

# OLAP Examples and QuickStart Exercises

## Quick Start Introduction

This set of exercises is designed to introduce you to the fundamentals of OLAP by using step-by-step procedures to create an OLAP model. These examples are constructed using the OLAP product PowerOLAP, but you'll find that the concepts of cubes, slices, and multidimensionality demonstrated here are still representative for OLAP in general.

By working through these Quick Start Exercises you will learn many elemental functions of OLAP: how to create databases, Dimensions, Cubes and Slices; and how to create an Excel worksheet from a Slice view. These examples show how to construct a model by working entirely with the product's "modeler." Meaning, the OLAP model will be built from the ground up. This is a perfect exercise for beginning to understand what OLAP is and how it works, but it is not reflective of how OLAP is usually implemented. Usually, data is imported or exchanged between existing operating systems and the OLAP system because the amount of data is so vast in the existing system that manual creation of a database and physical entry of data would be impossible.

However, you will undoubtedly need to understand the concepts and follow the steps covered in these examples because they convey how to use, customize and advance your own models. These skills, in turn, will enable you to vastly increase the potential business uses and benefits of any OLAP product.

## Example 1 - Creating an OLAP Database



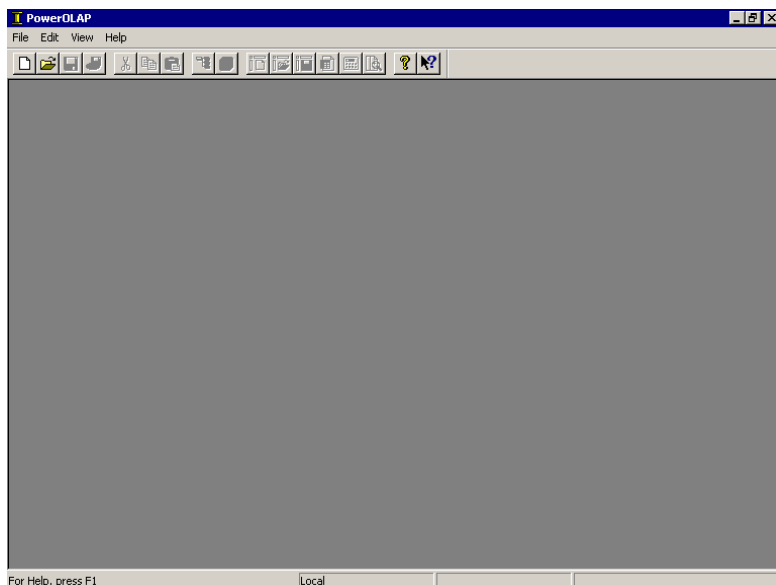
Create a  
New  
Database

Creating a PowerOLAP database is the first step in developing an OLAP application to store and model your data. The PowerOLAP database file, which has an ".olp" file extension, will contain all the components of your model. As you will see, these components include Dimensions and their Members; Cubes; Cube Formulas; and Slices, which display your data.

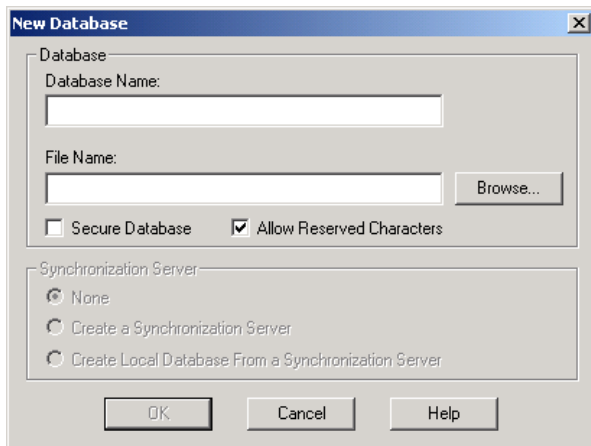
Let's start by creating a new database, which you will name "QS Database" (short for Quick Start):

➔ From the Start Menu, select **Start, Programs, PowerOLAP**.

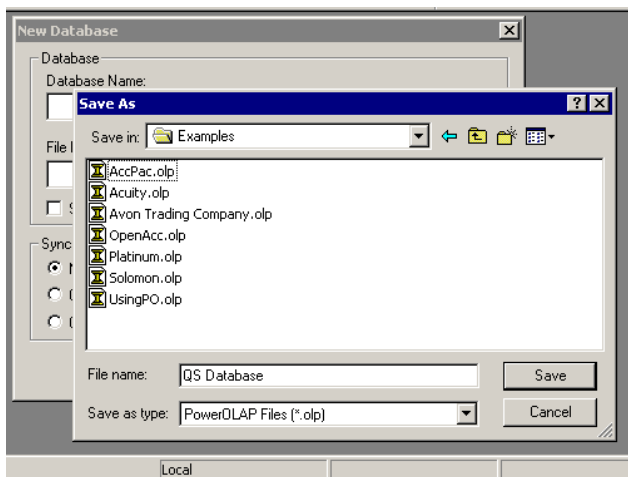
The PowerOLAP main application window appears:



- Select **File, New Database**, or click on the **New Database** button on the toolbar. The following **New Database** dialog box is displayed:

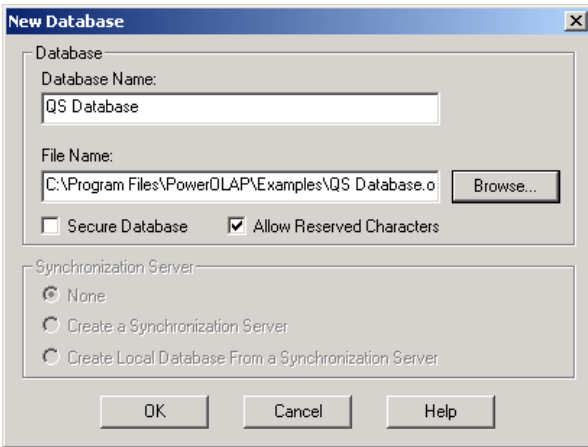


- Click **Browse** in the **Database Name** text box.
- In the **Save As** dialog, type **QS Database** in the **File name** text box, and follow the directory path: C:\Program Files\PowerOLAP\Examples\.



- Click **Save**. The **New Database** dialog box returns, displaying the Database Name as well as the path and file name of the database file.

In this case the Database Name will be the same as the File Name (shown in the following figure); you have the option to type in a different Database Name.



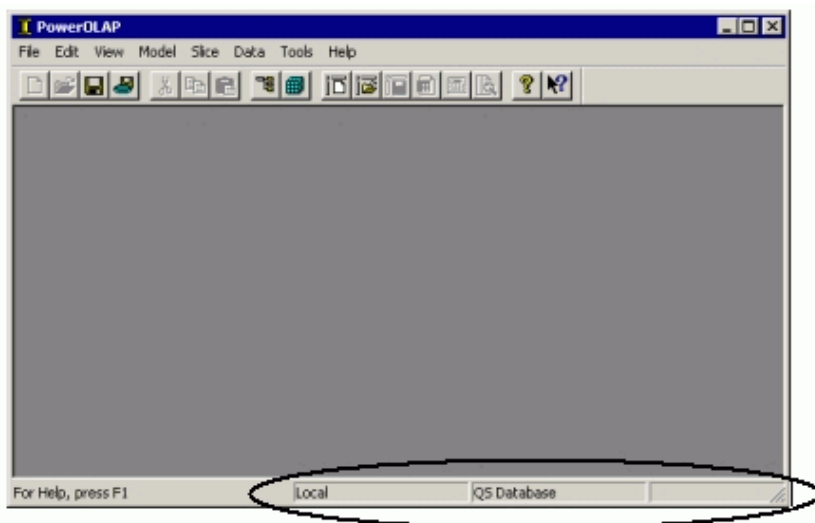
Notice the **Secure Database** and the **Allow Reserved Characters** checkboxes. Leave the default settings, unchecked and checked, respectively.

The **Secure Database** checkbox enables you to require a password to open the database. Thus if you check the box, then click OK, you will be prompted to give a password (and then verify it). For more information about Security, see the section in the PowerOLAP User Manual dedicated to Security features.

The **Allow Reserved Characters** checkbox allows you to use so-called “reserved characters”—e.g., quote, period, comma, etc.—in your database. See General Options further on in this manual for a list of these characters.

The **Synchronization Server** area of the dialog refers to a PowerOLAP component that allows PowerOLAP databases to be synchronized via a shared file. The Synchronization Server area is activated if your license includes Synchronization Server capabilities (see the *Synchronization Server* manual); otherwise, it is grayed out (as above). Consult your Administrator to determine whether this tool is part of your application.

➤ Click **OK**. Note that in the PowerOLAP window, all eight menu items appear, and that several more toolbar buttons are now active.



Notice the status area, circled in the figure. From left to right, the boxes indicate:

- Whether you are working in **Local** or **Server mode** (Server name will be indicated);
- The **Database Name**; and
- Synchronization Server Name**, if active.

Only one database file (".olp") may be open at a time. Therefore, a new database can not be created if a database is currently open.

**IMPORTANT:** If you are working as a Client to an MDB Server, you cannot create a database on the Server. Typically, a new database shared by multiple clients would be created from the MDB Server Control Program. It is worth noting, though, that a user can create a database in standalone mode that can then be made available to the Server.

## Example 2 – OLAP Dimensions and Members

### Creating Dimensions



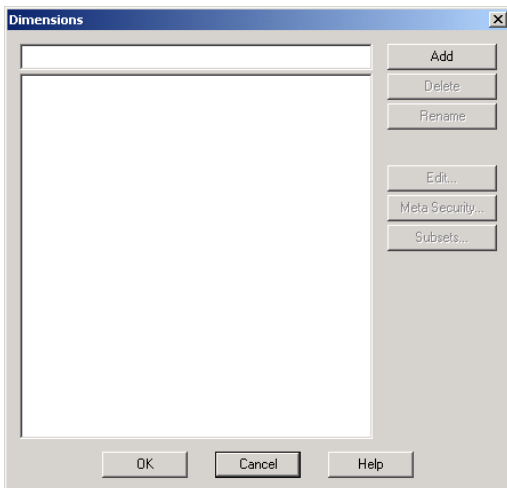
Create a  
New  
Dimension

Dimensions are lists of related terms used to organize your data. Thus, a natural Dimension name for the Members *January*, *February* and *March* might be *Months*. Dimensions, in turn, are used to construct Cubes, the multidimensional structures in which you store and model data.

In the model we are about to create, we will define three Dimensions: *Months*, *Accounts*, and *Regions*.

Create the *Months*, *Accounts*, and *Regions* dimensions as follows:

- Select **Model, Dimensions**. The following **Dimension** dialog box is displayed.



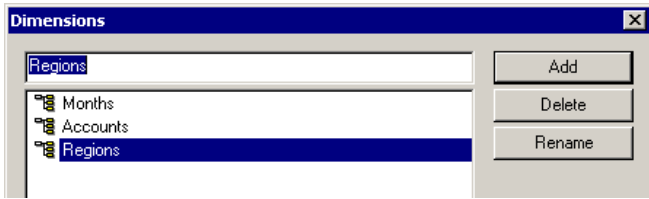
- Type **Months** in the **Dimension** text box at the top of the dialog.
  - Click **Add**.
- The dialog box appears as in the following figure:



- Type **Accounts** in the **Dimensions** text box.
- Click **Add**.
- Type **Regions** in the **Dimensions** text box.
- Click **Add**.

You can use the **Enter** key in place of clicking the Add button to add Dimensions to the database.

Once you have entered all of the Dimensions above, the list box will appear as in the following figure:



➔ Click **OK**. You are returned to the PowerOLAP main application window.



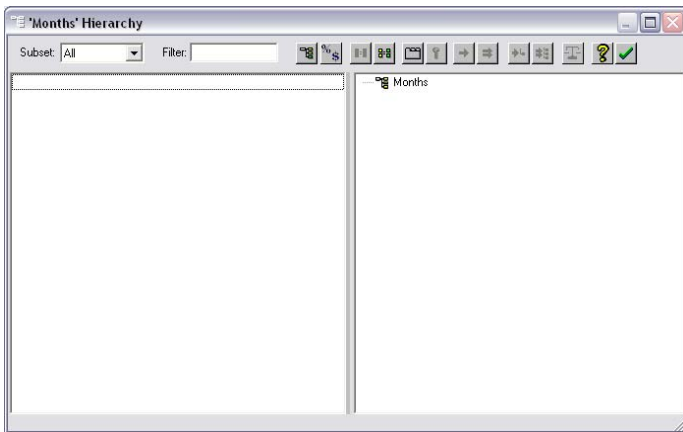
Create  
New  
Member

## Adding Members to Dimensions

Dimensions are composed of Detail and Aggregate member types. Detail members “add up” to Aggregate members. For example, in the *Months* dimension you would make *January*, *February*, *March* (all Detail members) add up to *1st Quarter* (Aggregate member).

To add Members to a Dimension:

- ➔ Select **Model, Dimensions**. You are returned to the **Dimensions** dialog box.
- ➔ Double-click on **Months**;  
or select **Months**, then click **Edit**.



The *Months* dimension is currently selected for editing, as indicated in the Dimension Hierarchy dialog title bar ('Months' Hierarchy).



Create  
New  
Member

- ➔ Select the **Create New Member** icon;  
or **right-click** within the **Member** list box (on the left in the dialog) and select **New**.
- ➔ Type **January** in the **Members** text box (over the currently highlighted text—e.g., Untitled3).
- ➔ Press **Ctrl-Enter**.
- ➔ Type **February** in the **Members** text box.
- ➔ Press **Ctrl-Enter**.  
The **Member** list box will appear as follows:



➤ Using this procedure, enter the **remaining months** of the year—these will be the Detail members in the *Months* dimension.

Next, you will create what will eventually be the Aggregate members for the *Months* dimension in the same manner (we say “eventually” because before a Hierarchy is created, all Members appear with the Detail icon—the number sign):

- Press **Ctrl-Enter**.
- Type **1st Quarter** in the **Members** text box.
- Press **Ctrl-Enter**.
- Type **2nd Quarter** in the **Members** text box.
- Press **Ctrl-Enter**.
- Complete the *Months* dimension by adding **3rd Quarter**, **4th Quarter** and **Total Year**.

You can double click on a name, or use the right mouse button, to rename or delete a name in the Member list box.

When you are done, the **Member** list box will appear as follows:



If the Member names are not in the order you want, click and drag them to the desired position in the list.

## Example 3 – Hierarchies and Aggregate Weights

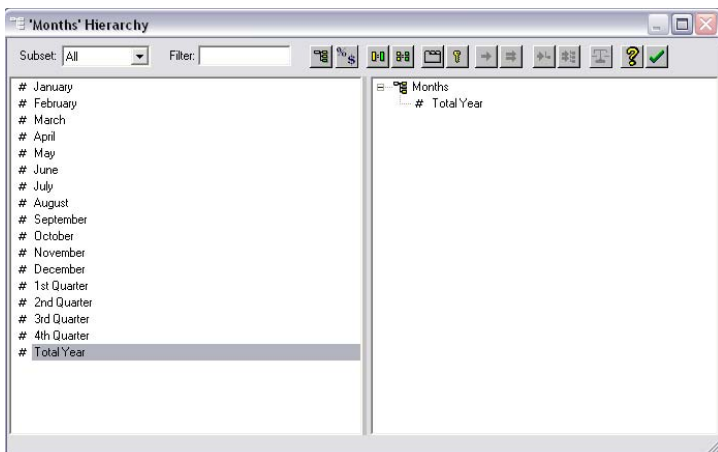
### Creating a Dimension Hierarchy

Once the Members have been defined for a Dimension, the Hierarchy of these Members must also be defined. The Hierarchy determines the aggregation of Dimension members.

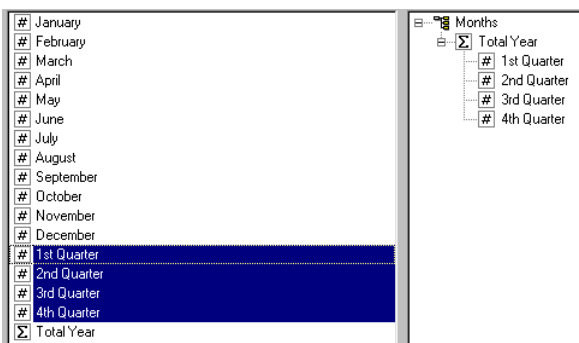
You will now create the Hierarchy by selecting Members and moving them to the **Hierarchy Definition** dialog box on the right side of the **Dimension Hierarchy** dialog box. We will proceed by creating the Hierarchy for the *Months* dimension.

Define the Hierarchy for the *Months* dimension as follows:

- Select **Total Year** from the **Members** list box on the left.
- Drag it so that it is placed just below **Months** in the **Hierarchy Definition** box on the right, so that it appears as below:

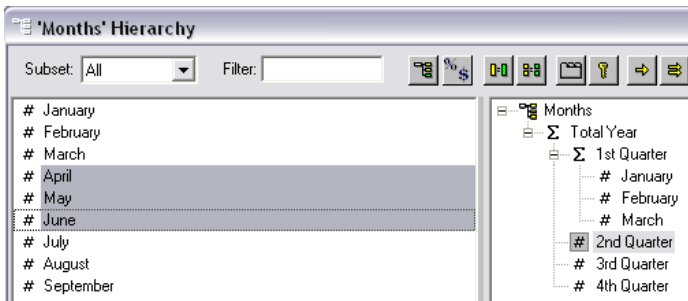




- Select **1st Quarter**, press the **Ctrl** key, and holding it down, select **2nd Quarter**, **3rd Quarter**, and **4th Quarter**.
- Place the selection just below **Total Year** in the **Hierarchy Definition** dialog box, so that a sigma sign (for sum),  $\Sigma$ , appears beside **Total Year**. This indicates that **Total Year** is now an Aggregate member, the sum of the Members you placed below it (see following figure).





- Select **January**, hold down the **Shift** key, then select **March** in the **Members** list box so that **February** is highlighted also.
- Drag and place the selection just below **1st Quarter** in the **Hierarchy Definition** dialog box. Now the sigma sign appears beside **1st Quarter**.

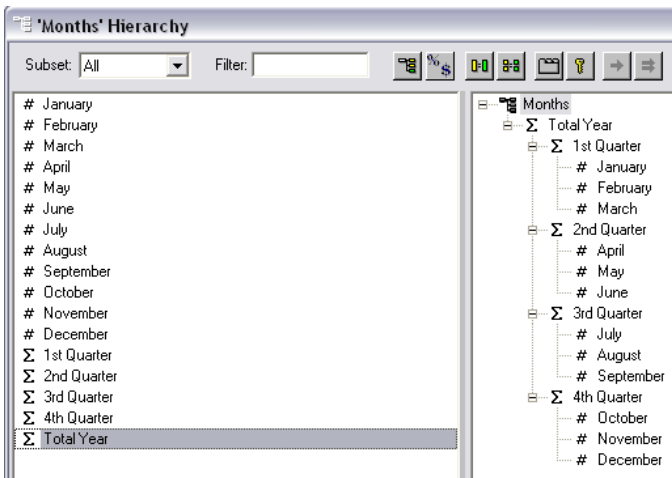
- Pressing the **Ctrl** key, select **April**, **May** and **June**. Release the **Ctrl** key. Now Select **2nd Quarter** in the **Hierarchy Definition** dialog box.




- Press the **Add Selected Members as Child** button, , on the toolbar. Notice that the sigma sign appears, next to **2nd Quarter**.
- Bring over **July** as a Detail member under **3rd Quarter**.
- Highlight **August** and **September** from the list on the left and highlight **July** on the right.
- Click on the **Add Selected As Sibling** button, , to add **August** and **September** into the Hierarchy under the **3rd Quarter**. Now **August** and **September** are shown under **July**, and the three Members comprise **3rd Quarter**.

[Note that other buttons are available for Hierarchy creation: **Add all Members as Child**, , and **Add All As Sibling** button, .]

- **Complete the Hierarchy** for the **4th Quarter** so that when you are done, the Hierarchy looks as follows:



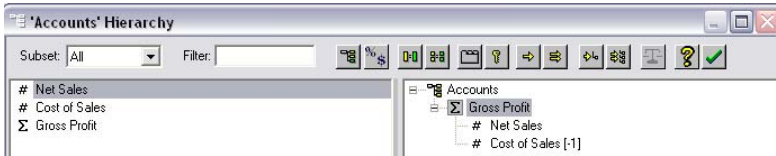
- Close the **Dimension Hierarchy** dialog by clicking the **OK** button, , the rightmost button on the toolbar. You are returned to the **Dimension** dialog box.

Next, you will create the Hierarchy for the *Accounts* and *Regions* dimensions:

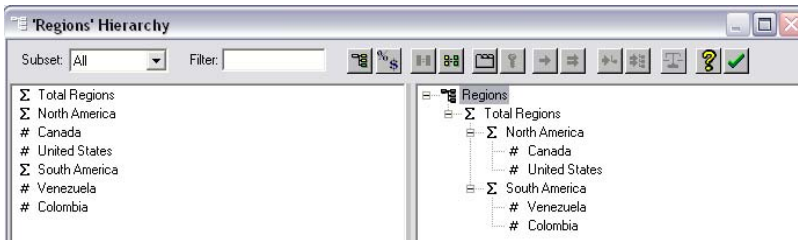
Add the following Members into the appropriate Dimensions. You will define their type, whether Detail or Aggregate, according to the Hierarchies you see in the following two figures (next page):

<u>Dimension</u>	<u>Member</u>	<u>Type</u>
Accounts	Net Sales	Detail
	Cost of Sales	Detail
	Gross Profit	Aggregate
Regions	Canada	Detail
	United States	Detail
	Venezuela	Detail
	Colombia	Detail
	Total Regions	Aggregate
	North America	Aggregate
	South America	Aggregate

When complete, the Dimension Hierarchies for *Accounts* and *Regions* should look as follows:



'Accounts' Hierarchy dialog box

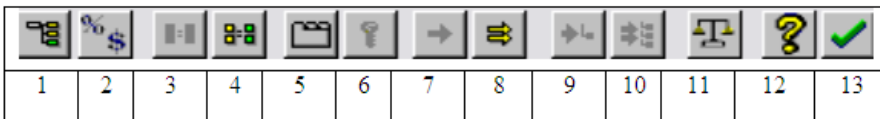


'Regions' Hierarchy dialog box

A hierarchical relationships—as you completed in the three Dimensions, *Months*, *Accounts* and *Regions*—defines a parent-child relationship between Members. Just as we have member siblings that exist on the same level in a Hierarchy under an Aggregate member, we also speak in terms of Child members, which are defined as all Members that make up parent aggregations. It is important to note that a Child member is not necessarily a Detail member. Child members may themselves be parents of other Members within a Hierarchy. For example, in the *Regions* dimension, *North America* is an Aggregate member; but it is also a child of *Total Regions*.

## The Dimension Hierarchy Toolbar

The buttons on the toolbar in the **Dimension Hierarchy** dialog box, and the functions they perform, are as follows:



1. **Create New Member:** Add a new Member (or press Ctrl-Enter to successively add new Members).
2. **Format:** Select formatting option for the corresponding cells.
3. **Member Aliases:** Define and edit Aliases and Alias Groups for the selected Member.
4. **Alias Group:** Add or delete Alias Groups, and assign names for each Member.

5. **Properties:** Assign Members a property for annotation purposes. A Member's properties can be displayed on an Excel worksheet when needed.
6. **Mark Member as Persistent:** Tag a Member as 'persistent' to prevent its data from being overwritten when updates or Cube re-builds occur.
7. **Add Selected as Sibling:** Insert the selection in the Member list on the left into the Hierarchy Definition on the right, below the selected Member.
8. **Add All as Sibling:** Insert all Members in the Member list after the selected Member in the Hierarchy, making them sibling Members.
9. **Add Selected Members as Child:** Insert selected Member(s) in the Member list as children of selected Member in the Hierarchy.
10. **Add All Members as Child:** Insert all Members in the Member list as children of selected Member in the Hierarchy.
11. **Specify Member Weights:** Edit the weight of a child Member (active only when a child Member is selected in the right hand Hierarchy Definition box).
12. **Help:** Accesses the help screen for the Dimension Hierarchy.
13. **OK:** Exits the dialog, with changes made and saved for the Dimension.

The functions listed above are described more fully in the *PowerOLAP User Manual*, though we will now discuss Aggregate weights in order to complete our *QS Database* Dimension set-up.

## Aggregate Weights

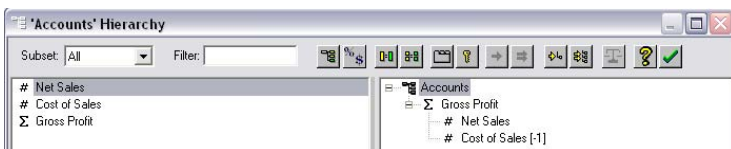



Specify Member Weight

Aggregate weights are used when a Member must be assigned a multiplied value in an aggregation in order for the data to be properly represented. For example, in the *Accounts* hierarchy, *Cost of Sales* should be handled as a negative number in the *Gross Profit* aggregation because it will represent an amount subtracted from *Gross Profit* (i.e.,  $Gross Profit = Net Sales - Cost of Sales$ ). To designate *Cost of Sales* as a negative number in the *Gross Profit* aggregation, we can assign it a weight of “-1”. This means that the data included in *Cost of Sales* will always be multiplied by -1 when it is rolled up in the Hierarchy.

To “weight” *Cost of Sales*, complete the following process:

- Return to '**Accounts**' Hierarchy dialog box (double-click on **Accounts** in the Dimensions dialog), and double-click **Cost of Sales** in the **Hierarchy Definition** box on the right. Note that, to the right of *Cost of Sales*, a box appears where “1” is highlighted and where you can enter a weight for the Member.
- Enter -1 in the box so that it appears as follows:



- Click the **OK** button, , on the toolbar when complete. You are returned to the **Dimension** dialog box.
- Click **OK**. You are returned to the main application window.

In PowerOLAP, the default Aggregate weight is equal to '1'. Thus, a parent Aggregate member is simply the sum of all Child members defined in the Dimension hierarchy. In the example exercise, all Aggregates you defined are standard with the exception of *Gross Profit*, in the *Accounts* dimension. Therefore, you do not need to define Aggregate weights for the remaining Aggregate members.

## Example 4 – OLAP Cubes and Slices



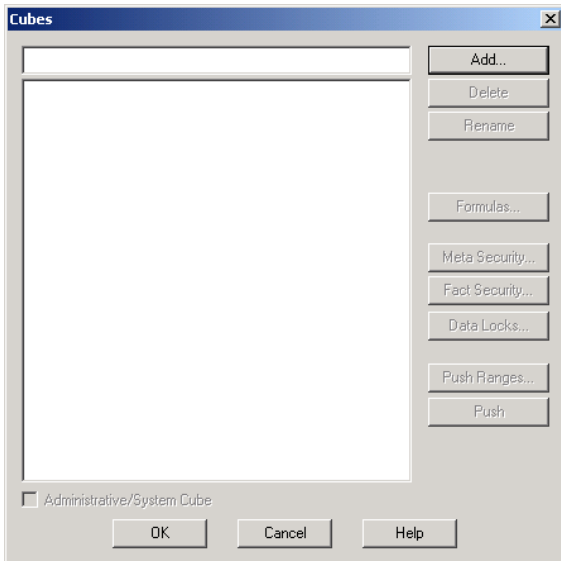
Cubes

### Creating a Cube

Using the Dimensions created in the previous exercises you will now create a PowerOLAP Cube that will store and model your data.

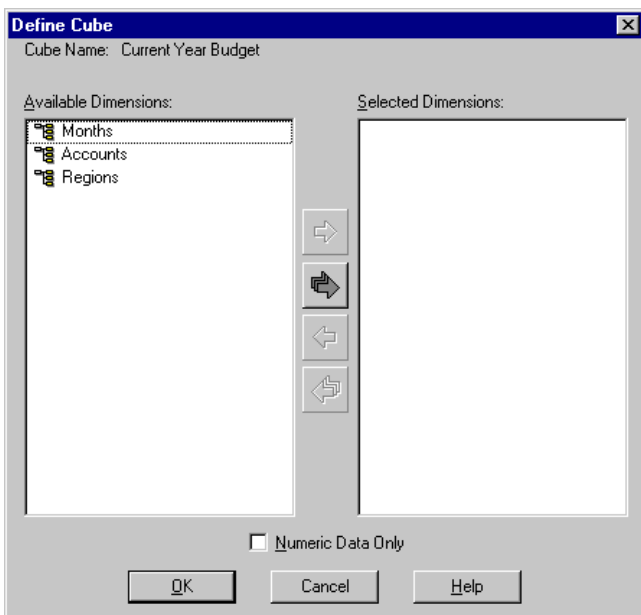
To create a *Current Year Budget* cube:

- From the main application window, select **Model, Cubes**. The **Cubes** dialog box is displayed:



- Type **Current Year Budget** in the **Cubes** dialog box.
- Click **Add**.

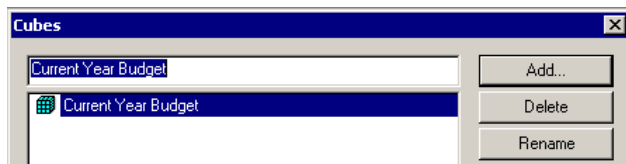
The **Define Cube** dialog box appears, in which you select Dimensions to be used by the Cube:



- Select all of the Dimensions in the **Available Dimensions** list box by clicking the  button.

All three Dimensions are moved to the Selected Dimensions list box on the right.

➔ Click **OK**. Note that the **Current Year Budget** cube is now listed in the **Cubes** dialog box.



All of the **Cubes** dialog's buttons on the right are activated. These buttons control functionality associated with Formulas and setting Security privileges, as well as the OLAP Exchange capability to push data ranges back to a relational database—they are covered in depth in the *PowerOLAP User Manual* and *OLAP Exchange* manual respectively.

➔ Click **OK** to return to the main application window.

The *Current Year Budget* cube is now ready for data input.

## Creating a Slice View



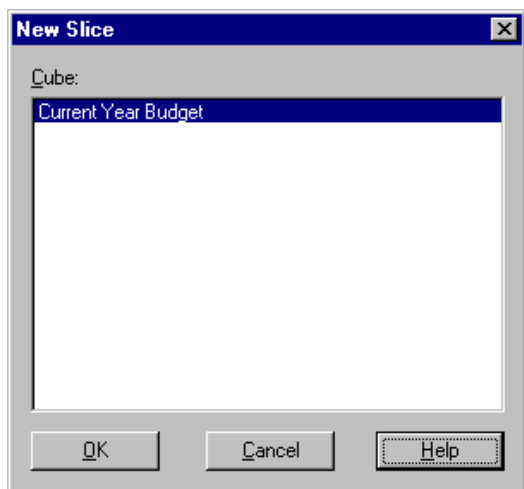
New Slice

PowerOLAP provides a method for looking into a Cube to view and input data. This means of viewing and inputting data is known as “creating a Slice.” A Slice is a two-dimensional view of a Cube that arranges data in a grid, just as a spreadsheet does. You can create Slices “on the fly” to see any view of a Cube, or you can save and re-open Slices for ongoing data viewing or inputting. Finally, as you will see, you can instantaneously create an Excel spreadsheet from

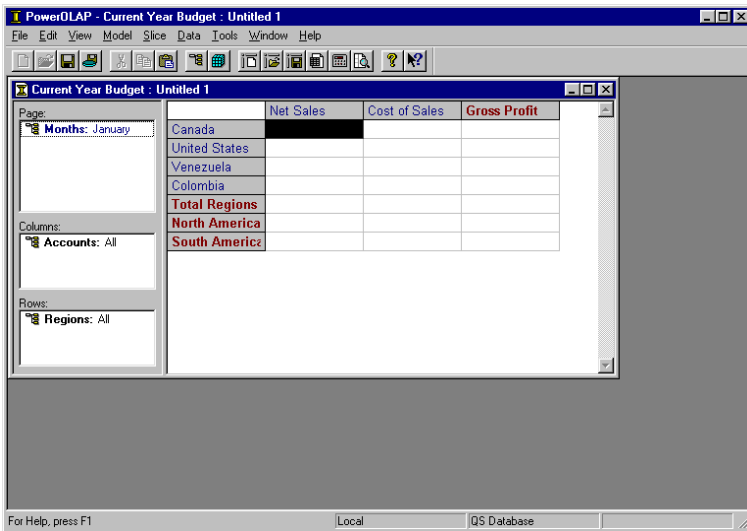
any Slice view.

To create a Slice called *Regions by Account*:

➔ Select **Slice, New**. The following **New Slice** dialog box is opened. The list box displays the names of available Cubes in your database. In our case, we just created the only Cube listed, *Current Year Budget*.

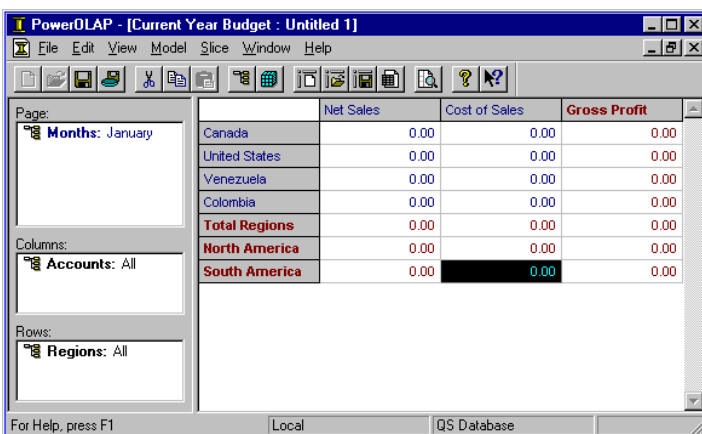


➔ With the **Current Year Budget** cube selected, click **OK**.



The **Slice View** dialog box is opened in the Content Area of the main application window, as in the above diagram. The window displays a **Current Year Budget** slice, as yet untitled, and with no data in the grid.

- ➔ Press **F9**. (This manually recalculates the grid's data, explained further below.) Keep in mind that, as yet, no figures have been entered into the Cube, so you will see zeros as data throughout the Slice.



By default, when PowerOLAP creates a new Slice, it places the last Dimension brought into the Cube when it was created in the Rows position, the next-to-last Dimension in the Columns position, and any remaining Dimension(s) in the Page position. (When we created the Cube in the last exercise, we brought all Dimensions into the Cube at once in the order they were listed.) In the above example Slice, *Accounts* are displayed as columns, *Regions* as rows and *Months* as the *Page* dimension, currently displaying *January*, which is the first Member entered for the *Months* dimension.

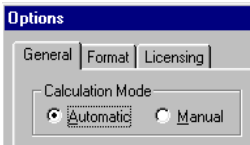


Save  
Slice

- ➔ Select **Slice, Save As** to save the Slice.
- ➔ Type **Regions by Accounts** in the **Slice Name** text box.
- ➔ Click **OK**. You are returned to the Slice—note that both the Cube name, *Current Year Budget*, followed by the Slice name, *Regions by Accounts*, appear in the title bar.

**NOTE:** PowerOLAP's default calculation mode is set to Manual. Thus, when you make changes to a Slice, you will need to Press F9 (or the calculator button on the menu bar) to see those changes reflected in the Slice. You can change the calculation mode to Automatic by selecting **Edit, Options**, and clicking on the **Automatic** radio button in the General tab.

- ➔ Change the calculation mode from **Manual** to **Automatic** on the **Edit** menu under **Options**.



Now you will see changes instantly on screen as they are made throughout the remainder of this manual's exercises.

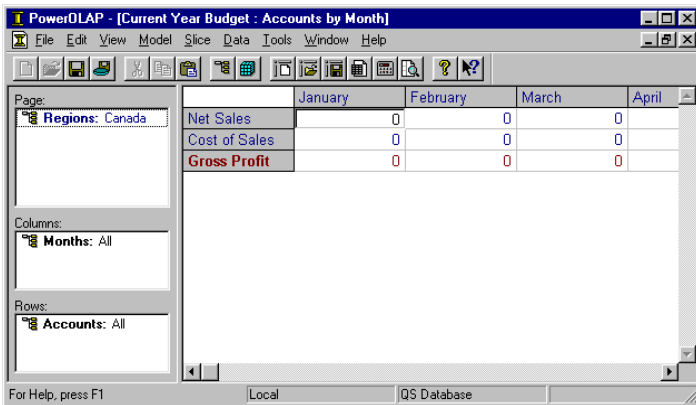
## Arranging Slice Dimensions

To demonstrate how quickly and easily views can be changed, you will now arrange the Dimensions of this Slice to view data with *Accounts* as rows, *Months* as columns and *Regions* displayed as a page. Start by dragging and dropping the Dimension names into the appropriate list boxes:

- Select **Months** in the Page list box and drag it down to the **Columns** list box, below *Accounts*. [Note that a “nested” view is created, assuming you are operating in Automatic calculation mode.]
- Select **Regions** in the **Rows** list box and drag it up to the **Page** list box.
- Select **Accounts** in the Columns list box and drag it down into the **Rows** list box.

By placing *Regions* in the **Page** list box, you display data for a single Member of the *Regions* dimension. The Page member you see when you first arrange a Slice is the Member at the top of that Dimension's member list. In this case, the Slice grid displays the data for all *Accounts* and all *Months* for the *Regions* member *Canada*.

- Select **Slice, Save As** and type **Accounts by Months** in the **Slice Name** text box.
- Click **OK**. You have created and saved a second Slice, *Accounts by Month*:



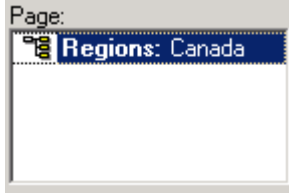


Set  
Page  
Member

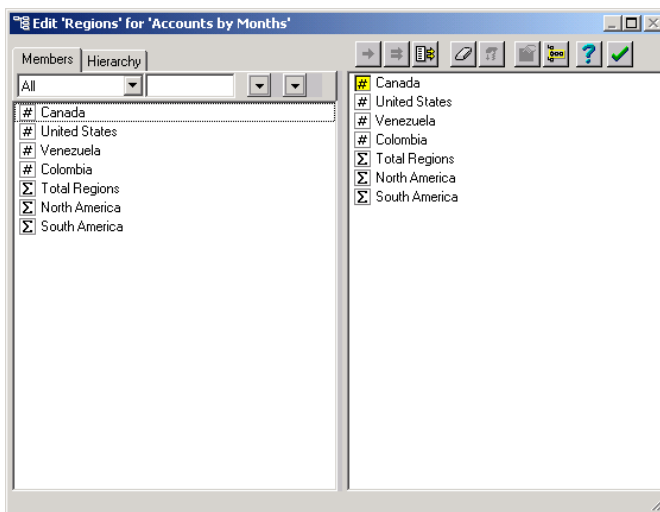
## Selecting Page Members

Currently you are viewing data for *Canada*. To view data for other Members defined in the *Regions* dimension within the *Accounts by Months* slice—e.g., to change the view from *Canada* to *United States*:

- Double click on **Regions: Canada** in the **Page** list box.





The following **Edit Slice** dialog box is displayed (in this example, Edit '*Regions*' for '*Accounts by Months*')



Note that the Detail member icon to the left of *Canada* in the **Slice Content** list box is yellow, indicating that this Member is the currently selected Page member.

You can select any Member in this list box as the Page member to view within the Slice:

- Double-click **United States** in the **Slice Content** list.  
The icon beside it is now yellow. You may also select a Page member by clicking on the Select Page Member icon, , from the menu bar.
- Click the **OK** button, , on the toolbar, to close the dialog and return to the *Accounts by Months* slice.

The current Slice now displays data for *United States*, which is indicated in the Page list box, beside *Regions* (i.e., *Regions: United States*).

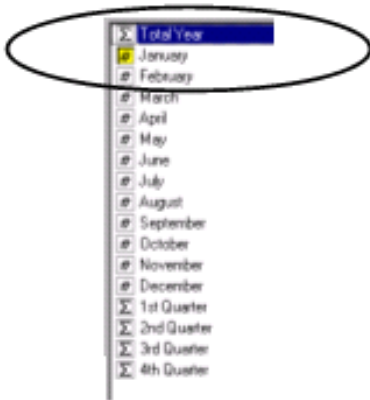
## Changing the Grid Layout

You can change the layout of the Slice grid by moving Members of a Dimension within the **Slice Content** list box:

- Double-click on the **Months** dimension in the **Columns** list box in your current Slice. The **Edit Slice** dialog box is displayed.

Currently, *Total Year* is at the bottom of the **Slice Content** list box, which corresponds to the rightmost column in the grid (you may need to scroll rightward in the grid to see *Total Year*). By dragging and dropping *Total Year* to the top of the list, you can move it to the leftmost column:

- Select **Total Year** from the **Slice Content** list box on the right.
- Drag and drop **Total Year** above **January**, as circled below.



- Click the **OK** button, , on the toolbar.

You are returned to the *Accounts by Months* slice, and *Total Year* is now displayed in the first column of the Slice.

## Entering Data in a Slice

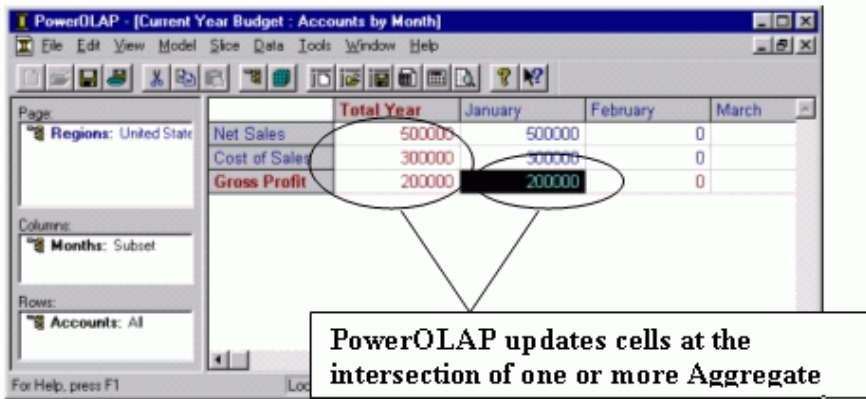
So far, you have demonstrated PowerOLAP's remarkable flexibility in organizing and displaying data within a Slice. Next, you will demonstrate another key function of the Slice: using a Slice to enter data directly into the underlying PowerOLAP database.

Currently, the data in the *Current Year Budget* cube is all zeros because it is a new Cube and data has not yet been entered into it.

To enter data into the *Accounts by Months* slice:

- Click the cursor at the intersection of **January** and **Net Sales**. Type **5000**, then press **Enter**.
- Click the cursor at the intersection of **January** and **Cost of Sales**, Type **3000**, then press **Enter**.

Notice that PowerOLAP has automatically adjusted the values in data cells that occur at the intersection of Aggregate members, reflecting the values entered above.



➤ Try to type **100000** at the intersection of **Total Year** and **Gross Profit**.

PowerOLAP does not allow you to change the values in data cells involving one or more Aggregate members. PowerOLAP will automatically update these cells only when the values in relevant Detail members change.

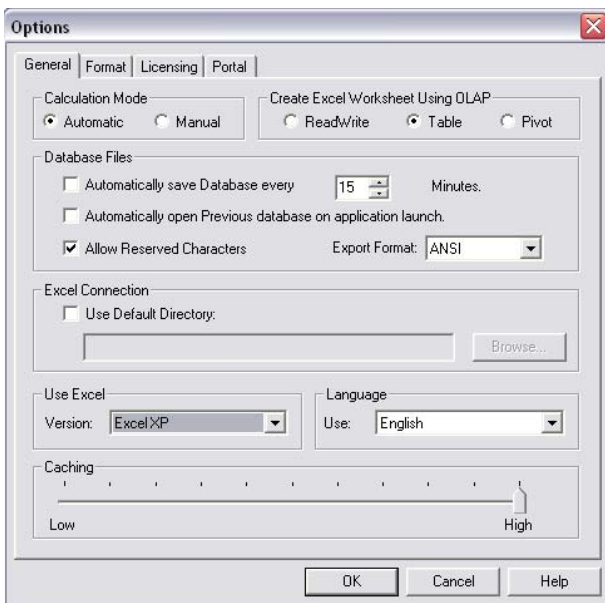
## Settings General & Format Preferences

Before continuing to work with data in a Slice, we will take a look at some preferences, among which are those that affect the look of a Slice.

### General Tab

Selecting the Options command from the Edit menu enables you to set several general database options.

➤ Select **Edit, Options**. The **Options** dialog box is opened, with the **General tab** on current settings.



### Calculation Mode

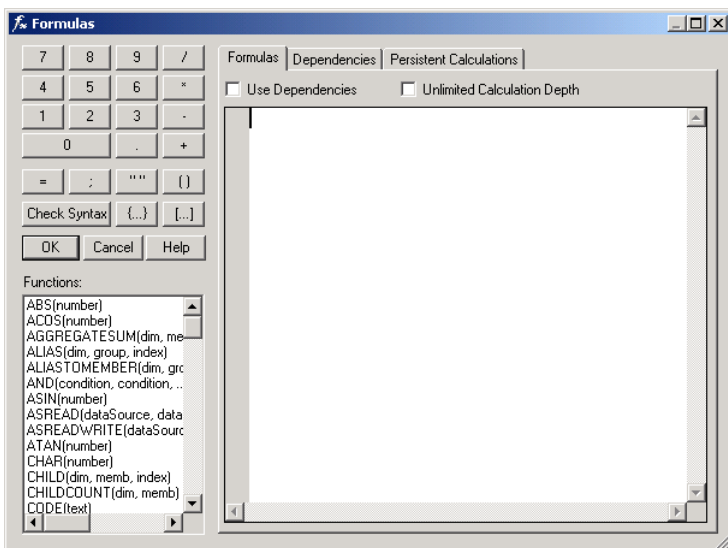
As discussed previously, the radio buttons will allow you to show Slice changes and data entry calculations upon entry (Automatic) or upon pressing F9—similar to your experience with Excel.

## Example 5 – OLAP Cube Formulas


You have seen how creating Dimension hierarchies, and assigning Aggregate weights, results in the natural “summing up” of values. Cube formulas represent a powerful extension of your ability to perform mathematical calculations throughout a PowerOLAP database. With Cube formulas, you can perform all manner of calculations to populate a cell, ranges of cells, even entirely different Cubes.

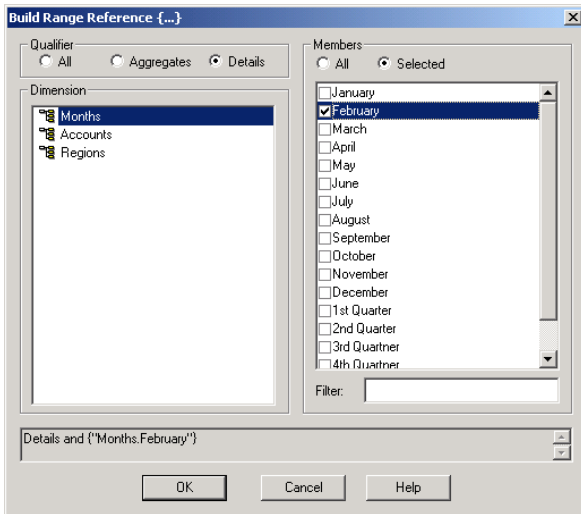
Presently your *Current Year Budget* cube contains data for *January* for all *Accounts* and *Regions*. The following Cube formula will populate the month *February*.

- Select **Model, Cube**. The **Cube** dialog box is opened
- Click on the **Current Year Budget** cube to select it.
- Click on the **Formulas** button. The **Formulas** dialog box is opened:



We will now make use of some buttons in the **Formula** dialog box (also known as the Formula Editor). These buttons will enable us to specify the area of the cube we want to populate with data, and where the data will come from.

- Click on the “squiggly brackets”—  .  
The **Build Range Reference** dialog appears.  
**Months** is selected in this dialog at the top of the **Dimension** list; it is the Dimension we want to work with, so leave as is.
- For the Qualifier (top left), select the radio button **Details**. This indicates that only Detail members are to be calculated by the Cube formula—Aggregate members will be calculated according to the Dimension hierarchy. (Note: it is possible to “overwrite” hierarchy calculations via a Cube formula, a very important feature if you wish to calculate a “what if” or budgeted Aggregate data point, so that it contrasts to actual figures in Detail data points.)
- On the right, select **February** among the Months.  
(The **Selected** radio button is selected, as a consequence.)  
The dialog appears as follows, with the formula as it exists so far, at the bottom:



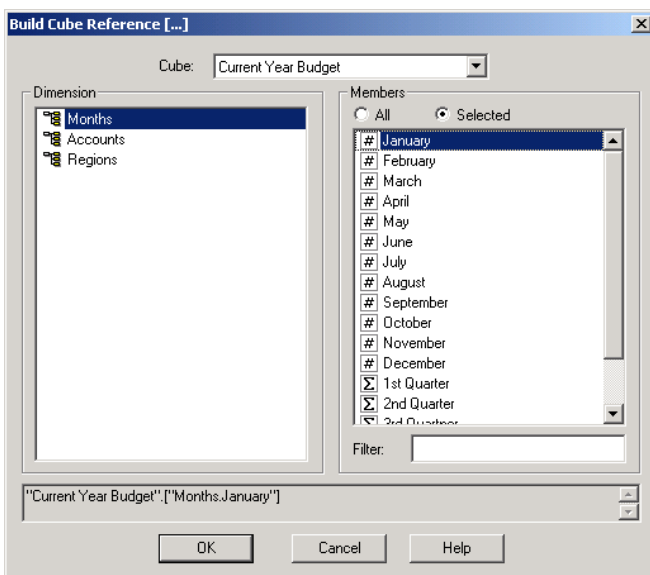
➤ Click **OK**.

➤ Click on the “**equals**” sign in the Formula Editor, **=**.  
The left-hand side of the formula is completed, and is shown in the content area.

**All and** {**Months.February**} =

➤ Next click on the “**square**” brackets — **[...]**.  
The **Build Cube Reference** dialog box appears.  
Again, **Months** is selected; it is the Dimension we want to work with, so leave as is.

➤ Select **January** from the Member list on the right. (The **Selected** radio button is selected, as a consequence.) [Note that at the top of the dialog, there is a Cubes drop-down.] This brings up an important feature—the ability to create cross-cube formulas, which is explained in the *PowerOLAP User Manual*. There is only one Cube in our database, *Current Year Budget*, in the formula we are creating, data will come from this Cube, to populate another area of the same Cube.] The **Build Cube Reference** dialog box appears as follows:



➤ Click **OK**.  
The Formula Editor content area appears as follows (you can hit **Enter** after the “**=**” to show the formula on two lines)”

```
All and {"Months.February"}=
"Current Year Budget". ["Months.January"]
```

- Use the buttons in the Formula Editor — the asterisk (for multiplication), the numbers and the semi-colon — to complete the formula to that it appears like so:

```
All and {"Months.February"}=
"Current Year Budget". ["Months.January"]*1.5;
```

Following is a breakdown of the syntax of the Cube formula:

Left of equal '='	Area of cube to populate
Right of equal '='	Formula
{"Months.February"}	Dimension and Member to populate
"Current Year Budget"	Source cube
["Months.January"]	Range within source cube
1.5	Value (in this case, +50%)
;	Ends formula statement


- Click **OK** to save the formula.  
(If you have mistyped the formula, you will receive a message indicating that there is syntax problem.)  
You are returned to the **Cubes** dialog box.
- Click **OK**.
- Press **F9** in the *Accounts by Month* slice to recalculate values.

Notice that the February column has been populated by the Cube formula defined in the previous steps.

	Total Year	January	February
Net Sales	1250000.00	500000.00	750000.00
Cost of Sales	750000.00	300000.00	450000.00
Gross Profit	500000.00	200000.00	300000.00

The Cube formula has populated February throughout the database  
Further, hierarchy calculations like Gross Profit update automatically.

Next, you will create a Cube formula that calculates a ratio of two Members. You will first need to add a new Member—*Margin %*—to the *Accounts* dimension, and then modify the *Accounts* dimension hierarchy. This Cube formula exercise brings up two important strengths of PowerOLAP, in comparison to static modeling tools, OLAP or otherwise: the capability to create new, “on-the-fly” calculations (which can of course be subsequently saved) for precisely specified (even new) components of a business model, which themselves are *created entirely within PowerOLAP* [i.e., not dependent on any static model of business data].

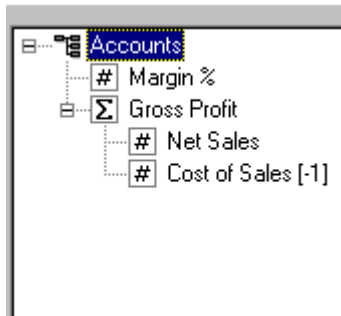
- Select **Model, Dimension**.
- Double click **Accounts** in the **Dimension** list box.  
The '**Accounts**' Hierarchy dialog box is displayed.
- Click on the **Create New Member** button, , on the toolbar.
- Type **Margin %** so that it appears in the **Members** list box.

To modify the *Accounts* dimension hierarchy:

- Expand **Accounts** in the **Hierarchy Definition** box, on the right.

- Select **Margin %** from the **Members** list box and drag it to the **Hierarchy** list box and release it just under **Accounts**.

The completed hierarchy will appear as in the following figure:



- Click the **OK** close the **Dimension Hierarchy** dialog box.
- Click **OK** in the **Dimensions** dialog box.  
*Margin %* now appears as the top row in the *Accounts by Month* slice.

Next, you will define a Cube formula that creates values for the new *Margin %*: the values will be based on a formula that divides *Gross Profit* by *Net Sales*:

- Select **Model, Cube**.
- Double-click the **Current Year Budget** cube.
- Press **Enter** twice in the Content Area to move the previously written formula down two lines. Begin on the top line of the Formula Content area, *i.e.*, *place this formula above the other*.

Priority, which is top-to-bottom in the Formula editor, is very important for determining data calculations—consult the *PowerOLAP User Manual*.

- Using the **Formula Editor** dialog box, create the formula:

**All and {"Accounts.Margin %"}=**  
**"Current Year Budget".["Accounts.Gross Profit"]/**  
**"Current Year Budget".["Accounts.Net Sales"]\*100;**

- Click **OK** to save the formula.  
You are returned to the **Cubes** dialog box.
- Click **OK**.
- Press **F9** to recalculate values in the *Accounts by Month* slice.

	Total Year	January	February
Margin %	40	40	40
Net Sales	1250000	500000	750000
Cost of Sales	750000	300000	450000
Gross Profit	500000	200000	300000

**Margin % values exist for all months based on the Cube**

*Margin %* is now calculated for all *Months* in the *Current Year Budget* cube. The figure above shows the *Margin %* figures for *United States*. You can select other *Regions* members to verify that all members in the *Regions* dimension have been updated as well.

- ➔ Select **File, Save All** to save the data and the Slice (which now includes *Margin %*) to disk.

## Example 6 – OLAP and Excel




Create  
Excel  
Worksheet

### Creating an Excel Worksheet

One of PowerOLAP’s key features is that it enables you to create an Excel worksheet from a PowerOLAP slice. You can then work with data in Excel, utilizing all that product’s features and functions while maintaining a dynamic connection to the PowerOLAP database. This is why PowerOLAP is credited with having a “spreadsheet front end.”

To create an Excel worksheet from the *Accounts by Months* slice:

- ➔ Select **Slice, Worksheet**; or press **F8**; or click on the create worksheet button, , from the menu bar.

PowerOLAP launches Excel (assuming it is not running), displaying the newly created worksheet. A new Excel worksheet appears, as follows:

	A	B	C	D	E	F	G	H	I
1	Database:	C:\Program Files\PowerOLAP\Examples\QS Database.xls							
2	Cube:	Current Year Budget							
3	Page:	Regions	United States						
4		Months	Along Columns						
5		Accounts	Along Rows						
6	OLAPTable								
7		Total Year	January	February	March	April	May	June	July
8	Margin %	40	40	40	0	0	0	0	0
9	Net Sales	1250000	500000	750000	0	0	0	0	0
10	Cost of Sales	750000	300000	450000	0	0	0	0	0
11	Gross Profit	500000	200000	300000	0	0	0	0	0

The first few rows of the worksheet display information indicating the PowerOLAP database; the Cube; the Page Dimension member(s) that the Slice data shows (in the figure above, one Page Dimension, *Regions*, and *United States* is shown); and the Dimensions “Along Rows” and “Along Columns”.

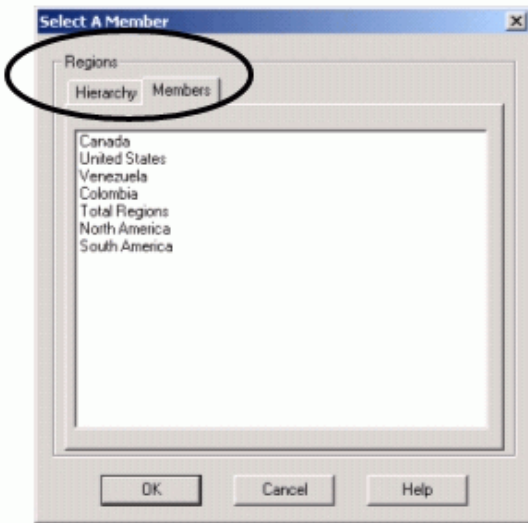
The worksheet can now be saved as an XLS file via Excel’s **Save** command.

### Selecting a Page Member to View in Excel

Change the Page member in Excel as follows:

- ➔ Double-click Page member cell—e.g., cell **C3** (United States).

The **Select a Member** dialog box appears. Note the two tabs (circled): you can find Members based on where they appear in the dimensional hierarchy or in the Member list (this tab is selected below).



- Select **Canada**.
- Click **OK**, and then press **F9** to update the worksheet.

The worksheet now shows data for the new Page Member, *Canada*. You can repeat this means of selection—via the **Select a Member** dialog, which PowerOLAP has made available in Excel—to pick other countries in the *Regions* dimension. [Were this a four-, five-, etc. dimensional Cube, you could pick any number of Page members to view, multiplying your potential sheaf of reports manyfold!]

## Entering Data from within Excel

You can enter data into a PowerOLAP database using an Excel worksheet. This has great applicability in forecasting, planning and budgeting systems that use PowerOLAP. All data entered into a worksheet is automatically updated using one of PowerOLAP's functions (OLAPTable has been shown here), each of which maintains a "bi-directional, dynamic spreadsheet connection" between PowerOLAP and Excel.

To enter data via an Excel worksheet:

- Select a cell at the intersection of Detail members, such as **F7**, which is the cell at the intersection of **April**, **Net Sales**.
- Type **100000**.
- Press **Enter**, and then press **F9** (if Excel is set to Manual calculation) to recalculate the worksheet. The worksheet appears as below:

	A	B	C	D	E	F	G	
1	Database:	C:\Program Files\PowerOLAP\Examples\QS Database.ulp						
2	Cube:	Current Year Budget						
3	Page:	Regions	Canada					
4		Months	Along Columns					
5		Accounts	Along Rows					
6	OLAPTable							
7		Total Year	January	February	March	April	May	
8	Margin %	72.30769	28	28	0	100	0	
9	Net Sales	1625000	250000	375000	0	1000000	0	
10	Cost of Sales	450000	180000	270000	0	0	0	
11	Gross Profit	1175000	70000	105000	0	1000000	0	

Now, to see the dynamic connection *back to* the PowerOLAP cube:

- Return to the PowerOLAP **Accounts by Months** slice (showing **Canada** as the Page Member).

- Press **F9** to update PowerOLAP.  
The Slice appears as follows:

	Total Year	January	February	March	April	May
Margin %	37.93	28.00	28.00	0.00	100.00	0.00
Net Sales	725000.00	250000.00	375000.00	0.00	100000.00	0.00
Cost of Sales	450000.00	180000.00	270000.00	0.00	0.00	0.00
Gross Profit	275000.00	70000.00	105000.00	0.00	100000.00	0.00

The data you entered in the Excel worksheet is now reflected in the PowerOLAP database. Because PowerOLAP’s function connecting to the worksheet (OLAPTable, in this case) is bi-directional, you can enter data in either Excel or PowerOLAP and select **F9** to update. (Note you can not write into Aggregate member spreadsheet cells or cells governed by a Cube formula, just as in a Slice).

The strength and power of the spreadsheet connection to PowerOLAP cubes are central to the use of the product: PowerOLAP “disburdens” Excel of its calculation tasks—hierarchies/ Aggregate weights/formulas are calculated in PowerOLAP’s engine, across specifiable multidimensional data ranges; further, PowerOLAP relieves users/organizations of the difficulties of maintaining hundreds or more linked spreadsheets.

## Defining Cube References

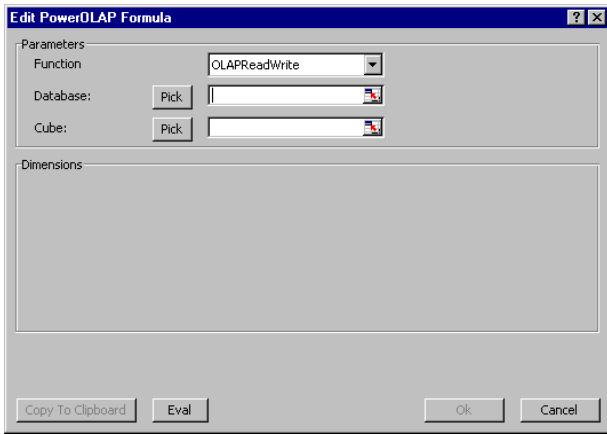
The bi-directional connection shown so far is OLAPTable function (shown in cell A6). In fact, when you click on cell **A6** in the worksheet, you will see in Excel’s formula bar the single formula that references all the worksheet cells that connect to data in the PowerOLAP cube:

**=OLAPTable(\$B\$1,\$B\$2,B5:R5,A6:A9,\$C\$3)**

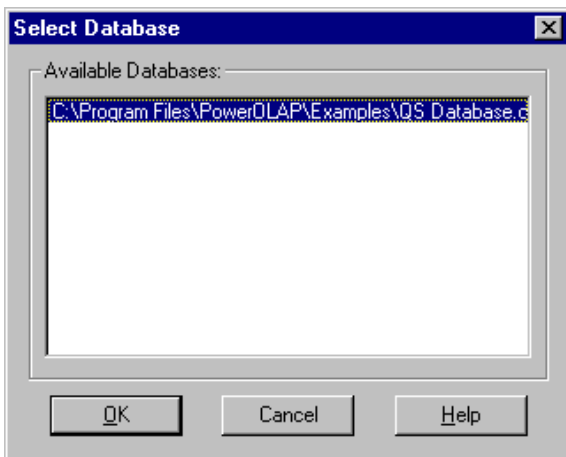
The OLAPTable function is one of many functions you can use to dynamically link data between a worksheet and a PowerOLAP database. (The other PowerOLAP functions for creating a worksheet from a Slice—OLAPReadWrite and OLAPPivot—and their differences, are discussed in the *PowerOLAP User Manual*.)

The next exercise will demonstrate how to define a Cube reference that returns a pertinent value into a cell by using the OLAPRead function.

- Select cell **D13** in Excel in the current worksheet. In this cell, you will define a Cube reference formula that shows the **Gross Profit** for **United States** in **February** (in order to make a quick visual comparison to **Gross Profit** for **Canada**, which appears in cell **D9**).
- From the Excel menu bar, select **PowerOLAP, Edit Formula**. The **Edit PowerOLAP Formula** dialog box is displayed:

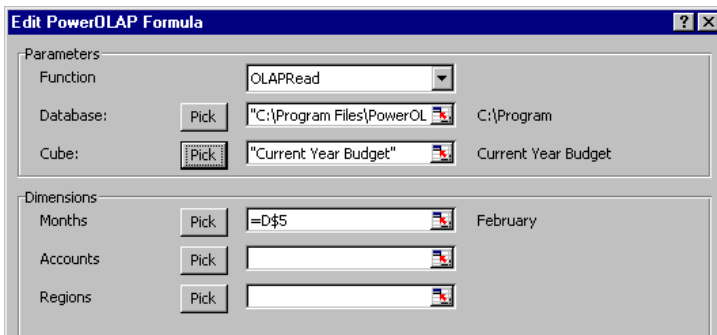


- Select **OLAPRead** from the top drop-down menu (to the right of Function).
- Press the **Pick** button,  (next to Database). The **Select Database** dialog box is displayed, as below:



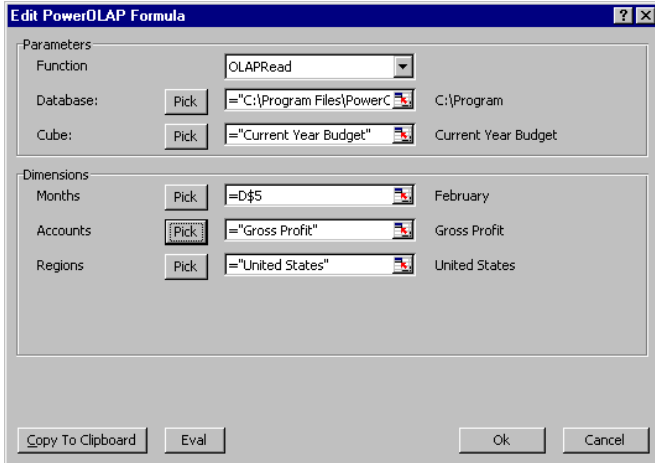
The current database—which contains the value you want—is selected.

- Click **OK**. You are returned to the **Edit PowerOLAP Formula** dialog box.
- Press the **Pick** button,  (to the right of Cube). The **Select Cube** dialog box is displayed. Likewise, this Cube contains the value you want to be reference into the Excel cell, **D13**.
- Click **OK**.  
Again, you are returned to the **Edit PowerOLAP Formula** dialog box. Now you have defined several of the parameters of the Cube reference formula, as shown in this detail of the dialog box:



Note that the Dimensions area now displays text boxes for you to enter choices for the *Months*, *Accounts* and *Regions* dimensions. In fact, *February* has been “pre-selected” for you. If you wanted another *Months* member for your formula, you would press the **Pick** button to make a different selection. Since you do want to select *February* data, continue to the *Accounts* and *Regions* dimensions. Use the **Pick** button and the corresponding **Select A Member** dialog boxes to choose data for **Gross Profit** and **United States**, respectively.

After you have made these choices, the **Edit PowerOLAP Formula** dialog box will look as follows:



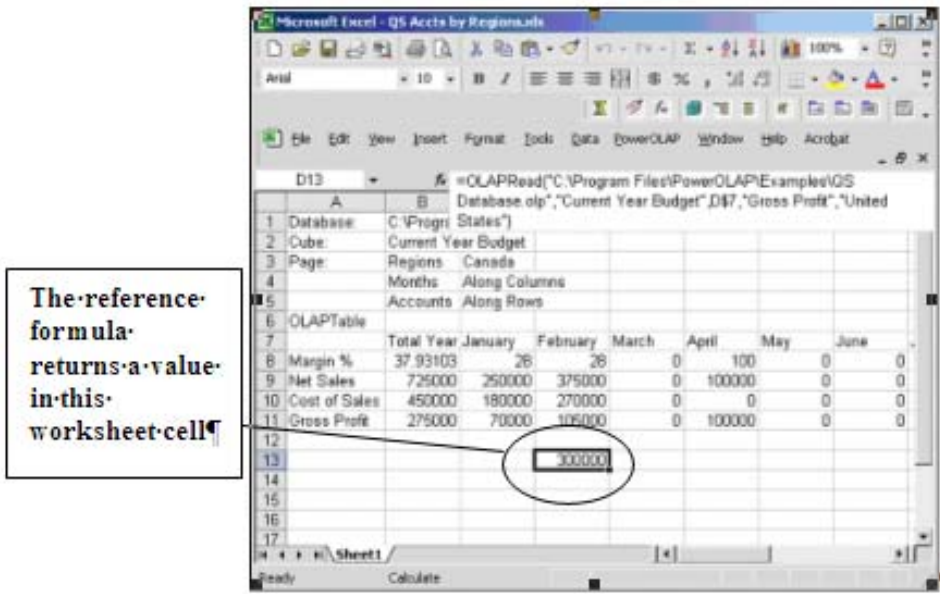
➤ Click **OK** to update Excel with the new formula reference.

Your dynamically connected Excel spreadsheet will appear as in the following figure:

You can save the current database, with changes you have made, from within Excel:

➤ Select **PowerOLAP, Save Current Database in Modeler**.

The PowerOLAP database is saved but not closed.



You now have a ready view of the *February*, *Gross Profit* for *United States* within a dynamically connected spreadsheet that shows figures for *Canada*. Now, whenever *February*, *Gross Profit* for *United States* (or for that matter, *Canada*) changes, it will be reflected in this worksheet.

You can save the current database, with changes you have made, from within Excel:

➤ Select **PowerOLAP, Save Current Database in Modeler**.

The PowerOLAP database is saved but not closed.

## Closing a Database

The Close Database command located on the File menu in PowerOLAP closes an open database. When you have completed work within one database, you may still wish to work with another database. You must first close the currently open database before opening another database.

To close an open database:

➤ Select **File, Close Database**.

If any Slices are open, PowerOLAP will prompt you to save Slices.

- Clicking **Yes** will save all database changes to disk and close the database file. Clicking **No** will close the database file without saving any changes made to the database. In either case, all open Slices will be closed along with the database.

As noted earlier, you can save and close any dynamically connected worksheet as a normal XLS file. Upon opening such a worksheet, when you press **F9**, PowerOLAP launches, and a spreadsheet system with OLAP cubes behind it, is ready for online, optimized planning / analysis / reporting.

## Summary of Quick Start Exercises

In the preceding examples you very quickly learned important basic concepts and fundamental functions of PowerOLAP, including:

- Creating a PowerOLAP database, the first step in building a Cube to model multidimensional data.
- Creating Dimensions, adding Members to those Dimensions, establishing a Hierarchy among Members (whether Detail or Aggregate), and assigning an Aggregate Weight to a Child member.
- Creating a Cube from Dimensions and their respective Members.
- Creating a Slice, arranging Slice dimensions, selecting Page members to view, and changing the layout of the grid within a Slice.
- Setting general and formatting preferences from the Edit, Options Menu.
- Entering data in a Slice, and seeing how PowerOLAP automatically recalculates Aggregate members to reflect changes in value. Then, saving those changes to a database.
- Creating Cube formulas.
- Creating a fully functional Excel worksheet from a Slice, and defining database reference formulas.
- Saving changes made from within Excel into the PowerOLAP modeler, and closing the PowerOLAP database, knowing that you can reopen it from a normal Excel worksheet.

Now that you have grasped the concepts and demonstrated these many functions, you are well prepared to use PowerOLAP in a production environment. For more detailed instruction on using PowerOLAP, and to learn additional features, see the *PowerOLAP User Manual* or email us at [info@olap.com](mailto:info@olap.com).