Running Macintosh Programs Under A/UX

A/UX is Apple's version of the UNIX operating system, which provides a multitasking and multi-user environment in which users can run applications. One of the most distinctive features of A/UX in comparison with other implementations of the UNIX operating system is its ability to run conforming Macintosh applications. Within limits described below, applications developed for the Macintosh Operating System using the standard Macintosh **User Interface Toolbox** routines will execute under A/UX.

The ability to run Macintosh applications under A/UX is provided by enhancements to the A/UX kernel and by a library of functions known as the A/UX Toolbox. The A/UX Toolbox is a library of routines that enables a program running under A/UX to call Macintosh Toolbox routines and native Macintosh Operating System routines. The A/UX Toolbox provides a bridge between the Macintosh and A/UX environments, giving you two kinds of code compatibility:

- You can execute Macintosh binary code (applications compiled in the Macintosh environment) under A/UX, within the current limitations of the A/UX Toolbox.
- You can write common source code that can be separately built (that is, compiled and linked) into executable code for both environments.

The A/UX Toolbox operates transparently to the user and to applications. This means that (subject once again to qualifications detailed later) your applications developed for the Macintosh Operating System should execute under the A/UX operating system.

This section briefly explains how the A/UX Toolbox works and then provides details on writing Macintosh applications that execute under the A/UX operating system. A/UX provides such a high level of compatibility with Macintosh applications that your existing application may very well run under A/UX with no changes whatsoever. In general, if your application conforms to the interfaces documented in *Inside Macintosh,* is MultiFinder-aware, does not rely on low-memory global variables, and heeds the various guidelines presented in **About Compatibility**, it should operate under A/UX.

How the A/UX Toolbox Works

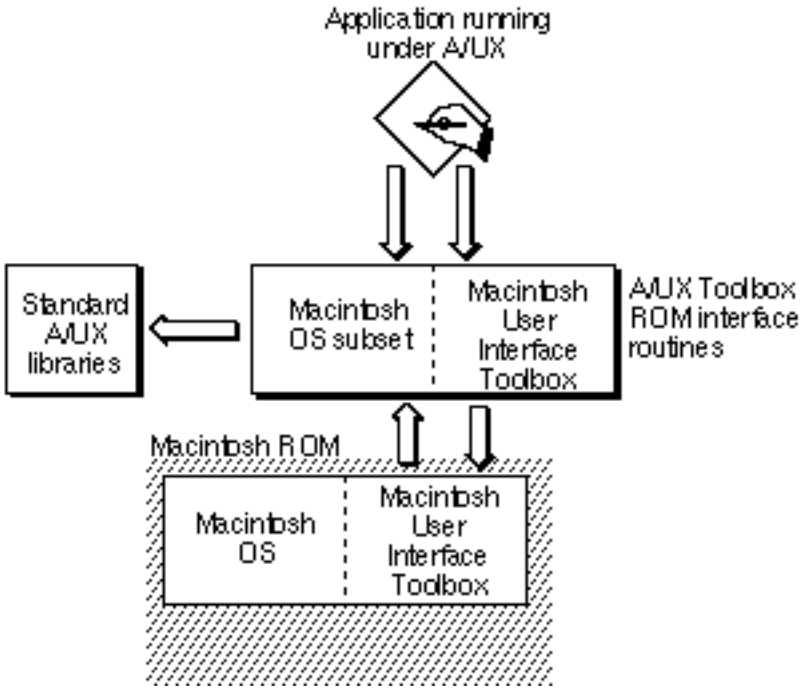
The primary function of the A/UX Toolbox is to make available to programs running under A/UX the standard Macintosh support code described in *Inside Macintosh*. Most of the support code consists of routines built into the Macintosh ROM.

The ROM routines fall into two categories, **User Interface Toolbox** routines and Macintosh Operating System routines. The A/UX Toolbox uses one of two strategies for supporting a call to a Macintosh ROM routine, depending on whether the call is to the **User Interface Toolbox** or to the native Macintosh Operating System.

When an A/UX Toolbox application calls one of the Macintosh **User Interface Toolbox** routines, the A/UX Toolbox intercepts the call and, if necessary, translates the parameters into a form usable by the ROM. After the A/UX Toolbox performs the translation, it invokes the ROM code that would be used in the native Macintosh environment.

When an A/UX Toolbox application calls one of the Macintosh Operating System routines, the A/UX Toolbox diverts the call to a substitute routine in its own library. The A/UX Toolbox Operating System routines call the standard A/UX libraries to perform the A/UX equivalents of the Macintosh Operating System functions. The Macintosh Operating System ROM code is never used under A/UX. Note that some of the built-in **User Interface Toolbox** routines generate calls to the Macintosh Operating System routines; these calls are also intercepted by the A/UX Toolbox and diverted to routines in its own library.

The Figure below illustrates how the two elements of the A/UX Toolbox library interact with the application and the ROM code.



Interactions among an application, the A/UX Toolbox, and ROM code

Using the A/UX Toolbox

The primary limitation on Macintosh applications running under A/UX is that the A/UX Toolbox does not currently support all managers and drivers. The Table below summarizes the status of various ROM libraries in A/UX Release 2.0. Note that "Full" support for a manager or driver means that the version of that manager released with system software 6.0.5 is available. In particular, there is currently no support under A/UX for any of the new features introduced in system 7.0.

Status of User Interface Toolbox and Macintosh Operating System libraries in the A/UX Toolbox

ROM library	Implementation
Alias Manager	None
ADB Manager	None
AppleTalk Manager	Full
Binary-Decimal Conversion Package	Full
Color Manager	Full

Color Picker Package	Full
Color QuickDraw	Full
Control Manager	Full
Data Access Manager	None
Deferred Task Manager	None
Desk Manager	Full
Device Manager	Full
Dialog Manager	Full
Disk Driver	Full
Disk Initialization Package	Full
Edition Manager	None
Event Manager Operating System	Partial
Event Manager Toolbox	Full*
File Manager	Full
Floating-Point Arithmetic and Transcendental Functions Packages	Full*
Font Manager	Full
Gestalt Manager	Full
Help Manager	None
International Utilities Package	Full
List Manager	Full
Memory Manager	Full
Menu Manager	Full
Notification Manager	Full
Package Manager	Full
Palette Manager	Full
Power Manager	None
PPC Toolbox	None
Printing Manager	Full
QuickDraw	Full
Resource Manager	Full
Scrap Manager	Full
Script Manager	Full
SCSI Manager	None
Segment Loader	Partial
Serial Drivers	Full
ShutDown Mgr	Full*
Slot Manager	Full
Sound Manager	Full
Standard File Package	Full
Startup Manager	Full
System Error Handler	Full*
TextEdit	Full
Time Manager	Full*
Utilities, **Operating System Utilities**	Partial
Utilities, **Toolbox Utilities**	Full
Vert. Retrace Mgr	Partial
Window Manager	Full

Note: When A/UX implements a particular manager or driver, the version of that manager or driver may not be the same as the version available in the Macintosh Operating System. This means that, whenever possible, you should use **Gestalt** to check for the existence of the particular features your application needs. In managers or drivers marked with an asterisk (*), all routines are implemented under A/UX, but the behavior is not identical to that in the Macintosh Operating System. See the publication *A/UX Toolbox:*

Macintosh ROM Interface for complete details on the implementation of these managers and drivers.

A/UX Compatibility Guidelines

The A/UX Toolbox has been designed to allow as many Macintosh applications as possible to execute under the A/UX operating system. Because of profound differences between the two environments, however, it is possible that some applications may not execute correctly under A/UX. By following these guidelines, you can help ensure that your Macintosh applications run under A/UX.

- Make certain that your application is MultiFinder-friendly. MultiFinder is a standard part of A/UX, just as it is in system 7.0 (where the Finder and the **Process Manager** provide the cooperative multitasking environment). Your application should include a 'SIZE' resource and call the **WaitNextEvent** function in its main event loop. Note that the version of MultiFinder included with A/UX Release 2.0 is functionally equivalent to the version of MultiFinder released with system software system 6.0.5, but it has been customized for use under A/UX.

- Always use the available managers and drivers to manipulate hardware devices. In the Macintosh Operating System, individual processes and the various libraries can have much more control over the system than under A/UX, where the kernel manages all interaction between processes and the underlying hardware. In particular, do not attempt to read data from or write data to any of the memory-mapped hardware available on a Macintosh computer.

- Avoid relying on the low-memory global variables. Not all of them are available under A/UX.

- Make certain that your application is 32-bit clean (that is, it operates in an environment where all 32 bits of a handle or pointer are significant in determining memory addresses).

- Use the **Gestalt Manager** to determine which versions of managers and drivers are present in the current operating environment before relying on features that are not common to all released versions. Generally, the versions of managers available under A/UX Release 2.0 are the same as those versions included in Macintosh system software system 6.0.5.

Finally, your application should conform to the programming interfaces described here and should follow the basic compatibility guidelines presented in **About Compatibility** . For further details on running Macintosh applications under A/UX, see *A/UX Toolbox: Macintosh ROM Interface.*