

SEMINAR ON “EXCEL AS AUDIT TOOL”

Organised by I.T. Committee, ICAI

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Working better with Excel

1 Basics

1.1 Right click menus

Using the 'Right click' to select the menu is the fastest way to work with a spreadsheet. This approach is not confined to just Excel but to all office products. The right click always brings up context sensitive menus. Thus choice is narrowed to the possible actions that can be applied to the object. You will observe that navigating to different sections of the worksheet and using the right click always brings up different menus that are relevant to your current selection.

1.2 Navigation / key actions

Use short cut navigation keys to move around the worksheet quickly. The functionalities of the keys are given below:

Keys	Action
Ctrl + {arrow} or [End], {arrow}	Cursor will move to the last entry in the direction of the arrow key
Ctrl + Home	Select cell A1
Ctrl + End	Selects bottom right of the worksheet
Ctrl + c	Copy
Ctrl + X	Cut
Ctrl + p	Paste
Ctrl + s	Save
Ctrl + W	Close sheet
Ctrl + o	File open
Ctrl + p	Print

1.3 New in XP

1.3.1 Task Pane

This is new feature of XP which is quite handy. The task pane contains the possible actions relevant to the context. In earlier versions of Excel this was handled by dialog boxes. A dialog box has to be closed before you can resume the work. The task pane on the contrary can be invoked when required and does not obstruct work. It can also be closed when not required.

If the Task Pane is not visible, Click View->Task Pane to display. Click 'x' on the Task Pane to close. Reposition the task pane by dragging it.

1.3.2 Smart Tags

The Smart Tags appear whenever you complete an action. It presents options that can be applied to that action. The list displayed consists of relevant options. For e.g. after you copy and paste, the Smart Tag displays the following options:

- Keep source formatting
- Match destination formatting
- Values and number formatting
- Keep source column width
- Formatting only

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- Link cells

The choices above are obvious. Smart Tags make it easy for us to extend the work. In effect this gives another option to modify the action.

1.3.3 Function arguments

Whenever a function is to be used, as soon as you type the function, the function arguments are displayed automatically. The earlier version displayed the function argument only when we called for this by typing 'Ctrl+Shift+A'. While this was a help, the down side was that the function arguments were typed in the formula bar and each of the argument had to be replaced with value. XP just displays the function argument separately without actually getting in the way.

1.4 Customizing the Toolbar

The tool bar on view can be customized by adding new buttons to it. A new toolbar can also be created. You can also load the necessary toolbars by calling the tool bars. From the View menu, click on Toolbars and select the tool bars required.

Steps in customizing

1.4.1 Displaying new toolbars

In the View menu, choose Toolbar and customize. The dialog box shows the option with Toolbar. The first tab marked Toolbars lists all the available toolbars. Click on the toolbars you want to use. These are immediately loaded. Move the toolbars around by clicking at the left extreme. Once you drag it into the menu area, they will automatically align.

1.4.2 Adding new buttons to tool bars

The second tab marked as Commands gives the list of buttons and action settings. Whatever buttons are required, drag them over to the menu or within a toolbar and drop them there. They become part of the toolbar for future use. In some cases there are no buttons associated with a menu like 'Save Workspace'. If this is included in the menu, the entire text is displayed as part of the menu. A few of these commands will occupy sizeable space. It is possible to substitute a button instead of the text. Once the 'Save Workspace' is placed in the toolbar, right click on the newly added button to display the associated menu. In the name box the name 'Save &Workspace' is shown. It can be substituted with any text. The Character next to the '&' will be underlined in the menu and the button can be called through the key board short cut by typing that letter with ALT key held down. Click on the Change button image to give a button face to the menu and choose 'Text Only' (in menus) to eliminate the text description and show only the buttons. Click Close. You will notice that the new button is included in the toolbar and once you take your mouse over the button, the description is displayed.

1.4.3 Adding new tool bars

From the View, Toolbar and Customize, click on new to create a new tool bar. Give this an appropriate name and as described above, proceed to place it in the menu and add button to it.

1.5 File handling

Excel offers number of file handling possibilities. Here we will review some of the features:

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1.5.1 File open

Open not only Excel files but files of other popular spreadsheet applications also. The list of type of files that Excel will open will appear when you click the 'File of type' list in the file open dialogue. If the file format clearly defines the field positions, Excel will immediately open the file.

1.5.2 Opening text files

In the case of text file where this is not so, Excel will guide you through a 'Text Import Wizard'. Select the text file you want to open. You can start by select specifying the type of file in the 'File Name' drop down. The following are the steps involved:

1.5.2.1 Step 1 of 3

Specify if the file type is Delimited or Fixed width. Delimited type is where the fields are separated through a field marker. Select fixed width if no specific delimiters have been used. It is common practice to specify a character like 'Tab', ':",';' as field separators. These characters will be added at the end of each field to mark the end of the field content.

1.5.2.2 Step 2 of 3

The screen displayed will be depending upon the selection in earlier screen. If the file type is delimited, then the list of field markers will be displayed. Click the appropriate field marker and Excel will automatically cut fields at the location of field markers. If the file type is fixed width, then Excel will allow you to specify the field width. Simply click in the data preview window and the field will be cut at that point. The click acts as a toggle. To remove the field cut, click again on that. You can also click the line where a field is being cut and move it to a required location. Browse through the data and mark fields where required.

1.5.2.3 Step 3 of 3

This lets you select the format applicable for the columns. You can also mark the columns as to be skipped. These will not be imported.

Once you click Finish, the data will be converted to Excel format.

Work

Try opening the text files 'Employee.txt' and 'Invoice.txt'. 'Employee.txt' does not contain a field delimiter and 'Invoice.txt' is a tab delimited file.

1.5.3 File search

Use this facility to search for files by specifying multiple criteria. When you are in the File Open dialogue, click Tools and select 'Search'. Excel will display a dialog with tabs as 'Basic' and 'Advanced'. Use the Basic to find file name containing specific characters. Specify the file name in the 'Search text' box. To search for all Excel files you can type '*.xls' and the system will display all files with 'xls' extensions. Specify the location in the 'Search in' drop down. This determines the directories which will be searched.

The 'Advanced' option helps us to locate the file based on file contents and file properties. When you click 'Advanced' tab you find that the 'Text of property' as the default selection in the 'Property' drop down. In case you wish to search for files containing specific text such as 'Budget for Feb 2003', then enter the text. The search will list all files containing this text. You can also search based on the other criteria in the 'property' drop down.

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1.5.4 Workspace

There may be a situation in which multiple files have to be opened together. This requirement depends on the values being shared across multiple files. By saving the related files as a workspace, you can open all the files together by just opening the workspace. To achieve this first open all the related files and ensure that only the required files are opened and other unrelated files have been closed. Click File → Save Workspace and in the dialogue specify the name and location. If you want to open all the related files together click File → Open and in the type of files list choose workspaces. Excel will list all available workspace definitions. Select the workspace to open.

1.5.5 Files based on templates

Templates are files, which have certain definitions and formatting. Typical example will be an invoice layout file. Whenever you wish to print an invoice you may want the new file to be created to be based on a template. To attach a file to a template while creating a new file click File → New, a dialogue will appear. The general tab will display the templates you have defined. Choose the applicable template. The file loaded will be similar to the template file.

1.6 Cell referencing

There are two types of cell referencing:

- Relative
- Absolute

1.6.1 Relative reference

The relative referencing is fundamental to Excel and without which the worksheet will be unworkable. We refer to the cell by using Column and row co-ordinates. Letters A, B, C, ... IV are used to denote the 256 columns and numbers 1 to 65536 are used to denote the rows. In a typical formula whenever we want to refer to the cell contents we use the cell address as a combination of column and row reference to point to a cell. Let us assume that a formula is entered in cell F10 as '=A10'. If this formula is copied to other columns the column reference is adjusted. If the formula is copied to cell H10, the formula will now read as '=C10'. The column reference A has been substituted with C. Similarly if the formula is copied down then the reference will be adjusted for rows. If the formula from F10 is copied to F15 then the new formula in cell F15 will read '=A15'. If the formula is copied both across and down, then the both column and row references will be adjusted suitably. For e.g. If the formula in cell F10 is copied to cell H15, the new formula in cell H15 will read as '=C15'.

1.6.2 Absolute reference

In the case of absolute reference, the references to the original row and/or column references do not change and always point to original row/column reference. Whenever a '\$' sign is added to the column/row reference, the reference is made absolute. For e.g. in cell F10 if we have a formula as '=\$A\$10', there will be no change in the formula if we copy this to cell H15. The new formula in cell H15 will still read as '=\$A\$10' as the references have been frozen. There are three possibilities here:

- Both row and column references are absolute (\$A\$10)
- Only column reference is absolute and row reference will vary (\$A10)
- Only the row reference is absolute and column reference will vary (A\$10)

If the cell F10 contains a formula as \$A10, if it is copied to other columns, the column reference will point to A only. However the row reference will change relatively. Similarly if the formula is

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'=A\$10, then the row reference will always be 10, but the column reference will change relatively.

1.6.3 Using names

The complexity is using cell references especially where we have to use a combination of row and column absolute reference can be easily overcome by using names. Range names will automatically use relative or absolute reference according to the context.

1.7 Range Names

1.7.1 What are Range Names

Range names are a very important idea within Excel. A single cell or a group of cells can be defined as a name and referred to by that name within that worksheet, workbook and also across workbooks. Broadly a range name can be classified into two categories:

- Name defined for a single cell
- Name defined for a group of cells

While name given to a single cell can be compared to a variable defined within a program, a range name containing a group of cells can be compared to a 'mini database'. These also lend themselves to be exploited by most of the functions within Excel. It is perfectly possible to work without any range names, but this could become cumbersome when a worksheet gets sizeable and contains a number of formulas.

The list of names defined could be found by clicking on the name box at the left of the formula bar. You can also use the Go To command by using F5 key and enter the name to go the name area.

1.7.2 How to define Range Names

Select a single cell or a range of cells for which a name is to be assigned. Then from the Insert menu, select Names and Define. In the dialog box enter the name for the range. The insert name dialog box displays the existing names defined. Enter the name and click on Add button. Note that this refers to the box pointing to the cell or range of cells from where you called the Insert Name command and also that the reference is absolute. This means that the name is not dependent on the cursor position and will always refer to the particular location. However by allowing the reference to be relative we can define ranges which are dynamic and the area selected will be dependent on the position of the cursor. We will review the use of dynamic ranges in conjunction with OFFSET function.

1.7.3 Why use Range Names

1.7.3.1 Readability

The worksheets become readable. It is always easier to understand a formula, Production * Rate rather than B6*D5.

1.7.3.2 Range names are intelligent

Range names have the ability to apply the names as a variable according to the context. Let us assume that you have given a range name 'Production' to quantity of production from Year 1 through Year 5. (E.g. C in worksheet) The value is to be derived by multiplying these values by a single rate what we will define as SaleRate. When we apply the formula Production * SaleRate

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for the first year and copy it across the years 2 through 5, the formula remains the same but the value is correctly arrived at. When it comes to the second year, the second element within the range production has correctly been used.

The same principle is also at work when we perform additions of elements within a range name. (E.g. B in worksheet). Here East, West, North and South are range names. Each of these names contains a column of value and when addition is performed, the right element within the name is applied. If we try to add say East + West in a location like J31, Value error will be returned, as the correct context is not available to the function.

1.7.3.3 Useful within functions

When functions are used within Excel, the range names will become the standard way. The functions can become a little complicated and use of names is necessary to easily understand the model we are building. We can also capitalise on the ability of the names to convert them in to absolute or relative reference depending on the context.

1.7.4 Type of Range Names

Range names can be either global or local

1.7.4.1 Global Names

Names as default will be global. This means that the names declared from within any worksheet are available to the whole of the workbook.

1.7.4.2 Local names

Names can also be declared specifically for the sheet. In such cases the names will not be available outside that sheet unless also used with the sheet prefix. While defining a name just prefix the name with the sheet name. E.g. If you want to define cell A15 within sheet Sum as a local name 'Approach2' then the name will be defined as 'Sum!Approach2'. The name Approach2 will be available only to sheet Sum. It can be referred to from other sheets as 'Sum!Approach2'

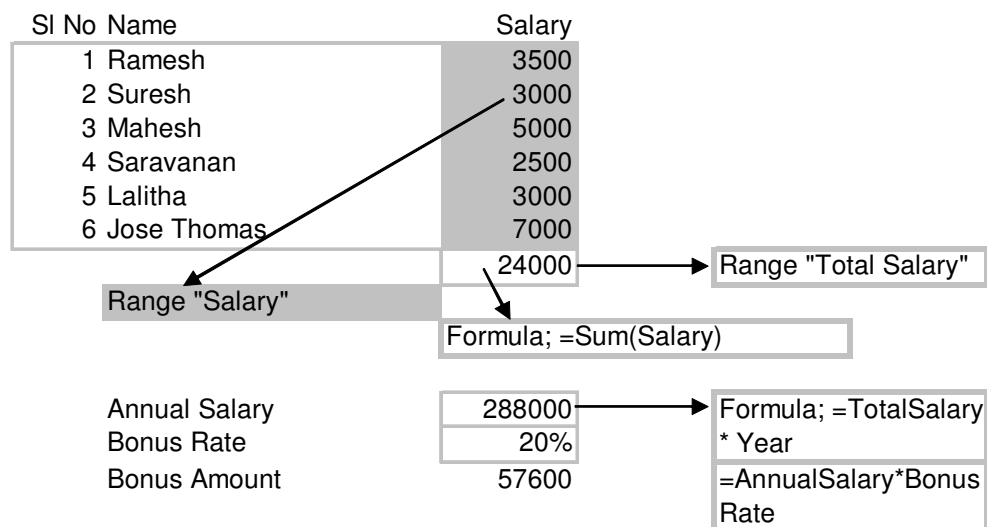
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Examples of range name in use

Simple naming of variables



A	B	C	D	E	F	G
22						
23		Range Names in use in multiplication				
24			Year 1	Year 2	Year 3	Year 4
25		Production (in units)	500	600	700	800
26		Rate	50			
27		Total value	25000	30000	35000	40000

Range "Production" points to the Production (in units) row.

Range "SaleRate" points to the Rate row.

Formula: =Production*SaleRate

Work

Open 'Basics.xls' and select 'RangeName' tab. Click the name box drop down and select 'ExA', 'ExBC' or 'ExD' to view some names in use.

1.8 Formatting

Excel offers a number of different formatting options for us. Formatting can be defined as the action applied on the underlying cell value to display it in a specific manner on the screen. Even after the formatting the underlying value remains unchanged. Excel allows some advanced formatting options where it is possible to display a numeric value as text or as combination of the numeric value and text. Always take note of only the underlying value and not the value displayed as only the underlying value is used in all calculations. Let us see some of the simple formatting options

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1.8.1 Number

The options under the Number tab in format cells dialog give us a choice of simple formatting such as number, date, text, percentage etc. Once you select the type of format a sample of the display is also shown.

1.8.2 Alignment

This offers choices on how the text will be justified. In this 'Wrap text' allow us to fold the text in the cell so that lengthy column headers can be folded and displayed in the same cell instead of breaking these down over a few cells. The 'Merge cells' allow us to merge multiple cells in to one. Excel then uses the top/left cell's reference with the merged cell in all calculations.

1.8.3 Custom formatting

Under the Number tab we also find a custom format option. Using this it is possible to look at the type of data in the cell and apply a specific format according to the type. We can enter up to four specific format options for positive, negative, zero and text values. These formats have to be separated by a semi colon. The linked Excel file gives an illustration of these techniques.

1.8.4 Conditional formatting

The format options above allow us to present the underlying cell value the way we want. This includes displaying a numeric value denoting Rupees as 'Rs.5000'. The value in the cell is only 5000. The conditional format on the other hand display the underlying value as it is but allows us to display it in different format and background colour. The objective is to identify critical data in our worksheet and this facilitates review easier. Whenever we want to set alerts we can resort to conditional formatting as this will display the data in specific formatting style so that it catches our attention.

Click 'Format' in the menu and choose 'Conditional formatting'. This allows us to use up to three conditions.

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Example of formatting

Using wrap text

Particulars	Op WDV	Additions	Sales	CI WDV	Depreciation		Depreciation	Net value	Net Value
of assets		for the			upto PY		for CY	CY	PY
		year							

Headers written in multiple cells

Particulars of assets	Op WDV	Additions for the year	Sales	CI WDV	Depreciation upto PY		Depreciation upto CY	Net value CY	Net Value PY
-----------------------	--------	------------------------	-------	--------	----------------------	--	----------------------	--------------	--------------

Headers written in single cell

Custom format

	Value entered	Value after formatting	Format text
Text formatting	1500	USD 1500	"USD" 0
Scaling numbers	125123456	125,123	#,##0,
Vaidation	123	123.00	0.00;"Positive only!"
	-123	Positive only!	0.00;"Positive only!"
	0	0.00	0.00;"Positive only!"
	123	123.00	[Blue]0.00;[Red](0.00);[Blue]-0-;[Yellow]General
Multiple formatting	-123	(123.00)	[Green]0.00;[Red](0.00);[Blue]-0-;[Yellow]General
	0	-0-	[Green]0.00;[Red](0.00);[Black]-0-;[Yellow]General
	Text	Text	[Green]0.00;[Red](0.00);[Blue]-0-;[Magenta]General
Telephone numbers	448254060	(44)-825 4060	(###)-### ####
	431704547	(431)-704547	(###)-#####

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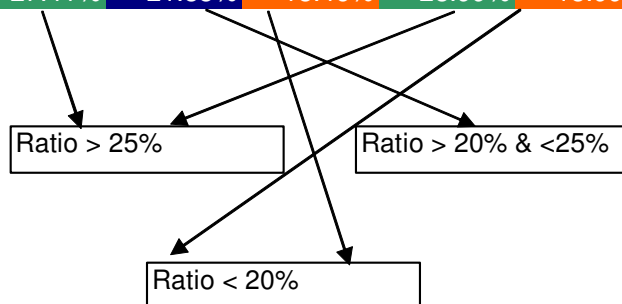
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Example of conditional formatting

Summarised Income and expenditure

Income	35300	36100	29800	33800	39500
Expenditure	25625	28200	24300	24000	32000
Operating profit	9675	7900	5500	9800	7500
Ratio	27.41%	21.88%	18.46%	28.99%	18.99%



Work

Open the 'Basics.xls' file and select 'Formatting' tab. Click the name box drop down and select 'ExA', 'ExB', 'ExC' and 'ExD' to view different formatting options.

1.9 Cut, Copy and Paste

1.9.1 Fast copy

These are commonly used facilities within Excel. Let's review some of the useful facilities. While copying a formula use the 'Fill handle' to quickly copy to multiple rows. As you move your mouse to the bottom right of the cell over the dark square, the cursor shape changes to that of the crosshair. This is the fill handle. Drag the fill handle in the direction in which you wish to copy the formulas. Alternatively, double click the fill handle and Excel will respond by copying the formulas all the way down. The number of rows to which the data will be copied will depend on the data content in the column to the left of the cell being copied. If the column to the left contains data for 100 rows, the formula will also be copied for 100 rows.

1.9.2 Links to other office module

The paste special option allows a number of options to copy by maintaining the link to the source module. Let us say that you wish to copy the contents of the Excel sheet into a Word document and you wish to update the Word document whenever changes are made to the sheet in Excel, this can be accomplished using the paste special. Copy the content from Excel sheet and after selecting Word, click Edit in menu and choose Paste special. The dialog displays two options Paste or Paste line. Choose Paste line and choose the type for display. All of these options will maintain the link to the source data and whenever source data changes you have the option to update the target file. Whenever you open the target file, the data will be updated for the latest data in the source file.

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2 Functions

Functions can be defined as Excel program returning a value of specific type. Most functions accept arguments which are use in its calculation. The argument list can contain absolute values or references to cells containing values.

To view the examples under functions open 'Functions.xls'. The workbook contains various sheets for the functions covered. Click the appropriate tab to view examples.

2.1 Sum

Function which aggregates a set of values contained within the argument list. The argument can also include multiple cell lists separated by commas.

2.2 Round Functions

Round function round off the digits to the number of digit specified in the function argument. Use of this function is often necessary to avoid certain apparent 'mistakes' appearing in the total. The variants of Round are RoundUp and RoundDown function, which perform as the name implies. Round is natural function and rounding off to higher or lower depending on the digit value.

The round functions round off the value to the nearest digits when the second argument, the number of digits is positive. When this number if negative, the round functions round off to the nearest tens and hundreds. '-1' will cause the round off function to round off to the nearest tens and -2 will cause the round off function to round off to the nearest hundred.

Round function in use						
A	B	C	D	E	F	G
3	<u>Using Round function</u>					
4						
5	Details of Other Expenses					
6						
7	Printing and stationery	4400.4	4400	4400		
8	Postage and telephone	9200.4	9200	9200		
9						
10	Total	13600.8	13601	13600		
11						
12						
13						
14						

The diagram illustrates the application of the ROUND function in an Excel spreadsheet. It shows a table with columns A through G and rows 3 through 14. The table contains data for expenses and their totals. The ROUND function is used to round the total value in cell D7 (13600.8) to the nearest integer (13600) in cell F10. The formula in F10 is =ROUND(D7,0). The SUM function is used to calculate the total of the expenses in column E (SUM(E7:E8) in cell E10) and the total of the expenses in column F (SUM(F7:F8) in cell F10). The formula in E10 is =SUM(E7:E8) and the formula in F10 is =SUM(F7:F8). The diagram shows arrows indicating the flow of data and formulas: D7 points to F7 (containing =D7), E7 and F7 point to E10 (containing =SUM(E7:E8)), F7 and F8 point to F10 (containing =SUM(F7:F8)), and D7 points to F10 (containing =ROUND(D7,0)).

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2.3 Average

The average function calculates the average value of the list of values given as arguments. The syntax is

=AVERAGE (number1, [number1], ...)

Example of average function

A	B	C	D	E	F	G	H
	Date	Units generated	Average of units generated for each month				
3							
4	01-Jan-99	500					
5	02-Jan-99	973					
6	03-Jan-99	934					
7	04-Jan-99	354					
8	05-Jan-99	554					
9	06-Jan-99	693					
10	07-Jan-99	100					
11	08-Jan-99	250					
12	09-Jan-99	527					
13	10-Jan-99	565					
14	11-Jan-99	335					
15	12-Jan-99	956					
16	13-Jan-99	381					
17	14-Jan-99	952					
18	15-Jan-99	366					
19	16-Jan-99	365					
20	17-Jan-99	627					
21	18-Jan-99	383					
22	19-Jan-99	27					
23	20-Jan-99	400					
24	21-Jan-99	761					
25	22-Jan-99	556					
26	23-Jan-99	487					
27	24-Jan-99	918					
28	25-Jan-99	721					
29	26-Jan-99	947					
30	27-Jan-99	784					
31	28-Jan-99	339					
32	29-Jan-99	239					
33	30-Jan-99	443					
34	31-Jan-99	75					

Jan	533
Feb	509
March	468

=ROUND(AVERAGE(C4:C34),0)

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2.4 Date Functions

Excel supports several date and related functions and few of which are given below:

Function Syntax	Explanation
=DATE(year, month, day)	Accepts year, month and date as arguments and returns date value
=YEAR(serial_number)	Returns the year of a date value.
=MONTH(serial_number)	Returns the month of date value.
=DAY(serial_number)	Returns the day of the month

With Date functions, it is possible to calculate the difference between two date values. The Year, Month and Day functions accept serial number of the date as argument. Remember that the date value is actually a number formatted as date. The value 1 corresponds to the first date of 1900.

2.4.1 Now

The Now function returns the current date with time

2.4.2 Today

The Today function returns the current date

2.4.3 EOMONTH (current_date, months)

This function returns the month end date. The calculation is based on the current date which is the first argument. The second argument specifies the number of months to be offset from the month of the current date. EOMONTH (1/1/2003, 0) will return 31-01-2003. If the month is changed to 1 the month end date of the next month is returned.

Example of Date functions

Simple date entry

20-Jan-03 01-Jan-03
21-Jan-03
22-Jan-03
23-Jan-03

1/20/2003

=DATE(2003,1,1)

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A	B	C	D	E	F	G	H	I
10	<u>Related Date functions</u>							
11								
12	20-Jan-03		Day of date		20		=DAY(B15)	
13	21-Jan-03							
14	22-Jan-03		Month of date		1		=MONTH(B17)	
15	23-Jan-03							
16	24-Jan-03		Year of date		2003		=YEAR(B19)	
17	25-Jan-03							
18	26-Jan-03							
19								
20	Due date				31-Jan-03			
21	Current date				15-Jan-03			
22								
23	No of days remaining				16		=F23-F24	

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2.5 Character Functions

There are a number of useful character functions by which we can put together character strings in different cells and also split the strings. The character functions are described below:

=CONCATENATE(text1 , [text2], ...)	This function 'adds' the values found in the argument list together
=LEFT(text, [num of chars])	In a given string, number of characters from left of string
=RIGHT(text, [num of chars])	In a given string, number of characters from right of string
=Mid(text, start num, , num of chars)	In a given string, anchors at the character specified as the start number and displays the next number of characters in the string.

Instead of using the concatenate function, the '&' can also be used to add strings together. For E.g. '=A1&B1&C1' would put together the values in cells A1, B1 and C1.

Example of Character Functions

A	B	C	D	E	F	G	H
4	This is	a	sample	text		This is a sample text	
5						This is a sample text	
6							
7	There	are		5 boxes		There are 5 boxes	
8							
9							
10	Length of the first string						
11	Left 5 characters						
12	Right 5 characters						
13							
14							
15							
16	5 Character starting from 6th position						

Formulas and Results:

- `=CONCATENATE(B4, " ", C4, " ", D4, " ", E4)` → F4: This is a sample text
- `=B4&" "&C4&" "&D4&" "&E4` → F4: This is a sample text
- `=LEFT(G4, 5)` → F11: This
- `=RIGHT(G4, 5)` → F12: text
- `=LEN(G4)` → H10: 21
- `=MID(G4, 6, 5)` → H12: is a

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2.6 Logical Functions

The logical functions include AND and OR. These return a TRUE or FALSE value depending on the test. In the case of AND function, TRUE value will be returned only if all the conditions are true and in the case of OR function any one of the conditions being true.

=AND (logical1, [logical1], ...)

= OR (logical1, [logical1], ...)

Example of AND / OR Function

4	B	C	D	E	F	G
5	Sale of products across regions					
6						
7		Zones				
8		East	West	North	South	Total
9	Product A	825	750	500	1200	3275
10	Product B	250	300	125	400	1075
11	Spares	25	30	30	40	125
12	Maintenance	300	300	200	400	1200
13		1400	1380	855	2040	5675
14						
15						
16	Formula entered				Result	
17						
18	=AND(C13>=1500,G13>=5500)				FALSE	
19						
20	=AND(C13>=1400,G13>=5500)				TRUE	
21						
22	=OR(C13>=1500,G13>=5800)				FALSE	
23						
24	=OR(C13>=1400,G13>=5500)				TRUE	

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2.7 If

If, Then, Else evaluates a condition and based on True or False proceeds to execute the set of arguments. If the condition is met, the first set of arguments is executed and if not the second set of arguments is executed. It is also possible to construct a nested if condition. After the first of test is performed and if the condition is not met, the second set of arguments will be executed. This second set of arguments can also be another if condition. If can also be used in conjunction with other functions

The syntax for IF functions is

=IF (logical test, [value if true], [value if false])

=IF (logical test, value if true, If (logical test, value if true, value if false))

Example of If function

A	B	C	D	E	F	G
3	<u>Simple if condition statement</u>					
4						
5	Sales across regions					
6		Zones				
7		East	West	North	South	Total
8	Product A	825	750	500	1200	3275
9	Product B	250	300	125	400	1075
10	Spares	25	30	30	40	125
11	Maintenance	300	300	200	400	1200
12		1400	1380	855	2040	5675
13						
14	Budget	1500	1200	900	2000	
15		=IF(C12>=C14,"OK","Deficit")				
16	Status	Deficit	OK	Deficit	OK	

A	B	C	D	E	F	G
20	<u>Multiple if condition statement</u>					
21						
22	Sales across regions					
23						
24		Zones				
25		East	West	North	South	Total
26	Product A	825	750	500	1200	3275
27	Product B	250	300	125	400	1075
28	Spares	25	30	30	40	125
29	Maintenance	100	300	200	400	1000
30		1200	1380	855	2040	5475
31						
32	Budget	1500	1200	900	2000	
33	Status	Over 10% shortfall	OK Up to 10% shortfall		OK	

=IF(C29>=C31,"OK",IF((C29/C31)>=0.9,"Up to 10% shortfall","Over 10% shortfall"))

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2.8 Count

The count functions count the number of records in a given range. The function has variants and counts cells containing numeric, blanks and non-blanks. The functions are as below:

=COUNT(value1, [value2], ...)	Returns the number of cells containing numeric value in the argument list and date is considered as a numeric value.
=COUNTA(value1, [value2], ...)	Returns the count of cells which are not blank in the argument list
=COUNTBLANK(range)	Returns the number of cells which contain blank in the range

Example Count function in use

A	B	C	D	E	F	G	H	I	J	K	L
4	List A		List B		List A		List B		List A		List B
5											
6		45		3		45		3		45	3
7		92				92				92	
8	ABC			28	ABC		28		ABC		28
9	10-Jan-96			0	10-Jan-96		0		10-Jan-96		0
10		200		#DIV/0!		200		#DIV/0!		200	#DIV/0!
11											
12		Count				CountA				CountBlank	
13		4		3		5		4		0	1
14											
15											
16											
17	=COUNT(B6:B10)				=COUNTA(F6:F10)				=COUNTBLANK(J6:J10)		

2.9 Lookup

The popular lookup functions are VLOOKUP and HLOOKUP. These functions lookup as the name indicates a list for a matching value and returns the column or row value. The syntax for the functions is:

2.9.1 VLOOKUP

=VLOOKUP(lookup value, table array, column index number, [range lookup])	
Lookup value	The lookup value which will be matched against the table array for selecting the first matching record
table array	The area which holds the data that the vlookup function will return. The left most column of the table

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	array is where the value will be searched
column index number	The column no in which the value is residing
[range lookup]	This can be TRUE or FALSE. If the fourth condition is not specified defaults to TRUE.

The function searches the range given for the criteria in the left most column and once a match is found, returns the value in the column no specified. For E.g. the function =VLOOKUP (A1, RateChart, 3) will search the First column of range RateChart for value in cell A1 and if the value is found return the value in 3rd column of that record. The fourth argument in the above will be treated as TRUE.

The TRUE argument will cause the search to identify the value either equal to the input value or if it is not found for the next value which is less than the input value. Thus if a search is made for 10-Jan-99 in a column and if this is not found, then the next value which is less than this value will be considered. If the column contains 8-Jan-99, then this will be accepted. In other words the highest value equal to or less than the search value will be accepted. If the TRUE argument is used, the List should be sorted in ascending order or else the results will be erratic.

The FALSE argument will cause the function to look for exact match rather than the nearest match and if not found will return #NA value. If the FALSE argument is used, it is not necessary that the list should be in any order.

Example of Vertical Look Up

A	B	C	D	E	F	G	H
	Date	Units	Week No				
4		generated					
5	01-Jan-03	500	1	Date		10-Jan-03	
6	02-Jan-03	856	1	Unit Generated		703	
7	03-Jan-03	127	1				
8	04-Jan-03	558	1				
9	05-Jan-03	797	1				
10	06-Jan-03	797	1				
11	07-Jan-03	263	1				
12	08-Jan-03	157	2				
13	09-Jan-03	526	2				
14	10-Jan-03	703	2				
15	11-Jan-03	526	2				
16	12-Jan-03	716	2				
17	13-Jan-03	732	2				
18	14-Jan-03	604	2				
19	15-Jan-03	626	3				

=VLOOKUP(G5,UnitsDB,2,False)

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2.9.2 HLOOKUP

=HLOOKUP(lookup value, table array, row index number, [range lookup])	
Lookup value	The lookup value which will be matched against the table array for selecting the first matching record
table array	The area which holds the data that the hlookup function will return. The top most row of the table array is where the value will be searched
row index number	The row no in which the value is residing
[range lookup]	This can be TRUE or FALSE. If the fourth condition is not specified defaults to TRUE.

The functionality is very similar to that of VLOOKUP with the essential difference that the look up is performed horizontally and not vertically. Whenever HLOOKUP is in use, it may be necessary to add the fourth argument as FALSE as the normal construction of a data list is vertical and not horizontal and we not expect the columns to be in sorted order from left to right.

Example Horizontal Look Up

A	B	C	D	E	F	G	H	I	J
4	Sales			Jan	Feb	Mar	Apr	May	Jun
5	Product A			815	236	909	535	52	999
6	Product B			351	95	415	665	709	197
7	Product C			773	325	815	648	665	658
8	Product D			505	86	358	957	792	703
9	Product E			871	349	574	960	925	943
10	Product F			166	74	244	269	164	43
11	Product G			178	309	835	137	463	346
12									
13									
14		Sales for the Month of		Jan					
15		Sales of Product B			351				



=HLOOKUP(F14,HLookUp!SalesData,3,FALSE)

2.9.3 Match and Index

Lookup can also be performed by using a combination of Match and Index functions. Let us review the Match and Index functions now:

The process of lookup is done through two steps. First we determine the relative position of the value we are searching for in the criteria range.

=MATCH(lookup value, lookup array, [match type])	
Lookup value	The lookup value which will be matched against the

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	lookup array for obtaining the position of the record
Lookup array	The range in which the search will be made
Match type	The type of match to be performed. It can be: Closest value higher (indicated by 1) Closest value lower (indicated by –1) Exact match (indicated by 0)

The default value for the match type will be 1 if not specified. For this the lookup array has to be in ascending order. If the search is for closest value lower, the criteria range should be in descending order. To carry out the exact match the data can be in any order.

The result will give the row number in which the data we are looking for is found.

The next step is to use this row position to get the cell value by using the Index function. Let us see review the index function now:

The syntax for the Index function is as below:

=INDEX(array, row number, [column number])	
Array	The range where the data is residing. It can be either a single row, single column or a range consisting of rows and columns
row number	The row number within the data range where the data we need resides
column number	The column number within the data range where the data we need resides

Where the range consists of a column or a row, a single parameter is sufficient. It will be automatically substituted as a row or column position as the case may be.

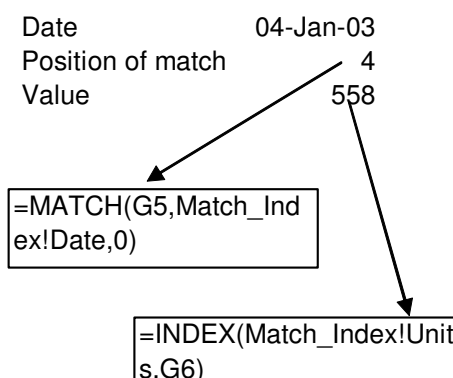
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Example of Lookup(Match and Index functions used)

A	B	C	D	E	F	G	H
	Date	Units	Week No				
4		generated					
5	01-Jan-03	500	1	Date		04-Jan-03	
6	02-Jan-03	856	1	Position of match		4	
7	03-Jan-03	127	1	Value		558	
8	04-Jan-03	558	1				
9	05-Jan-03	797	1				
10	06-Jan-03	797	1				
11	07-Jan-03	263	1				
12	08-Jan-03	157	2				
13	09-Jan-03	526	2				
14	10-Jan-03	703	2				
15	11-Jan-03	526	2				
16	12-Jan-03	716	2				
17	13-Jan-03	732	2				
18	14-Jan-03	604	2				
19	15-Jan-03	626	3				
20	16-Jan-03	838	3				
21	17-Jan-03	754	3				
22	18-Jan-03	446	3				
23	19-Jan-03	958	3				
24	20-Jan-03	892	3				
25	21-Jan-03	963	3				
26	22-Jan-03	166	4				
27	23-Jan-03	590	4				
28	24-Jan-03	432	4				
29	25-Jan-03	266	4				
30	26-Jan-03	454	4				
31	27-Jan-03	965	4				
32	28-Jan-03	703	4				



2.10 SumIf

SumIf is one of the most powerful functions within Excel used extensively in List management. It enables preparation of a summary and allows the file to be maintained as a list. SumIf performs a sum function of selected values within a list for a specified condition. The syntax for SumIf is as follows:

=SUMIF(range, criteria, [sum range])	
Range	Contains the list of criteria we will be searching for
Criteria	The criteria which will be matched against the criteria range for selecting matching records
sum range	The values in the value range will be summed where the criteria is matched

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The SUMIF function not only runs on a vertical data list but also on a horizontal data list.

If the third argument is dropped, the values in the range will be summed.

Conventional approach						
A	B	C	D	E	F	G
	Date	Units generated	WeekNo			
3				Approach A		
4	01-Jan-03	500	1	Summary		
5	02-Jan-03	856	1	Week 1		3898
6	03-Jan-03	127	1	Week 2		3964
7	04-Jan-03	558	1	Week 3		5477
8	05-Jan-03	797	1	Week 4		3576
9	06-Jan-03	797	1			16915
10	07-Jan-03	263	1			
11		3898		=C11		
12					=SUM(G5:G8)	
13	08-Jan-03	157	2			
14	09-Jan-03	526	2			
15	10-Jan-03	703	2			
16	11-Jan-03	526	2			
17	12-Jan-03	716	2			
18	13-Jan-03	732	2			
19	14-Jan-03	604	2			
20		3964				
21						
22	15-Jan-03	626	3			
23	16-Jan-03	838	3			
24	17-Jan-03	754	3			
25	18-Jan-03	446	3			
26	19-Jan-03	958	3			
27	20-Jan-03	892	3			
28	21-Jan-03	963	3			
29		5477				
30						
31	22-Jan-03	166	4			
32	23-Jan-03	590	4			
33	24-Jan-03	432	4			
34	25-Jan-03	266	4			
35	26-Jan-03	454	4			
36	27-Jan-03	965	4			
37	28-Jan-03	703	4			
38		3576				

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Example of Sumif

I	J	K	L	M	N	O	P
	Date	Units generated	Week No				
3					Approach B - using Sumif		
4	01-Jan-03	500	1		Summary		
5	02-Jan-03	856	1		Week 1	3898	
6	03-Jan-03	127	1		Week 2	3964	
7	04-Jan-03	558	1		Week 3	5477	
8	05-Jan-03	797	1		Week 4	3576	
9	06-Jan-03	797	1			16915	
10	07-Jan-03	263	1				
11	08-Jan-03	157	2				
12	09-Jan-03	526	2				
13	10-Jan-03	703	2				
14	11-Jan-03	526	2				
15	12-Jan-03	716	2				
16	13-Jan-03	732	2				
17	14-Jan-03	604	2				
18	15-Jan-03	626	3				
19	16-Jan-03	838	3				
20	17-Jan-03	754	3				
21	18-Jan-03	446	3				
22	19-Jan-03	958	3				
23	20-Jan-03	892	3				
24	21-Jan-03	963	3				
25	22-Jan-03	166	4				
26	23-Jan-03	590	4				
27	24-Jan-03	432	4				
28	25-Jan-03	266	4				
29	26-Jan-03	454	4				
30	27-Jan-03	965	4				
31	28-Jan-03	703	4				

Approach B - using Sumif

Summary

Week 1 3898

Week 2 3964

Week 3 5477

Week 4 3576

16915

=SUMIF(SumIf!Week,1,
SumIf!UnitsGenerated)

SumIf!UnitsGenerated)

SumIf!Week

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2.11 Subtotal

The subtotal function performs a number of functions including sum of range of values. Subtotals can be used to prepare grand totals without having to call the individual group totals into summary. The syntax for the subtotal is given below:

=subtotal (function number, ref1, [ref2], ...)

The first argument decides the type of function to use and the second argument is the values which will be used by the function. Subtotal function will ignore previous subtotals and will include only data values in its calculation. The following table gives the details of the function the subtotal function uses:

Function number	Function
1	AVERAGE
2	COUNT
3	COUNTA
4	MAX
5	MIN
6	PRODUCT
7	STDEV
8	STDEVP
9	SUM
10	VAR
11	VARP

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Example of Subtotal

A	B	C	D
	Date	Units generated	WeekNo
3			
4	01-Jan-03	500	1
5	02-Jan-03	856	1
6	03-Jan-03	127	1
7	04-Jan-03	558	1
8	05-Jan-03	797	1
9	06-Jan-03	797	1
10	07-Jan-03	263	1
11		3898	=SUBTOTAL(9,C4:C10)
12			
13	08-Jan-03	157	2
14	09-Jan-03	526	2
15	10-Jan-03	703	2
16	11-Jan-03	526	2
17	12-Jan-03	716	2
18	13-Jan-03	732	2
19	14-Jan-03	604	2
20		3964	=SUBTOTAL(9,C13:C19)
21			
22	15-Jan-03	626	3
23	16-Jan-03	838	3
24	17-Jan-03	754	3
25	18-Jan-03	446	3
26	19-Jan-03	958	3
27	20-Jan-03	892	3
28	21-Jan-03	963	3
29		5477	
30			
31	22-Jan-03	166	4
32	23-Jan-03	590	4
33	24-Jan-03	432	4
34	25-Jan-03	266	4
35	26-Jan-03	454	4
36	27-Jan-03	965	4
37	28-Jan-03	703	4
38		3576	

Grand Total 16915

=SUBTOTAL(9,C4:C38)

2.12 Choose

Choose function chooses a value from the list. The syntax for the function is as below:

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=CHOOSE(index_num, value1, [value2], ...)	
Index_num	The reference by which the value from the list will be selected. This has to be an integer.
Value	The list of values will be entered separated by comma. The first value is required and rest are optional

The function will choose the value from the list of values based on the first argument.

Example of Choose function

2 → index_num

20 =CHOOSE(index_num,10,20,30,40,50,60)

Feb =CHOOSE(index_num,"Jan","Feb","Mar","Apr","May","Jun")

=CHOOSE(index_num,Choose!Range1,Choose!Range2,Choose!Range3,Choose!Range4)

Selected	Range1	Range2	Range3	Range4
10	1	10	100	1000
20	2	20	200	2000
30	3	30	300	3000
40	4	40	400	4000
50	5	50	500	5000

This returns a name from the list based on the value in cell A2 (Index_num). For e.g. 3 will return Range3 and this is captured into range name 'Selected'

2.13 Offset

Offset is powerful function helps in defining a range dynamically. Offset basically performs two acts depending on the type of input given. It allows the user the place the cursor at a particular cell from the present location. From there either the value of the new cell can be picked up or a new range starting from that point can be defined. The syntax for the OFFSET function is as below:

=OFFSET(reference, rows, cols, [height], [width])	
Reference	Reference is the cell where the cursor will be positioned initially. Anchor can either be a cell of a range name.
Rows	The number of rows by which the cursor will be moved

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	down
Columns	The number of columns by which the cursor will be moved right
Height	This is applicable only if the Anchor is a name and not a cell. This denotes the height in number of rows for the new range from the new cursor position as determined by rows and columns
Width	Width is the number of columns to be included in the new range. Like Height, this is also applicable only if the Anchor is a range name and not a cell.

Offset is a very flexible function and the movement is not limited to the range name given. It simply determines a new point within the boundaries of the worksheet. Negative values can also be used as arguments and in which case the cursor will up and left. If the reference causes a movement outside the boundaries of the sheet, #REF error will be returned. Offset can be used along with any of the aggregate functions.

Example of Offset

A	B	C	D	E	F	G	H
	Employee details						
4	Employees	1993	1994	1995	1996	1997	1998
5	Sales	19	23	24	31	28	35
6	Marketing	4	9	16	12	16	18
7	Administration	5	7	8	11	12	15
8	Technical	19	31	25	34	42	49
9	Total	47	70	73	88	98	117
10							
11		Range name :Corner			Range Name :Employees		
12	NoRows	2					
13	NoCols	4					
14							
15	Formula					Value	
16	=OFFSET(B3,1,3)					24	
17							
18	=OFFSET(Employees,4,NoCols,1,1)					98	
19							
20	=OFFSET(Corner,-1,0)					1993	
21							
22	=AVERAGE(OFFSET(Employees,3,0,1))					33.33333	
23							
24	=SUM(OFFSET(Employees,0,2,,1))					73	
25							
26	=OFFSET(Employees,3,1)					#VALUE!	

2.14 Array formulas

The array formulas apply to a group of cell collectively. They are indicated by the braces at the beginning and end of the function. ({}). These are inserted by the system automatically. Array

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formulas behave in a different way than the regulars functions. An Array formula once applied to the group of cells can be modified only when all cells are selected. The formula in an individual cell cannot be either edited or modified. For e.g. if you enter a formula for calculating bonus as Salary multiplied by 20% and you wish that the formulas in any individual cells should not be modified, then you can enter this as an array formula. First select the group of cells in which the formulas should reside and enter the formula. Terminate the formula by holding down the 'Shift+Ctrl' keys while pressing 'Enter' key. Excel will copy the formula in all the cells. Let's assume that you wish to enter the formula in cells D2 to D20 and each of these cells should be a product of B2 which holds Salary and C2 which holds the rate. If you want to enter a normal formula you will type in cell D2 the following:

=B2*C2

However if you wish to enter an array formula you should first select cells D2 to D20 and type the following:

= (B2:B20)*(C2:C20)

Terminate the formula as described above and you will see that the formula is displayed as below:

{= (B2:B20)*(C2:C20)}

In order to select the all the formula cells for modification, select any cell and press 'Ctrl+/' . After modifying remember to terminate the formula by 'Shift+Ctrl+Enter' . Otherwise it will be saved back as an ordinary formula.

Example of Array function

A	B	C	D	E	I	K	L
2	Product ID	Quantity	Rate	Value			
3	3	450	80	36000			
4	6	300	60	18000			
5	5	350	40	14000			
6	2	300	10	3000			
7	9	500	90	45000			
8	2	400	80	32000			
9	7	400	10	4000			
10	9	200	80	16000			
11	5	50	30	1500			
12	6	350	90	31500			
13	9	50	10	500			
14	3	100	30	3000			
15	2	400	20	8000			
16	1	300	90	27000			
17	7	100	20	2000			
18	3	50	70	3500			
19				245000			
20							

= {(C3:C18)*(D3:D18)}

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3 List Management

To view the examples under functions open 'List management.xls'. The workbook contains various sheets for the functions covered. Click the appropriate tab to view examples.

3.1 Sort

Sort enables a quick sort of a single column or does a multiple column sort. Some of the sort criteria are listed below:

- Blanks are always pushed to the last
- Generally sort is not case sensitive unless specifically set
- Numbers sorted from smallest negative to largest positive

Even though sort gives you option to sort up to 3 columns, you can go beyond that by concatenating columns and perform a sort based on the combined column. Usually the column sort will meet the normal requirements.

Besides ascending and descending Sort is also possible based on a custom list. To define a custom list Click Tools → Options and in the dialogue box select Custom Lists. Click Add and enter the series. Separate each field with a comma. While sorting the list, when you are in the sort dialogue, click Options and select the sort order from the drop down list.

Sort can also act on columns by sorting them left to right or right to left. When you are within the sort dialogue click Options and choose Sort left to right. A second dialogue box will appear which will ask you value in which row is to be used for sorting. Row 1 will be the header. You can choose the appropriate row.

The data list in sort has to obey some rules. The values in rows if defined through formulas then sort will corrupt the data. Let us say that your list has data from cell A1 to E50. If a cell in row 45 (B20) is referring to a value in cell B100 which is outside the list or E20 which is within the list, then after sorting you will note that the formula defined have changed and it is now displaying junk value. This is so because the sort function after sorting the data is trying copy the formula to a its new location and in that process applies its rule of maintaining relative reference. In the example shown above cell B20 is referring to the cell B100 and in other words the cell is referring to 80 rows below it in the same column. Now after sort if the record has been moved to 2nd want the cell to always refer to B100. Such situations these formulas should be defined using absolute reference.

Example of sort

Data sorted on Year (ascending) and invoice value (descending)

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inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price
48	2003	13-Apr-02	8	4	2	192	100	19200	100
12	2003	03-Apr-02	30	5	2	190	100	19000	100
45	2003	12-Apr-02	16	1	2	190	100	19000	100
96	2003	28-Apr-02	15	2	2	186	100	18600	100
42	2003	10-Apr-02	28	1	2	185	100	18500	100
38	2003	09-Apr-02	4	2	2	178	100	17800	100
78	2003	22-Apr-02	23	4	2	175	100	17500	100
11	2003	02-Apr-02	4	1	2	174	100	17400	100
74	2003	20-Apr-02	14	1	2	174	100	17400	100
79	2003	22-Apr-02	25	1	2	174	100	17400	100
10	2003	02-Apr-02	3	2	2	169	100	16900	100
99	2003	29-Apr-02	27	3	2	163	100	16300	100
26	2003	06-Apr-02	20	3	6	183	89	16287	89
14	2003	03-Apr-02	11	1	1	198	80	15840	80
95	2003	28-Apr-02	16	3	6	177	89	15753	89
100	2003	29-Apr-02	11	1	12	183	85	15555	85
15	2003	04-Apr-02	30	2	2	155	100	15500	100
72	2003	20-Apr-02	22	3	11	200	77	15400	77
33	2003	08-Apr-02	8	4	11	191	77	14707	77

3.2 Filters

Filters can be applied to a list so as to extract specific data. There are two types of filters. These are:

- Auto filter
- Advanced filters

Filters are very easy to set up and use. Once the cursor is within the data area, click Data → Filter → AutoFilter. Excel will immediately sense the boundary of the data list and in the first row which is the header row applies the filter button. Click on the button to view the list of unique items in the column. If you select any item from the list, the data list will be displayed showing only the selected item. The filtered column will also be indicated separately. The filter button will be shown in blue colour.

Multiple columns can be filtered by using the same approach.

One of the features of the filters is that the subtotal function can be used effectively with that. After filtering a column move to the end of the column and click 'Σ' on the standard toolbar. A subtotal function will be inserted selecting all the values in the column including the hidden rows. However the total will be only for the displayed values. If you employ different criteria for listing the column, which results in different set of records, the sub total function will display the appropriate total for the selected rows.

It will be interesting to note that if you move to the end of a column containing values continuously without applying filter and click 'Σ' the function inserted will be sum and not subtotal

3.3 Options available

Filter gives the following options:

3.3.1 Display top 10

You can choose to display the top n number of items. This is applicable to numeric columns. Even though the menu says 'Display top 10', you can display top 5 or bottom 20 values. Click the

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filter and select 'top 10 values'. A dialogue box will be displayed through which you can choose to view Top or Bottom values and the number of items to be viewed.

3.3.2 Custom

This option allows you to view the values based on certain criteria. You can set a range of values to be included.

inv_r	year_r	inv_da	customer_r	line_r	product_r	quantity	rate	inv_val	net_pri
2	2003	01-Apr-02	25	1	15	152	30	4560	30
2	2003	01-Apr-02	25	2	2	135	100	13500	100
2	2003	01-Apr-02	25	3	5	136	25	3400	25
2	2003	01-Apr-02	25	4	15	167	30	5010	30
3	2003	01-Apr-02	29	4	8	51	35	1785	35
3	2003	01-Apr-02	29	5	8	62	35	2170	35
3	2003	01-Apr-02	29	3	15	127	30	3810	30
3	2003	01-Apr-02	29	2	7	97	14	1358	14
3	2003	01-Apr-02	29	1	2	10	100	1000	100
9	2003	02-Apr-02	27	2	7	198	14	2772	14
9	2003	02-Apr-02	27	3	13	193	29	5597	29
9	2003	02-Apr-02	27	4	11	119	77	9163	77
9	2003	02-Apr-02	27	5	12	162	85	13770	85
9	2003	02-Apr-02	27	1	13	154	29	4466	29
12	2003	03-Apr-02	30	1	15	88	30	2640	30
12	2003	03-Apr-02	30	2	8	137	35	4795	35
12	2003	03-Apr-02	30	3	3	142	15	2130	15
12	2003	03-Apr-02	30	4	6	88	89	7832	89
12	2003	03-Apr-02	30	5	2	190	100	19000	100
15	2003	04-Apr-02	30	1	15	26	30	780	30
15	2003	04-Apr-02	30	2	2	155	100	15500	100
15	2003	04-Apr-02	30	3	10	68	47	3196	47
15	2003	04-Apr-02	30	4	3	52	15	780	15
15	2003	04-Apr-02	30	5	5	109	25	2725	25
17	2003	04-Apr-02	22	1	13	169	29	4901	29
17	2003	04-Apr-02	22	2	4	40	67	2680	67
17	2003	04-Apr-02	22	3	6	97	89	8633	89
17	2003	04-Apr-02	22	4	8	146	35	5110	35
18	2003	04-Apr-02	24	3	4	191	67	12797	67
18	2003	04-Apr-02	24	4	7	119	14	1666	14
18	2003	04-Apr-02	24	1	13	121	29	3509	29
18	2003	04-Apr-02	24	5	2	44	100	4400	100
18	2003	04-Apr-02	24	2	6	50	89	4450	89

Filter conditions applied

Year = 2003; Invoice date <= 07-Apr-2002; Customer no >=25

3.4 Advanced filters

Advanced filters are required where the filtering criterion becomes complex and it is not possible for the Auto Filter to handle the requirements. Click Data → Filter → Advanced Filter and Excel display a dialogue asking you to fill in the following:

3.4.1 List range

Excel would have pre-selected the data list. If the data list shown is not correct, define the data list

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3.4.2 Criteria range

Enter the column captions in a separate area of the worksheet. Specify the values based on which you wish to filter below the columns. The values mentioned in the same row will be used as logical 'AND' and the values mentioned in different rows will be used as logical 'OR'

Advanced Filter also gives an option to filter the values either in place or in a separate area in the worksheet.

Example of advanced filter

Filter condition										
inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price	
1	2004	02-Apr-03								

Filter result										
inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price	
1	2004	01-Apr-03	6	1	4.00	174	84	14616	71	
1	2004	01-Apr-03	6	2	6.00	117	100	11700	92	
1	2004	01-Apr-03	6	3	15.00	55	26	1430	23	
7	2004	02-Apr-03	29	1	11.00	3	83	249	79	
7	2004	02-Apr-03	29	3	14.00	106	40	4240	36	
7	2004	02-Apr-03	29	2	13.00	219	31	6789	30	
8	2004	02-Apr-03	5	1	7.00	90	16	1440	14	
8	2004	02-Apr-03	5	2	8.00	128	37	4736	36	
8	2004	02-Apr-03	5	3	10.00	71	57	4047	48	
8	2004	02-Apr-03	5	4	12.00	51	105	5355	96	
9	2004	02-Apr-03	27	1	2.00	4	101	404	93	
9	2004	02-Apr-03	27	5	13.00	230	31	7130	30	
9	2004	02-Apr-03	27	4	12.00	79	105	8295	96	
9	2004	02-Apr-03	27	2	3.00	206	14	2884	13	
9	2004	02-Apr-03	27	3	4.00	158	84	13272	71	
10	2004	02-Apr-03	2	1	1.00	2	87	174	86	
10	2004	02-Apr-03	2	2	10.00	173	57	9861	48	
10	2004	02-Apr-03	2	3	12.00	170	105	17850	96	
11	2004	02-Apr-03	24	2	6.00	178	105	18690	92	
11	2004	02-Apr-03	24	1	2.00	219	101	22119	93	
11	2004	02-Apr-03	24	4	9.00	114	34	3876	29	
11	2004	02-Apr-03	24	3	8.00	206	37	7622	36	

3.5 Form

Form is used for entering data that is arranged in rows so that we may find it easier for data entry.

Define headings for the columns in the first row of the data entry range.

Choose Data-->Form, Excel will ask whether to use the row for header. Choose OK.

Excel then displays a dialogue box as shown in the example.

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3.6 Pivot Table

Pivot table is a very powerful data analysis facility and has got great dynamic capabilities. The features of the pivot table report are described below:

3.6.1 Setting up a Pivot Table

Keep the cursor within the data list and click Data → Pivot table report. Excel display the Pivot table wizard which will guide you through the steps in defining a Pivot table report

3.6.1.1 Step 1 of 3

The data source is decided at this stage. The data list can be any of the following:

Excel list

- External data base
- Multiple Excel lists
- Another pivot tale report

Excel would have selected the Excel list as default but this can be changed

3.6.1.2 Step 2 of 3

Select the data area here. Excel will display the current data list as the default area.

3.6.1.3 Step 3 of 3

This displays the options to choose the location where the Pivot table will be drawn. Also gives the option to design the layout of the pivot table. Click 'Layout' to proceed with the design. Alternatively click 'Finish' to complete the report which displays a dummy report with outlines which could be customised.

3.6.2 Managing a Pivot table

A Pivot table has basically four aspects. 'Data', which is summarized, is at the centre of the Pivot Table. Drag the columns, which required to be summarized and drop them in the data area. Besides 'sum' other aggregate functions like 'count', 'average' etc. The data is analyzed through fields, which contain the record parameters. Multiple fields can be used in which case the summary is made available for each of these fields. The way this information is viewed can be through placing a field in a Row and another in a Column. It is also possible to keep more than one field as a Row or as a Column. The fourth aspect is the 'Page'. The Row/Column summary is viewed for each item in a third field when this item is defined as a Page.

When you are in the wizard screen of the Pivot table, the list of available fields will be listed in the right. The Pivot Table will also show a layout showing placeholders for Data, Row, Column and Page fields. Drab the fields for which you want construct a summary in to the data area. In the worksheet attached these columns will be Salary, Bonus, Commission and Gross. Drag the fields based on which you wish to analyze and drop them on to Row, Column or Page areas.

If you wish to change the Row, Column or Page fields simply click and drag the fields to the required area. This can be done from within the Pivot table report itself. As you click the field and drag it, the layout location currently associated with it will be shown in the mouse tip. As you drag it in to new location say from Column to field, the mouse tip will change to indicate that the orientation has changed.

Example of a Pivot table

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year_no	2004
---------	------

Sum of inv_value	product_no					
customer_no	1	2	3	4	5	Grand Total
1	31146			16380	6825	54351
2	21228	24846		4452	4165	54691
3	15051	11716	2674	19488	4585	53514
4	10560	19800	238	12936	3010	46544
5	7134		2478	12348		21960
6				34776	12390	47166
7		9494	2170	1344	700	13708
8	13659		1036		8085	22780
9		12221	2604		3360	18185
10	20184	22321	1022	30828		74355
11				8568		8568
12		30502	1904	7392	4725	44523
14				4368		4368
15	17487	11918		9996	1435	40836
16					6230	6230
17	9831	909	504	6048	1925	19217
18			3486			3486
19				1176		1176
20		10403				10403
Grand Total	146280	154130	18116	170100	57435	546061

Chart showing sum of invoice value for customer/product combination for year 2004

Sum of inv_value	year_no		
customer_no	2003	2004	Grand Total
1	42170	54351	96521
2	10710	54691	65401
3	48362	53514	101876
4	40694	46544	87238
5	12998	21960	34958
6	16845	47166	64011
7	20730	13708	34438
8	61749	22780	84529
9	2475	18185	20660
10	1530	74355	75885
11	65299	8568	73867
12	10560	44523	55083
13	300		300
14	23553	4368	27921
15	19990	40836	60826
16	38180	6230	44410
17	34196	19217	53413
18	13520	3486	17006
19	7510	1176	8686
20	10535	10403	20938
Grand Total	481906	546061	1027967

Chart showing invoice value for customer 1 to 20 for years 2003 & 2004

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3.6.3 Formatting

Excel also offers option to choose from multiple pre-set format styles. Choose Format->AutoFormat and apply a format. In order to format the cells first check the Preserve formatting Check box in Table options. The context sensitive menus are available on the right click once the cursor is within the pivot table area. Alternatively invoke the Pivot table toolbar.

Select a cell amongst the group of cells to be formatted and on right click select Field setting to display the 'Pivot Table Field' dialog. Click 'Number' and specify the format option. This will ensure that the format is retained even when the pivot table is redrawn when rows/column fields are changed. If the format is done by choosing the Format from the menu, then if the table is redrawn, all previous formatting will be lost.

3.6.4 Grouping

The information in a Pivot Table is presented as a summary. Typically the table lists information for each item in a field. It is possible to create groups out of these items. Some of these items can be consolidated in to a group. This technique is relevant where data fields are involved. Let us say that a date field is used as a row. The Pivot table will list the date grouped under each date found in the list. But we may want to summaries the data based on months. In such case it is easy to view the month summary by creating a group for the date field.

The grouped fields then in turn can be used as if these are regular fields

3.6.5 Hide fields

In a column or row, each unique data item of the fields will be listed and the data area will contain the summarized information for these items. It is possible to temporarily remove some items from view. To hide an item from view when you are within the Pivot table choose the row or column header. Excel will respond by selecting the row or column labels. Move the cursor within the area and use right click to display the menu. From the menu choose Field. Excel will display the Pivot table Field dialogue. Click the fields to be hidden and click OK. To display the hidden field, use the same approach to list the dialogue and click the field market as hidden to display it.

3.6.6 Calculated field and items

3.6.6.1 Calculated field

Through calculated fields, we can introduce additional calculations based on existing data fields. Data fields are those on which the aggregate functions are performed. For example the data list contains information on Gross salary for an employee but not the eligible amount of loan. If we wanted to look at possible loan amounts, which are related to the gross salary, then this can be defined as a formula.

Once you are within the Pivot table click the Pivot table drop down in the Pivot table tool bar and from the menu select Formula → Calculated field. A dialogue will be displayed. In the name field enter the name for new field; in the formula field enter the formula. If you wish the formula to refer to data fields, drag the fields in to formula bar and set the appropriate equation. After you click OK, Pivot Table will introduce a new calculated field.

3.6.6.2 Calculated item

Through Calculated items you can define additional data groups. If the calculated fields primarily work on the data items, which are used in aggregation, the calculated items work on the fields, which are used to analyze, and in another words fields containing parameters for data. For e.g. if

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a company is trying to set up a new product line and expects the revenues be studied in relation to an existing product, then this can be done through a calculated item.

Once you are within the Pivot table click the Pivot table drop down in the Pivot table tool bar and from the menu select Formula → Calculated item and Excel will display a dialogue. In the Name field enter the name for the new item; in the formula fields enter the formula for the item. You will note that the field from which you called the menu is selected and the items belonging to that field are displayed in the item box. Only the items belonging to a single field can be used in the calculation at a time. Drag the fields and items in to the formula field and set the appropriate equation.

Calculated fields and calculated items can be used in conjunction with each other. These can also be grouped.

		Data		
product_no	year_no	Sum of inv_value	Sum of quantity	Sum of Avg Rate
1	2003	178720	2234	80.0
	2004	208050	2402	86.6
1 Total		386770	4636	83.4
2	2003	391400	3914	100.0
	2004	293914	2912	100.9
2 Total		685314	6826	100.4
3	2003	24390	1626	15.0
	2004	32998	2357	14.0
3 Total		57388	3983	14.4
4	2003	133330	1990	67.0
	2004	260316	3111	83.7
4 Total		393646	5101	77.2
5	2003	59225	2369	25.0
	2004	72625	2134	34.0
5 Total		131850	4503	29.3

‘Sum of Avg Rate’ is a calculated field by pivot table report.

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Sum of inv_value	year_no			
customer_no		2003	2004	Variation
16		113039	18461	-94578
14		89164	6443	-82721
8		135554	65099	-70455
11		123511	54506	-69005
19		70797	11870	-58927
13		45481		-45481
17		80588	44163	-36425
18		66715	35380	-31335
4		92522	66522	-26000
15		74548	60512	-14036
20		77524	69782	-7742
7		86473	83767	-2706
6		36383	87801	51418
1		70453	122567	52114
9		12310	71019	58709
12		15124	82509	67385
10		16715	124154	107439
5		25059	136381	111322
2		53194	167005	113811
3		72025	190338	118313
Grand Total		1357179	1498279	141100

'Variation' is a 'Calculated item' of pivot table which represents difference between two analysis fields 2004 and 2003.

3.6.7 Type of summary values

The data summarized can be of two types. In can be summarized using any of the summary functions like sum, count average etc. here we will review the type of summary. We can view the data item or view it in different forms like running total, deviation from a base amount, % of row/column total etc.

Once you are within the Pivot table select the data column and right click. From the menu click Field → Options to display the full dialogue for the field. In the show data as field, choose the data expression form from the drop down list.

3.6.8 Options

Pivot table has facility to customize the report. When you are within the Pivot table report on right click choose options. We will review some of the item under options:

3.6.9 Preserve formatting

Check this option to retain the format applied to a field or row. Without this the format will be lost when data is manipulated afresh.

3.6.10 Save data with layout

This is what gives the Pivot table speed. It saves a copy of data with itself. Of course this is hidden from us. Even if you delete the source table, the Pivot table will still work as it has a local

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copy of the data but we can no longer view the data in raw form. You will also notice that if you attempt to create a second pivot table on the same data Excel issues a caution asking your preference to use the earlier pivot table itself or create a new one. It will also report that you prefer to create afresh it will use up more memory. This is because it will be saving a second copy of data with the report.

3.7 Form

Form is used for entering data that is arranged in rows so that we may find it easier for data entry.

Define headings for the columns in the first row of the data entry range.

Choose Data-->Form, Excel will ask whether to use the row for header. Choose OK.

3.8 External data

Click Data->Import External Data and select New Database Query. Excel displays a wizard and guides you through the process of importing data.

3.8.1 Import data

3.8.1.1 Step1

Excel displays 'Choose Data Source' dialog. This contains the drivers defined for data sources. There are two ways by which you can proceed. Choose a generic driver type based on the type of database you want to link to or create a specific driver. The following are the steps in creating a specific driver:

Select New Data Source and click 'OK'

3.8.1.2 Step 2

In the next dialog give a name for the driver, choose the generic database driver for your type of data source and click 'Connect' to specify the specific data source you want to link. This will define a new data source name. If you choose a generic driver you have to identify the data source every time you want to connect to the same data source. Defining a specific driver will always point to the particular data source you define.

After you select the driver, the dialog displayed will depend upon the type of driver. If you had selected a generic driver, Excel will prompt you to choose the data source also. If you select the specific driver defined by you it will list all the tables in the data source.

3.8.1.3 Step 3

Choose the tables and fields from the list. If you choose more than one table, if the relationship is defined between these tables Excel will automatically allow you to choose all the fields from both the tables. If you choose two or more table which does not have a common field amongst them Excel will ask you to specify the join condition in the database before proceeding with the selection.

3.8.1.4 Step 4

Choose to apply filters and also specify a sort order. Excel will pull down the data from the data source. It will also maintain a dynamic link to the data.

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3.8.2 Refresh

Select any cell within the data list. Right click gives a list of context sensitive menu. Choose 'refresh' to refresh data

3.8.3 Options

On right click choose 'Data Range properties' to bring up the dialog. Specify appropriate settings applicable. If you wish to enter some formulas on the data pulled in and wish to apply the same formula every time the link I refreshed check the 'Fill down formulas in columns adjacent to data'.

3.9 Subtotal

The subtotal function drives automatic totalling based on the change in fields. Using these multi level subtotals can be quickly done. Click Data → Subtotal and Excel displays a dialogue box. The information required by subtotal utility is as follows:

3.9.1 Index column

Select the column, which will be used as index. Subtotal will be made for each change in the column value.

3.9.2 Function to be used

Select the type of aggregate function to be used from the drop down list.

3.9.2.1 Apply subtotal to

Select the columns for which subtotal are required. Check the applicable columns.

Option is also available to specify whether the subtotal should be below the data or above the data.

To get a subtotal for multiple columns repeat the above step and choose the index column. Remember not to check the 'Replace the current subtotal' option.

Subtotal on Customer

inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price
			1	Total		3449		193020	
			2	Total		3844		220199	
			3	Total		4139		262363	
			4	Total		2229		159044	
			5	Total		2817		161440	
			6	Total		2376		124184	
			7	Total		4080		170240	
			8	Total		3992		200653	
			9	Total		1607		83329	
			10	Total		2371		140869	

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Subtotal on Product within Customer

inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price
					1 Total	516		43786	
					2 Total	247		24700	
					3 Total	72		1080	
					4 Total	195		16380	
					5 Total	345		10575	
					6 Total	234		24570	
					7 Total	167		2672	
					8 Total	757		27611	
					9 Total	21		714	
					10 Total	160		9120	
					12 Total	135		11475	
					13 Total	256		7892	
					14 Total	344		12445	
			1 Total			3449		193020	

inv_no	year_no	inv_date	customer_no	line_no	product_no	quantity	rate	inv_value	net_price	
70	2003	20-Apr-02		1	3	1	158	80	12640	80
39	2004	10-Apr-03		1	1	1	227	87	19749	86
95	2004	28-Apr-03		1	1	1	97	87	8439	86
85	2004	25-Apr-03		1	1	1	34	87	2958	86
					1 Total		516		43786	
46	2003	12-Apr-02		1	3	2	103	100	10300	100
47	2003	12-Apr-02		1	2	2	73	100	7300	100
46	2003	12-Apr-02		1	2	2	71	100	7100	100
					2 Total		247		24700	
47	2003	12-Apr-02		1	1	3	72	15	1080	15
					3 Total		72		1080	
39	2004	10-Apr-03		1	2	4	78	84	6552	71
78	2004	22-Apr-03		1	1	4	70	84	5880	71
79	2004	22-Apr-03		1	1	4	47	84	3948	71
					4 Total		195		16380	
46	2003	12-Apr-02		1	1	5	150	25	3750	25
39	2004	10-Apr-03		1	3	5	195	35	6825	32
					5 Total		345		10575	

3.10 Data Validation

The data validation option is used to perform validating the data at the time of entry in to cell. Validation is often essential and may even become critical when functions are used in list management. A case is where we are employing a sum if function on a list. It must be ensured that the final list of criteria on which data is summed must be present exactly as found in the summary. Any unwanted space within the criteria within the list will cause SUMIF function to overlook such rows and the final sum will be inaccurate. However while the Pivot Table detects such values, for e.g. 'CMP' and 'CMP '(the second CMP has a trailing space) are counted as different entities. But the Filter function will not detect this and will still consider both as same. The data validation assumes importance in this background.

The common data validations are

- Restricting a number
- Restricting dates
- Entry of codes based on list

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4 Tools & utilities

To view the examples under functions open 'Tool.xls'. The workbook contains various sheets for the functions covered. Click the appropriate tab to view examples.

4.1 Goal seek

Goal seek enable us to find what should be the value of a source cell given the value of the target cell where the source and target cells are related in a calculation. The goal seek utility will substitute multiple values in the source cell and see if the value of the target cell matches the required value. Click Tools->Goal seek to bring up the Goal seek dialog

4.2 Scenario

4.2.1 Add

Define scenarios to quickly view the results in a 'what-if' situation. Click Tools->Scenarios to bring up the scenario dialog. Click to Add a scenario. In the 'Scenario name' enter a suitable name. Give a single or list of cell in the 'Changing cells' box. Separate multiple cells by commas and click 'OK' to add the scenario.

4.2.2 View

To view a scenario click Tool->Scenario and select the predefined scenario. The results for the scenario will be displayed.

4.2.3 Summary report

Click Tools->scenario->Summary to bring up the summary dialog. Choose the results cell that you wish to see and Excel inserts a new sheet with the results displayed for each of the scenario defined,

4.3 Solver

Solver solves where multiple constrains have to be optimized. Typical example of where solver is used is in a transportation and problem where multiple manufacturing units ship to multiple markets. The important issue while working with the solver is setting up the problem.

Refer to the attached worksheet for the solver problem

In the above, the three units ship materials to the 8 markets listed. The net realization in each market after the unit to market freight chares is given in Rates. The objective is to maximize the sales. The following are the constraints:

Each unit cannot produce more than the capacity

For each market there are minimum and maximum levels. Irrespective of the price the supply has to be maintained at least at minimum level and cannot exceed maximum level. The following steps are involved in solving this problem:

Click Tools->Solver to bring up the Solver dialog

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- ❖ In 'Set Target Cell' refer to the cell containing the final value we are interested and choose Minimum or Maximum. Also set a specific value as target.
- ❖ In the 'By changing cells' specify the cells whose value has to be substituted by solver.
- ❖ In the 'Subject to Constraints' enter the list of constraints

Click 'Solve' to solve the problem.

4.3.1 Options

Customise the solver problem by using the solver options. From the Solver dialog click 'Options' to display the Solver Options dialog.

4.3.1.1 Precision

Lower the precision level for a faster solution

4.3.1.2 Convergence

This will determine when the solver should stop looking to better the solution. When each of the 5 successive solutions is not better than the previous by the convergence level, the solver will stop processing.

4.3.1.3 Assume non negative

Solver will not try with any negative values in the 'By changing cell' area.

4.3.1.4 Show iteration results

Solver will display the result of each iteration and wait for confirmation to proceed.

Example of a solver problem

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Solver example for solving distribution model

Markets	Quantity						Total Value
	Unit 1	Unit 2	Unit 3	Total Qty	Minimum	Maximum	
Market 1	180000	0	0	180000	2500	180000	3780000
Market 2	10000	0	110000	120000	5000	120000	2490000
Market 3	88000	0	0	88000	3500	140000	1320000
Market 4	0	160000	0	160000	2500	160000	3040000
Market 5	0	90000	0	90000	7500	90000	1620000
Market 6	0	50000	90000	140000	4000	140000	2460000
Market 7	2000	0	0	2000	2000	180000	26000
Market 8	120000	0	0	120000	3000	120000	2040000
	400000	300000	200000	900000	30000	1130000	16776000

Capacity	400000	300000	200000
----------	--------	--------	--------

	Rates		
Market 1	21	17	14
Market 2	18	10	21
Market 3	15	12	13
Market 4	10	19	18
Market 5	12	18	10
Market 6	14	15	19
Market 7	13	12	14
Market 8	17	13	17

Current distribution

Markets				Sale rate			Total Value
	Unit 1	Unit 2	Unit 3	Unit 1	Unit 2	Unit 3	
Market 1	180000	0	0	21	17	14	3780000
Market 2	120000	0		18	10	21	2160000
Market 3	100000	0	0	15	12	13	1500000
Market 4	0	160000	0	10	19	18	3040000
Market 5	0	90000	0	12	18	10	1620000
Market 6	0	50000		14	15	19	750000
Market 7	0		180000	13	12	14	2520000
Market 8		0	20000	17	13	17	340000
	400000	300000	200000				15710000

4.4 Form control

These are controls that can be drawn on the worksheet and can be used to update values in a cell or trigger macros. Some of the form controls are:

- ❖ Combo box
- ❖ List box
- ❖ Command button
- ❖ Spinner
- ❖ Scroll bar

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- ❖ Check box
- ❖ Option button

These controls are available in the 'Forms' toolbar. Select the required control and draw it on the sheet. Right click on the control's border and choose 'Format control' to customize the control. Each of these controls can be customized to send value to a cell. This will be the cell link of the control. Some of the controls like List Box and Combo Box will accept to range of input cells and send the out put to the linked cell.

4.5 Custom view

Define a custom view to view the sheet based on a specific setting. Click Views->Custom views to bring up the custom view dialog. Click 'Add' to define views. This is useful where the worksheet contains a number of columns and we need to view only a few columns most of the time according to the context. Hide unwanted columns and rows and create a view. When the view is called up, the display will be according to the view definition.

4.6 Protection

Excel offers different type of protection. These are

Protect cells

Protect sheet

Protect work book

Each of these protection functionalities works in conjunction with the other. Let us review these.

4.6.1 Cell protection

By default all the cells are locked. But the locking of the cell has no effect unless the sheet is protected. Similar to locking the cell formulas can also be hidden. In 'Format cells' click Protection and check the Locked and Hidden check boxes.

4.6.2 Protect sheet

Click Tools->Protection and Protect sheet. The protect sheet dialog displays a number of options. Check the required options and click Ok to protect the worksheet. Once the sheet is protected the locked cells cannot be edited. Before calling up the protection first select the cell of data entry and using format cell remove locking. Only values of these cells can be modified.

4.6.3 Protect workbook

Choose the kind of protection required. The options available are structure and widows. The structure protection will prevent the user from inserting or deleting the sheets. The windows option will cause the worksheet position in the screen to be locked at the same position.

4.6.4 Allow users to edit a range

This is a new facility in XP. Define a range of cells which will be editable when the worksheet is protected.

4.7 Sharing

Excel allows sharing of workbook amongst a group of users. This is useful where a list is being updated by several people in an organization. Click Tools->Share workbook and check the 'Allow changes by more than one user' check box. The file will be marked as 'Shared'. The other users then can open the file and work on. After a second user adds some data and saves the file, the

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changes will be visible in the file where the shared file is saved. The owner of the file will have the option to accept or reject changes by calling up Accept or Reject changes within Track changes in Tools menu.