Apple Events and Microsoft Excel 4.0

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Excel 4.0 responds to the core Apple events defined in the *Apple Event Registry* and defines 11 objects and approximately 65 properties that can be used as parameters to these Apple events. Using these events, objects, and properties, you can send data to and retrieve data from Excel; you can format worksheets; and you can create, format, and retrieve charts. Most events in the miscellaneous standard suite are supported, and Excel defines two additional Apple events. One of these, the "Do-Macro" event, allows a list of Excel functions or macros to be sent to Excel for evaluation and/or execution.

The first part of this document lists the Apple events to which Excel responds. The second section is a detailed description of Excel's objects and their properties. Each object description lists which events apply to it, and includes some examples. The style used is similar to that of the *Apple Event Registry.* The third section describes Excel's additional Apple events. It is assumed that the reader is familiar with Apple events, the Apple Event Object Model, and the *Apple Event Registry*.

Note: Setting some properties have the side effect of changing the selection. This is due to internal Excel limitations. In future versions of Excel, Apple events may not have the same effects on the selection. Thus, you should not make any assumptions about how Apple events affect the selection (unless the event explicitly changes the selection).

I. Apple Events

The Core Suite

Clone	Get Data Size
Close	Move
Count Elements	Open
Create Element	Print
Delete	Quit
Do Objects Exist	Save
Get Data	Set Data

Apple will be providing system handlers for the Get Class Info and Get Event Info events, so there is no code in Excel to respond to these.

The Miscellaneous Standards Suite

Begin Transaction	End Transaction
Copy	Paste
Create Publisher	Redo
Cut	Revert
Do Script	Undo

The Table Suite

The table suite does not define any Apple events, though it defines some objects. Excel supports and extends the definition of these objects.

Custom Events

Recalc
DoMacro

II. Objects and Their Properties

1. The Cell Object

Class:	`'ccel'`
Default Data Type:	`'cell'`

Notes:

• When the direct parameter of a GetData or SetData event is a cell object (as opposed to a property of a cell object), the data that is returned or the data that is set is an Apple event record corresponding to the cell object (which is described below). As a "feature," however, if the data to be set is text or numeric, then Excel automatically sets the formula of the cell.   Thus, you can say "set cell 1 of row 1 of the document named Worksheet1 to =ROW()*COLUMN()," rather than explicitly stating "set the formula of cell 1 ..."

• Many properties can be set to any text or numeric data. Either can be sent with a SetData event, since the Apple Event Manager will automatically coerce these as needed. In response to a GetData event, however, Excel will always return TEXT, unless it is asked to coerce to a numeric type (with the requested type parameter to the GetData event).

<u>**Properties**</u>

Protection
> Description: The protection of the cell
> Property ID: `'ppro'`
> Access: read/write
> Data Type: Enumeration:
>> Read Only　　`'nmod'`
>> Read/Write　　`'modf'`
>
> Notes: This property corresponds to the locked checkbox of the Cell Protection command in the Formula menu. In Excel, the protection of all cells is read only by default, but this setting does not take effect unless document protection is also read only.

Formula
> Description: The formula contained in the cell
> Property ID: `'pfor'`
> Access: read/write
> Data Type: Any text or numeric data
> Notes: There is no difference betwen setting the formula and value of a cell.

Value
> Description: The value in the cell
> Property ID: `'pval'`
> Access: read/write
> Data Type: Any text or numeric data
> Notes: There is no difference betwen setting the formula and value of a cell.

Text

Description: The text in a cell

Property ID: `'ptxt'`

Access: read-only

Data Type: TEXT

Notes: This returns the actual formatted text in a cell. For example, if a cell is formatted to show dollar values, getting the text of the cell will show the dollar sign.

Number Format

    Description: The formating code for a cell as indicated in the Number dialog in the Format menu
    Property ID: `'pnft'`
    Access: read/write
    Data Type: TEXT

Alignment

    Description: The horizontal alignment of a cell's contents
    Property ID: `'alig'`
    Access: read/write
    Data Type: Enumeration

General:	`'gnrl'`
Left:	`'left'`
Center:	`'cent'`
Right:	`'righ'`
Fill:	`'fill'`
Justified:	`'just'`
Center Across Selection:	`'cnsl'`

    or Numeric/Text: Instead of an enumeration code, you may pass a numeric/text value which is the same value used in the ALIGNMENT macro. See the Excel function reference for further details.
    Notes: This property corresponds to the horizontal radio group in the Alignment dialog under the format menu. Vertical alignment and orientation are not accessible via a property, but can be accessed with the DoScript AppleEvent.

Left Border
Right Border
Top Border
Bottom Border

    Description: The four borders of a cell
    Property ID: `'plbr'`, `'prbr'`, `'ptbr'`, `'pbbr'`
    Access: read/write
    Data Type: Enumeration

None:	`'none'`
Thin:	`'thin'`
Medium:	`'med '`
Dashed:	`'dash'`
Dotted:	`'dot '`
Thick:	`'thck'`
Double underline:	`'dbl '`
Hairline:	`'hair'`

    or Numeric/Text: Instead of an enumeration code, you may pass a numeric/text value which is the same value used in the BORDER macro. See the Excel function reference for further details.
    Notes: In a more perfect world, a cell would contain 4 border objects, named "left," "right," "top," and "bottom," and each of these objects would contain a type and a color, but this implementation was chosen for simplicity.

Left Border Color
Right Border Color
Top Border Color
Bottom Border Color
> Description: The color of a cell border
> Property ID: `'plbc', 'prbc', 'ptbc', 'pbbc'`
> Access: read/write
> Data Type: `'RGB '`
> Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Pattern
> Description: The pattern in the cell as indicated by the Patterns dialog in the Format menu.
> Property ID: `'ppat'`
> Access: read/write
> Data Type: typeBWPattern `'bwpt'`
> Notes: The type typeBWPattern is simply 8 bytes corresponding to a QuickDraw Pattern data structure. While the QuickDraw Graphics Suite of the *Apple Event Registry* provides for use of a pixelmap to pass patterns using Apple events, Excel only supports black and white patterns, so using an entire pixelmap data structure is not only unnecessary, but is a large amount of work (converting a BW Pattern to a pixmap and back). Thus, the type typeBWPattern has been defined for passing black and white patterns. Excel also includes a coercion handler to coerce from an AEList to typeBWPattern, so you can pass a list of 8 values rather than an typeBWPattern data type if this is easier.

Foreground Color
Background Color
> Description: The foreground and background colors of the pattern in the cell as indicated by the Patterns dialog in the Format menu. To set the color of the text in the cell, use the Color property below.
> Property ID: `'pfcl', 'pbcl'`
> Access: read/write
> Data Type: `'RGB '`
> Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record.   Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Cell Style
> Description: The cell's style as indicated by the style tool in the standard toolbar or the Style dialog in the format menu.
> Property ID: `'pcsy'`
> Access: read/write
> Data Type: `'TEXT'`

Font
> Description: The font of the text in the cell as indicated by the Font dialog in the Format menu or the font tool in the Text Formatting Toolbar.
> Property ID: `'font'`
> Access: read/write
> Data Type: `'TEXT'`

Font Size

> Description: The size of the font in the cell
> Property ID: `'ptsz'`
> Access: read/write
> Data Type: Any text or numeric type, or a 16.16 fixed point number (`'fixd'`)
> Notes: The 'fixd' data type can only be used in a SetData. GetData will always return TEXT or a numeric format.

Color

> Description: The color of the text in the cell, use the Color property below.
> Property ID: `'colr'`
> Access: read/write
> Data Type: `'RGB '`
> Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Name

> Description: The name assigned to the cell in the name dialog in the Formula menu
> Property ID: `'pnam'`
> Access: read/write
> Data Type: `'TEXT'`
> Notes: If the cell has not been assigned a name, then Excel will return a text descriptor of length 0, rather than returning an error.

Style

> Description: The character style of the characters in the cell
> Property ID: `'txst'`
> Access: read/write
> Data Type: `'tsty'` (typeTextStyles)
> Notes: You can also turn individual style properties on or off, by setting them to TRUE or FALSE, as indicated below.

Bold
Italic
Underline
Strikethrough
Outline
Shadow
Plain

> Description: Character styles of the characters in the cell
> Property ID: `'bold'`, `'ital'`, `'undl'`, `'strk'`, `'outl'`, `'shad'`, `'plan'`
> Access: read/write
> Data Type: Boolean

Elements

> None

Parent Class

Document, row, column, or the application object ('null').

> *Default parent classes*
> > If you leave out the document part of the object specifier, Excel will assume that you are referring to the topmost Worksheet.

Naming Forms

Apple Events and Microsoft Excel 4.0

Cells can be referred to by number or by name. Note that in general, Excel only supports the absolute index and the name key forms (i.e. the test keyForm is not supported).

By number:
• When referring to a cell in a row, the leftmost cell is cell 1, and the rightmost cell in the row is 256.
    i.e. cell 6 of row 2

• When referring to a cell in a column, the topmost cell is cell 1, and the bottomost cell is 16384.
    i.e. cell 32 of column 8

• When referring to a cell in a document, numering starts at the upper left, and proceeds in row-major order. Thus, A1 is cell 1, B1 is cell 2, A2 is cell 257, etc.

By name
To refer to a cell by name, you can use R1C1 style addressing, or use a name that has been defined on a spreadsheet. Thus, one can speak about "the cell named R5C5" and "the cell named Sales."

Apple Events

• GetData
• SetData
• Delete Deleting a cell object is defined as clearing that cell
• Clone   A cell can be cloned or moved into another cell or into a range object. When describing the destination object, the only valid preposition is 'rplc' (replacing), that is, before and after are not supported. When a cell is cloned into a range, the cell is cloned into every cell of the range.
• Move
• Create Publisher   any cell or range of cells can be published

Apple Events and Microsoft Excel 4.0

External Form

As the *Apple Event Registry* indicates, a cell object is an Apple event record of type 'cell' (typeCell), where each of the cell's properties is expressed in a keyWord parameter. Just as Excel has extended the definition of the cell object beyond its definition in the registry (by adding more properties), it has also extended the Registry's definition of the typeCell AppleEvent record. Excel's cell object simply contains more keyword parameters than the object in the registry (because there are more properties).

That said, here is Excel' cell object, an Apple event record of type `'cell'` (typeCell).

Property Name	KeyWord	Type
Protection	`'kptc'`	`'enum'` (see description above)
Formula	`'kfla'`	`'TEXT'`
Value	`'kval'`	`'TEXT'`
Text	`'ktxt'`	`'TEXT'`
Number Format	`'knft'`	`'TEXT'`
Alignment	`'klig'`	`'enum'` (see description above)
Left Border	`'klbr'`	`'enum'` (see description above)
Right Border	`'krbr'`	`'enum'` (see description above)
Top Border	`'ktbr'`	`'enum'` (see description above)
Bottom Border	`'kbbr'`	`'enum'` (see description above)
Left Border Color	`'klbc'`	`'RGB '` (6 bytes)
Right Border Color	`'krbc'`	`'RGB '` (6 bytes)
Top Border Color	`'ktbc'`	`'RGB '` (6 bytes)
Bottom Border Color	`'kbbc'`	`'RGB '` (6 bytes)
Pattern	`'kpat'`	`'bwpt'` (8 bytes)
Foreground Color	`'kfcl'`	`'RGB '` (6 bytes)
Background Color	`'kbcl'`	`'RGB '` (6 bytes)
Cell Style	`'kcsy'`	`'TEXT'`
Font	`'kont'`	`'TEXT'`
Size	`'ktsz'`	`'TEXT'`
Color	`'kolr'`	`'RGB '` (6 bytes)
Name	`'knam'`	`'TEXT'`
Style	`'kxst'`	`'tsty'` (a record of 2 lists)

2. The Range/Table Object

Class:	`'crng' / 'ctbl'`
Default Data Type:	`'rang', a list of lists  /  'tabl'  (typeTable)`

Notes:

• The table suite was not really designed with spreadsheets in mind. One example is the table data type (typeTable), an Apple event record with fields for name, protection, and finally, a row list. Spreadsheet ranges do not have protections distinct from the protections of their cells, and most do not have names distinct from their locations on the sheet (e.g. R1C1:R4C4). In returning the information for a range, then, one option was to use the table data type, and then just use the rowlist field. This, however, introduces needless complexity as well as an extra indirection. Thus, Excel returns the data for a range in a list of lists, where each sublist contains data for one row.
However, for compatibility, Excel *also* supports the table data type, as defined in the table suite chapter of the registry

• You can GetData a property of a range *or* a range itself. When you GetData a property of a range, Excel returns a list of lists (as described in the previous paragraph), where each sublist contains the values of the property for a row of the range. For example if the font of A1 was Times, B1 Helvetica, A2 Courier and B2 New York, *Get Data the font of the range named R1C1:R2C2* would return [[Times, Helvetica], [Courier, New York]]. When you GetData a range (as opposed to a property of that range), Excel's actions depend on the keyAERequestedType parameter to the GetData AppleEvent. If it is typeCell ('cell'), typeRange ('rang') or ommitted, Excel returns a list of lists of cell objects, whose structure is described in the external form section of the cell object. If typeText ('TEXT') is requested, Excel returns a list of lists of formulas (identical to requesting the formula property of the range).   If any numeric type is requested, Excel returns a list of lists of values (identical to requesting the value property of the range).
Everything in the previous paragraph also refers to tables, except you would use cTable ('ctbl') and typeTable ('tabl') instead of cRange ('crng') and typeRange ('rang').

• You can SetData a range or property of a range in two ways -- you can pass Excel a list of lists containing the values of the properties or cell objects (just like the GetData event would return). In this case, Excel will iterate through the range, applying values in the list of lists to the corresponding cell in the range. Alternatively, you can pass just one value, in which case this value is applied to all cells in the range.

 • One exception to the above GetData and SetData rules is the name property of a range, which applies to the entire range, not to each cell of the range individually.

Properties

All the properties of the cell object can be used wuth the range object. The use of the GetData and SetData events is described in the notes above.

Elements
None

Parent Class
Document, or the application object ('null').

Default parent classes
If you leave out the document part of the object specifier, Excel will assume that you are referring to the topmost Worksheet.

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Naming Forms

Ranges can be referred to by name in R1C1 format, e.g. "R5C5:R11C18," or by name, if you've named a range of cells (with Define Name).

Apple Events

• GetData   See notes above
• SetData   See notes above
                    • Clone A range can be cloned or moved into another range object. When describing the destination object, the only valid preposition is 'rplc' (replacing), that is, before and after are not supported.
• Move

External Form

As described above, a list of lists, where each lists contains data for one row is used to transport range objects. The individual descriptors in each of the sublists can be of several data types. In addition to allowing you to specify/ask for data elements as cell objects, you can also specify them as text or any numeric format. For example, if you wanted all the values of a range of cells as IEEE floating point numbers, you would use the type `'doub'` in the GetData event, and you would get a list of lists of these numbers rather than a list of cell objects (you could also do this by GetData-ing the value property of the range). When you leave out the type parameter, or ask for type cell or range/table, you get a list of list of cell objects, which are just Apple event records, as described above.

3. The Row Object

Class: 'crow'
Default Data Type: None

Properties

Height

        Description: The height of the row as expressed in the Row Height command in the Format Menu
        Property ID: 'prhi'
        Access: read/write
        Data Type: Any text or numeric format
        Note: Either text or a numeric format may be sent with a SetData event, since the AE Manager will automatically coerce these as needed. In response to a GetData event, however, Excel will always return TEXT, unless it is asked to coerce to a numeric type (with the requested type parameter to the GetData event).

Elements

        Cell

Parent Class

Document, or the application object ('null').

        Default parent classes

                If you leave out the document part of the object specifier, Excel will assume that you are referring to the topmost Worksheet.

Naming Forms

Rows may be referred to only by number, i.e. "Row 6."

Apple Events

• GetData
• SetData
• Create You can insert rows in two ways:
          a) You can insert a row before or after another row, i.e. Create row after row 3.
          b) If you have no destination object, or if the destination object is a document, then Excel will insert as many rows as are selected before the selection (just like the Insert... command on the Edit Menu does).
          Note that Excel does not examine the keyAEPropData paramter to the Create element AppleEvent.
• Delete   Deleting a row is equivalent to the Delete command on the Edit menu
• Clone   A row can be cloned or moved into another row object. When describing the destination object, the only valid preposition is 'rplc' (replacing), that is, before and after are not supported.
• Move
• Count Elements You can count how many rows are in a document. This lets you know the position of the last non-empty row in the document.

External Form

None. That is, you can't say "get row 1 of document 1."

4. The Column Object

Class:	`'ccol'`
Default Data Type:	None

Properties

Width

> Description: The width of the column as expressed in the Column Width command in the Format Menu
> Property ID: `'pcwi'`
> Access: read/write
> Data Type: Any text or numeric format
> Note: Either text or a numeric format may be sent with a SetData event, since the AE Manager will automatically coerce these as needed. In response to a GetData event, however, Excel will always return TEXT, unless it is asked to coerce to a numeric type (with the requested type parameter to the GetData event).

Elements
> Cell

Parent Class
Document, or the application object ('null').

> ***Default parent classes***
> > If you leave out the document part of the object specifier, Excel will assume that you are referring to the topmost Worksheet.

Naming Forms
Columns may be referred to by number or by name, i.e. "Column 6," or "Column J." Note that when referring to a column by name, you use the columns letter, that is, the tenth column is referred to as column J, not column C10.

Apple Events

• GetData
• SetData
• Create You can insert columns in two ways:
> a) You can insert a column before or after another column, i.e. Create column after column 3.
> b) If you have no destination object, or if the destination object is a document, then Excel will insert as many column as are selected before the selection (just like the Insert... command on the Edit Menu does).
> Note that Excel does not examine the keyAEPropData paramter to the Create element AppleEvent.
• Delete   Deleting a column is equivalent to the Delete command on the Edit menu
• Clone   A column can be cloned or moved into another column object. When describing the destination object, the only valid preposition is 'rplc' (replacing), that is, before and after are not supported.
• Move
• Count Elements You can count how many columns are in a document. This lets you know the position of the last non-empty column in the document.

External Form
None. That is, you can't say "get column 1 of document 1."

5. The Document Object

Class: 'docu'
Default Data Type: 'TEXT'

Note: When you GetData a document object, you get the document's name. You cannot SetData a document object.

Properties

Name
> Description: The name of the document
> Property ID: 'pnam'
> Access: read-only
> Data Type: 'TEXT'

Pathname
> Description: The pathname of the document (this does not include the document name). If the document has not been saved, GetData will return an error.
> Property ID: 'ppth'
> Access: read-only
> Data Type: 'TEXT'

Type
> Description: The type of the document
> Property ID: 'ptyp'
> Access: read-only
> Data Type: Enumeration:

Worksheet:	'wkst'
Macro Sheet:	'mcro'
Chart Sheet:	'chrt'
Workbook:	'wkbk'
Clipboard Window:	'clip'
Info Window:	'info'

Modified
> Description: Tells whether the document is "dirty."
> Property ID: 'imod'
> Access: read-only
> Data Type: Boolean

Cell Protection
Object Protection
        Description: Indicates whether cells or objects are protected on this sheet. These settings correspond to the
                checkboxes in the Protect Document dialog accessed through the Options menu.
        Property ID: `'pcpr', 'popr'`
        Access: read/write
        Data Type: Enumeration:

Read Only	`'nmod'`
Read/Write	`'modf'`

Number of Windows
        Description: The number of windows currently visible on the document
        Property ID: `'pnwn'`
        Access: read-only
        Data Type: `'long'`

Selection or User Selection

Description: The current selection on the document

Property ID: `'sele'` or `'pusl'`

Access: read/write

Data Type: `'TEXT' or 'obj '`

Notes: Cell selections can be gotten/set using either an object specifier or a textual representation ("R1C1:R5C4"). If the current selection is Excel's object layer (i.e. a rectangle, oval, button), then only the textual representation may be used. To change the current document, set the selection of the application object ('null') to a document object.

        Excel treats the selection and user selection properties identically.

Protection

Description: Indicates whether or not the document is modifiable

Property ID: `'ppro'`

Access: read-only

Data Type: Enumeration:

Read Only	`'nmod'`
Read/Write	`'modf'`

All window properties are also valid for documents. Window properties include Bounds, Has Title Bar, Index, Is Floating, Is Modal, Is Resizable, Is Zoomed, and IsVisible. See the description of the window object for more information.

<u>**Elements**</u>

Cell, Row, Column, Window

<u>**Parent Class**</u>

The application object ('null').

<u>**Naming Forms**</u>

Documents may be referred to by number (in which case z order) is used, or by name (in which case the name in the title bar is used).

<u>**Apple Events**</u>

• GetData

• SetData

• Create You can specify the type of the newly created document by passing the document type in the keyAEData paramter of the Create AppleEvent. You can either pass an enumeration value (described under the type property), or pass the same text/numeric value passed to the Excel NEW() macro.

    Note that Excel does not examine the keyAEPropData paramter to the Create Element AppleEvent.

• Save Excel will only bring up the standard file dialog if the interaction level of the Apple event is set to kAEAlwaysInteract.

• Close

• Print Excel will only bring up the print dialog if the interaction level of the Apple event is set to kAEAlwaysInteract.

• Revert

• Count Elements You can count the number of documents in the application object ('null')

<u>**External Form**</u>

None. Doing a GetData on a document object will return the document's title.   You can't do a SetData on a document object.

6. The Window Object

Class:	`'cwin'`
Default Data Type:	`'TEXT'`

Note: The word "window" means two different things in Excel. On the one hand, there are windows on the screen, so you can refer to window 1 or window 2. In this case, the application object ('null') is the parent class of the window. In addition, a document can also have several windows. In this case, the windows, created with the New Window command the the Window menu, are different views on the document. Thus, you can refer to "window 2 of document 1." In this case, the parent class of the window is a document. In Excel 4.0, you cannot refer to floating windows with Apple events.

When you GetData a window object, you get the document's name. You cannot SetData a window object.

Properties

Name
Description: The name of the window
Property ID: `'pnam'`
Access: read-only
Data Type: `'TEXT'`

Type
Description: The type of the document the window belongs to
Property ID: `'ptyp'`
Access: read-only
Data Type: Enumeration:

Worksheet:	`'wkst'`
Macro Sheet:	`'mcro'`
Chart Sheet:	`'chrt'`
Workbook:	`'wkbk'`
Clipboard Window:	`'clip'`
Info Window:	`'info'`

Selection or User Selection
Description: The current selection on the window
Property ID: `'sele' or 'pusl'`
Access: read/write
Data Type: `'TEXT' or 'obj '`
Notes: Cell selections can be gotten/set using either an object specifier or a textual representation ("R1C1:R5C4"). If the current selection is in Excel's object layer (i.e. a rectangle, oval, button), then only the textual representation may be used. To change the current window, set the selection of the application object ('null') to a window object.

Excel treats the selection and user selection properties identically.

Bounds
Description: The bounding rectangle of the window
Property ID: `'pbnd'`
Access: read/write
Data Type: `'qdrt'` (typeQDRectangle), 8 bytes specifying the rectangle's coordinates
Notes: Using the SetData AppleEvent, you can position the window in a position that the user would not ordinarily be able to put it, so be careful.

Has Title Bar

> Description: A boolean indicating whether the window has a title bar
> Property ID: `'ptit'`
> Access: read-only
> Data Type: `'bool'`
> Note: All Excel windows have titlebars.

Is Floating

> Description: A boolean indicating whether the window is a floating toolbar
> Property ID: `'isfl'`
> Access: read-only
> Data Type: `'bool'`
> Note: Excel 4.0 does not allow you to refer to floating windows with Apple events, so doing a GetData on this property will always return false.

Is Modal

> Description: A boolean indicating whether the window is a modal dialog
> Property ID: `'pmod'`
> Access: read-only
> Data Type: `'bool'`

Is Resizable

> Description: A boolean indicating whether the window is resizable
> Property ID: `'prsz'`
> Access: read-only
> Data Type: `'bool'`
> Note: All non-modal Excel windows are resizable.

Is Zoomed

> Description: A boolean indicating whether the window is zoomed
> Property ID: `'pzum'`
> Access: read/write
> Data Type: `'bool'`

Is Visible

> Description: A boolean indicating whether the window is visible
> Property ID: `'pvis'`
> Access: read/write
> Data Type: `'bool'`

Index

> Description: The z order of the window
> Property ID: `'pidx'`
> Access: read-only
> Data Type: Any text or numeric data type

Elements

> None

Parent Class

Document, or the application object ('null'), as described above.

Naming Forms

Windows may be referred to by number (in which case z order) is used, or by name (in which case the name in the

title bar is used).

Apple Events and Microsoft Excel 4.0

Apple Events

• GetData
• SetData
• Create The Create Element Apple event creates a new window (a new view) on an existing document. If you really want to create a new document, make a document the object type you want to create.
   Note that Excel does not examine the keyAEPropData paramter to the Create Element AppleEvent.
• Close

External Form

None. Doing a GetData on a window object will return the window's title.   You can't do a SetData on a window object.

7. The File Object

Class: 'file'
Default Data Type: none

Properties
None. If you think about it, it's really the Finder's job to give you information about files, not Excel. The raison d'etre of Excel's file object is to allow you to open and print files using the object model.

Elements
None

Parent Class
The application object ('null').

Naming Forms
Files can only be referred to by name. The name is interpreted as a relative pathname of a full pathname, using the same rules that Excel and the Macintosh OS use. Excel contains a coercion handler that maps text to an alias record.

Apple Events

• Open
• Print

External Form

None. Doing a GetData on a file object will fail.

8. The Application Object

Class: 'null'
Default Data Type: none

Properties

Clipboard
> Description: The contents of the clipboard
> Property ID: 'pcli'
> Access: read-only
> Data Type: any legal clipboard type; if omitted, PICT is used
> Note: The Macintosh Toolbox doesn't "properly" handle the case of a background application accessing the clipboard (that is, GetScrap and PutScrap do not operate on the data pointed to by the low memory global ScrapHandle). Thus, getting the clipboard property has some restrictions. Basically, when you GetData the clipboard, the application should be in the same state (foreground or background) that is was when the data was put on the clipboard (e.g if the app is in the background when you send the GetData, the data should also have been copied to the clipboard when the app was in the background (and the same for foreground).

Is Front Process
> Description: A boolean indicating whether Excel is the foreground application
> Property ID: 'pisf'
> Access: read-only
> Data Type: 'bool'

Text Item Delimiter
> Description: The character Excel uses to delimit items in lists
> Property ID: 'txdl'
> Access: read-only
> Data Type: 'TEXT'
> Note: It's a comma.

Version
> Description: The version of Excel being used
> Property ID: 'vers'
> Access: read-only
> Data Type: 'long'
> **Note: This returns the version longword. For Excel 4.0, it's (obviously) 0x00040000.**

Calculation
> Description: Excel's current recalculation mode
> Property ID: 'pclc'
> Access: read/write
> Data Type: Enumeration
> > Automatic: 'auto'
> > Automatic Except Tables: 'antb'
> > Manual: 'manl'
> *or* Numeric/Text: Instead of an enumeration code, you may pass a numeric/text value which is the same value used in the CALCULATION macro. See the Excel function reference for further details.
> Notes: This property corresponds to the calculation radio group in the Calculation dialog under the Options menu.

Apple Events and Microsoft Excel 4.0

Iteration

Description: A boolean indicating whether or not iteration is turned on
Property ID: `'pitr'`
Access: read/write
Data Type: `'bool'`
Notes: This property corresponds to the iteration checkbox in the Calculation dialog under the Options menu.

Name

Description: The localized name of Excel, as shown in the About Box
Property ID: `'pnam'`
Access: read-only
Data Type: `'TEXT'`

Selection or User Selection

Description: The current selection in Excel
Property ID: `'sele'` or `'pusl'`
Access: read/write
Data Type: `'TEXT'` or `'obj '`
Notes: The selection can be set to a cell or range, items in Excel's object layer, or a document. Selecting items in a chart is not supported.

Cell selections can be gotten/set using either an object specifier or a textual representation ("R1C1:R5C4"). If the current selection is Excel's object layer (i.e. a rectangle, oval, button), then only the textual representation may be used.

Unlike the selection property of documents and windows, the selection property of the application object contains either the document name (if text is being returned) or a document object (if an object specifier is being used).

To change the current document, set the selection of the application object ('null') to a document object.

Excel treats the selection and user selection properties identically.

Elements

Documents, Windows, Rows, Columns, Cells, Ranges, Files, Charts, Axes, Series

Naming Forms

None

Apple Events

• GetData
• SetData
• Count Elements   You can count the number of open documents.

External Form

None. Doing a GetData on a application object will fail.

9. The Chart Object

Class:	`'chrt'`
Default Data Type:	`'PICT' or 'SPIC'`

<u>Notes:</u>
• When you do a GetData on a chart object, you get a PICT that is rendered for printing, which will typically be black and white (unless the print with color checkbox of the print dialog was set). If you want a color chart , set the desired data type of the GetData event to `'SPIC'` (for screen picture).
• Excel contains 2 kinds of charts--chart documents and chart objects that exist on Worksheets. You may refer to either with Apple events. To refer to a chart doucments, use a parent class of 'null', and to refer to a chart object on a worksheet, use a parent class of document.
• Apple events in Excel 4.0 only provide access to main charts, not overlay charts.

Properties
Title
Description: The title of the chart
Property ID: `'pttl'`
Access: read/write
Data Type: A chart title is an object of class ChartText, which means you can gert/set font name, font size, color, style and individual style elements, pattern, and the pattern's forecolor and backcolor. See the class ChartText for more information.

The Class ChartText
Class: 'cctx'
Default Data Type: none

Note that there is no actual ChartText object in Excel. Rather, other objects (that are properties) are of the class ChartText (for example, a chart title, or an axis label). Thus, you never refer to "the ChartText of ..." Instead, you refer to "the title of chart 1," or "the label of axis "category" of chart 1."

Properties
Font
Description: The font of the text in the cell as indicated by the Font dialog in the Format menu or the font tool in the Text Formatting Toolbar.
Property ID: `'font'`
Access: read/write
Data Type: `'TEXT'`

Size
Description: The size of the font in the cell
Property ID: `'ptsz'`
Access: read/write
Data Type: Any text or numeric type, or a 16.16 fixed point number (`'fixd'`)
Notes: The 'fixd' data type can only be used in a SetData. GetData will always return TEXT or a numeric format.

Color
Description: The color of the text.
Property ID: `'colr'`
Access: read/write
Data Type: `'RGB '`

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Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Style
Description: The character style of the characters in the cell
Property ID: `'txst'`
Access: read/write
Data Type: `'tsty'` (typeTextStyles)
Notes: You can also turn individual style properties on or off, by setting them to TRUE or FALSE, as indicated below.

Bold
Italic
Underline
Strikethrough
Outline
Shadow
Plain
Description: Character styles of the characters in the cell
Property ID: `'bold'`, `'ital'`, `'undl'`, `'strk'`, `'outl'`, `'shad'`, `'plan'`
Access: read/write
Data Type: Boolean

Pattern
Description: The pattern in the cell as indicated by the Patterns dialog in the Format menu.
Property ID: `'ppat'`
Access: read/write
Data Type: typeBWPattern `'bwpt'`
Notes: The type `typeBWPattern` is simply 8 bytes corresponding to a QuickDraw Pattern data structure. While the QuickDraw Graphics Suite of the *Apple Event Registry* provides for use of a pixelmap to pass patterns using Apple events, Excel only supports black and white patterns, so using an entire pixelmap data structure is not only unnecessary, but is a large amount of work (converting a BW Pattern to a pixmap and back). Thus, the type `typeBWPattern` has been defined for passing black and white patterns.   Excel also includes a coercion handler to coerce from an AEList to `typeBWPattern`, so you can pass a list of 8 values rather than an `typeBWPattern` data type if this is easier.

Foreground Color
Background Color
Description: The foreground and background colors of the pattern in the cell as indicated by the Patterns dialog in the Format menu. To set the color of the text, use the Color property above.
Property ID: `'pfcl'`, `'pbcl'`
Access: read/write
Data Type: `'RGB '`
Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

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Number of Series
>Description: The number of series in the chart
>Property ID: `'pcsr'`
>Access: read-only
>Data Type: any text or numeric type

Type
>Description: The type of chart
>Property ID: `'ptyp'`
>Access: read/write
>Data Type: Enumeration

Area:	`'area'`
Bar:	`'bar '`
Column:	`'col '`
Line:	`'line'`
Pie:	`'pie '`
Scatter:	`'xy  '`
Three D Area:	`'3ara'`
Three D Column:	`'3col'`
Three D Line:	`'3lin'`
Three D Pie:	`'3pie'`
Three D Bar:	`'3bar'`
Three D Surface:	`'3sur'`
Radar:	`'radr'`

>*or* Numeric/Text: Instead of an enumeration code, you may pass a numeric/text value which is the same value used in the FORMAT.MAIN macro. See the Excel function reference for further details.

Variant
>Description: The variant of the chart type, as shown in the chart gallery
>Property ID: `'pcvr'`
>Access: read/write
>Data Type: any TEXT or numeric format

Has Legend
>Description: A boolean indicating whether the chart has a legend
>Property ID: `'phld'`
>Access: read/write
>Data Type: `'bool'`

Pattern
>Description: The pattern of the chart background as indicated by the Patterns dialog in the Format menu.
>Property ID: `'ppat'`
>Access: read/write
>Data Type: `typeBWPattern 'bwpt'`
>Notes: The type `typeBWPattern` is simply 8 bytes corresponding to a QuickDraw Pattern data structure. While the QuickDraw Graphics Suite of the *Apple Event Registry* provides for use of a pixelmap to pass patterns using Apple events, Excel only supports black and white patterns, so using an entire pixelmap data structure is not only unnecessary, but is a large amount of work (converting a BW Pattern to a pixmap and back). Thus, the type `typeBWPattern` has been defined for passing black and white patterns. Excel also includes a coercion handler to coerce from an AEList to `typeBWPattern`, so you can pass a list of 8 values rather than an `typeBWPattern` data type if this is easier.

Apple Events and Microsoft Excel 4.0

Foreground Color
Background Color
> Description: The foreground and background colors of the pattern of the chart background as indicated by the Patterns dialog in the Format menu.
> Property ID: `'pfcl'`, `'pbcl'`
> Access: read/write
> Data Type: `'RGB '`
> Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Elements
> Axis, Series

Parent Class
Document, or the application object ('null'), as described above.

Naming Forms
If referring to a chart document (the parent class in 'null'), then charts may be referred to by name or by z order (this z order applies only to chart documents, ignoring all other types of documents).

When referring to a chart object on a worksheet, charts may be referred to by name (in which case the object name is used, i.e. "Chart 5"), or by number, in which case Excel looks at all chart objects, and returns the one in the *position* you specify (thus, if there are 3 chart objects, "Chart 5," "Chart 7," and ""Chart 14", asking for chart 2 refers to "Chart 7."

Apple Events

• GetData
• SetData
• Create To create a new chart, first set the selection property (of the application or a document) to the data you want to chart (yes, this is unfortunate, but is pretty fundamental to Excel). To create a chart document, use the class chart ('chrt') as the class of object to create, and omit the container parameter. To create a chart object in a worksheet, use the class chart ('chrt') as the class of object to create, and make the chart's container a range object.

> When a new chart is created by the user, and the first column contains numeric data, Excel typically asks the user whether the first column contains the first data series, X axis labels, or X values for an XY chart. To pass the same information to Excel, you can pass a text/numeric value in the keyAEData parameter of the Create element AppleEvent.   Pass 1,2, or 3. If this value is left out, Excel assumes 1 (first data series).

> Note that Excel does not examine the keyAEPropData paramter to the Create Element AppleEvent.

• Delete You can only delete a chart object on a Worksheet. To delete a chart document, send a close event to the document object.
• Clone
> You can copy a chart or chart object into the clipboard (with the Copy AppleEvent), or you can clone a chart document "into" a range of cells on a Worksheet (thus converting a chart document into a chart object on a Worksheet). Use the preposition 'rplc' (replacing) in the insertion loc parameter in the clone event.
• Create Publisher

External Form

As described in the note above, PICT is the only external form for charts (there is no chart AERecord).

10. The Series Object

Class: `'cser'`
Default Data Type: typeSeries (`'sers'`), an Apple event record

Notes:

> • You can only use Apple events to access series in a main chart, not an overlay chart.
> • You can manipulate series objects, i.e. get series 1 of chart 1, or set series 4 of chart 2 to <a series object>, or Create series after series 4, etc.

Properties

Name

> Description: The name of the series
> Property ID: `'pnam'`
> Access: read-only
> Data Type: If a series does not have an explicit name (that is, if there was no series label in the data that created the chart, series are named "Series 1, Series 2," etc.

Pattern

> Description: The pattern of the series as indicated by the Patterns dialog in the Format menu.
> Property ID: `'ppat'`
> Access: read/write
> Data Type: typeBWPattern `'bwpt'`
> Notes: The type `typeBWPattern` is simply 8 bytes corresponding to a QuickDraw Pattern data structure. While the QuickDraw Graphics Suite of the *Apple Event Registry* provides for use of a pixelmap to pass patterns using Apple events, Excel only supports black and white patterns, so using an entire pixelmap data structure is not only unnecessary, but is a large amount of work (converting a BW Pattern to a pixmap and back). Thus, the type `typeBWPattern` has been defined for passing black and white patterns. Excel also includes a coercion handler to coerce from an AEList to `typeBWPattern`, so you can pass a list of 8 values rather than an `typeBWPattern` data type if this is easier.

Foreground Color
Background Color

> Description: The foreground and background colors of the pattern of the series as indicated by the Patterns dialog in the Format menu.
> Property ID: `'pfcl'`, `'pbcl'`
> Access: read/write
> Data Type: `'RGB '`
> Notes: As indicated in the registry, the 'RGB ' data type is simply 6 bytes corresponding to a Color QuickDraw RGBColor record. Excel also includes a coercion handler to coerce from an AEList to the RGB data type, so you can pass a list of 3 values rather than an RGB data type if this is easier.

Elements
> None

Parent Class
Chart, or the application object ('null').

> ### *Default parent classes*
> > If you leave out the chart part of the object specifier, Excel will assume that you are referring to

the topmost sheet. If the topmost sheet is not a chart, an error will be returned.

Apple Events and Microsoft Excel 4.0

Naming Forms
A series may be referred to by name or number. When referring to a series by name, you can either use the series' actual name, if it has one, or "Series *n*" for the nth series, if that series does not have a name.

Apple Events

• GetData
• SetData
• Create A new series can be created before, after, or replacing an existing series. The keyAEData parameter of the Create Element Apple event should be a series object -- an Apple event record of type series.
• Delete You can only delete a chart object on a Worksheet. To delete a chart document, send a close event to the document object.

External Form

The external form of a series is typeSeries ('sers') which is an Apple event record with 2 elements:
keyAEName   'knam'   a descriptor of type 'TEXT' with the series' name
keyAESeriesData 'kcsd'   an Apple event list of typePoint ('srpt') Apple event records,
                                            where the point record is as follows:

       keyAEYValue   'kcyv'   an IEEE floating point number ('doub') with the Y value of the point

       keyAEXValue   'kcxv'   an IEEE floating point number ('doub') with the X value of the point
or: keyAEXLabel   'kcxl'   a 'TEXT' descriptor for the X label of the point

(scatter and surface (x/y) charts use keyAEXValue, and all other charts use keyAEXLabel)

11. The Axis Object

Class: `'ccax'`
Default Data Type: `none`

Notes:

> • You can only use Apple events to access the axes of a main chart, not an overlay chart.

Properties

Label
> Description: The label of the axis
> Property ID: `'paxl'`
> Access: read/write
> Data Type: An axis label is an object of class ChartText, which means you can gert/set font name, font size, color, style and individual style elements, pattern, and the pattern's forecolor and backcolor. See the class ChartText (described above) for more information.

Is Visible
> Description: A boolean indicating whether or not the axis is visible
> Property ID: `'pvis'`
> Access: read/write
> Data Type: `'bool'`

Min
Max
> Description: The minimum and maximum values on the axis
> Property ID: `'pamn', 'pamx'`
> Access: read/write
> Data Type: `'TEXT'` or any numeric type
> Note: You can only set these properties on the y axis (or the x axis of a scatter chart). Whenever Excel can return TEXT or numeric data in response to a GetData event, Excel always returns TEXT unless you ask for a specific numeric type.

Major Step
Minor Step
> Description: The major and minor step values along the axis
> Property ID: `'pajs', 'pans'`
> Access: read/write
> Data Type: `'TEXT'` or any numeric type
> Note: The minor step value only matters when minor tick type is something other than 'none'.
> You can only set these properties on the y axis (or the x axis of a scatter chart). Whenever Excel can return TEXT or numeric data in response to a GetData event, Excel always returns TEXT unless you ask for a specific numeric type.

Major Tick Type
Minor Tick Type
> Description: The kind of tick mark Excel uses at major and minor step increments
> Property ID: `'pajt', 'pant'`
> Access: read/write
> Data Type: Enumeration
>> None: `'none'`
>> Inside: `'insi'`
>> Outside: `'outs'`

      Cross: `'cros'`

or Numeric/Text: Instead of an enumeration code, you may pass a numeric/text value which is the same value used in the PATTERNS macro. See the Excel function reference for further details.

Elements
None

Parent Class
Chart, or the application object ('null').

Default parent classes
If you leave out the chart part of the object specifier, Excel will assume that you are referring to the topmost sheet. If the topmost sheet is not a chart, an error will be returned.

Naming Forms
Axes may be referred to by name or by number. When referring to axes by name, you can use either "X," "Y," or "Z," or "Category," "Value," or "Series." When referring to axes by number the x, y, and z axes are always 1, 2, or 3.

Apple Events

• GetData
• SetData

External Form

None, that is, you can't do a GetData on an axis object.

III. Excel's Additional Apple Events

1. The Recalculate AppleEvent

The recalculate Apple event forces a recalculation of all sheets. This useful if recalculation has been set to manual (calculation mode is a property of the application object, described above).

Class:	'XCEL'
Event ID:	'rclc'
Parameters:	None
Return Value:	None (this always succeeds)

2. The DoMacro or DoScript AppleEvent

This Apple event allows you to pass Excel a function or macro to evaluate /execute, or a list of functions and macros to be evaluated/executed. Excel returns the results of evaluating/executing the function(s) and macro(s). If Excel is passed a single function/macro, it returns a single result; if passed a list, Excel will return a list of results.

Almost any legal expression can be used. For example, you could evaluate SIN(PI()/2)*COS("R1C1"), or PATTERNS(1,1,1). This Apple event is a good way to access Excel's functionality if you haven't mastered the Apple Event Object Model, or if the things you want to do are not accessible via the Excel object model (i.e. changing the date mode from 1904 to 1900).

You should not precede your command with an equals sign, as you would in a macro sheet. Also, all of your references must be quoted R1C1 format references.

Class:	'XCEL'	or	Class:	'aevt'
Event ID:	'mcro'		EventID:	'dosc'

Parameters: The direct parameter should either be a single TEXT descriptor that is the function or macro to be executed or an Apple event list of functions/macros to be executed.

Results: The direct parameter of the result contains either a single value or an Apple event list of values containing the results of evaluaing/executing the function(s) or macro(s) that were passed to Excel.