Technote 1188

Packages in Mac OS 9

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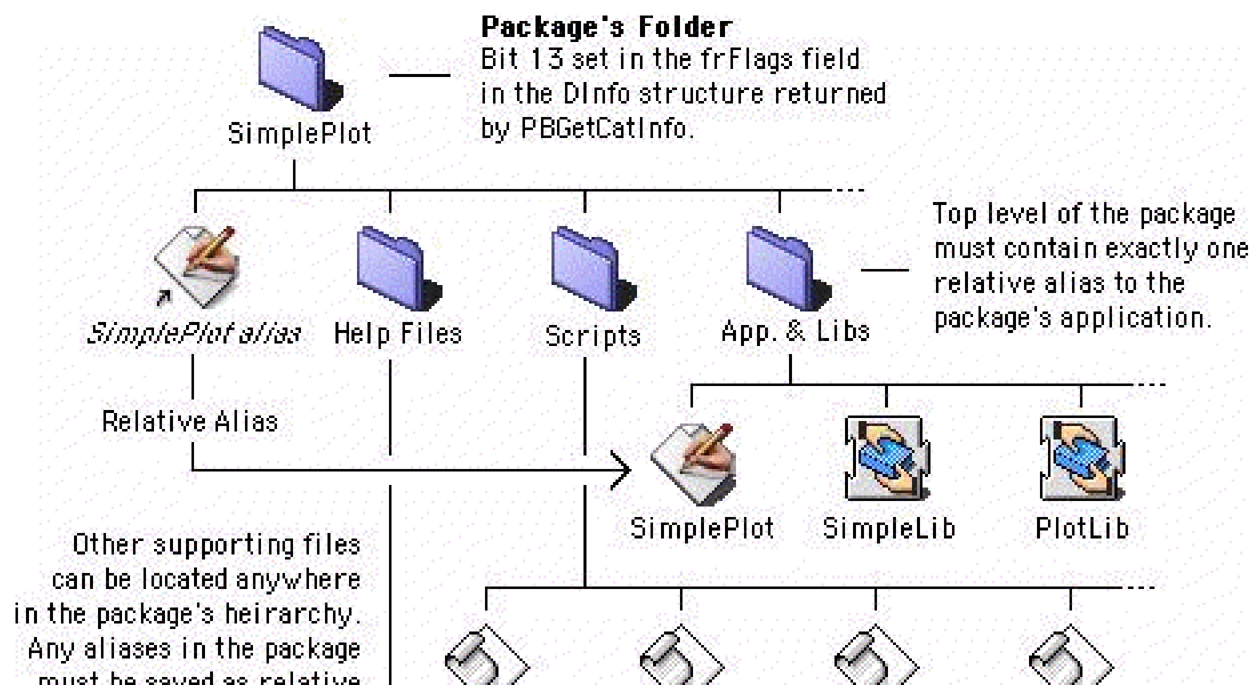
This Technote describes how the Finder implements packages in Mac OS 9. Developers interested in creating packages for use in Mac OS 9 can use this document as a guide for creating packages. Mac OS 9 packages offer a simple consolidated experience for the user when interacting with a package in the Finder's windows, while at the same time preventing accidental tampering with a package's required support files.

For Mac OS X package compatibility, an additional package specification for Mac OS X will be released as an adjunct to the Mac OS 9 package specification described in this document. Upon release of this additional specification, developers will be able to create packages to be used in either Mac OS 9 or Mac OS X.

Overview

Packages in Mac OS 9 are not complex. Simply said, a Package in Mac OS 9 is a folder with the "package bit" set that contains exactly one alias file at the topmost level. Normally, a package will consist of an application and a number of support files organized into sub-directories. There is only one requirement governing the internal organization of packages, and there are no restrictions on how package sub-directories can be named, how package sub-directories must be organized, or what package sub-directories must contain. Figure 1 provides an illustration of a hypothetical package named SimplePlot.


Package's Folder
Bit 13 set in the frFlags field in the DInfo structure returned by PBGetCatInfo.
SimplePlot
SimplePlot alias
Help Files
Scripts
App. & Libs
Top level of the package must contain exactly one relative alias to the package's application.
Relative Alias
SimplePlot
SimpleLib
PlotLib
Other supporting files can be located anywhere in the package's heirarchy.
Any aliases in the package

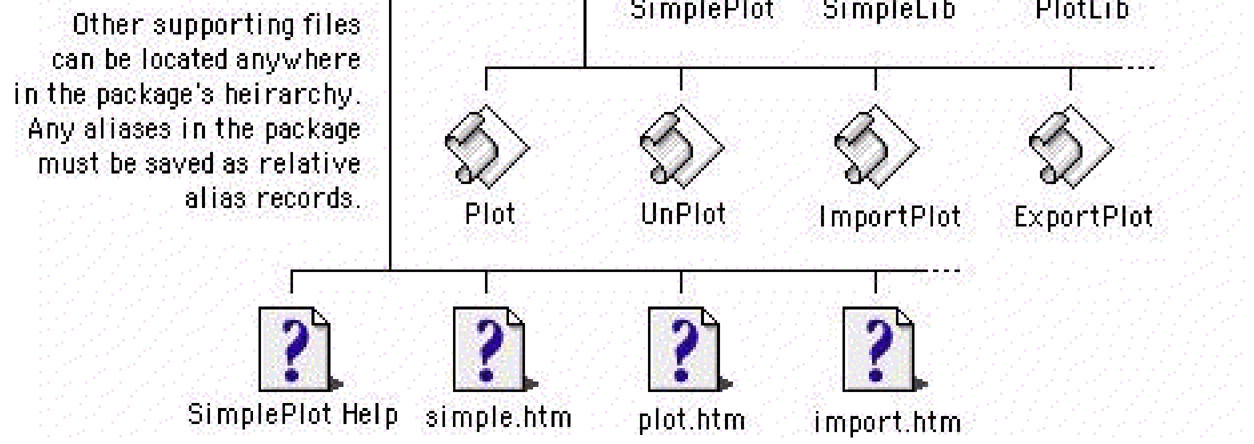

Other supporting files can be located anywhere in the package's heirarchy. Any aliases in the package must be saved as relative alias records.
SimplePlot
SimpleLib
PlotLib
Plot
UnPlot
ImportPlot
ExportPlot
SimplePlot Help
simple.htm
plot.htm
import.htm

Figure 1. Sample package directory layout.

Although requirements for packages in Mac OS 9 are few, Figure 1 illustrates the two main requirements for packages: the appropriate Finder flag must be set for the package's folder and exactly one relative alias must be present in the top-level of the package's directory hierarchy.

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The Package Flag

The folder containing the package has bit 13 (for files, the `hasBundle` bit) set in its Finder flags. For files, this bit is known as the "bundle bit" indicating that the file contains a `'BNDL'` resource that is used by the Finder to determine how the file's icon is displayed. For more information about how the Finder `'BNDL'` resources see the Finder Interface chapter of Inside Macintosh: Macintosh Toolbox Essentials .

In Mac OS 9, any folder having this bit set is recognized as a package. If this bit is set, and the folder contains exactly one alias at its topmost level, then the Finder will treat the folder as a package.

In some circumstances, due to a software problem or a crash, a folder may wind up having the package bit set when in fact it is not a package. In this case, the Finder will treat such a folder as a "damaged package" and its icon will appear as a blank document with the kind string set to "package." To correct this problem, there is a utility called "Package First Aid" provided on the Mac OS 9 install CD.

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The Top-Level Alias File

The package's folder contains exactly one alias file at its topmost level. This alias points to some other file in the package's directory hierarchy; and, it should be a relative alias so that it will remain valid if a package is copied to another volume. In this discussion, the file pointed to by that alias is called the "package's main file."

COMPATIBILITY NOTE
Although the top-level alias file refers to an "application" in the example shown in Figure 1, there is no requirement that the main file in a package must be an application. It is possible to create many types of packages including document packages, library packages, et cetera. However, the primary focus for Mac OS 9 is application packages.

The package's main file governs the behavior of the package in the Finder's windows. For all intents and purposes, the Finder treats the package as if it were a file containing the `'BNDL'`, `'FREF'`, icon resources, et cetera found in the package's main file.

For example, when a file is dragged over a package's icon, the Finder will track the drag command exactly as if the file was being dragged over the package's main file. Referring to Figure 1, say the application SimplePlot's `'BNDL'` resource indicated it was capable of opening files of type `'PLOT'`, then:

1. The Finder will allow the user to drop files of type `'PLOT'` into the SimplePlot package and the package's icon will be hilited appropriately during drag operations,

2. If a user drops a file of type `'PLOT'` into the SimplePlot package, the Finder will Launch the SimplePlot application, if it is not already running, and send an "open documents" Apple event to the application asking it to open the file.

There are two ways to create the relative alias file required for a package. The first is to manually create an alias file in the Finder using the "Make Alias" command. The second, is to make the appropriate calls to the Resource Manager and the Alias Manager in software as shown in Listing 1.

```
/* MakeRelativeAliasFile creates a new alias file located at
    aliasDest referring to the targetFile.  relative path
    information is stored in the new file. */

OSErr MakeRelativeAliasFile(FSSpec *targetFile, FSSpec *aliasDest) {
    FInfo fndrInfo;
    AliasHandle theAlias;
    Boolean fileCreated;
    short rsrc;
    OSErr err;
        /* set up locals */
    theAlias = NULL;
    fileCreated = false;
    rsrc = -1;
        /* set up our the alias' file information */
    err = FSpGetFInfo(targetFile,
&fndrInfo);
    if (err != noErr) goto bail;
    if (fndrInfo.fdType == 'APPL')
        fndrInfo.fdType = kApplicationAliasType;
    fndrInfo.fdFlags = kIsAlias; /* implicitly clear the inited bit */
        /* create the new file */
    FSpCreateResFile(aliasD
est, 'TEMP', 'TEMP', smSystemScript);
    if ((err = ResError()) !=
noErr) goto bail;
    fileCreated = true;
        /* set the file information or the new file */
    err = FSpSetFInfo(aliasDest,
&fndrInfo);
    if (err != noErr) goto bail;
        /* create the alias record, relative to the new alias file */
    err = NewAlias(aliasDest,
targetFile, &theAlias);
    if (err != noErr) goto bail;
        /* save the resource */
    rsrc = FSpOpenResFile(aliasDes
t, fsRdWrPerm);
    if (rsrc == -1) { err = ResError(); goto
bail; }
```

```
    UseResFile(rsrc);
    AddResource((Handle) th
eAlias, rAliasType, 0, aliasDest->name);
    if ((err = ResError()) !=
noErr) goto bail;
    theAlias = NULL;
    CloseResFile(rsrc);
    rsrc = -1;
    if ((err = ResError()) !=
noErr) goto bail;
        /* done */
    return noErr;
bail:
    if (rsrc != -1) CloseResFile(rsrc);
    if (fileCreated) FSpDelete(aliasDest);
    if (theAlias != NULL) DisposeHandle((Handle)
theAlias);
    return err;
}
```

Listing 1. Sample routine for creating a relative alias file.

Developers interested in creating an application for automating the creation of packages will want to employ some method similar to the routine shown in Figure 1. Other options include using the Finder's "Make Alias" command or creating aliases using AppleScript. The advantage of calling `NewAlias` directly is that you have more control over how the alias is created and are able to specify which file is used for constructing relative aliases.

COMPATIBILITY NOTE
When creating aliases using either the Finder's "Make Alias" command, or the method shown in Figure 1, be sure that File Sharing is turned off. If file sharing is turned on, then full path information such as the server name, etc., is stored in the alias making it unsuitable for use in packages. Be sure file sharing is turned off before creating any aliases used in packages.

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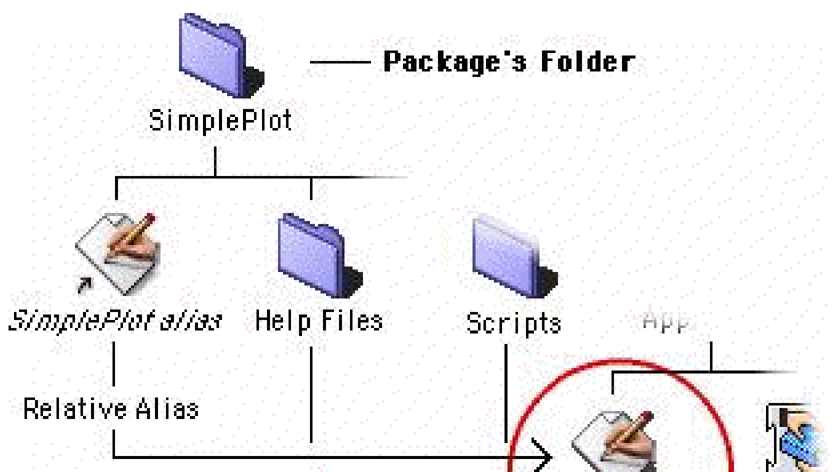
The Package's Main File

In the context of the Finder's windows, a package will behave as if it were a file or an application. And, all of the properties of the package's icon are determined by the package's main file. As shown in Figure 2, this is the file referred to by the package's top-level alias file.



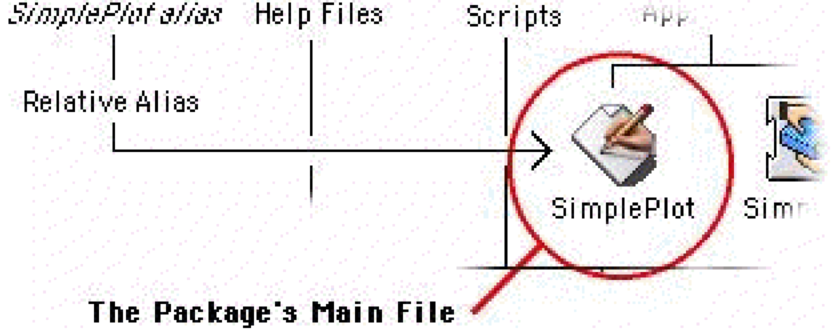


Figure 2. The package's main file.

For example, if the package's main file is an application, then the package will look and feel like an application; and, if the package's main file is a document, then the package will look and feel like a document. The package's main file is used by the Finder to determine the majority of the external characteristics of the package. These characteristics include:

- The package's icon,
- The package's kind (application, document, et cetera),
- The Get Info data (Excluding the package's size: a package's size is the total of the sizes of all of the package's contents. Also, the package's size is displayed in the Get Info window without reference to the number of items in the package's folder.),
- Drag-and-drop information,
- The `kIsStationery` and `kHasCustomIcon` Finder flags from package's main file are used when displaying the package. The other Finder flags - specifically the invisible, name locked, inited, bundle, and color flags - are taken from the package folder's flags instead of the main file's flags.

In general, a package will have all the same properties as the package's main file. Points where they differ include:

- The package's size is the total size of package folder contents,
- The main file's name and the package's name may differ. This allows the user to edit the name of the package without disturbing the name of the package's main file.

Application packages (package's whose main file is an application) accept drag-and-drop operations in Finder windows in the same way application files accept drag-and-drop operations in Finder windows. Here, the acceptance of a drag-and-drop is governed by the properties of the package's main file, and if a drop is allowed, then the Finder will send the appropriate Apple event to the package's main file.

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Other Support Files

One of the key features of packages is the developer's ability to consolidate many support files together with the main application. By taking advantage of this facility, developers can group the files used in a product in a way that both simplifies the user's task of dealing with the product in the Finder's windows and prevents tampering with the arrangement of the support files used in the product.

COMPATIBILITY NOTE
Developers currently placing support files for their applications in the System Folder should consider

consolidating their applications and support files into packages for Mac OS 9.

A package may contain a complex hierarchy of support files, shared libraries, and other types of files used by the application in its operation. Also, it is not unreasonable to suppose that a package may contain one or more application files that in some way lend to the overall facility provided by the package. In Figure 1, the package contains a number of support files including private shared libraries presumably used by the main application, a number of AppleScript scripts, and a suite of help files.

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The Optional Open Document Event Parameter

Application packages may receive a open document `'odoc'` Apple events containing an optional parameter with the key `'fpdl'` (Finder package document list). This will be sent to the package when the Finder is asked to open any file inside of a package. There are a few ways this can happen:

- While running under a previous version of Mac OS, the user created an alias referring to an item inside of the package's folder and put the alias somewhere outside of the package's folder. Then, after switching to Mac OS 9, they attempted to open the item by double clicking on the alias.
- An open document event targeting one or more items inside of the package's folder was sent to the Finder by some other application.
- An alias to an item inside of a package is dropped onto another application. In this case, rather than launching the application that the alias was dropped onto, the Finder will launch the package's application and send it an open document event containing a `'fpdl'` parameter referring to the file.

In either case, the Finder will not open the items in the way that it usually does. Instead, the Finder will package the items into an open document Apple event in a `'fpdl'` parameter and send the event to the package's application. The structure of the `'fpdl'` parameter is identical to the structure of the `keyDirectObject` open document event parameter - it is a list of file aliases. The only difference is, the aliases will all refer to files or folders inside of the application's directory.

Your open document event handler should be designed to handle each of the three different combinations of event parameters it can receive:

- Open document events without the optional `'fpdl'` parameter.
- Open document events where the `keyDirectObject` is an empty list referring to no documents, but the optional `'fpdl'` parameter contains a list referring to one or more documents.
- Open document events where the `keyDirectObject` contains a list referring to one or more documents and the optional `'fpdl'` parameter contains a list referring to one or more documents.

In general, the main application's open document event handler should always look for the optional `'fpdl'` parameter and take appropriate actions when it is there. At the very least, the application should provide appropriate feedback to the user indicating that the requested file is an internal part of the package and cannot be opened. Other situations may call for different kinds of processing; for example, say the `'fpdl'` parameter contains a reference to a help file inside of the package, then it would be appropriate for the application to open that help file and display its contents.

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Package Compatibility Notes

Packages cannot be shared by way of Personal File Sharing in Mac OS 9.

The StandardFile dialogs are not aware of packages. As a result, it is possible for users to use these windows to navigate into package folders and either attempt to open documents inside of them or save documents inside of packages. Navigation Services has been updated to recognize packages and it does not allow users to navigate into them (unless specifically directed to do so).

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Downloadables

Acrobat version of this Note (98K).

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Acknowledgments

Special thanks to Pat McClaughry and the Finder Team.

And, thanks to Tim Holmes, Ingrid Kelly, Quinn "The Eskimo!", Karl Schlosser (Editor), John C. Signa, and David J. Wright.

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Updated: 11-October-1999