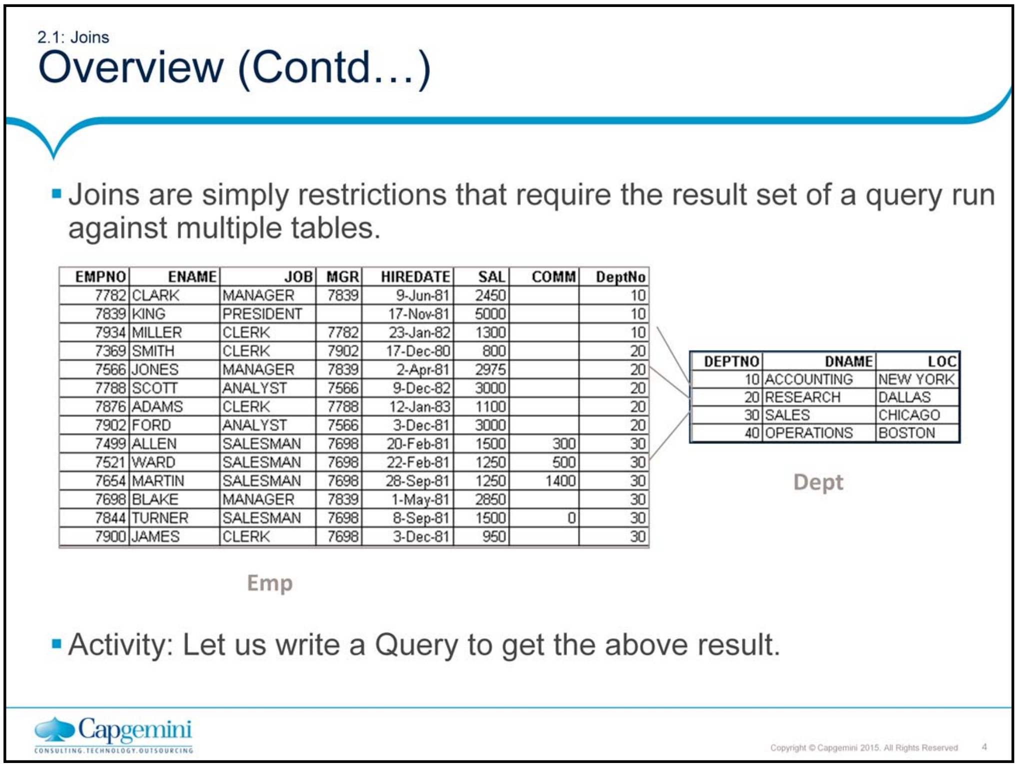
- List the coverage for this lesson
  - Joins and Types of Joins
  - What are Classes, Objects, and Types of Objects?
  - What is Multidimensional Analysis? How does BusinessObjects support Multidimensional Analysis?
  - Filtering the data by applying restrictions



2.1: Joins

Overview

- A join is a relational operation that joins two or more tables with a common field(s) to be combined into a single table.
- The purpose of joins is to restrict the result set of a query run against multiple tables.



2.1: Joins

Overview (Contd…)

- Joins are simply restrictions that require the result set of a query run against multiple tables.

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DeptNo
7782	CLARK	MANAGER	7839	9-Jun-81	2450		10
7839	KING	PRESIDENT		17-Nov-81	5000		10
7934	MILLER	CLERK	7782	23-Jan-82	1300		10
7369	SMITH	CLERK	7902	17-Dec-80	800		20
7566	JONES	MANAGER	7839	2-Apr-81	2975		20
7788	SCOTT	ANALYST	7566	9-Dec-82	3000		20
7876	ADAMS	CLERK	7788	12-Jan-83	1100		20
7902	FORD	ANALYST	7566	3-Dec-81	3000		20
7499	ALLEN	SALESMAN	7698	20-Feb-81	1500	300	30
7521	WARD	SALESMAN	7698	22-Feb-81	1250	500	30
7654	MARTIN	SALESMAN	7698	28-Sep-81	1250	1400	30
7698	BLAKE	MANAGER	7839	1-May-81	2850		30
7844	TURNER	SALESMAN	7698	8-Sep-81	1500	0	30
7900	JAMES	CLERK	7698	3-Dec-81	950		30

Emp

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Dept

- Activity: Let us write a Query to get the above result.

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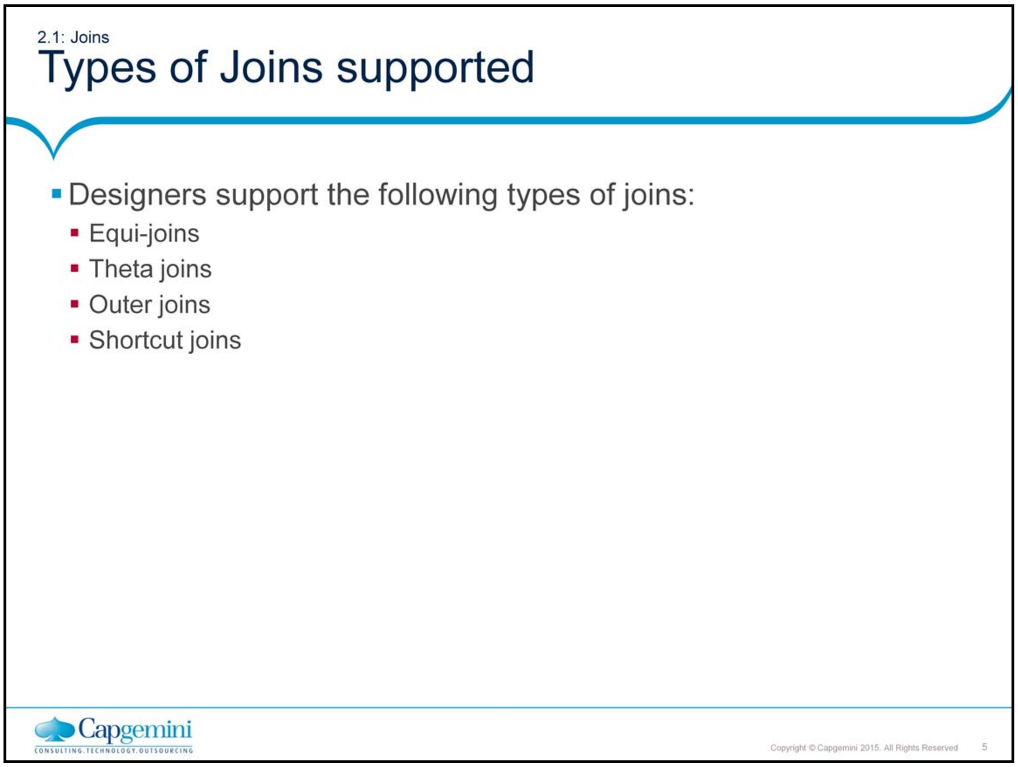
Add the notes here.



2.1: Joins

Types of Joins supported

- Designers support the following types of joins:
  - Equi-joins
  - Theta joins
  - Outer joins
  - Shortcut joins

Add the notes here.

2.1: Joins

Equi-Join

- An equi-join is used when we want to retrieve matching records only.

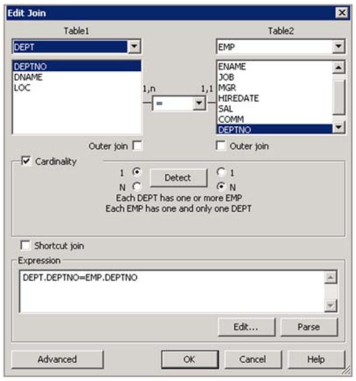


Table1: DEPT

DEPTNO
DNAME
LOC

Table2: EMP

ENAME
JOB
MGR
HIREDATE
SAL
COMM
DEPTNO

☑ Cardinality

1 ● ○ 1

N ○ ● N

Each DEPT has one or more EMP
Each EMP has one and only one DEPT

□ Shortcut join

Expression

```
DEPT.DEPTNO=EMP.DEPTNO
```

- Activity: Let us write a Query to get the above result.

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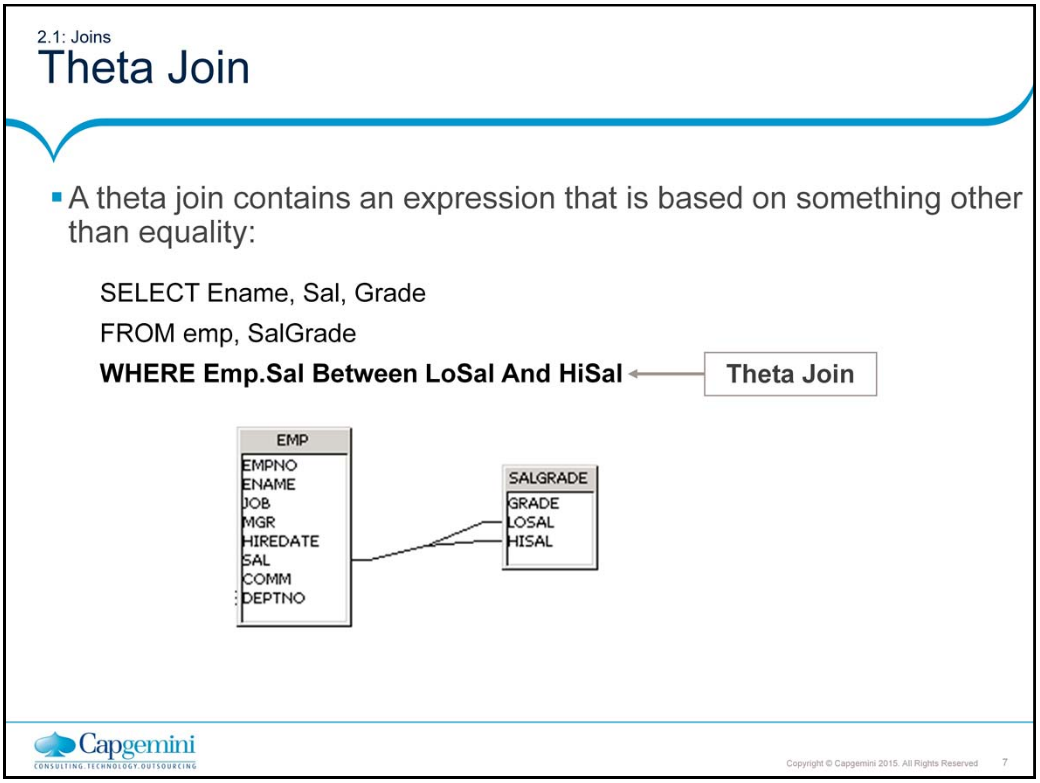
6

Add the notes here.



2.1: Joins

Theta Join

- A theta join contains an expression that is based on something other than equality:

```
SELECT Ename, Sal, Grade
FROM emp, SalGrade
WHERE Emp.Sal Between LoSal And HiSal
```

Theta Join

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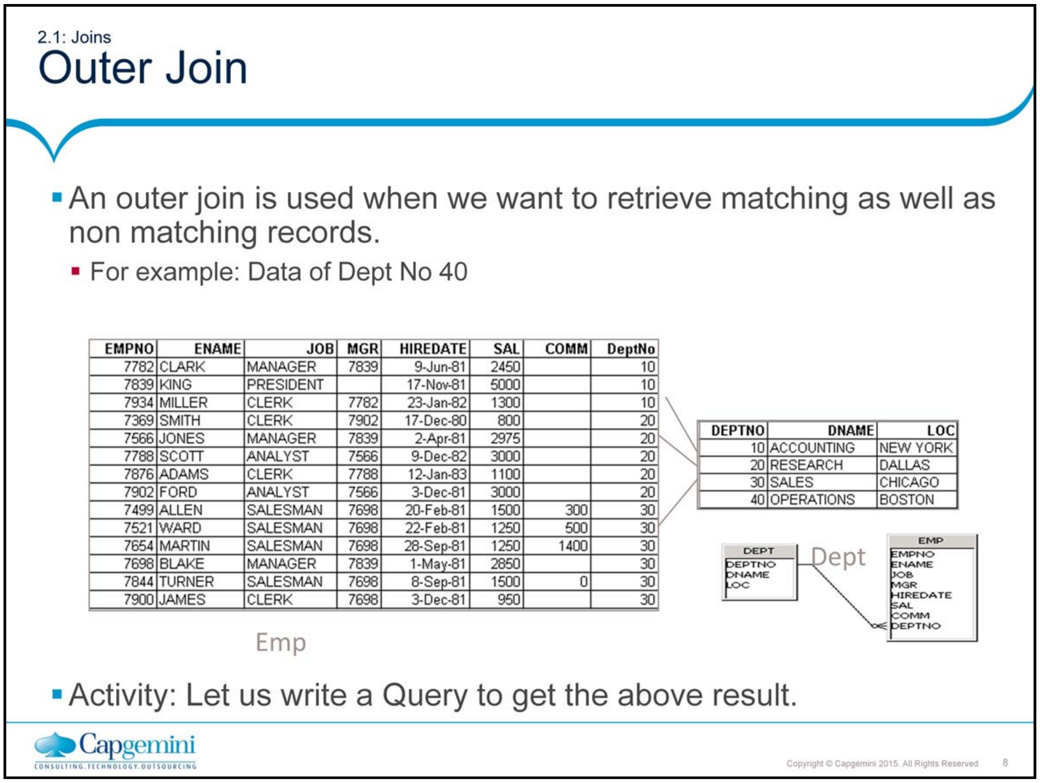
<u>Theta Join</u>:
A theta join links tables that have a relationship based on something other than equality. For example, a theta join may be used when some form of range relationship needs to be expressed in the join restriction to explain the relationship between data held in one table and that in another table.

For example: All Employees have a Salary associated with them. However, these employees can be categorized by the Salary ranges held in the SalGrade table. The problem arises in how to specify the join information between these two tables in order to make sure that each Employee is associated with their appropriate Salary range. A theta join helps in maintaining such relationships.



2.1: Joins

Outer Join

- An outer join is used when we want to retrieve matching as well as non matching records.
  - For example: Data of Dept No 40

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DeptNo
7782	CLARK	MANAGER	7839	9-Jun-81	2450		10
7839	KING	PRESIDENT		17-Nov-81	5000		10
7934	MILLER	CLERK	7782	23-Jan-82	1300		10
7369	SMITH	CLERK	7902	17-Dec-80	800		20
7566	JONES	MANAGER	7839	2-Apr-81	2975		20
7788	SCOTT	ANALYST	7566	9-Dec-82	3000		20
7876	ADAMS	CLERK	7788	12-Jan-83	1100		20
7902	FORD	ANALYST	7566	3-Dec-81	3000		20
7499	ALLEN	SALESMAN	7698	20-Feb-81	1500	300	30
7521	WARD	SALESMAN	7698	22-Feb-81	1250	500	30
7654	MARTIN	SALESMAN	7698	28-Sep-81	1250	1400	30
7698	BLAKE	MANAGER	7839	1-May-81	2850		30
7844	TURNER	SALESMAN	7698	8-Sep-81	1500	0	30
7900	JAMES	CLERK	7698	3-Dec-81	950		30

Emp

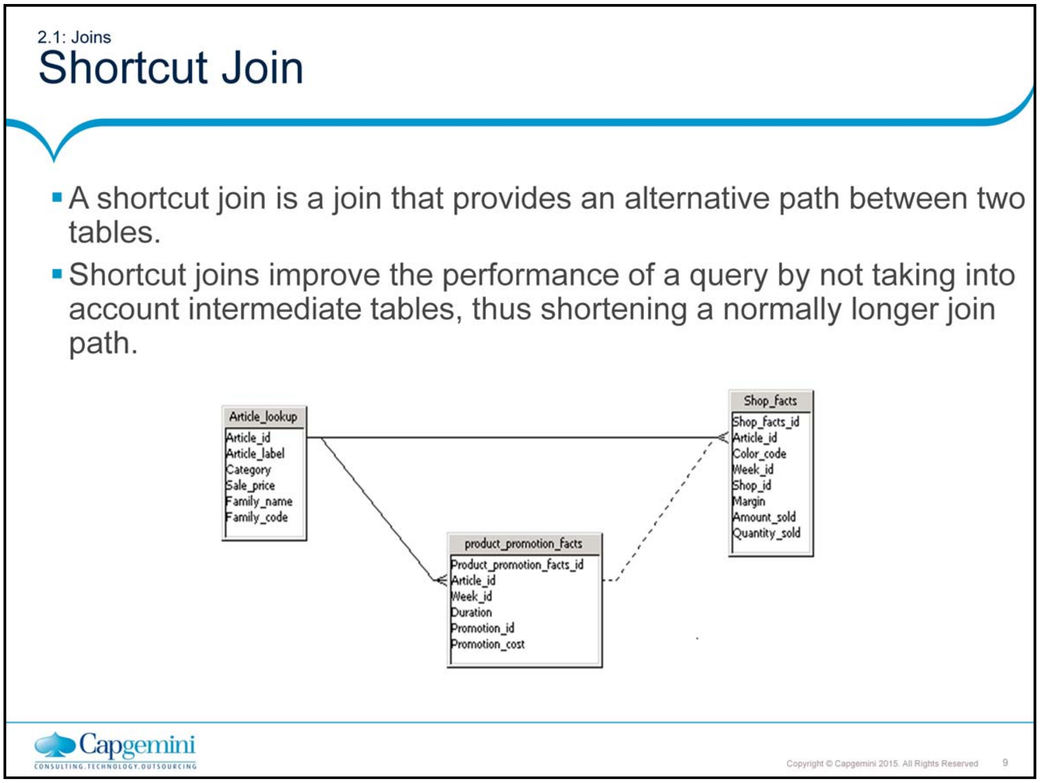
DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

- Activity: Let us write a Query to get the above result.

8

<u>Outer Join</u>:

- An outer join is a slight modification of the equi-join. It can be used in situations where the data in one table does not have the corresponding data in the secondary table and a report requirement is to fetch the matching as well as non matching records from one table.
- This situation can be best explained through an example:
  - ➢ Suppose an Analyst is looking at data that comes from two tables, namely Department Name from Dept table and Employee Name from Emp table.
  - ➢ The report requirement is to provide the details of all departments along with the list of employees working under these department.
  - ➢ In this case, to get a clear picture, we need the names of all departments irrespective of whether employees are working under them or not.
  - ➢ Sometimes the requirement can be, “I want to see all those departments where no employee is working (for example: newly formed departments)”.
  - ➢ In both cases we need to have an outer join.



2.1: Joins

Shortcut Join

- A shortcut join is a join that provides an alternative path between two tables.
- Shortcut joins improve the performance of a query by not taking into account intermediate tables, thus shortening a normally longer join path.

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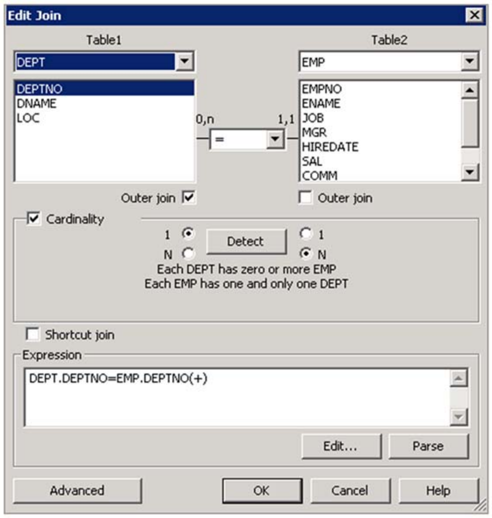
Shortcut Join:

- A shortcut join is possible only if both the tables are detailed to same level.
  For example: A product_promotion_fact can be joined with Shop_fact via Article lookup table only.
- Since both the fact tables are detailed to the Article level, a shortcut join between both the fact tables is possible to improve the performance.
- **Note:** Shortcut join will appear as a dotted line.

2.2: Cardinalities of a Join

Overview

- The cardinalities in the join can be expressed in a “sentence” or in a “notation” form.
  - Each Dept has Zero or more Emp or (0,N).
  - Each Emp has one and only one Department or (1,1).



Edit Join

Table1: DEPT

DEPTNO
DNAME
LOC

0,n = 1,1

Table2: EMP

EMPNO
ENAME
JOB
MGR
HIREDATE
SAL
COMM

Outer join ☑ □ Outer join

☑ Cardinality

1 ● ○ 1
N ○ ● N

Each DEPT has zero or more EMP
Each EMP has one and only one DEPT

□ Shortcut join

Expression

```
DEPT.DEPTNO=EMP.DEPTNO(+)
```

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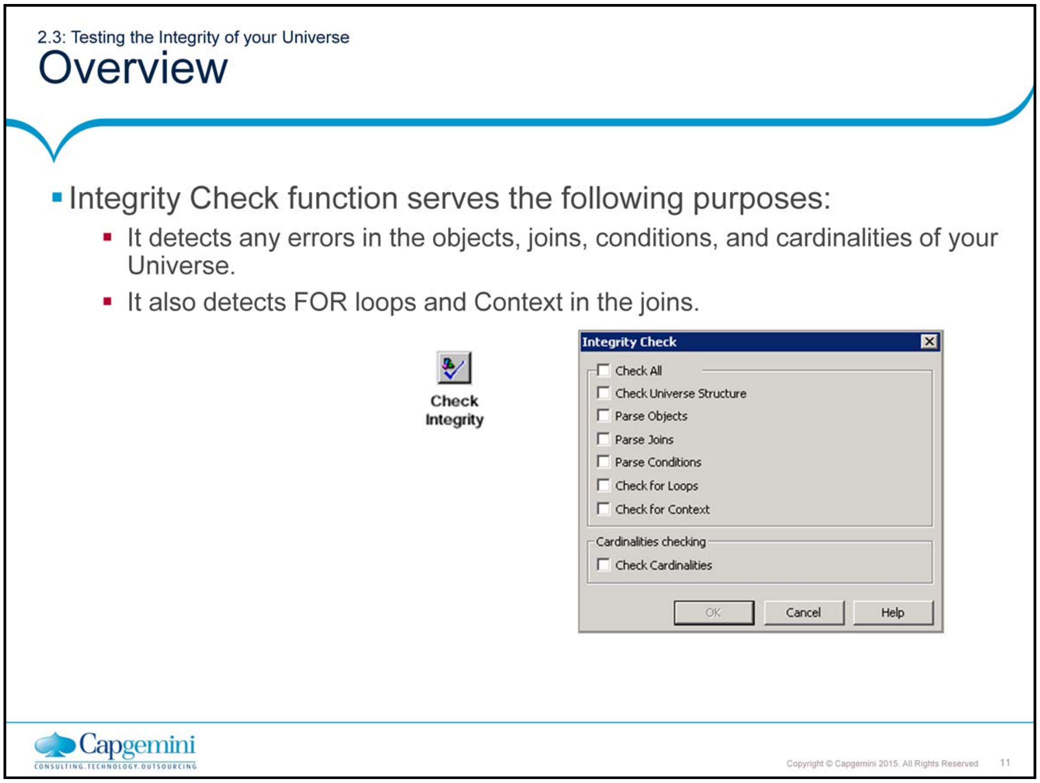
<u>Cardinalities</u>:
Cardinality expresses the minimum and maximum number of instances of an entity B that can be associated with an instance of an entity A. The minimum and the maximum number of instances can be equal to 0, 1, or N.

Displaying the cardinalities:
The **Graphics** tab of the **Options** dialog box contains a number of options for the display of cardinalities in the **Structure** pane.



2.3: Testing the Integrity of your Universe

Overview

- Integrity Check function serves the following purposes:
  - It detects any errors in the objects, joins, conditions, and cardinalities of your Universe.
  - It also detects FOR loops and Context in the joins.

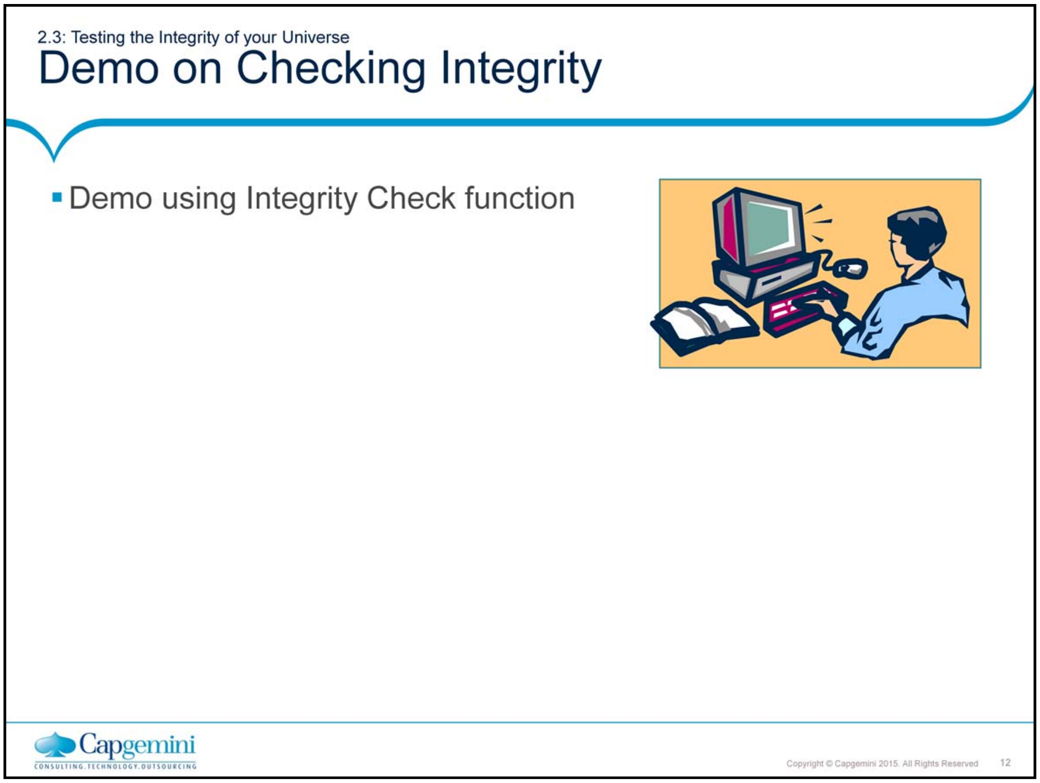
Integrity Check

☐ Check All
☐ Check Universe Structure
☐ Parse Objects
☐ Parse Joins
☐ Parse Conditions
☐ Check for Loops
☐ Check for Context

Cardinalities checking
☐ Check Cardinalities

<u>Testing the Integrity of your Universe</u>:

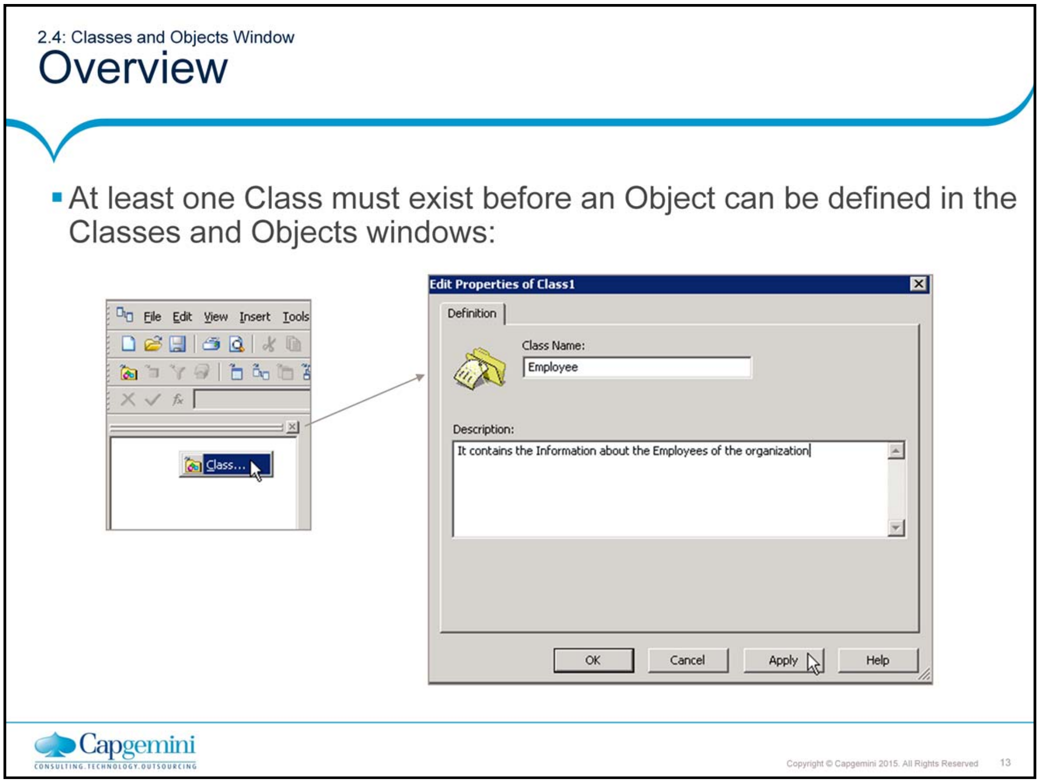
- Using the **Integrity Check** function, you can test to see whether the design of your active Universe is accurate and up-to-date.
- **Integrity Check** serves the following purposes:
  - It detects any errors in the objects, joins, conditions, and cardinalities of your Universe.
  - It detects whether there are any loops in the joins.
  - It detects whether contexts are necessary.
  - It determines whether any changes were made to the database to which the Universe is connected.
- The **parse object** checks the SQL definition of all objects. The **parse conditions** checks for WHERE clause. The **parse joins** checks for the join condition that you create.



2.3: Testing the Integrity of your Universe

Demo on Checking Integrity

- Demo using Integrity Check function



2.4: Classes and Objects Window

Overview

- At least one Class must exist before an Object can be defined in the Classes and Objects windows:

Class Name: Employee

Description: It contains the Information about the Employees of the organization

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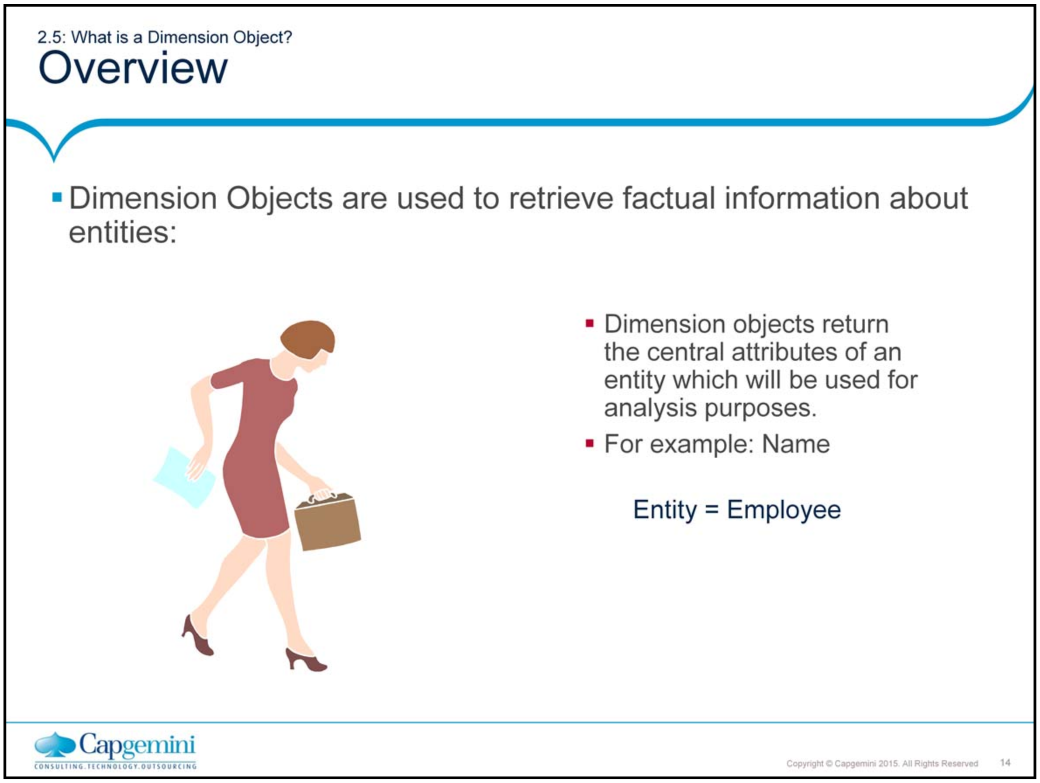
<u>Classes and Objects Window</u>:

- The **Classes and Objects** pane in the Designer module is used to build the business layer of the Universe that will appear to users in the **Query** panel**.**
- Every object has to belong to at least one class. Therefore a **Class** must be inserted before any object creation can proceed.
  - ➢ Right click in the **Classes and Objects** window, and select **Class** from the popup menu.
  - ➢ In the **Description** field, key in some help for the user on the type of objects the class will contain, and click **Apply**.
- Business Objects has three types of objects:
  - ➢ Dimension
  - ➢ Measure
  - ➢ Detail
- Let us discuss these objects in detail.



2.5: What is a Dimension Object?

Overview

- Dimension Objects are used to retrieve factual information about entities:
  - Dimension objects return the central attributes of an entity which will be used for analysis purposes.
  - For example: Name

Entity = Employee

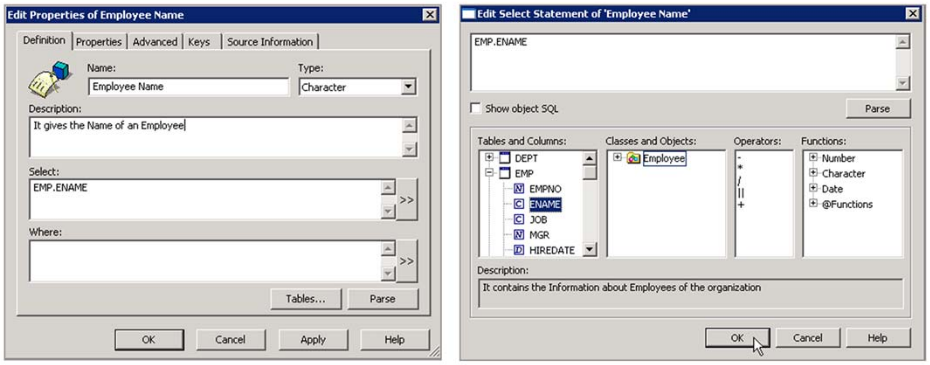
What is Dimension Object?

- The qualification of an object reveals how it can be used in multidimensional analysis. It may be qualified as a **dimension**, **detail**, or a **measure**. This section deals with **dimension objects** and **detail objects** and the differences between the two. Measure objects will be dealt with later in the course.
- The **detail objects** returns information on the additional attributes of the entity in question. The data it returns is purely informational and is never used for analysis purpose.

2.5: What is a Dimension Object?

Creating a Dimension Object

- The SQL Editor provides a simplified mechanism for editor an Object’s Select Statement:



Edit Properties of Employee Name

Name: Employee Name

Type: Character

Description: It gives the Name of an Employee

Select: EMP.ENAME

Where:

Edit Select Statement of 'Employee Name'

EMP.ENAME

☐ Show object SQL

Description: It contains the Information about Employees of the organization

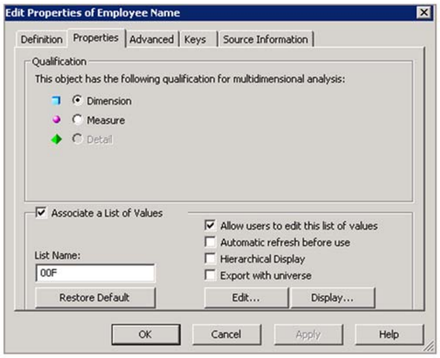
Creating a Dimension Object:

- To create a dimension objects, we need to follow the following steps:
  - Open the Class, select **Insert → Object.**
  - Give the name of the Object, it’s data type.
  - Provide a meaningful description for the object.
  - Select the relevant field name from the **Tables and Columns** pane.

2.5: What is a Dimension Object?

Other Properties of Dimension Object

- The Properties tab of the Definition dialogue controls:
  - Object Qualification
  - List of Values



Qualification

This object has the following qualification for multidimensional analysis:

● Dimension
○ Measure
○ Detail

☑ Associate a List of Values

List Name: 00F

☑ Allow users to edit this list of values
□ Automatic refresh before use
□ Hierarchical Display
□ Export with universe

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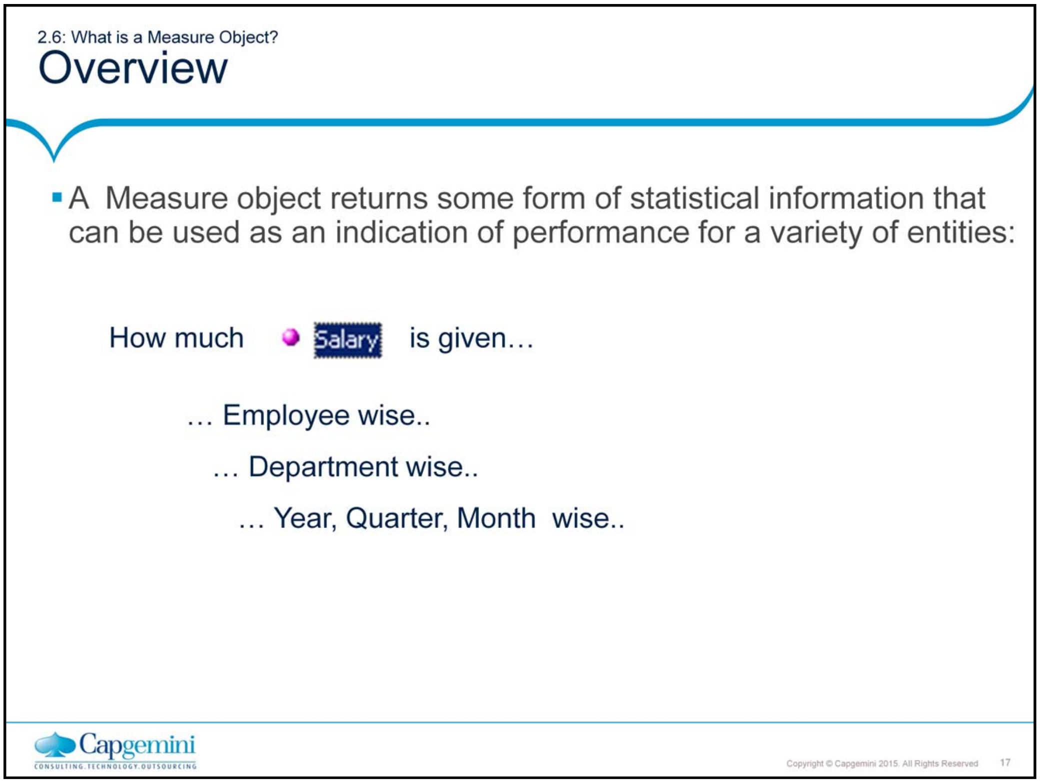
Other Properties of Dimension Object:

- The **Properties** tab of the Object definition dialog allows a designer to qualify the Object as being of a certain type, according to its use in multidimensional analysis, and to attach a List of Values to it.
- By default, a List of Values is attached to a new Object. A List of Values can be accessed by end users in the **Query** panel to simplify the insertion of an operand or value into a condition in the query.
- A List of Values should only be allocated to an Object if it will provide some functionality to the User. If the list is too long or the data will be meaningless to someone, then the **Associate List of Values** check box should be cleared.



2.6: What is a Measure Object?

Overview

- A Measure object returns some form of statistical information that can be used as an indication of performance for a variety of entities:

How much ● Salary is given…

… Employee wise..

… Department wise..

… Year, Quarter, Month wise..

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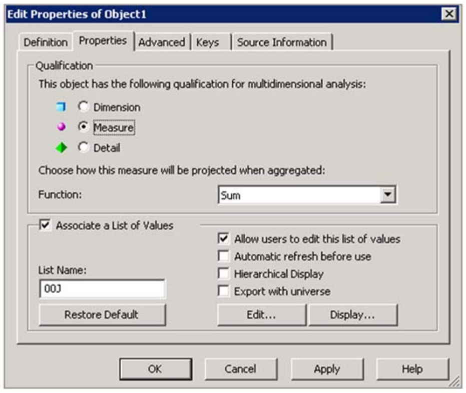
<u>What is a Measure Object?</u>

- A Measure object is used to return statistical information to an Analyst. It returns the “numeric information” that Dimension objects are compared against to quantify performance.
- Measure objects are very flexible due to the fact that they are semantically dynamic. This means that their meaning in a query will be dependant on the context in which they are actually used, or in other words the other objects against which they are being projected.
- **For example:**
  - ➢ If the **Employee Name Object** and the **Salary Measure Object** are placed in the **Query Panel**, then the query will return the total salary paid to an employee for all the number of years for which we have data in the warehouse.
  - ➢ If the **Year** and **Salary** are combined in the **Query Panel**, then the **Measure** will return the total salary for each Year for all employees.
  - ➢ Finally, if the **Employee Name**, **Year**, and **Salary** are combined together in the **Query Panel**, then the **Salary Measure** will return the total salary paid per year, for each employee.

2.6: What is a Measure Object?

Measure needs Aggregation

- In order to show the correct summarized results, all Measure objects need to get aggregated.
- The type of applicable aggregation depends upon requirement.



Edit Properties of Object1

Qualification

This object has the following qualification for multidimensional analysis:

○ Dimension
● Measure
○ Detail

Choose how this measure will be projected when aggregated:

Function: Sum

☑ Associate a List of Values

List Name: 00J

☑ Allow users to edit this list of values
□ Automatic refresh before use
□ Hierarchical Display
□ Export with universe

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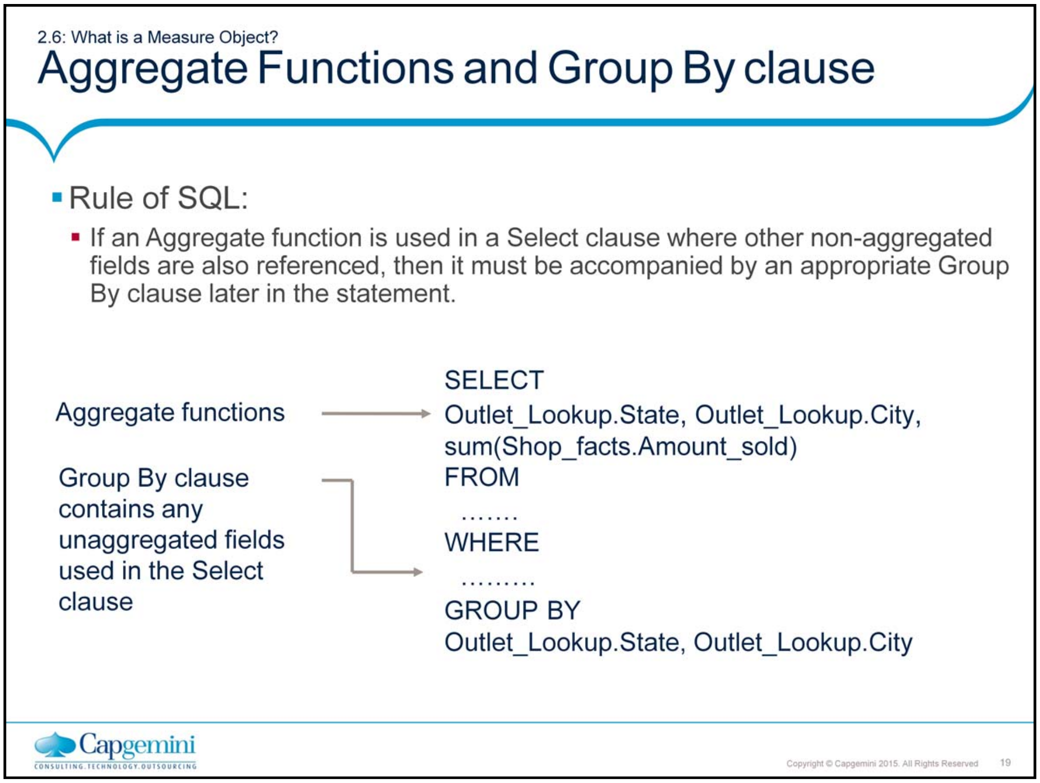
<u>Measure needs Aggregation</u>:

- While displaying the results, the value of Measure objects needs to get re-calculated according to available dimensions. Therefore it is important to specify the type of aggregation that needs to be applied on these Measure objects to display correct summarized result.
- This helps in building a query with proper **Aggregate** function and **Group By** clause.



2.6: What is a Measure Object?

Aggregate Functions and Group By clause

- Rule of SQL:
  - If an Aggregate function is used in a Select clause where other non-aggregated fields are also referenced, then it must be accompanied by an appropriate Group By clause later in the statement.

Aggregate functions

Group By clause contains any unaggregated fields used in the Select clause

```
SELECT
Outlet_Lookup.State, Outlet_Lookup.City,
sum(Shop_facts.Amount_sold)
FROM
  …….
WHERE
  ………
GROUP BY
Outlet_Lookup.State, Outlet_Lookup.City
```

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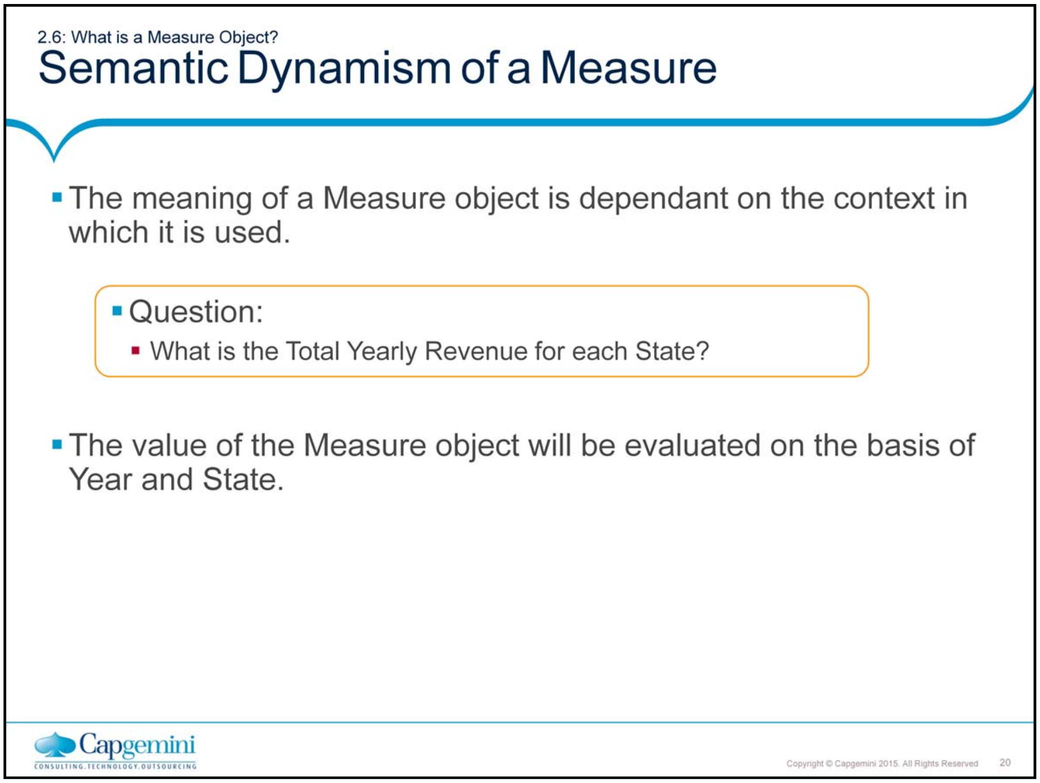
<u>Aggregate Functions and Group By clause</u>:

- If an Aggregate function is used in the **Select** clause of the statement, then a **Group By** clause must be added to the SQL statement. This will help to ensure that the level of aggregation is controlled by the other fields referenced in the **Select** clause. This is a rule of SQL.
- **For Example:** The SQL statement in the example in the above slide takes the data from the State & City and compares it with the Revenue that has been generated by the orders placed in those cities. Even though in the database this data is stored in a format whereby each city has many transactions attributed to it (because each city has many orders), the result set returned has only one row of data for each city comparing the city name with the amount of revenue generated in that city.
- The criterion that controls this behavior is the **Group By** clause at the bottom of the SQL statement. The server will generate a revenue calculation for every invoice that has been placed by each customer for each city. It will then look at the **Group By** clause and apply the **Aggregate** function (in this case **Sum**), surrounding the revenue calculation, to this result set according to the level indicated in the **Group By** clause. The **Group By** clause, tells it to group the Result set by the State and City name.



2.6: What is a Measure Object?

Semantic Dynamism of a Measure

- The meaning of a Measure object is dependant on the context in which it is used.
  - Question:
    - What is the Total Yearly Revenue for each State?
- The value of the Measure object will be evaluated on the basis of Year and State.

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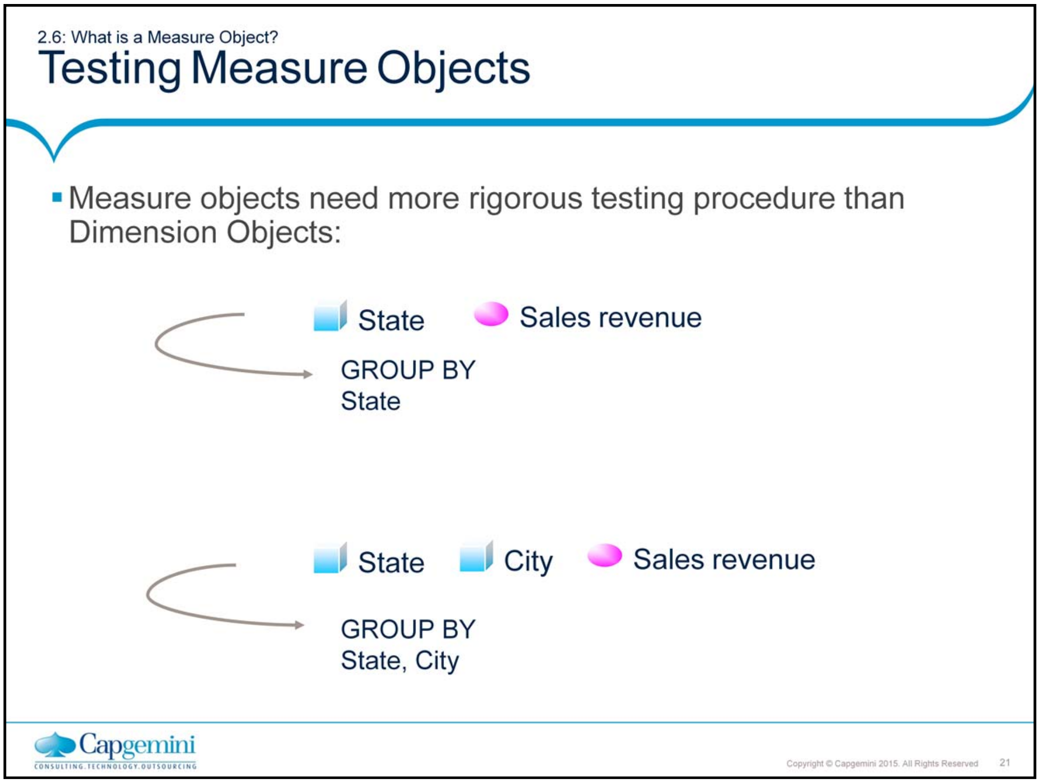
Semantic Dynamism of a Measure:

- Measure objects in a BusinessObjects Universe are semantically dynamic. The values returned by a Measure Object are dependant on the context in which they are being used. The context is set by the other Objects that are used in the query.
- Business Objects uses the **Group By** rule of SQL in the inference engine to control the semantically dynamic behavior of Measure objects. This guarantees that in whatever combination of Objects that the Measure is used, its return result will always be aggregated to the appropriate level.



2.6: What is a Measure Object?

Testing Measure Objects

- Measure objects need more rigorous testing procedure than Dimension Objects:

State Sales revenue

GROUP BY
State

State City Sales revenue

GROUP BY
State, City

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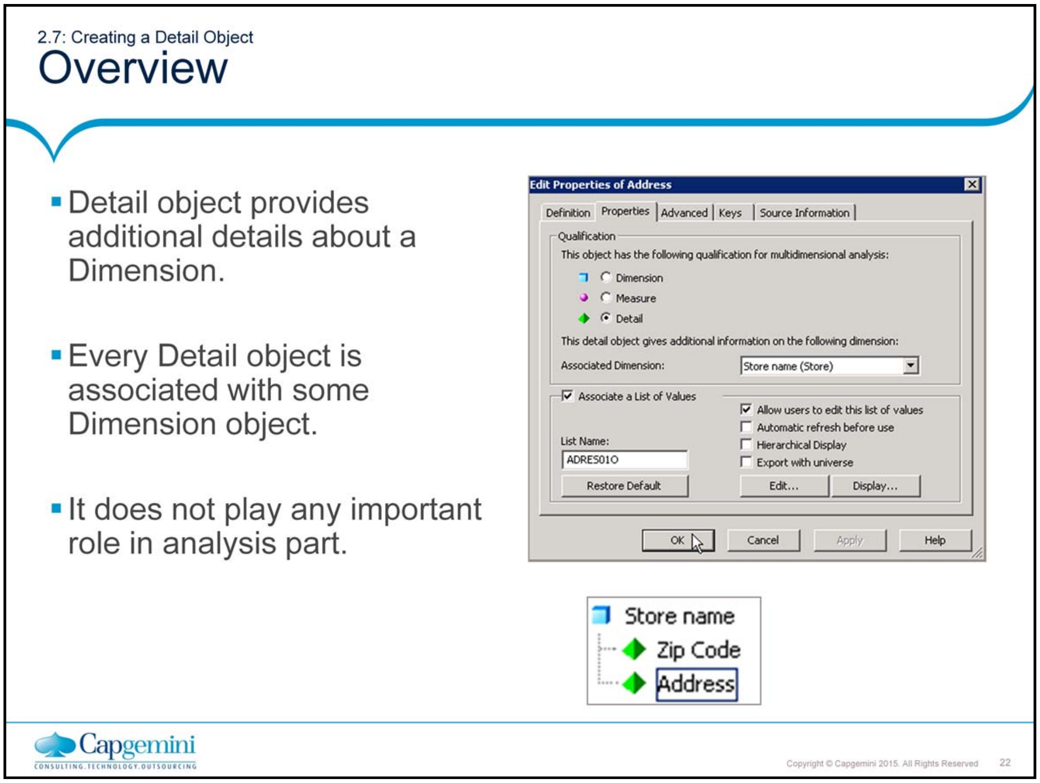
<u>Testing Measure Objects</u>:

- Measure objects require a slightly more rigorous testing procedure than Dimension objects. By definition, they must return a different set of results for each context into which they are placed. Therefore the designer must ascertain that the appropriate level of aggregation is being achieved (the correct GROUP BY clause generated) for each situation in which the Object may be used.
- In the example in the above slide, Sales Revenue generation can be tested at the level of State and/or City. Each of these situations (and possible combinations) must be tested, and the SQL must be examined to determine that it is correct.



2.7: Creating a Detail Object

Overview

- Detail object provides additional details about a Dimension.
- Every Detail object is associated with some Dimension object.
- It does not play any important role in analysis part.

Edit Properties of Address

Definition | Properties | Advanced | Keys | Source Information

Qualification

This object has the following qualification for multidimensional analysis:

○ Dimension
○ Measure
● Detail

This detail object gives additional information on the following dimension:

Associated Dimension: Store name (Store)

☑ Associate a List of Values

List Name: ADRES01O

☑ Allow users to edit this list of values
☐ Automatic refresh before use
☐ Hierarchical Display
☐ Export with universe

Restore Default | Edit... | Display...

OK | Cancel | Apply | Help

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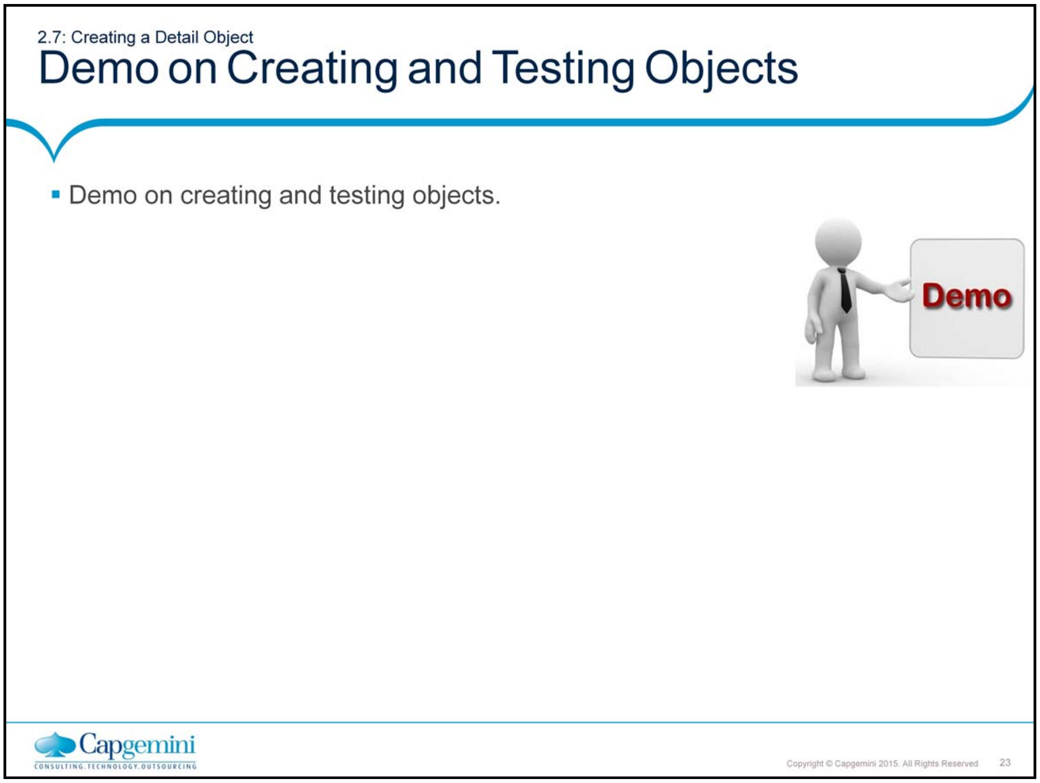
Creating a Detail Object:

- Detail objects are used by an end user as a source of additional information, on the entity being analyzed, should they require it.
  For example: A detail of the Customer Name object that has just been created can be a Phone Number or an Address Object.
- Detail objects are less likely to be used in queries, in general, and conditions, in particular. It is less likely that a list of values needs to be associated with the object.
- Detail objects return information on ancillary attributes of an entity that are not central to Analysis.
- **For example:** Address, Phone Numbers



2.7: Creating a Detail Object

Demo on Creating and Testing Objects

- Demo on creating and testing objects.

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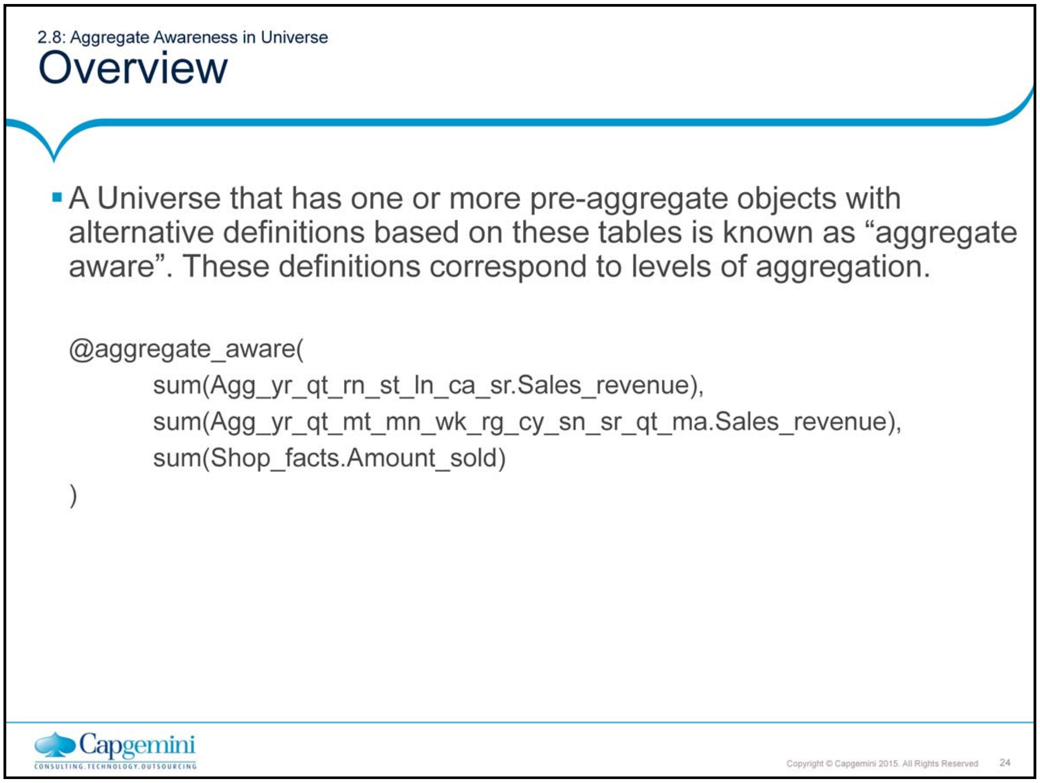

2.8: Aggregate Awareness in Universe

Overview

- A Universe that has one or more pre-aggregate objects with alternative definitions based on these tables is known as “aggregate aware”. These definitions correspond to levels of aggregation.

```
@aggregate_aware(
        sum(Agg_yr_qt_rn_st_ln_ca_sr.Sales_revenue),
        sum(Agg_yr_qt_mt_mn_wk_rg_cy_sn_sr_qt_ma.Sales_revenue),
        sum(Shop_facts.Amount_sold)
)
```

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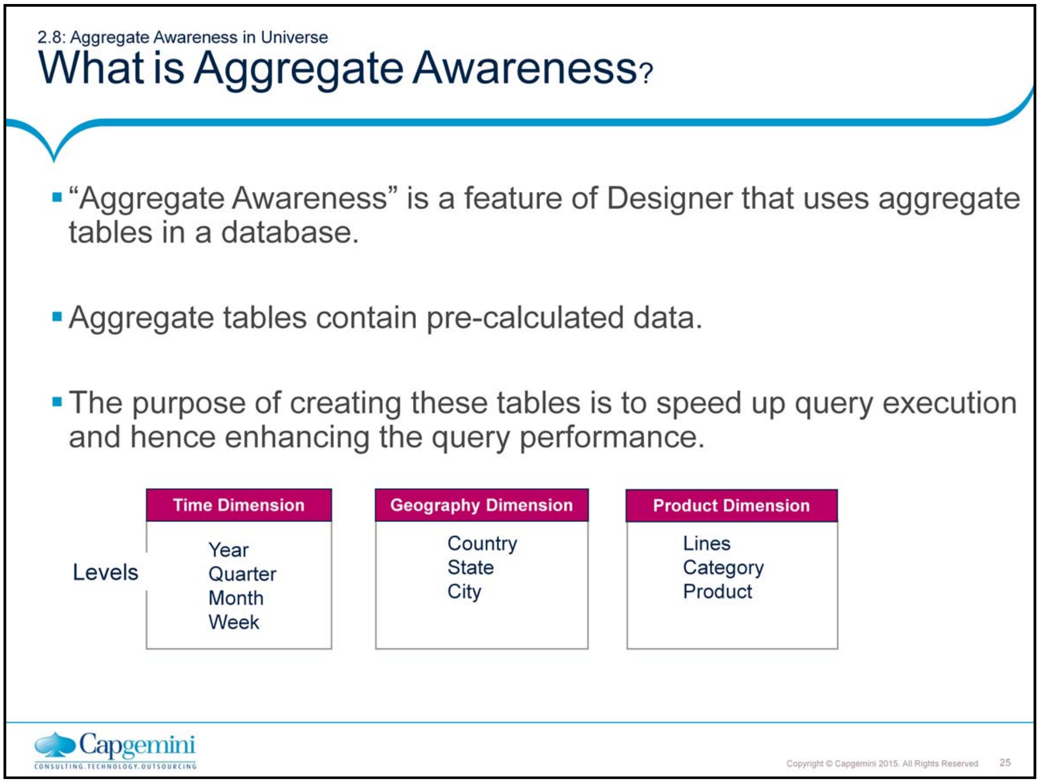
<u>Aggregate Awareness in Universe</u>:

- “**Aggregate awareness**” is a feature of Business Objects Designer that makes use of “aggregate tables” in a database to improve the performance of query processing. These are tables that contain pre-calculated data. The reliability of the technique depends on the accuracy of the aggregate tables. In fact, they must be refreshed at the same time as all fact tables.
- **For example:** A Sales Revenue object can be pre-aggregated by month, by quarter, or by year. Queries built from such a Universe return information aggregated to the appropriate level at optimal speed.



2.8: Aggregate Awareness in Universe

What is Aggregate Awareness?

- “Aggregate Awareness” is a feature of Designer that uses aggregate tables in a database.
- Aggregate tables contain pre-calculated data.
- The purpose of creating these tables is to speed up query execution and hence enhancing the query performance.

	Time Dimension	Geography Dimension	Product Dimension
Levels	Year Quarter Month Week	Country State City	Lines Category Product

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<u>What is Aggregate awareness</u>?

- At its lowest level, the data warehouse can store daily information about products as per geographical location. In other words, there is one row for product purchases. Assume that there are 1000 different products sold everyday. This can be mathematically expressed as 365 days x 1000 products = 365,000 rows per year. If you have data for three years, then there will be more than a million records.
- Thus, if you were to seek information about yearly sales per product, you will cause your database engine to add up a very large number of rows. However, in actual fact, the yearly sales of companies may involve fewer rows. This can be represented as 3 years x 1000 Products = 3000 rows
- Thus, 3000 rows from a table are sufficient to answer the question. Clearly, it will be far more efficient to pre-summarize these rows into aggregate tables.

2.8: Aggregate Awareness in Universe

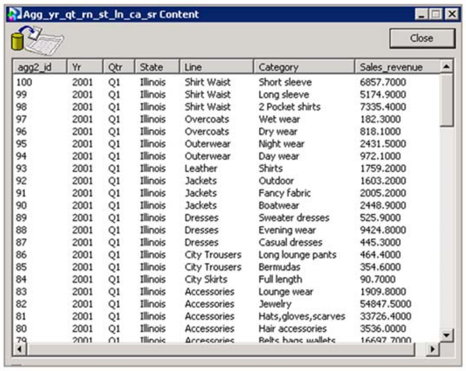
Creating Aggregate Awareness

- The order needs to be from Higher level of aggregation to Lower level of Aggregation.

```
@aggregate_aware
(
sum(Agg_yr_qt_rn_st_ln_ca_sr.
Sales_revenue),

sum(Agg_yr_qt_mt_mn_wk_rg_cy_sn_sr
_qt_ma.Sales_revenue),

sum(Shop_facts.Amount_sold)
)
```



agg2_id	Yr	Qtr	State	Line	Category	Sales_revenue
100	2001	Q1	Illinois	Shirt Waist	Short sleeve	6857.7000
99	2001	Q1	Illinois	Shirt Waist	Long sleeve	5174.9000
98	2001	Q1	Illinois	Shirt Waist	2 Pocket shirts	7335.4000
97	2001	Q1	Illinois	Overcoats	Wet wear	182.3000
96	2001	Q1	Illinois	Overcoats	Dry wear	818.1000
95	2001	Q1	Illinois	Outerwear	Night wear	2431.5000
94	2001	Q1	Illinois	Outerwear	Day wear	972.1000
93	2001	Q1	Illinois	Leather	Shirts	1759.2000
92	2001	Q1	Illinois	Jackets	Outdoor	1603.2000
91	2001	Q1	Illinois	Jackets	Fancy fabric	2005.2000
90	2001	Q1	Illinois	Jackets	Boatwear	2448.9000
89	2001	Q1	Illinois	Dresses	Sweater dresses	525.9000
88	2001	Q1	Illinois	Dresses	Evening wear	9424.8000
87	2001	Q1	Illinois	Dresses	Casual dresses	445.3000
86	2001	Q1	Illinois	City Trousers	Long lounge pants	464.4000
85	2001	Q1	Illinois	City Trousers	Bermudas	354.6000
84	2001	Q1	Illinois	City Skirts	Full length	90.7000
83	2001	Q1	Illinois	Accessories	Lounge wear	1909.8000
82	2001	Q1	Illinois	Accessories	Jewelry	54847.5000
81	2001	Q1	Illinois	Accessories	Hats,gloves,scarves	33726.4000
80	2001	Q1	Illinois	Accessories	Hair accessories	3536.0000
79	2001	Q1	Illinois	Accessories	Belts,bags,wallets	16697.7000

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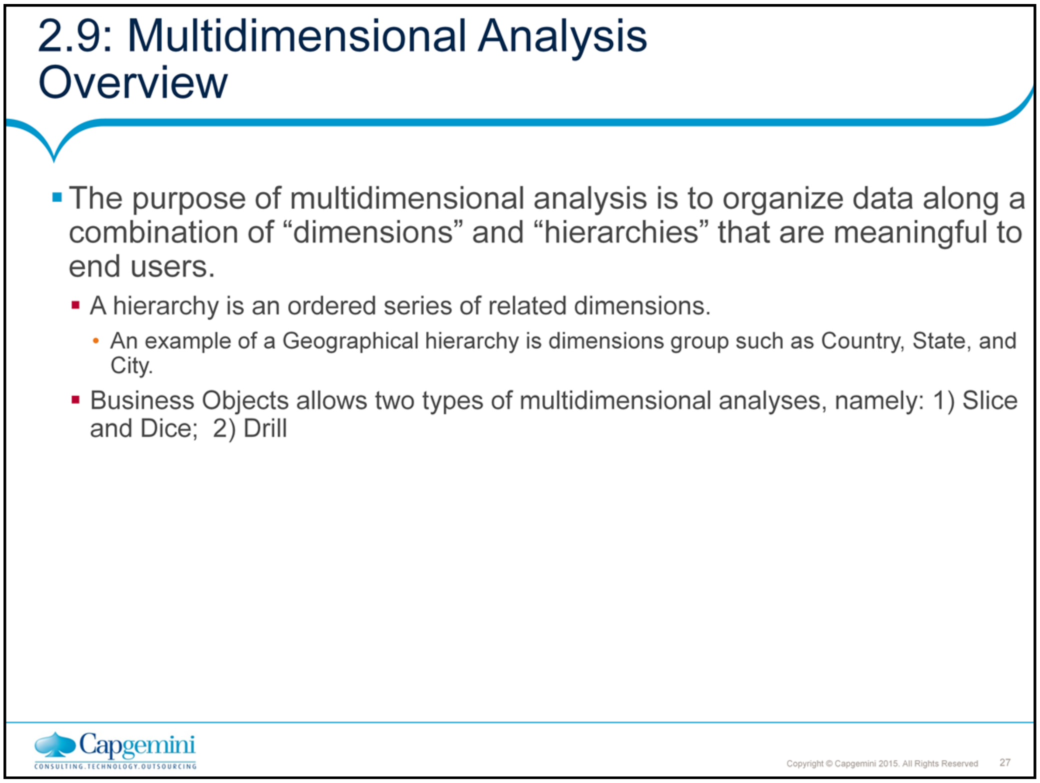
Creating Aggregate Awareness:

- While creating aggregate_aware objects, a developer needs to be aware of various aggregate tables and level of granularity.
- The order of parameters needs to be from Higher level of aggregation to Lower level of aggregation. The last parameter will be from the base table itself.

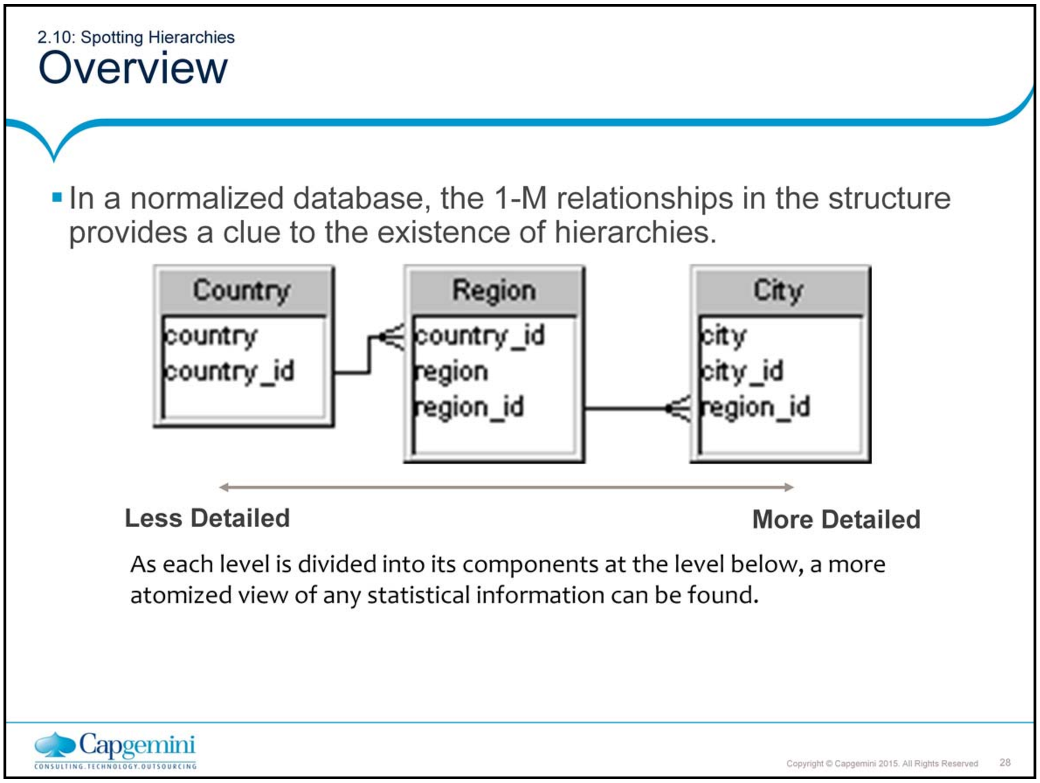


2.9: Multidimensional Analysis Overview

- The purpose of multidimensional analysis is to organize data along a combination of “dimensions” and “hierarchies” that are meaningful to end users.
  - A hierarchy is an ordered series of related dimensions.
    - An example of a Geographical hierarchy is dimensions group such as Country, State, and City.
  - Business Objects allows two types of multidimensional analyses, namely: 1) Slice and Dice; 2) Drill

Multidimensional Analysis:

- Multidimensional Analysis gives the ability to end users to observe data from various viewpoints. In this way, an end user can spot trends or exceptions in the data. A dimension is simply the object to be tracked. A dimension can be an object such as State, City or Product Lines.
- With slice and dice, an end user can rotate a micro-cube in order to view it from different perspectives.
- **For example:**
  - Let us say that a micro-cube is made up of three hierarchies: Country, State, Product Lines along with Sales revenue as measure.
  - The sales manager may wish to view Revenue by Country. By rotating the micro-cube, the sales manager can also view Revenue by State or by Product Lines.
- Thus, a micro-cube with n dimensions has n x (n - 1) possible views.
- Drill gives an end user the ability to navigate through hierarchical levels of detail. The notion of hierarchy is very important in drill. It provides the framework for “drilling up” or “drilling down”. Drill is the central mechanism through which multidimensional analysis can be conducted.



2.10: Spotting Hierarchies

Overview

- In a normalized database, the 1-M relationships in the structure provides a clue to the existence of hierarchies.

Country
country
country_id

Region
country_id
region
region_id

City
city
city_id
region_id

Less Detailed

More Detailed

As each level is divided into its components at the level below, a more atomized view of any statistical information can be found.

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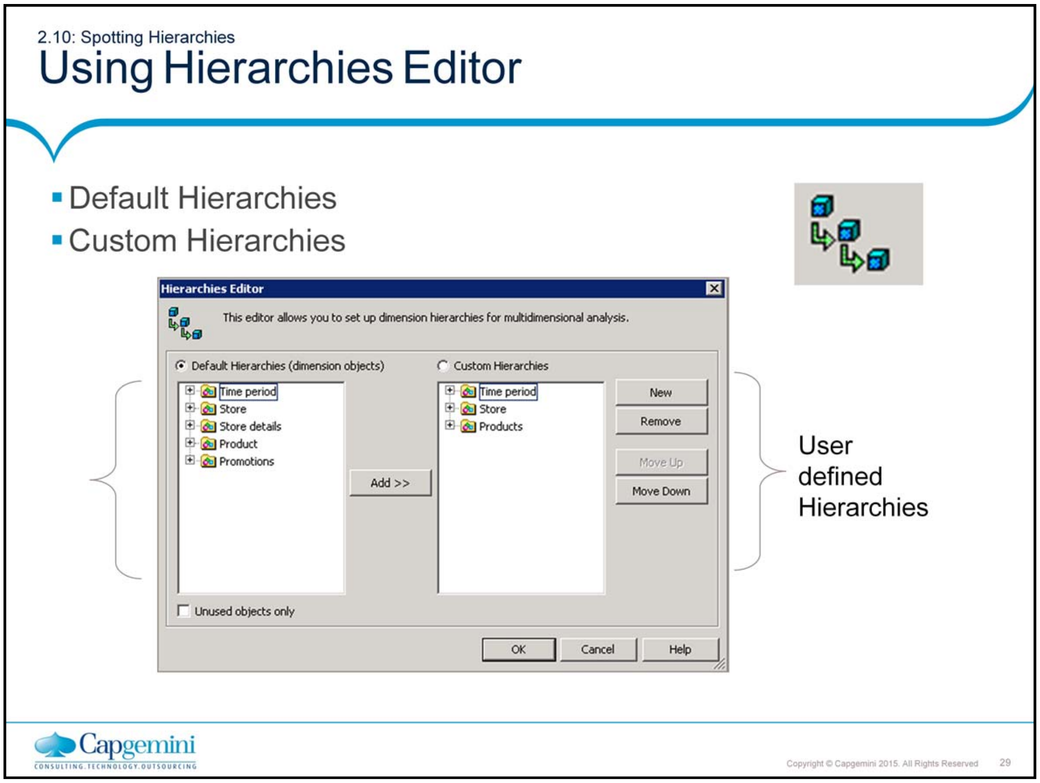
Spotting Hierarchies:

- The hierarchies implicit in the data are dependent on the nature of the data and the way it has been stored in the database.
- Thus you may need to analyze the data very carefully in order to find the hierarchies in your specific system that are best suited to your users' requirements for analysis.



2.10: Spotting Hierarchies

Using Hierarchies Editor

- Default Hierarchies
- Custom Hierarchies

Hierarchies Editor

This editor allows you to set up dimension hierarchies for multidimensional analysis.

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<u>Using Hierarchies Editor</u>:

- **Default Hierarchies** are represented by the way Objects are laid out in the **Classes and Objects** window of the **Query** panel. However, **Custom Hierarchies** provide more flexible Drill options without involving the re-organization of Classes and Objects.
- By default, Designer provides a set of default hierarchies for multidimensional analysis. However, you can set up your own customized hierarchies by using the **Hierarchies Editor**. To access the editor, select the **Hierarchies** command from the **Tools** menu, or click the **Hierarchies Editor** button on the Standard toolbar. The editor is made up of two panes called Default Hierarchies and Custom Hierarchies.
- Designer represents “hierarchies” with a “folder symbol”, and “dimensions” with a “cube symbol”. The left pane lists all the classes that contain dimension objects in the active Universe. The right pane shows all the customized hierarchies that you create.

Using Hierarchies Editor (contd.):

Creating a Hierarchy:

You can create a hierarchy from the Hierarchies Editor as follows:

1. Select the particular folder from default hierarchy. Click **Add >>** button. A folder representing the hierarchy will be displayed in the right pane.
2. Open the newly created hierarchy folder and remove the unwanted objects from it.
3. Press the **OK** button. The custom hierarchy will be created.

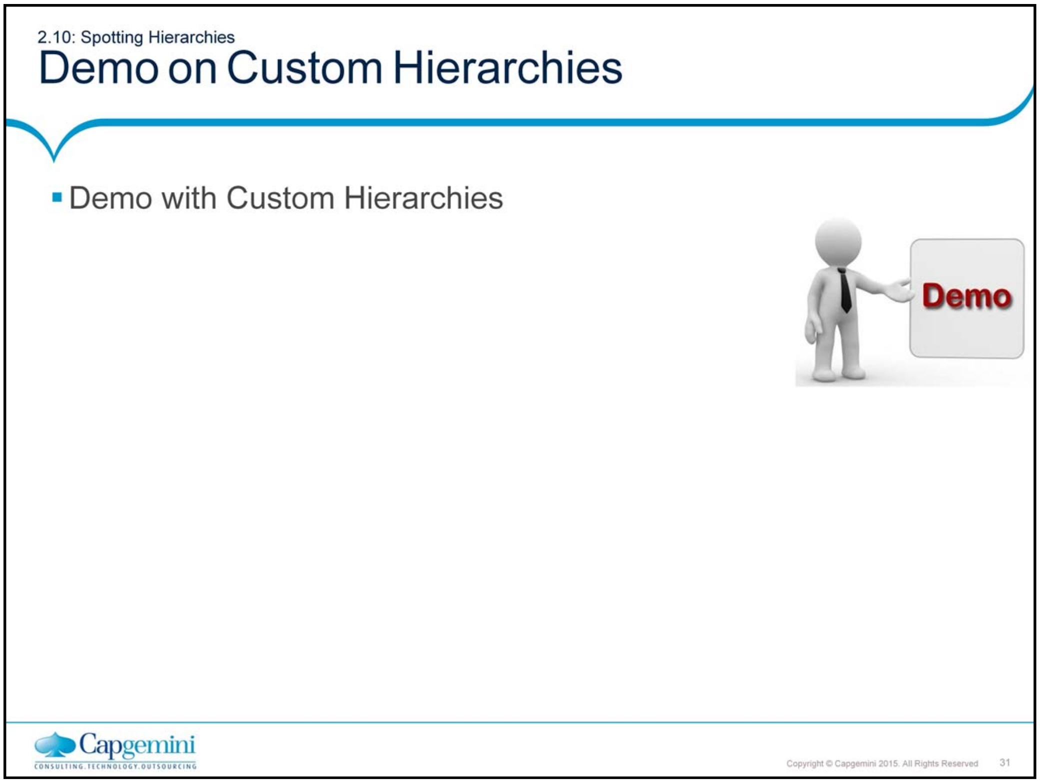
Adding dimension objects to a Hierarchy:

You can create the dimension objects of a hierarchy as follows:

1. In the left pane, click the **plus sign (+)** of all the default hierarchies in order to view the dimension objects.
2. Click the hierarchy that should contain the dimension. The hierarchy is highlighted.
3. Click the dimension object you wish to add. The dimension object is highlighted. To select a series of dimension objects, click each dimension while keeping the CTRL key pressed.
4. Click the **Add** button.
   The dimension object will be displayed in the right pane. An alternative way to add a hierarchy or dimension object is to drag and drop it from the left pane to the right pane. The **Unused objects only** check box is a useful way to view only the dimension objects that you have not yet selected for inclusion in a hierarchy.

Additional data points on using Hierarchies Editor:

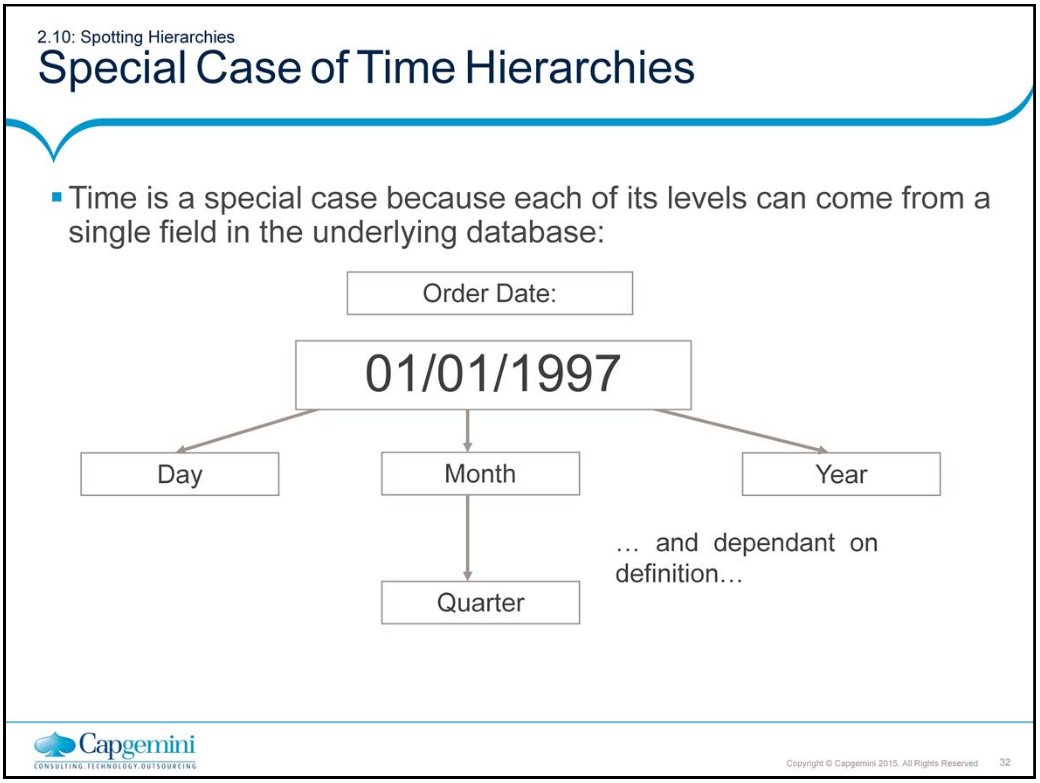
- To remove a dimension or a hierarchy, click it and then click the **Remove** button.
- You can rearrange the order in which the dimension objects are displayed within a hierarchy.
- Hierarchies can take on just about any form.
- Examples of **classic hierarchies** include:
  - **Geography**: Continent . Country . Region . City
  - **Products**: Category . Brand . Product
  - **Time**: Year . Quarter . Month .Week . Day
- In addition, it is possible for a hierarchy to be “mixed” such as the following:
  - **Geography/Products:** Continent . Country . Category . Brand . Product



2.10: Spotting Hierarchies

Demo on Custom Hierarchies

- Demo with Custom Hierarchies



2.10: Spotting Hierarchies

Special Case of Time Hierarchies

- Time is a special case because each of its levels can come from a single field in the underlying database:

Order Date:

01/01/1997

Day

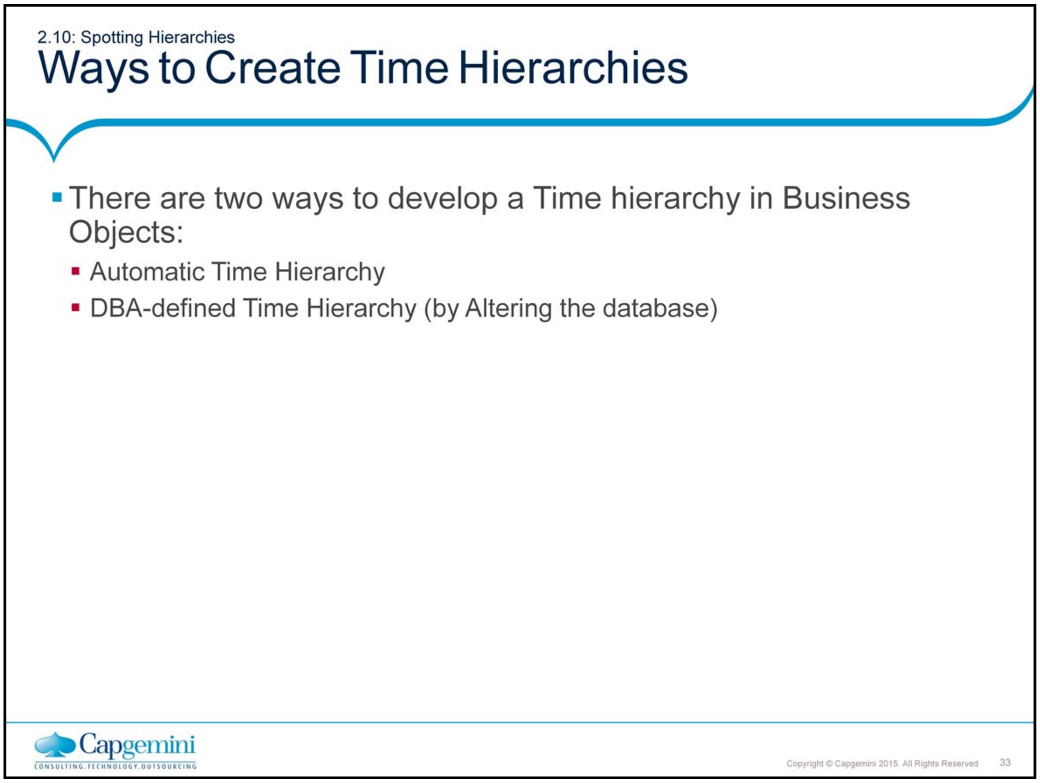
Month

Year

Quarter

… and dependant on definition…

<u>Special Case of Time Hierarchies</u>:
Time is a special case when it comes to defining hierarchies. This is because all the information for Dimension Objects that represent it come from a single field in the database structure. Dates can be broken down into several discrete pieces of information.



2.10: Spotting Hierarchies

Ways to Create Time Hierarchies

- There are two ways to develop a Time hierarchy in Business Objects:
  - Automatic Time Hierarchy
  - DBA-defined Time Hierarchy (by Altering the database)

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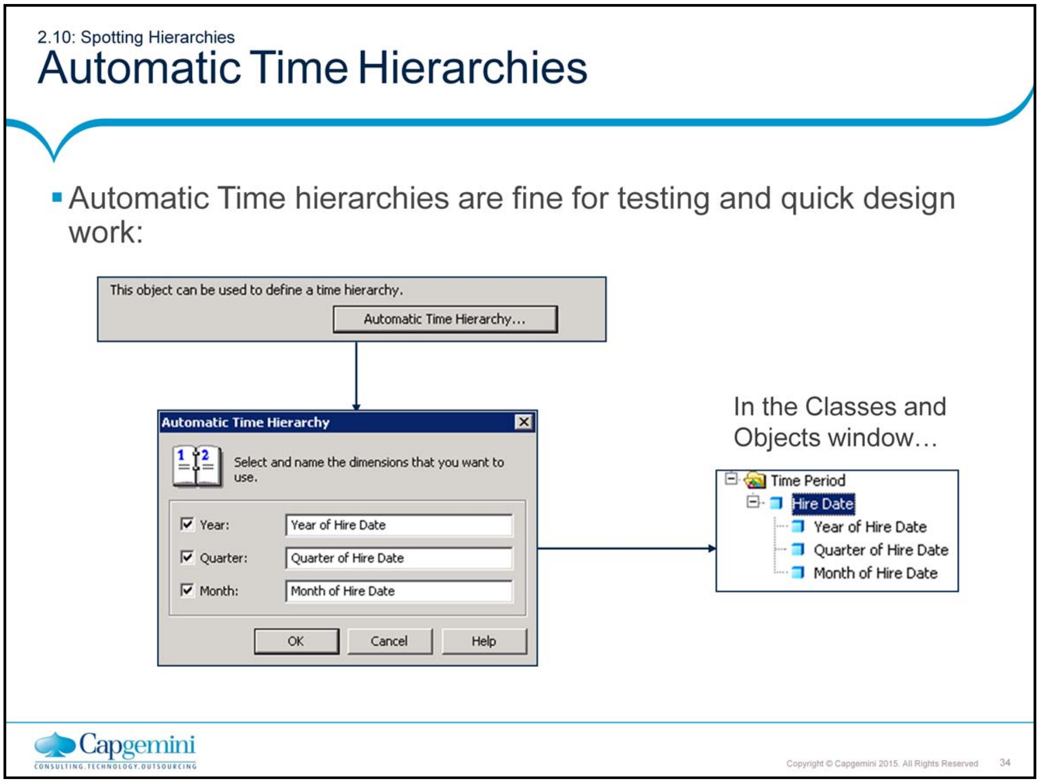
Ways to Create Time Hierarchies:
There are two methods that can be used to create a time hierarchy.

- **Method 1:**
  Generate it Automatically: This method allows Business Objects to generate the appropriate Object definitions necessary for a time hierarchy from a data object. This method is very quick. However, it does not give the Designer control over the format of the data that is returned and so can lead to confusion for an end user while analyzing the report.

- **Method 2:**
  Building a database structure (table) that conforms to a specific company's time period requirements: Tables can be created allowing the designer to define the time slots when company-specific periods begin and end. This function can then be used throughout the organization. However, this flexibility has its costs.
  - It requires a DBA to get involved in the Universe design.
  - It requires extensive database skills.
  - It requires additional space on the server.
  - It takes time to create.



2.10: Spotting Hierarchies

Automatic Time Hierarchies

- Automatic Time hierarchies are fine for testing and quick design work:

This object can be used to define a time hierarchy.

Automatic Time Hierarchy…
Automatic Time Hierarchy
Select and name the dimensions that you want to use.

☑ Year: Year of Hire Date

☑ Quarter: Quarter of Hire Date

☑ Month: Month of Hire Date

In the Classes and Objects window…

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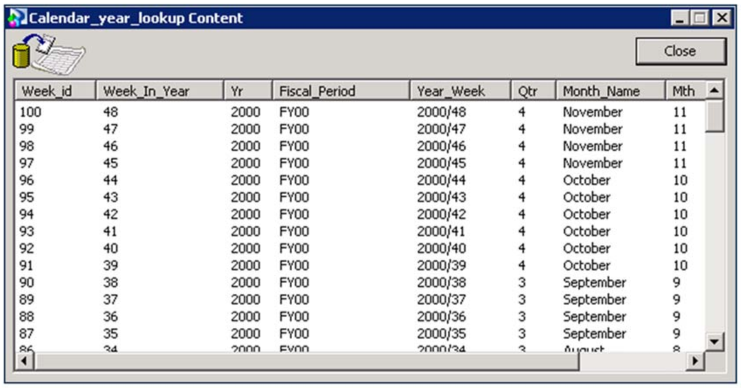
<u>Automatic Time Hierarchies</u>:
At the click of a button, a designer can have a logical time hierarchy generated for them when they are working with **Date** fields in **Object** definitions.

2.10: Spotting Hierarchies

DBA Defined Time Periods

- Altering the database table structure gives the designer the flexibility to provide their own definition of periods.



Week_id	Week_In_Year	Yr	Fiscal_Period	Year_Week	Qtr	Month_Name	Mth
100	48	2000	FY00	2000/48	4	November	11
99	47	2000	FY00	2000/47	4	November	11
98	46	2000	FY00	2000/46	4	November	11
97	45	2000	FY00	2000/45	4	November	11
96	44	2000	FY00	2000/44	4	October	10
95	43	2000	FY00	2000/43	4	October	10
94	42	2000	FY00	2000/42	4	October	10
93	41	2000	FY00	2000/41	4	October	10
92	40	2000	FY00	2000/40	4	October	10
91	39	2000	FY00	2000/39	4	October	10
90	38	2000	FY00	2000/38	3	September	9
89	37	2000	FY00	2000/37	3	September	9
88	36	2000	FY00	2000/36	3	September	9
87	35	2000	FY00	2000/35	3	September	9
86	34	2000	FY00	2000/34	3	August	8

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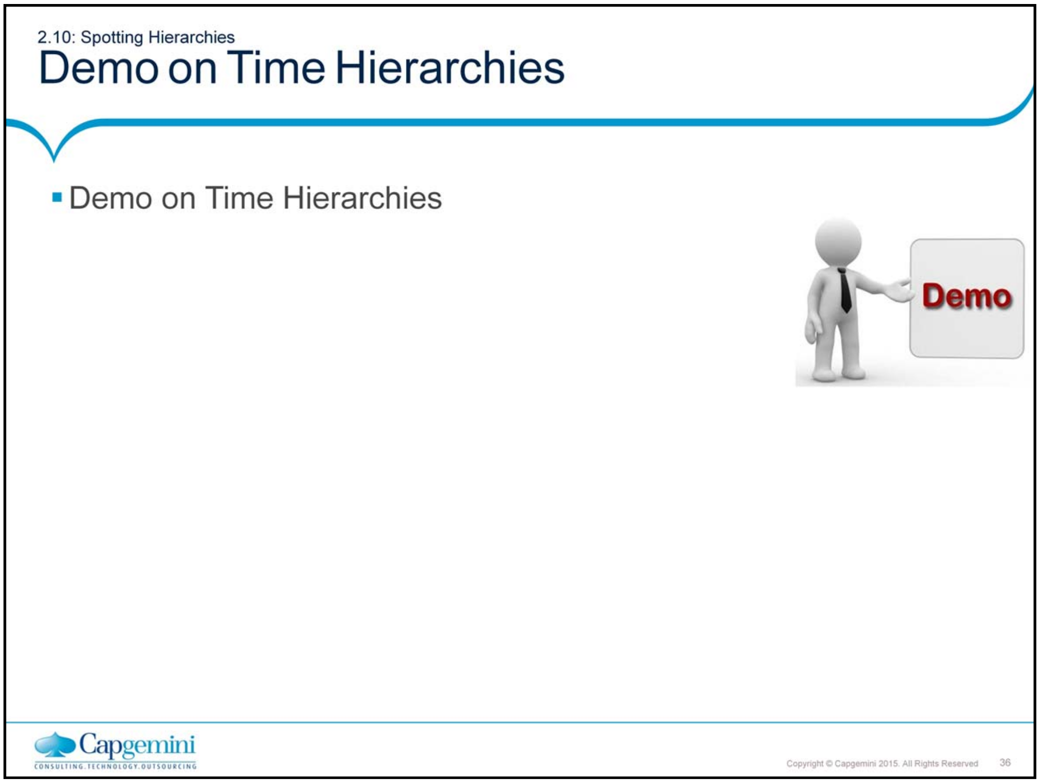
<u>DBA Defined Time Periods</u>:

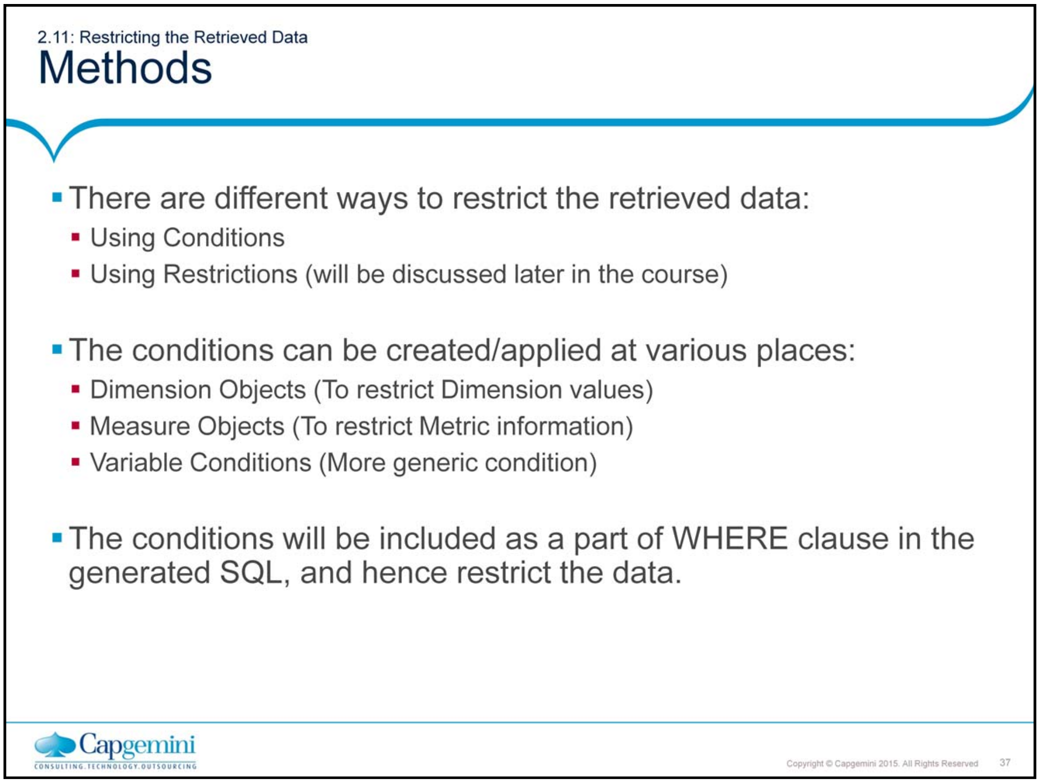
- It is possible for the database structure to be altered to allow the insertion of company or accountancy-specific time period definitions into a time hierarchy.
- **For example:** A table structure(s) can be created that reflects the time period in the financial year. This means that the year definitions will run from 1st April XXXX to 31st March XXXX+1. It also implies that the definition of Quarters will be very different to that of a calendar year function.
    - ➢ **Calendar Year:** 01/01/2003 – 31/12/2003
    - ➢ **Calendar Quarter 1:** 01/01/2003 – 31/03/2003
    - ➢ **Financial Year:** 01/04/2003 – 31/03/2004
    - ➢ **Financial Quarter 1:** 01/04/2003 – 30/06/2003
- This method is extremely flexible. However, it does require that the database be modified. It will require the assistance or permission from the DBA. It is a server-led initiative rather than BusinessObjects-led initiative. It also increases the size of the database, and will slow down any queries due to the presence of a join.



2.10: Spotting Hierarchies

Demo on Time Hierarchies

- Demo on Time Hierarchies



2.11: Restricting the Retrieved Data

Methods

- There are different ways to restrict the retrieved data:
  - Using Conditions
  - Using Restrictions (will be discussed later in the course)
- The conditions can be created/applied at various places:
  - Dimension Objects (To restrict Dimension values)
  - Measure Objects (To restrict Metric information)
  - Variable Conditions (More generic condition)
- The conditions will be included as a part of WHERE clause in the generated SQL, and hence restrict the data.

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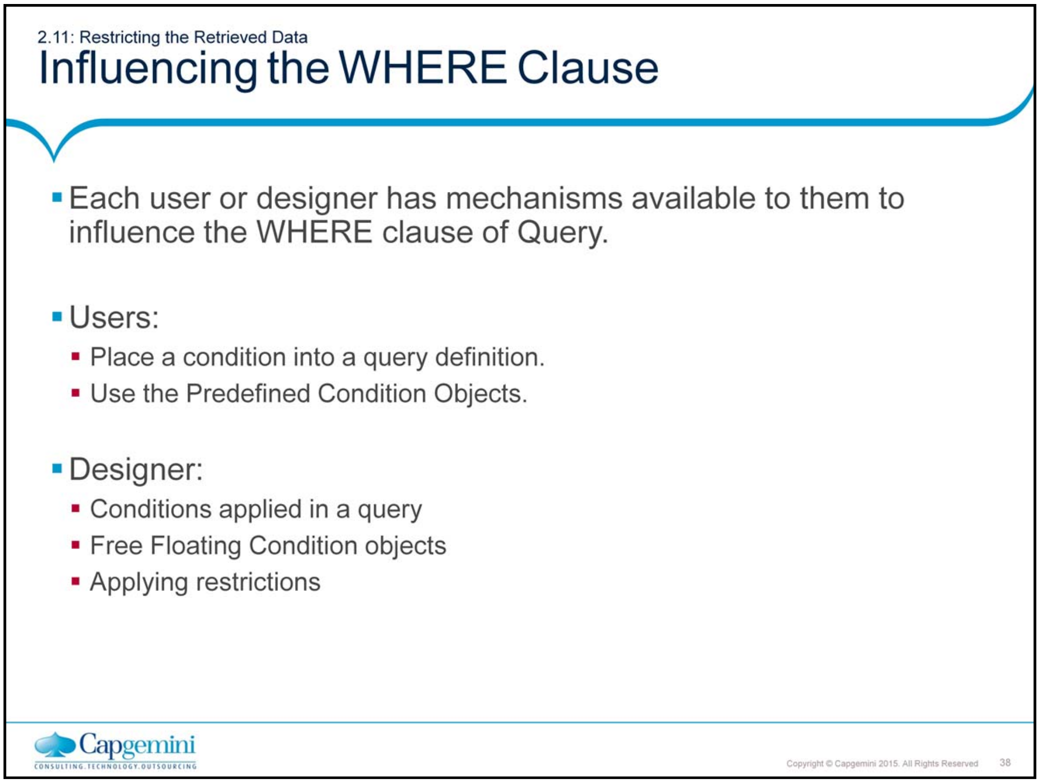
Restricting the Retrieved Data:

- Conditions are used to cut down or hide the important data from the end user. It reduces amount of network traffic dramatically. Therefore it enhances the flow of information around the organization. It is used to focus the analyst’s attention on specific subject matter, possibly related only to themselves.
- Restrictions are applied by the Administrators to enhance the security of data.
- **Example:** A Sales Person only sees his own Sales figures, Salary, or Bonus. Analysts will no longer be overwhelmed by the volume of data returned.



2.11: Restricting the Retrieved Data

Influencing the WHERE Clause

- Each user or designer has mechanisms available to them to influence the WHERE clause of Query.
- Users:
  - Place a condition into a query definition.
  - Use the Predefined Condition Objects.
- Designer:
  - Conditions applied in a query
  - Free Floating Condition objects
  - Applying restrictions

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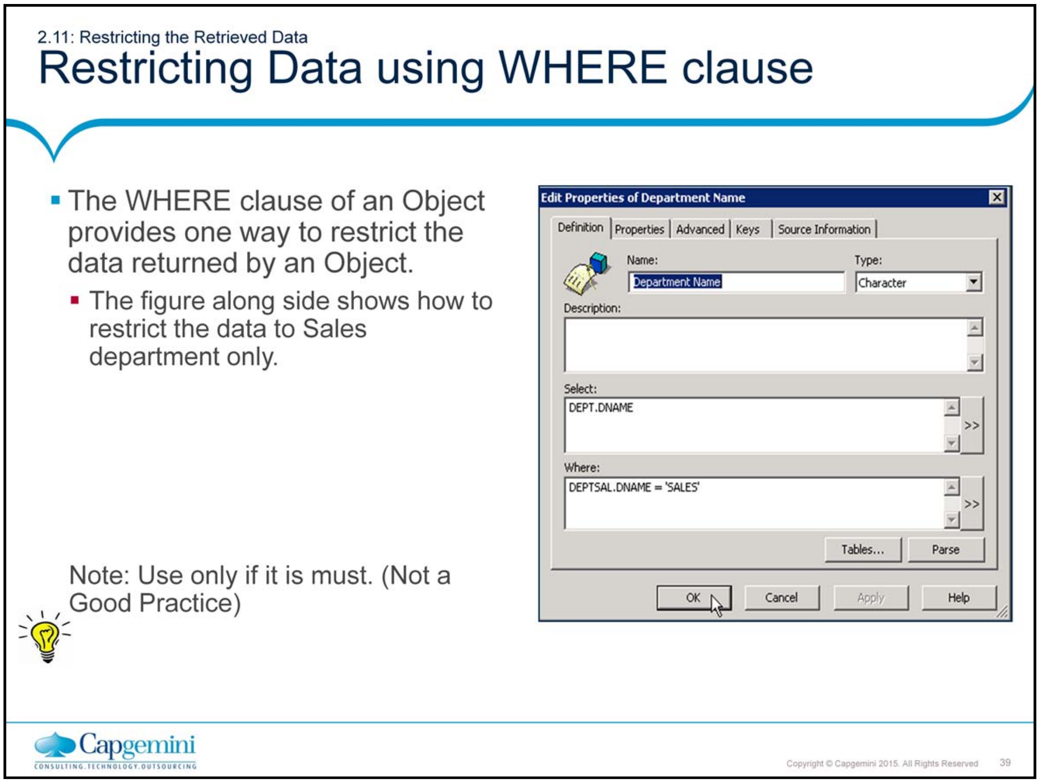
Influencing the WHERE Clause:

- An end user can place a condition into the query:
  - ➢ by defining it themselves from scratch, or
  - ➢ by using predefined **Condition Object** Objects provided by the Universe Designer
- Designer has numerous ways of influencing the WHERE clause of an SQL, either directly or indirectly.
  - ➢ A direct influence means that Designer forces a condition to be applied in a Query, dependant on the combination of Objects placed in the Query panel.
  - ➢ An indirect influence over the WHERE clause is exerted by giving the User the choice of whether to use a condition or not.



2.11: Restricting the Retrieved Data

Restricting Data using WHERE clause

- The WHERE clause of an Object provides one way to restrict the data returned by an Object.
  - The figure along side shows how to restrict the data to Sales department only.

Note: Use only if it is must. (Not a Good Practice)

Edit Properties of Department Name

Name: Department Name

Type: Character

Description:

Select: DEPT.DNAME

Where: DEPTSAL.DNAME = 'SALES'

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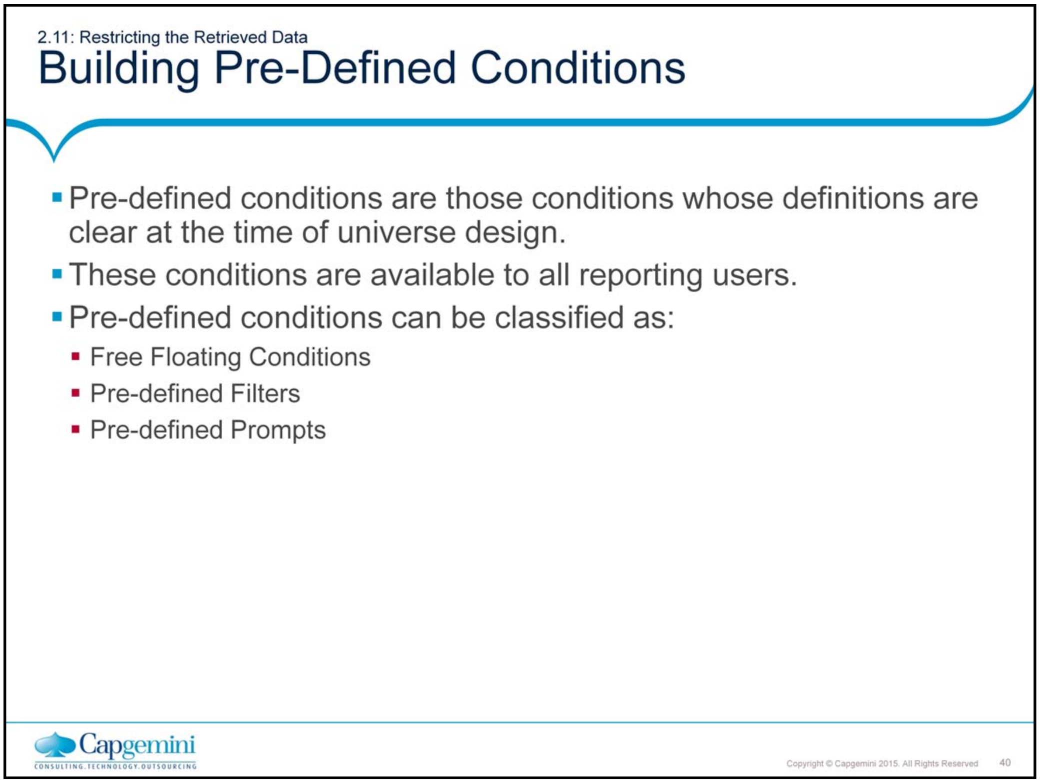
<u>Restricting Data using WHERE clause</u>:

- The WHERE clause in the above mentioned example will ensure that the output will belong to Sales department only. It can be used to show selected data only.
- Use of hard coded values in the WHERE clause of a Dimension Objects definition is not recommended, as it can interrupt the multidimensional nature of the Universe structure.
  For example: A user will not get the information about other departments.



2.11: Restricting the Retrieved Data

Building Pre-Defined Conditions

- Pre-defined conditions are those conditions whose definitions are clear at the time of universe design.
- These conditions are available to all reporting users.
- Pre-defined conditions can be classified as:
  - Free Floating Conditions
  - Pre-defined Filters
  - Pre-defined Prompts

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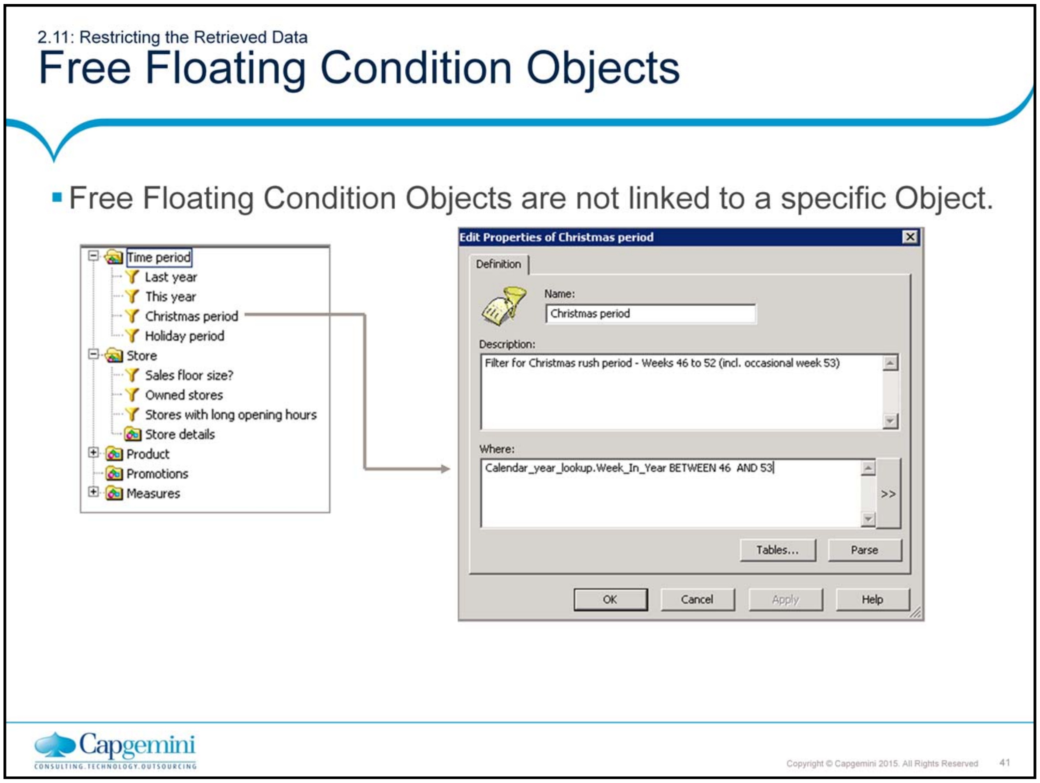
Building Pre-Defined Conditions:

- Pre-defined conditions are defined by the Universe designer to help the end user. It eliminates the need of re-creating the same set of conditions while preparing reports.
- These conditions act as an object, and can be included in the report by using just a drag and drop method.



2.11: Restricting the Retrieved Data

Free Floating Condition Objects

- Free Floating Condition Objects are not linked to a specific Object.

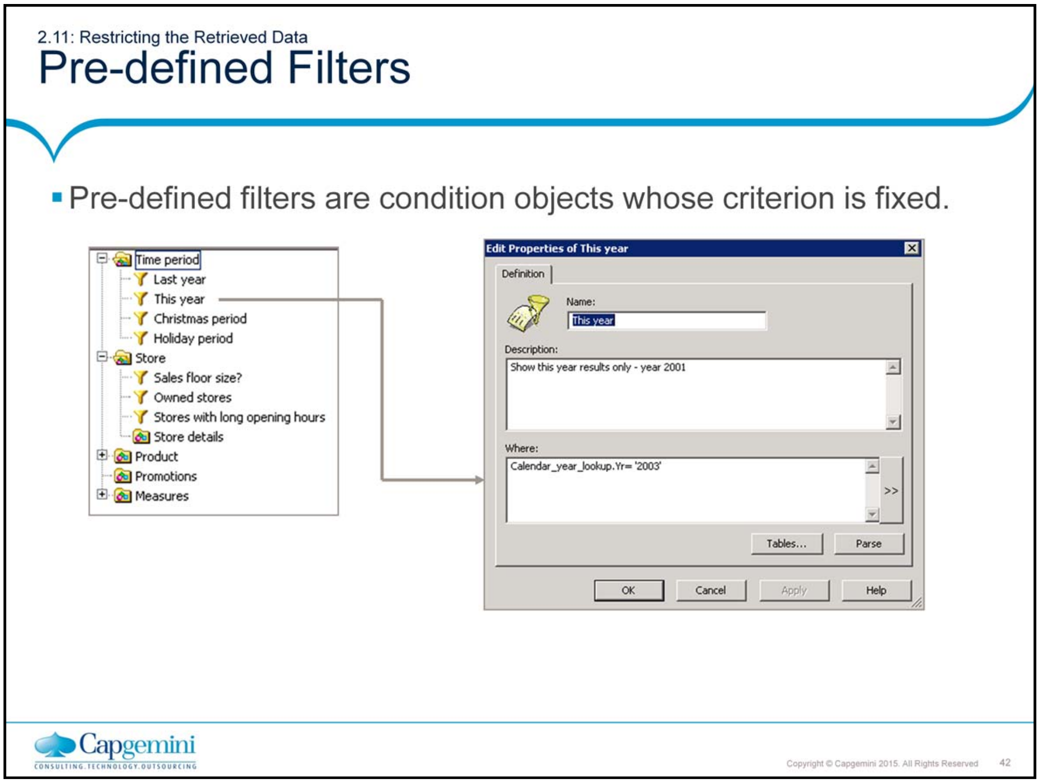
Name: Christmas period

Description: Filter for Christmas rush period - Weeks 46 to 52 (incl. occasional week 53)

Where: Calendar_year_lookup.Week_In_Year BETWEEN 46 AND 53

Free Floating Condition Objects:

- Free Floating Conditions are free floating WHERE clauses. Their main purpose is to extend Business rules applied in Objects.
- **Example:** A survey company wants to conduct a survey based on annual income of the participants and classify them as Below Middle class, Middle class, and Upper Middle class. The classification has to be made by the company, else every surveyor will come up with their own definition of these classes.



2.11: Restricting the Retrieved Data

Pre-defined Filters

- Pre-defined filters are condition objects whose criterion is fixed.

Name: This year

Description: Show this year results only - year 2001

Where: Calendar_year_lookup.Yr= '2003'

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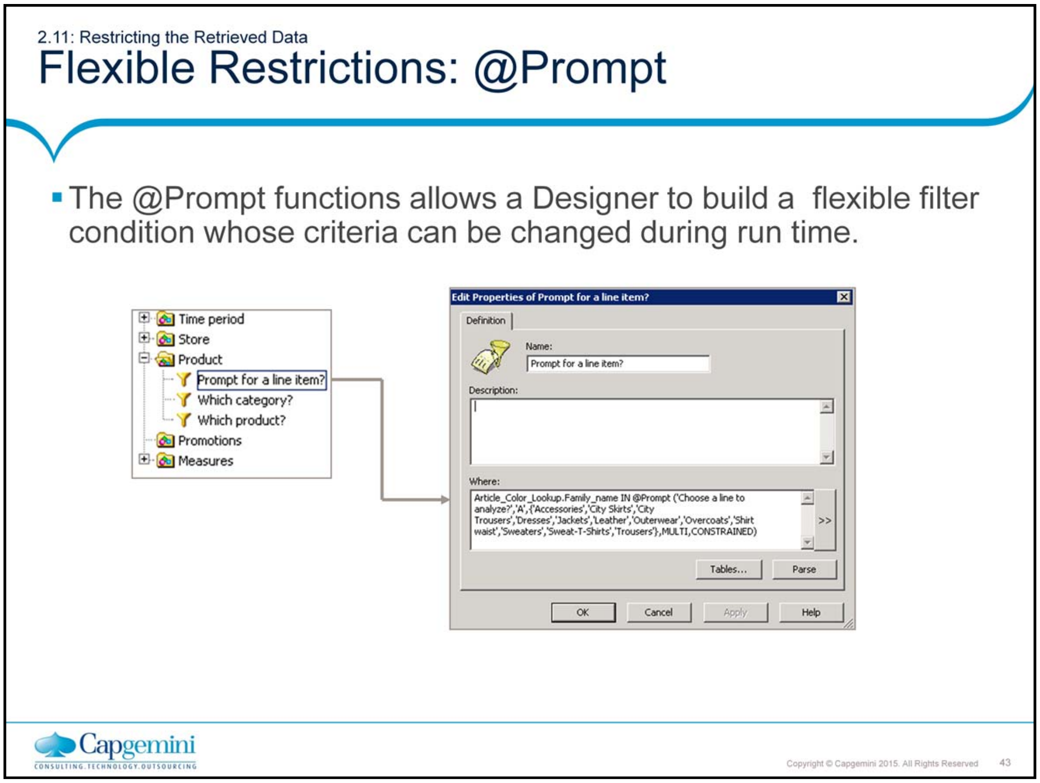
<u>Pre-defined Filters</u>:

- Pre-defined filters are static conditions that do not change. It’s criteria is hard coded during design time, and it can be applied by applying drag and drop method. It is very useful while scheduling documents.

- **Example:** A company wants to generate many reports for current year. In such a case, a report designer either has to create filter every time or use the prompt and specify the value. A pre-defined filter eliminates both the problems and leads to more simplicity.

- **Note:** Since they are static in nature, their value will not change unless they are changed in the universe.



2.11: Restricting the Retrieved Data

Flexible Restrictions: @Prompt

- The @Prompt functions allows a Designer to build a flexible filter condition whose criteria can be changed during run time.

Name: Prompt for a line item?

Description:

Where:

```
Article_Color_Lookup.Family_name IN @Prompt ('Choose a line to
analyze?','A',{'Accessories','City Skirts','City
Trousers','Dresses','Jackets','Leather','Outerwear','Overcoats','Shirt
waist','Sweaters','Sweat-T-Shirts','Trousers'},MULTI,CONSTRAINED)
```

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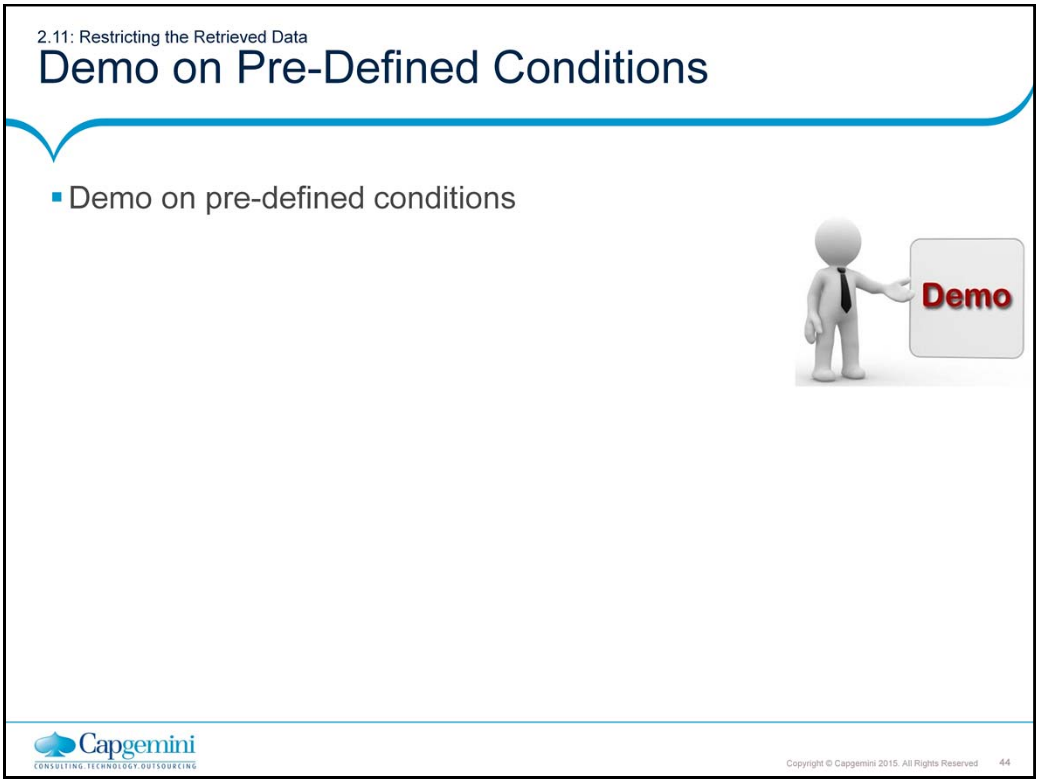
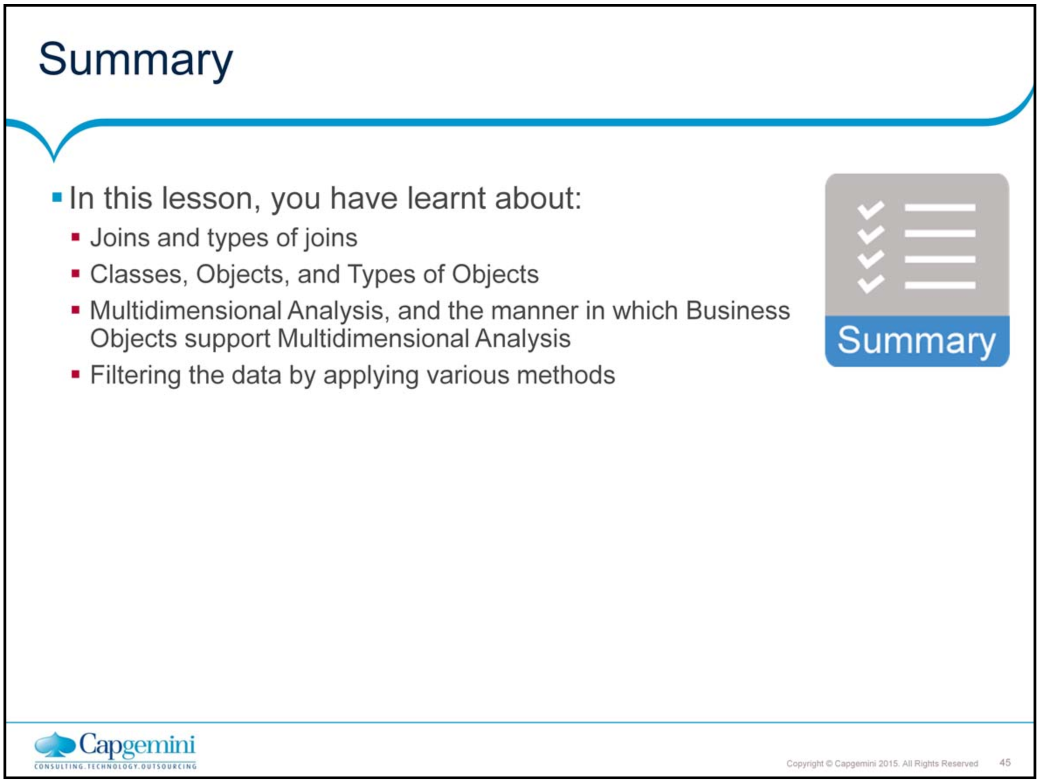
Flexible Restrictions: @Prompt:
Prompts provide a much more flexible approach than using hard coded values in the pre-defined filters. It gives the user the flexibility to adjust the value used in the condition each time the query is run without having to build their own.



2.11: Restricting the Retrieved Data

Demo on Pre-Defined Conditions

- Demo on pre-defined conditions



Summary

- In this lesson, you have learnt about:
  - Joins and types of joins
  - Classes, Objects, and Types of Objects
  - Multidimensional Analysis, and the manner in which Business Objects support Multidimensional Analysis
  - Filtering the data by applying various methods

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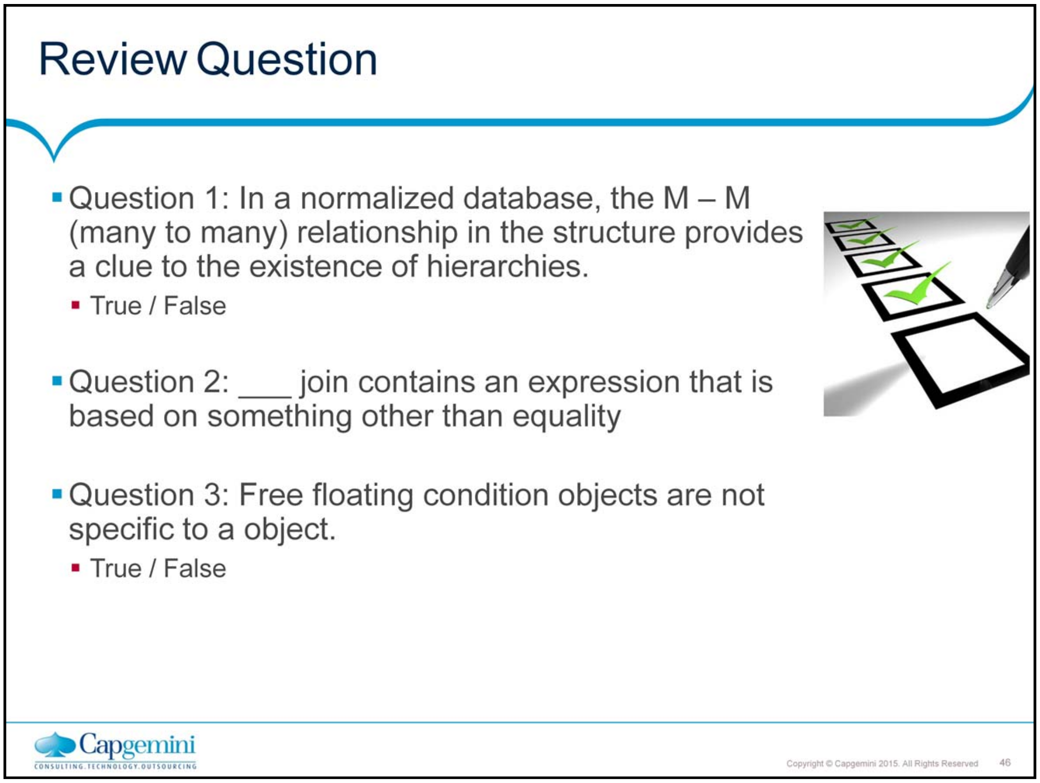

Review Question

- Question 1: In a normalized database, the M – M (many to many) relationship in the structure provides a clue to the existence of hierarchies.
  - True / False
- Question 2: ___ join contains an expression that is based on something other than equality
- Question 3: Free floating condition objects are not specific to a object.
  - True / False

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