ADOBE® ILLUSTRATOR®

ADOBE ILLUSTRATOR 2019 PROGRAMMER'S GUIDE

Adobe Illustrator 2019 Programmer's Guide

Preface

This document introduces the Adobe® Illustrator® API for plug-ins.

- Chapter 1, "Overview" describes the basic concepts behind Illustrator plug-in programming.
- Chapter 2, "Tutorial" describes plug-in programming fundamentals using an example project.
- Chapter 3, "Creating an HTML/JS UI for Plug-ins" describes how to create a user interface for your plug-in using Adobe Flash®.
- Chapter 3, "Plug–in Techniques" describes Plug-in property lists (PiPL resources) in detail, and explains how to handle Live Effects in plug-ins.

Terminology and notational conventions

API — Application programming interface.

Application — Illustrator 2019, unless otherwise specified.

PiPL — Plug-in property list.

SDK — Software development kit for the application. `<SDK>` indicates your locally installed SDK root folder. The actual root location depends on the installation and operating system.

Supporting documentation

The following documents are companions to this guide:

- *Getting Started with Adobe Illustrator 2019 Development* — Describes platforms supported for plug-in development, how to set up the development environment, and the code samples included in the SDK. Provides step by step guides on creating new projects either from scratch or from the templates provided with the SDK.
- *Adobe Illustrator 2019 Porting Guide* — Describes issues related to porting plug-ins across different versions of the Illustrator API. See `<SDK>/docs/guides/porting-guide.pdf`.
- *Adobe Illustrator API Reference* — Describes the suites and functions in the Illustrator API in detail. See the `<SDK>/docs/references/` folder.
- *Using the Adobe Text Engine with Illustrator 2019* — Describes how to use the Adobe text engine—the text API provided by the Adobe® Illustrator® 2019 SDK—in your Illustrator plug-ins.

Sample code

Sample plug-ins are provided in the sample code folder in the SDK, and described in *Getting Started with Adobe Illustrator 2019 Development*. Chapter 2, "Tutorial," describes plug-in programming fundamentals using the Tutorial sample project.

1 Overview

This chapter introduces the Adobe® Illustrator® plug-in architecture. It shows how plug-ins interact with Illustrator and gives an idea of the power of plug-ins.

What is a plug-in?

A plug-in is a library that extends or changes the behavior of Illustrator. On Windows, a plug-in is built as a DLL (dynamic-link library). On Mac OS, a plug-in is built as a bundle that contains a shared library.

The plug-in architecture in Illustrator is very powerful. Plug-ins have access to Illustrator's elegant vector, text, and raster engines, as well as Illustrator's user interface. The API is a fundamental part of the application; in fact, most of Illustrator itself is implemented as plug-ins.

You can create plug-ins that add new tools to the drawing, shading, and raster tools already in Illustrator. Plug-ins can turn Illustrator into a powerful CAD, cartographic, or other custom design application. Users can add or remove plug-ins to quickly and easily customize Illustrator to their needs.

The Illustrator API offers several benefits to plug-in developers. Because Illustrator handles large application tasks like printing and saving files, you can concentrate on the implementation of your plug-in's unique features. Plug-ins do not need to support undo or window updating; these are handled by the API and are invisible to the plug-in. This translates into shorter development cycles.

A brief history of the Adobe Illustrator API

The Illustrator API first appeared in version 5.0. It supported one type of plug-in, filters. This was extended in Adobe Illustrator 5.5 to include file formats. The 5.x APIs displayed characteristics of many early API design efforts: the interface was monolithic, incorporating enough function to achieve its intended purpose, but not allowing for future expansion. A single callback function table was provided, with no means to extend or update it. Platform abstraction was minimal, and interaction with the user was restricted to modal.

The Illustrator 6.0 API began addressing these limitations, using a modular and extensible approach . Callback functions were organized into *suites* that could be easily replaced or extended. The plug-in types were abstracted and extended to include tools, floating windows, menu items, events, and combinations of these types. The first steps towards platform abstraction were taken.

The Illustrator 7.0 API refined prior efforts. The API was extended to be truly cross-platform (the Windows version of Adobe Illustrator jumped from version 4.2 directly to 7.0), including a complete set of user-interface suites. The plug-in management core was generalized for both cross-platform and cross-product use. More of Illustrator's core functionality was implemented through plug-ins, allowing the application's behavior to change without modifying the application itself.

The Illustrator 8.0 API switched from fixed to floating-point numbers and included more than a dozen new suites, many corresponding to new user features like plug-in groups, cursor snapping, and actions.

Illustrator 9.0 stopped loading Mac OS plug-ins containing Motorola 68K code. Only plug-ins with the Illustrator 9 version information in the PiPL were recognized and included in Illustrator 9's initial start-up process; however, Illustrator 6 and 5.5 plug-ins were supported by adapters.

The Illustrator 10.0 API changed API structures in Mac OS to use PowerPC (4-byte) alignment instead of 68K (2-byte) alignment, requiring Mac OS plug-ins to be rebuilt. Illustrator plug-ins for Windows built with the Illustrator 9 SDK or earlier were not affected and remained compatible with Illustrator 10.

Illustrator CS1 (Illustrator version 11.0) integrated a new text engine, the Adobe Text Engine (ATE). This change broke backward compatibility. Illustrator plug-ins that used the obsolete text API had to be rebuilt with the Illustrator 11 SDK and ported to use the new ATE API.

The Illustrator CS2 API (Illustrator version 12.0) introduced Unicode support. In Mac OS, the object-file format for Illustrator plug-ins changed from PEF to Mach-O.

The Illustrator CS3 API (Illustrator version 13.0) introduced support for universal binary plug-ins in Mac OS. The plug-in development environment in Mac OS switched to Xcode from CodeWarrior.

The Illustrator CS4 API (Illustrator version 14.0) introduced support for multiple artboards and the FXG file format.

In Illustrator CS5 API (Illustrator version 15.0), Adobe Dialog Manager (ADM) was deprecated. This release introduced the Beautiful Strokes feature, and improved and enhanced existing features, such as perspective grids.

In Illustrator CS6 API (Illustrator version 16.0), ADM was removed. A new vectorization engine replaced the former tracing functionality; the ability to create patterns and gradients on strokes was added; and the API provided support for UI color themes. This release supported the 64-bit Windows platforms, with the development environments Visual Studio 2010 and Xcode 3.2.5.

In Illustrator CC 2014 API (Illustrator version 18.0), the `ASReal` data types was removed in favor of `AIReal`. The development environment in Mac OS was updated to Xcode 5.1.1 with LLVM GCC4.2

In Illustrator CC 2015 API (Illustrator version 19.0), the development environment in Windows is updated to Visual Studio 2013, and in Mac OS to Xcode 6.2. For documentation on these changes and other API changes, see *Adobe Illustrator 2015 Porting Guide*.

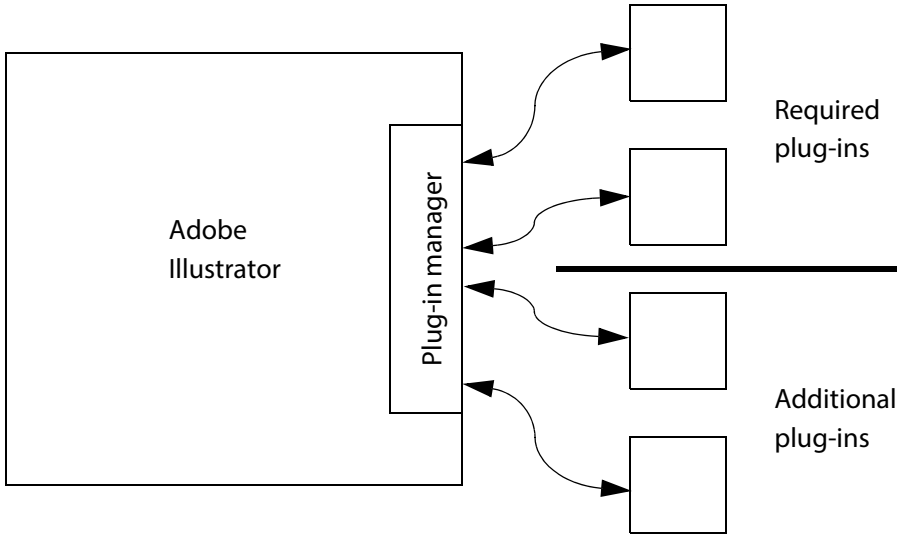
In Illustrator CC 2017 API (Illustrator version 21.0), the development environment in Windows is updated to Visual Studio 2015, and in Mac OS to Xcode 7.3. For documentation on these changes and other API changes, see *Adobe Illustrator 2017 Porting Guide*.

In Illustrator CC 2018 API (Illustrator version 22.0), the development environment in Mac OS to Xcode 8.2.1. For documentation on these changes and other API changes, see *Adobe Illustrator 2018 Porting Guide*.

In Illustrator 2019 API (Illustrator version 23.0), the development environment in Windows is updated to Visual Studio 2017, and in Mac OS to Xcode 9.2. For documentation on these changes and other API changes, see *Adobe Illustrator 2019 Porting Guide*.

Anatomy of a plug-in

Like most programs, Illustrator plug-ins contain both code and data. The *Illustrator plug-in manager* loads and executes a plug-in's code when required, sending various messages to the plug-in. The plug-in manager also unloads plug-ins that are no longer needed. See the following figure.



Plug-ins are notified by Illustrator when they have just been loaded or are about to be unloaded, permitting them to restore or save any state information.

Types of plug-ins

This section describes the different types of Illustrator plug-ins you can create. A single plug-in file can contain multiple plug-in types. For example, a shape creation plug-in may implement several plug-in filters and a plug-in tool. Plug-in types are listed in the following table and described more fully after the table.

Plug-in Type	What it does
Action	Playback or register actions.
Effects	Add menu items to the Effects menu.
File format	Add file types to the Open, Save, and Export commands.
Filter	Add menu items to the Filter menu.
Menu command	Add menu items to the general menu structure.
Notifier	Receive and process art-state events.
Plugin group	Maintain “display” art that is associated with another art object
Suite	Implement and publish your own suite of callback functions.
Timer	Receive periodic notification.
Tool	Add tools to the Tools panel.
Transform again	Set the transform-again feature.

Action plug-ins

Action plug-ins are used to execute Illustrator commands. An action plug-in can register itself so it can be recordable via the Actions panel. For more information, see `AIActionManagerSuite` in *Adobe Illustrator API Reference*.

Plug-in file formats

Plug-in file formats are used to extend the number of file types Illustrator can read and write. Plug-ins indicate which file formats they support during initialization, specifying the supported names and file types (or extensions). One plug-in can register as many formats as desired.

The file types supported by a file-format plug-in can appear in Illustrator's Export, Save, and Open dialogs, depending on the options specified when the new file type is added.

For more information, see `AIFileFormatSuite` in *Adobe Illustrator API Reference*

Plug-in filters

Plug-in filters appear under the Object menu and are used to create or manipulate Illustrator artwork. Typically, filters present a modal interface to the user, who can set parameters before executing.

NOTE: In other applications (including Adobe PageMaker® and Adobe FrameMaker®), the term "filter" or "filter plug-in" sometimes is used to describe software that reads and writes non-native files (e.g., TIFF or JPEG files). In Illustrator, these are called file-format plug-ins. Illustrator uses the term "filter plug-in" in a way similar to Adobe Photoshop: a filter plug-in modifies the artwork in an algorithmic fashion.

Illustrator updates the Repeat and Undo menus automatically, making filters one of the simplest plug-in types to create.

For more information, see `AIFilterSuite` in *Adobe Illustrator API Reference*.

NOTE: `AIFilterSuite` is deprecated in favor of `AILiveEffectSuite`. We recommend that you change plug-ins which implement filters to use live effects instead, as `AIFilterSuite` will be removed at some point in the future.

Plug-in menu commands

Plug-in menus are used to add menu items to Illustrator's menu structure other than the Filter menu. A typical use of this plug-in type is to add a Hide/Show Window menu item to Illustrator's Window menu.

Plug-in menu commands can be added at several places in the menu structure.

For more information, see `AIMenuSuite` in *Adobe Illustrator API Reference*.

Plug-in notifiers and timers

Plug-in notifiers and timers are used by a plug-in to have Illustrator inform it of certain events.

A *notifier plug-in* is notified when the state of an Illustrator document changes. For example, a plug-in may request to be notified when the selection state changes. A notifier plug-in registers for one or more notifications during start-up.

A *timer plug-in* is notified at regular time intervals. For example, a timer plug-in may request to be notified once a second.

For more information, see `AINotifierSuite` and `AITimerSuite` in *Adobe Illustrator API Reference*.

Plugin-group plug-ins

Plugin-group plug-ins maintain one or more plug-in groups. A plug-in group is a special art object that contains editable art as well as art that is displayed but not editable. A plugin-group plug-in is responsible for regenerating the display art (or result art) whenever there is a change in the edit art. Plug-in groups are used to make special art types like Live Blends and Brushes.

For more information, see `AIPluginGroupSuite` in *Adobe Illustrator API Reference*.

Plug-in tools

Plug-in tools add an icon to the Tools panel, expanding the number of tools available to the user. Many standard Illustrator tools, including the knife tool, shape tools, and twirl tool, are implemented as plug-in tools.

When selected, a tool plug-in can track the mouse, determine which artwork was selected, and act on it. For example, a tool might create or distort objects. Some things are handled automatically for plug-in tools, like scrolling the window.

For more information, see `AIToolSuite` in *Adobe Illustrator API Reference*.

Combining multiple plug-in types

As mentioned before, it is likely one plug-in file implements multiple plug-in types. A plug-in also may need to add multiple instances of a single plug-in type. The plug-in API supports both these cases.

Where plug-ins live

Illustrator's `Plug-ins` folder is in the following locations:

Windows: `C:\Program Files\Adobe\Adobe Illustrator CC 2019\Plug-ins\`

Mac OS: `/Applications/Adobe Illustrator CC 2019/Plug-ins/`

A user-specific `Plug-ins` folder, which may be appropriate to use in multi-user systems, is located as follows:

Windows 7: `C:\Users\<username>\AppData\Roaming\Adobe\`
`Adobe Illustrator CC 2019 Settings\<localeCode>\Plug-ins\`

Mac OS `/Users/{username}/Library/Application Support/Adobe/`
`Adobe Illustrator CC 2019/<localeCode>/Plug-ins`

Optionally, an additional folder can be specified using Illustrator's Additional Plug-ins Folder preference.

In general, each plug-in type is in a specific subfolder; for example, tool plug-ins are in a folder named `Tools`.

What defines a plug-in?

On Windows, an Illustrator plug-in is a DLL (dynamic-link library). In Mac OS, an Illustrator plug-in is a bundle that contains a shared library. An Illustrator plug-in has the following characteristics:

- A file extension of `.aip`; for example, `CoolEffect.aip`.
- A valid plug-in PiPL resource. The PiPL resource contains information about your plug-in. Illustrator considers only those files with PiPL resources to be potential plug-ins. Files with the correct properties are added to the plug-in list.
- A code entry point containing binary code that can run on the target platform. The entry point is specified in the PiPL resource and is called with several messages telling it which actions to take.

PiPL resources

A plug-in property list (PiPL) resource contains properties used by the Illustrator plug-in manager, including the following:

- The type of the plug-in, given by the `kind` property.
- The calling mechanism for the plug-in code, given by the `ivrs` property.
- The entry point of the plug-in, given by a `code descriptor` property.

Illustrator considers only files with a valid PiPL to be potential plug-ins. PiPL properties are defined using native platform resources. For more information about PiPL resources and samples, see Chapter 4, "Plug–in Property Lists.

Plug-in management

When Illustrator is launched, only plug-ins with a valid PiPL and code entry point are recognized and included in the initial start-up process. Each plug-in is loaded into and unloaded from memory as needed by Illustrator. A plug-in needs to be written assuming it is not always in memory. This is why a plug-in should save and restore state information during unload and reload. A plug-in can expect certain services from the application. Because a plug-in may be unloaded, Illustrator provides a means of storing important data when the plug-in is unloaded. Each time a plug-in is called, it is given enough information to accomplish the action to be performed.

The loading order of plug-ins becomes important when one plug-in depends on a resource provided by another, as the resource providing plug-in must be loaded first. As mentioned above, plug-ins that export one or more suites must declare (in the PiPL resource) what they export. Illustrator uses this information when loading and executing plug-ins, ensuring that suites and other resources are available.

Plug-in entry point and messages

The Illustrator plug-in manager communicates with your plug-in by loading the plug-in code into memory if necessary, then calling the entry point given by the code-descriptor property in the PiPL. By convention, the entry point is called `PluginMain` and is compiled with C linkage:

```
extern "C" ASAPI ASErr PluginMain(char* caller, char* selector, void* message);
```

Three arguments are passed to the `PluginMain` function; collectively, they make up a *message*.

The first two parameters represent the *message action*, describing what the plug-in is supposed to do, as described in the following section. The third parameter is a pointer to a data structure, which varies depending on the message action. When you determine the message action, you typecast the data in the `message` parameter as needed.

The result of the function is an error code.

Message actions: callers and selectors

Each time your plug-in is called, it receives a message action from Illustrator. The message action notifies your plug-in that an event happened or tells your plug-in to perform an action.

The message action passed to your plug-in consists of two identifiers:

- The *caller* identifies the sender of the message (PICA, the host application, or a plug-in) and a general category of action.
- The selector specifies the action to take within the category of action. All plug-ins receive at least four message actions: reload, unload, startup and shutdown. In addition, your plug-in may receive additional message actions specific to the plug-in type.

For example, Illustrator sends a plug-in a message action based on these two strings, when the plug-in is unloaded and reloaded:

```
#define kSPAccessCaller          "SP Access"
#define kSPAccessUnloadSelector   "Unload"
#define kSPAccessReloadSelector   "Reload"
```

The caller and selector identifiers are C strings. By convention, each caller string has a prefix. This is so new message actions can be easily defined by other plug-ins, with little chance of conflict. For example, callers and selectors from Illustrator suites use the prefix "AI", while those from PICA use the prefix "SP."

Illustrator message actions are used to indicate events in which a plug-in has interest. Information on the callers and selectors supported by the API is given by the Plug-in Callers and Plug-in Selectors pages in *Adobe Illustrator API Reference*.

Core message actions

The following table contains the set of core message actions received by all plug-ins and corresponding actions your plug-in should take.

Caller	Selector	Action to perform
`kSPAccessCaller` ("SP Access")	`kSPAccessReloadSelector` ("Reload")	Restore any state information (globals).
	`kSPAccessUnloadSelector` ("Unload")	Save any state information (globals).
`kSPInterfaceCaller` ("SP Interface")	`kSPInterfaceStartupSelector` ("Startup")	Initialize globals and add features to the application.
	`kSPInterfaceShutdownSelector` ("Shutdown")	Free globals, remove features from the application, and save preferences.

Reload and unload messages

Whenever a plug-in is loaded into memory or unloaded from memory, Illustrator sends it an *access* message action:

```
#define kSPAccessCaller          "SP Access"
#define kSPAccessUnloadSelector   "Unload"
#define kSPAccessReloadSelector   "Reload"
```

The message action contains the *access caller* and a *reload* or *unload* selector. This is your plug-in's opportunity to set up, restore, or save state information. The access caller/selectors bracket all other callers and selectors.

Access messages bracket all other messages. Reload is the first message your plug-in receives; unload is the last. At these times, your plug-in should not acquire or release suites other than those built into Illustrator.

Start-up and shut-down messages

Illustrator has two core interface message actions, where the plug-in can interact with the application:

```
#define kSPInterfaceCaller              "SP Interface"
#define kSPInterfaceStartupSelector     "Startup"
#define kSPInterfaceShutdownSelector    "Shutdown"
```

When Illustrator is launched, it sends a "startup" message to each plug-in it finds. This allows your plug-in to allocate global memory, add user-interface items to Illustrator, register suites, or perform other initialization. The start-up message action consists of the interface caller (`kSPInterfaceCaller`) and start-up selector (`kSPInterfaceStartupSelector`).

When the user quits Illustrator, it sends each plug-in a "shutdown" message. The shut-down message action comprises the interface caller (`kSPInterfaceCaller`) and shut-down selector (`kSPInterfaceShutdownSelector`). Shut-down is intended for flushing files and preserving preferences, not destruction. A plug-in that exports a suite should not dispose of its plug-in globals or suite information, since it may be called after its own shut-down by another plug-in's shut-down. For example, if your plug-in implements a preferences suite that other plug-ins use, they may call you in their shut-down handlers after you already shut down.

Notifiers

Some message actions also are referred to as *notifiers*, indicating something in Illustrator was changed by the user; for example, when the user selects an object.

Plug-ins must register for the notifiers in which they are interested. The Notifier suite is used to register and remove notification requests (see `AINotifierSuite`).

Plug-ins also can create their own notifiers, which can be used to broadcast changes to other plug-ins.

Handling callers and selectors

Your plug-in's organization is based largely on the messages it receives. The main routine of your plug-in must first determine the message action, using the caller and selector parameters. For example:

```
extern "C" ASAPI ASErr PluginMain(char* caller, char* selector, void* message)
```

```
{
    ASErr error = kNoErr;
    if ( strcmp( caller, kSPAccessCaller ) == 0 ) {
        // Handle Reload and Unload
        if ( strcmp( selector, kSPAccessReloadSelector ) == 0 )
            error = MyRestoreGlobals( message );
        else if ( strcmp( selector, kSPAccessUnloadSelector ) == 0 )
            error = MySaveGlobals( message );
    } else if ( strcmp( caller, kSPInterfaceCaller ) == 0 ) {
        // Handle Startup and Shutdown
        if ( strcmp( selector, kSPInterfaceStartupSelector ) == 0 )
            error = MyStartupPlugin( message );
        else if ( strcmp( selector, kSPInterfaceShutdownSelector ) == 0 )
            error = MyShutdownPlugin( message );
    } else if ( strcmp( caller, kCallerAIMenu ) == 0 &&
         strcmp( selector, kSelectorAIGoMenuItem ) == 0 ) ){
        // Handle menu message
        error = MyHandleMenu( message );
    }
    return error;
}
```

Message data

The last argument passed to your plug-in entry point is a pointer to a message data structure, which contains information appropriate to the message action. For example, when a mouse-clicked message action is received, the message data structure contains the mouse position.

The contents of the message data structure depend on the message action and are not completely known until your plug-in identifies this. While the contents of the message data vary, by convention all message data structures begin with the common fields that are grouped into the `SPMessageData` structure:

```
typedef struct SPMessageData {
    ai::int32 SPCheck;
    struct SPPlugin *self;
    void *globals;
    struct SPBasicSuite *basic;
} SPMessageData;
```

If this is a valid message, the `SPCheck` field contains `kSPValidSPMessageData`.

The `self` field is a reference to the plug-in being called. The reference to the running plug-in's `self` is used to add plug-in suites, adapters, and other plug-in data to Illustrator. Illustrator stores this value with the added data. It is used to recall your plug-in as needed.

The `globals` pointer is for use by your plug-in, to preserve any information between calls that it needs. Usually, it is a pointer to a block of memory allocated by your plug-in at start-up. This value is preserved by Illustrator when your plug-in is unloaded and passed back to the plug-in each time it is called. Plug-ins use this block to store any state information they need to maintain between unload and reload.

NOTE: It is important that the memory for globals be allocated using Illustrator's memory-allocation APIs; otherwise, the memory may be destroyed by the operating system when a plug-in is unloaded.

The `basic` field is a pointer to the Basic suite (see `SPBasicSuite`), which allows your plug-in to acquire other suites and provides basic memory management. See "Suites" on page 13.

When Illustrator or a plug-in wants to send a message to your plug-in, it passes in a relevant message data structure. Some examples are given below.

Caller	Message type	Description
`kSPAccessCaller`	`SPAccessMessage`	Contains `SPMessageData`.
`kSPInterfaceCaller`	`SPInterfaceMessage`	Contains `SPMessageData`.
`kCallerAIMenu`	`AIMenuMessage`	Contains `SPMessageData` and a reference to a menu item that was chosen.

Once a plug-in identifies the message action via the caller and selector parameters, it casts the message parameter to access further message data. For example:

```
if (strcmp(caller, kSPAccessCaller) == 0) {
    SPAccessMessage* accessMsg = static_cast<SPAccessMessage*>(message);
    // access accessMsg
}
else if (strcmp(caller, kSPInterfaceCaller) == 0) {
    SPInterfaceMessage* interfaceMsg = static_cast<SPInterfaceMessage*>(message);
    // access interfaceMsg
}
else if (strcmp(caller, kCallerAIMenu) == 0) {
    AIMenuMessage* menuMsg = static_cast<AIMenuMessage*>(message);
    // access menuMsg
}
```

Live Effect messages

For specific information about the message handlers you use in a plug-in that adds an item to the Live Effects menu, see "Handling Live Effects" on page 32.

Illustrator API

Suites

The Illustrator plug-in manager calls a plug-in through the plug-in's entry point, sending various messages as described in the previous section. When a plug-in is active, it needs a way to perform actions within Illustrator. The mechanism for this is *plug-in suites*, which are one or more related functions grouped together in a C structure.

Functions are grouped into suites based on the services they provide; for example the Path Suite (see `AIPathSuite`) contains functions that create and manipulate paths and segments. For detailed documentation on the suites and functions provided, see *Adobe Illustrator API Reference*.

Illustrator's suite architecture (also known as the *Plug-in Component Architecture*, or PICA*)* also is found in the latest versions of Adobe Photoshop and other Adobe applications. A former term for PICA was Suite Pea (SP). Suites that are part of PICA all start with the suffix SP; for example, `SPBasicSuite`.

Suites fall into two general categories: those that implement a plug-in type (see "Types of plug-ins" on page 6) and those that provide general functions. Suites that provide general functions make up most of

the API; they provide a wide range of capabilities for manipulating text, gradients or raster images, or performing math functions. The following table lists several major suites and what they do.

Suite Name	Suite	Services provided
Art suite	`AIArtSuite`	Access the artwork tree.
Block suite	`AIBlockSuite SPBlocksSuite`	Allocate and free memory.
Custom Color suite	`AICustomColorSuite`	Create or work with custom colors.
Document list suite	`AIDocumentListSuite`	Create or work with documents
Document suite	`AIDocumentSuite`	Get and set document information.
Gradient suite	`AIGradientSuite`	Create or work with gradients.
Group suite	`AIGroupSuite`	Make clipped groups.
Layer suite	`AILayerSuite`	Get information about layers.
Path suite	`AIPathSuite`	Work with Illustrator paths.
Random suite	`AIRandomSuite`	Generate random numbers.
Raster suite	`AIRasterSuite`	Work with raster objects.
Real Math suite	`AIRealMathSuite`	Many useful math functions.
Tag suite	`AITagSuite`	Associate information with art objects.
Text frame suite	`AITextFrameSuite`	Work with text objects.

For detailed descriptions of suites and their associated functions, see *Adobe Illustrator API Reference*.

Acquiring and releasing suites

Before you can use a function in a suite, you must first *acquire* the suite. When the suite's functions are no longer needed, your plug-in must *release* the suite.

It is important to release suites so the Illustrator plug-in manager can run optimally. The plug-in manager uses the acquire/release mechanism to determine when plug-ins can be unloaded to free memory.

When your plug-in is first called, it "knows about" only the Basic suite (see `SPBasicSuite`), which was introduced earlier in this chapter (as part of the `SPMessageData` structure). The Basic suite is used to acquire and release other suites.

The following code snippet shows how to pop an alert on start-up using `MessageAlert()` function in the `AIUser` suite.

```
#include "IllustratorSDK.h"
// Tell Xcode to export the following symbols
#if defined(__GNUC__)
#pragma GCC visibility push(default)
#endif
// Plug-in entry point
extern "C" ASAPI ASErr PluginMain(char * caller, char* selector, void* message);
// Tell Xcode to return to default visibility for symbols
#if defined(__GNUC__)
#pragma GCC visibility pop
#endif

extern "C"
{
    AIUnicodeStringSuite* sAIUnicodeString = NULL;
    SPBlocksSuite* sSPBlocks = NULL;
}

extern "C" ASAPI ASErr PluginMain(char* caller, char* selector, void* message)
{
    ASErr error = kNoErr;
    SPBasicSuite* sSPBasic = ((SPMessageData*)message)->basic;
    if (sSPBasic->IsEqual(caller, kSPInterfaceCaller)) {
        AIUserSuite *sAIUser = NULL;
        error = sSPBasic->AcquireSuite(kAIUserSuite, kAIUserSuiteVersion, (const void**)
&sAIUser);
        error = sSPBasic->AcquireSuite(kAIUnicodeStringSuite, kAIUnicodeStringSuiteVersion, (const
void**) &sAIUnicodeString);
        error = sSPBasic->AcquireSuite(kSPBlocksSuite, kSPBlocksSuiteVersion, (const void**)
&sSPBlocks);
        if(sSPBasic->IsEqual(selector, kSPInterfaceStartupSelector)){
            sAIUser->MessageAlert(ai::UnicodeString("Hello World!"));
        }
    else if(sSPBasic->IsEqual(selector, kSPInterfaceShutdownSelector)){
        sAIUser->MessageAlert(ai::UnicodeString("Goodbye World!"));
    }
    error = sSPBasic->ReleaseSuite(kAIUserSuite, kAIUserSuiteVersion);
    error = sSPBasic->ReleaseSuite(kAIUnicodeStringSuite, kAIUnicodeStringSuiteVersion);
    }
return error;
}
```

This code snippet is intended to illustrate the concepts of acquiring, using, and releasing a suite. To see how suites are more typically acquired and released, see the sample plug-ins provided in the SDK.

Publishing suites

All plug-ins use suites, since they are the fundamental mechanism of the Illustrator API. Plug-ins also can publish suites of their own, for use by other plug-ins. This feature, where plug-ins may be both clients of suites and publishers of suites, is extremely powerful. Several plug-ins included with Illustrator publish suites used by many other plug-ins.

From the plug-in's perspective, it is unimportant whether a particular suite is implemented within Illustrator itself or as a plug-in. The Illustrator plug-in manager is responsible for managing suites among various plug-ins and the application.

To export a suite, a plug-in must call `SPSuitesSuite::AddSuite` on start-up. We also recommend that a plug-in declare a `PIExportsProperty` in its PiPL, to allow Illustrator to optimize the plug-in initialization

process. Illustrator always tries to load plug-ins with a `PIExportsProperty` first, so other plug-ins that depend on exported suites can load and start up successfully on the first try.

For more information on how to publish suites, see `SPSuitesSuite::AddSuite` in *Adobe Illustrator API Reference* and "Export property" on page 36.

Binary compatibility

The development environments for Illustrator 2019 have changed. This means that you must recompile plug-ins built with an earlier version of the Illustrator SDK in order for them to run in Illustrator 2019

- In Windows, use Microsoft Visual Studio 2017.
- In Mac OS, use Xcode 9.2 (requires OSX **10.12** or higher), LLVM Clang, and the Apple **10.7** SDK.

Illustrator's artwork as seen by a plug-in

Most plug-ins manipulate Illustrator artwork (including paths, text, and raster art) in some manner. Illustrator artwork objects are presented to plug-ins as a hierarchical tree, which plug-ins can freely modify.

Plug-ins can create, remove, and change the characteristics of artwork objects. For example, plug-ins can group objects, move or distort paths, adjust colors, and search and change text.

Cross-platform support

The implementation of the Illustrator API is highly portable across platforms. Plug-ins can be written for Mac OS and Windows platforms. Working with Illustrator data types is the same on both platforms. Differences are related to the architectures of the hardware or operating system on which Illustrator runs, and these are abstracted, so the API call works on both environments with a minimum of platform support code. There are platform-specific API functions, but these exist largely for backward compatibility with earlier implementations; there are cross-platform versions that we suggest you use instead.

Because of this high level of compatibility, writing an Illustrator plug-in for Mac OS and Windows is fairly easy. Platform-specific components, if needed, can be specified in a few lines of code within an `#ifdef`. For example, the Tutorial sample in the SDK uses identical source code; only the resources are platform specific.

The main differences are in presenting the user interface and resource data; depending on user-interface complexity, this can be a significant undertaking. User-interface items like menus are implemented using the Illustrator API and are highly compatible across platforms.

Memory

Memory-management functionality is provided by `SPBasicSuite` and `SPBlocksSuite`. The Basic suite (`SPBasicSuite`) memory allocation functions are convenient since this suite is readily available when a plug-in is called (see `SPMessageData`).

Resources

Illustrator plug-ins define their resources in the format native to the platform on which they are running. The resources can be accessed from a plug-in using `SPAccessSuite::GetAccessInfo`.

Byte information and structures

Illustrator-specific data structures for the Mac OS and Windows implementations are the same, with the exception of platform dependencies like byte order. In both Windows and Mac OS, byte alignment is to eight-byte boundaries.

System requirements

The platforms supported for Illustrator plug-in development are documented in *Getting Started with Adobe Illustrator 2019 Development*. Platform requirements for Illustrator are defined in the product release notes.

Helper classes

The API provides helper classes that make it easier to write plug-in code. These classes encapsulate calling of suites; they remove the need to call suites directly in your code. For example, `ai::UnicodeString` provides support for Unicode strings and removes the need to call `AIUnicodeStringSuite`.

Source files for these helpers are provided by the API. To use a helper, add the `.cpp` file that implements it to your project and build the code as part of your plug-in. For example, `IAIUnicodeString.cpp` file implements the `ai::UnicodeString` class.

NOTE: Using helper classes is different than using suites. Suites are implemented by another binary component (the Illustrator application or its plug-ins) and called by your plug-in; an API header file defines the interface. Helper classes, on the other hand, are built as part of your plug-in; an API header file defines the interface, and an API source file (`.cpp` file) provides the implementation.

To use a helper class, a plug-in typically must provide pointers to the suites used by the class, in global variables with well-known names. For example, `ai::UnicodeString` requires that the calling plug-in acquire a pointer to `AIUnicodeStringSuite` and `SPBlocksSuite` in the global variables below:

```
extern "C" {
    AIUnicodeStringSuite* sAIUnicodeString = nil;
    SPBlocksSuite* sSPBlocks = nil;
}
```

If you add a helper class to your plug-in and you do not define the global suite pointers it requires, you will get linker errors when you build your project. If you do not acquire the suites the class depends on, run-time errors will occur (see "Acquiring and releasing suites" on page 14). On Windows, if you add a helper class to your plug-in and your Visual Studio project is using pre-compiled headers, you will get a compilation error, because the source file for the helper class does not `#include` your pre-compiled header file. To fix this override the Create/Use Precompiled Header setting to be Not Using Precompiled Headers for the helper-class source file.

For documentation on the classes provided, see *Adobe Illustrator API Reference* > *Helper classes*.

Plug-in adapters

Support for older plug-ins, as well as for Photoshop plug-ins, is provided through *plug-in adapters*, plug-ins that map API calls between Illustrator and the older or non-native APIs of the other plug-ins. Adapters are not discussed in detail in this document.

About Plug-ins menu

To display company contact information or copyright statements about your plug-in, follow these steps:

- Create a new menu group under Illustrator's About group (see `kAboutMenuGroup`), to contain all the About plug-in menu items.
- For each plug-in, create a menu item under this new group.
- Handle the menu message related to use of your About plug-in menu item by showing an About box containing plug-in specific information.

An illustration of the resulting menus on Mac OS is given below:

```
Illustrator > About MyCompanyName Plug-ins > MyPluginName1...
                                             MyPluginName2...
```

An illustration of the resulting menus on Windows is given below:

```
Help > About MyCompanyName Plug-ins > MyPluginName1...
                                     MyPluginName2...
```

A helper class that supports this functionality is provided as sample code; see `SDKAboutPluginsHelper`. The Tutorial sample shows how to use this class.

NOTE: Before Illustrator CS3, the list of plug-ins that were loaded was displayed in the About Plug-ins dialog, and the user could choose to request further information about a specific plug-in. As of Illustrator CS3, the About Plug-ins dialog was removed.

Next steps

In this chapter, we introduced plug-ins for Adobe Illustrator, and defined several key concepts, including:

- Plug-in manager
- Plug-in types
- Messages and message actions
- Notifiers
- Loading and unloading
- Acquiring, using, and releasing suites

Chapter 2, "Tutorial" explains the process of writing a plug-in in more detail. *Adobe Illustrator API Reference* describes each function in detail and provides information on the artwork objects and data structures you need to complete the job. Finally, the sample projects in the SDK provides concrete examples and are a good starting point for your project.

2 Tutorial

This chapter describes the fundamentals of Illustrator plug-in programming, using as an example a plug-in called Tutorial that is provided on the SDK. Look for the sample project in the sample code folder on the SDK, and browse the source code while reading this chapter.

The core characteristics of an Illustrator plug-in were introduced in Chapter 1, "Overview. If you have not read that chapter already, do so before proceeding through this chapter.

PiPL resource and plug-in entry point

Illustrator plug-ins must have a valid PiPL resource and an entry point Illustrator can call.

The Tutorial plug-in's PiPL resource declaration is in the following source files:

- Windows: `Tutorial.rc`
- Mac OS: `Tutorial.r`
  (a link to `<SDK_install)/common/mac/Plugin.r`)

For more information on PiPLs, see "Plug–in Property Lists" on page 35.

The Tutorial plug-in's entry point is the `PluginMain` function in `Tutorial.cpp`.

Only plug-ins with the Illustrator version information in the PiPL are recognized and included in Illustrator's initial start-up process. A plug-in is loaded into and unloaded from memory as needed by Illustrator. Your plug-in should be written assuming it is not always in memory. This is why your plug-in should save and restore state information during unload and reload. Your plug-in can expect certain services from the application. Because your plug-in may be unloaded, Illustrator provides a means of storing important data when the plug-in is unloaded. Each time the plug-in is called, it is given enough information to accomplish the action to be performed.

Handling callers and selectors

Your plug-in's organization is based largely on the messages received by its `PluginMain` function. The main routine of your plug-in basically becomes a switch implemented as a series of string comparisons that call functions appropriate for the message action caller and selector. See "Handling callers and selectors" on page 11.

Using suites and callback functions

The Illustrator API provides the core functionality used by a plug-in. Illustrator's API comprises callback functions organized into suites. Before your plug-in can use a function that is part of a suite, the suite containing it must first be *acquired*. A suite is a structure filled with function pointers; when your plug-in acquires a suite, a pointer to this structure is returned.

When the suite is no longer needed, the acquired suite is *released*. It is important to do this, so the Illustrator plug-in manager can run optimally. For instance, Illustrator keeps track of how many times a

suite was acquired. If a suite added by plug-in is no longer in use (its reference count is 0), the plug-in may be unloaded to free memory.

Acquiring and releasing suites and calling suite functions

When your plug-in is first called, it knows about only one suite. The message data structure passed to all plug-ins has a member variable named *basic*, which points to the Basic suite (see `SPBasicSuite`). The Basic suite is used to access other suites and contains two important functions for doing so:

```
SPAPI SPErr (*AcquireSuite)( const char *name, long version, const void **suite );
SPAPI SPErr (*ReleaseSuite)( const char *name, long version );
```

A plug-in uses the first function, `SPBasicSuite::AcquireSuite`, to gain access to a suite of functions. All acquired suites must be released with the `SPBasicSuite::ReleaseSuite` function when the suite is no longer required.

To acquire a suite, you first need to declare a suite pointer. Then you call `SPBasicSuite::AcquireSuite`, using the name and version number of the suite you want, found in its public header file. For instance, suppose you need to use Illustrator's Menu suite, `AIMenuSuite`:

```
AIMenuSuite* sAIMenu = nil;
SPBasicSuite* sSPBasic = ( ( SPMessageData* )message)->basic;
SPErr error = sSPBasic->AcquireSuite(kAIMenuSuite, kAIMenuSuiteVersion,&sAIMenu);
```

A pointer to the acquired suite is returned in `sAIMenu`, and functions in the suite can be called through this pointer:

```
ai::int32 count = 0;
sAIMenu->CountMenuItems(&count);
```

After the function is used, the suite is released:

```
sSPBasic->ReleaseSuite( kAIMenuSuite, kAIMenuSuiteVersion );
```

Since they are used throughout the plug-in code, it is convenient to make suite pointer variables global. The convention used for these global variables is a small "s," followed by the owner of the suite, followed by the suite name; e.g., `sSPBasic` as shown above, `sAIMenu` for the Menu suite, etc.

Illustrator API suites

Every suite has the suite name and version in the suite header file, along with other definitions, like error strings, that are particular to their function. If the suite defines plug-in messages, they also are in the header file, with the suite functions. The function pointers are fully prototyped.

Full documentation on available suites and the functions they contain is in *Illustrator API Reference*.

Callers and selectors

This section describes and illustrates what the various caller/selector pairs mean and what your plug-in is expected to do in response to receiving them.

Caller: kSPInterfaceCaller, selector: kSPInterfaceStartupSelector

When Illustrator starts up, each plug-in receives a `kSPInterfaceStartupSelector` message. Only one such message is received per Illustrator session. This is where the plug-in needs to allocate memory and add plug-in types to Illustrator. Sample code that handles start-up in the Tutorial plug-in looks something like this:

```
typedef struct {
    AIFilterHandle   filterVariation1;
    AIToolHandle     toolVariation1;
    AIMenuItemHandle aboutPluginMenu;
} Globals;

Globals* g = nil;

static AIErr StartupPlugin ( SPInterfaceMessage* message )
{
    AIErr error = kNoErr;
    error = AcquireSuites( message->d.basic );
    if (!error) {
        // Allocate our globals - Illustrator will keep track of these.
        error = message->d.basic->AllocateBlock( sizeof(Globals), (void **) &g );
        if ( !error ) {
            message->d.globals = g;
        }
    }
    if (!error) {
        error = AddFilter(message);
    }
    if (!error) {
        error = AddTool(message);
    }
    if (!error) {
        error = AddAction(message);
    }
    if (!error) {
        error = AddMenu(message);
    }
    ReleaseSuites( message->d.basic );
    return error;
}
```

When allocating memory during this phase, you should use memory management functions provided by the Illustrator API (see `SPBasicSuite` or `SPBlocksSuite` for example) and put a reference to the memory in the *globals* field of the `SPMessageData` structure. Illustrator keeps this value for you and passes it back to you on subsequent calls, so it is a convenient place to store information you may need next time the plug-in is loaded. Illustrator does not care what you put in the `globals` field. Usually, it is a pointer to a block of memory. If you do not have any global data, you can leave the `globals` field empty.

During the start-up message, you need to inform Illustrator of the filters, tools and so on that your plug-in adds. For example, the `StartupPlugin` function above adds a filter. The filter is added by calling the `AIFilterSuite::AddFilter` function provided by the Illustrator API. See the `AddFilter` function in `Tutorial.cpp` for the code that makes this call:

```
error = sAIFilter->AddFilter( message->d.self, "Tutorial", &filterData,
            kToolWantsToTrackCursorOption, &g->filterVariation1);
```

When adding most plug-in types, the same or similar arguments are used. The first argument is a reference to the plug-in itself. You can get this from the `SPMessageData` structure. The second argument is an identifier for the plug-in type. This C-style string identifies the current added plug-in to a second plug-in, one perhaps searching for the plug-in's functionality. To be helpful, it should be as descriptive as possible.

Following the identifier are data and options specific to the plug-in type. The data is any information specific to the plug-in type on a platform. For instance, the filter above has a filter *category* and filter *title*. All filters with the same category are placed together in one submenu.

The options specify plug-in behavior to be provided by Illustrator. Filters do not have any special behavior but could use some default behavior options, like the `kPluginWantsResultsAutoSelectedOption` constant, which is used to control how artwork is selected when the plug-in returns control to Illustrator.

The final argument is returned to the plug-in by Illustrator. It is a reference to the added plug-in type. For simple plug-ins, where only one instance of a given plug-in type is added, this value can be ignored. If a plug-in adds more than one instance of a type, this reference should be saved in the `globals` block whose reference is returned to Illustrator. When a plug-in is called, Illustrator passes the active instance of the plug-in inside the message data. The saved references and current plug-in are compared later, to determine which plug-in instance was selected by the user:

```
if ( (AIFilterMessage)message->filter == g->filterVariation1) {
    // Do something for this variation
}
else {
    // Do the other variation
}
```

Of course, if you have no special requirements, you do not need to do any checking. That is it for initialization. The `kSPInterfaceStartupSelector` selector is called only once.

Caller: kSPInterfaceCaller, selector: kSPInterfaceShutdownSelector

When Illustrator is in the process of quitting, each plug-in receives a `kSPInterfaceShutdownSelector` message. Only one such message is received per Illustrator session. Actions that should happen when the user is completely finished using the plug-in, like saving preference information, are done at this time. Also, any needed follow-up action for something done during the `kSelectorAIStartupPlugin` message should be done now. Some actions, like adding a plug-in type, do not need any clean up. A common example is freeing allocated memory that the system does not automatically free when the application is quit. A shut-down routine corresponding to the `StartupPlugin()` function above would look like this:

```
static AIErr ShutdownPlugin( SPInterfaceMessage* message )
{
    AIErr error = kNoErr;
    if ( g != nil ) {
        message->d.basic->FreeBlock(g);
        g = nil;
        message->d.globals = nil;
    }
    return error;
}
```

Caller: kSPAccessCaller, selector: kSPAccessReloadSelector

Plug-in code is loaded and unloaded dynamically, depending on whether Illustrator is using it. If the code is unused by the main application or another plug-in for a pre-defined period of time, it is unloaded. This is

true of all plug-in types, including plug-in suites. Illustrator notifies the plug-in of the loading and unloading events.

After the start-up selector is received, each time your plug-in is brought into memory, it receives the `kSPAccessCaller`/`kSPAccessReloadSelector` message pair. Reload is your plug-in's opportunity to restore state information it needs to run, like global variables. Plug-in suites use the reload message to set up their function tables. A reload routine looks something like this:

```
Globals* g;

static AIErr ReloadPlugin( SPAccessMessage *message )
{
    AIErr error = kNoErr;
    g = ( Globals* )message->d.globals;
    return error;
}
```

Caller: kSPAccessCaller, selector: kSPAccessUnloadSelector

The opposite of the reload selector is `kSelectorAIUnloadPlugin`. This is an opportunity for the plug-in to save any state information before being removed from memory. Here is a sample routine for the unload selector:

```
static AIErr UnloadPlugin( SPAccessMessage* message )
{
    AIErr error = kNoErr;
    message->d.globals = g;
    return error;
}
```

Plug-in type-specific messages

The selectors discussed so far are received by all plug-ins. Other caller/selector pairs a plug-in receives depend on the *plug-in types* added at start-up. This section describes the caller/selector pairs associated with the plug-in types used in the Tutorial. For a description of the major plug-in types Illustrator supports, see Chapter 1, "Overview."

Filter plug-ins

Illustrator allows plug-ins to add new filters to the Object menu. To add a filter, your plug-in must do the following:

- Call `AIFilterSuite::AddFilter` on start-up, to add the filter to Illustrator.
- Handle messages relating to filter events.

There are two caller/selector pair messages associated with Filter plug-in types:

- Get-filter parameters (`kCallerAIFilter` / `kSelectorAIGetFilterParameters`).
- Go filter (`kCallerAIFilter` / `kSelectorAIGoFilter`).

The get-filter-parameters selector pair is an opportunity for your plug-in to present a dialog to the user, requesting information about how the plug-in should work. It is followed by the go-selector pair, which is when the plug-in actually does its work. The parameters are acquired in a separate call to support the Last

Filter feature in the Filter menu, which applies the last-used filter without asking the user for a new set of parameters. In this case, you receive a `kCallerAIFilter`/`kSelectorAIGoFilter` pair without a preceding `kCallerAIFilter`/`kSelectorAIGetFilterParameters` pair.

The Tutorial plug-in's `PluginMain` function handles these selector pairs as follows:

```
} else if ( strcmp( caller, kCallerAIFilter ) == 0 ) {
    if ( strcmp( selector, kSelectorAIGetFilterParameters ) == 0 )
        error = GetFilterParameters( ( AIFilterMessage* )message );
    else if ( strcmp( selector, kSelectorAIGoFilter ) == 0 )
        error = GoFilter( ( AIFilterMessage* )message );

}
```

When the user chooses your filter in the Object menu, your plug-in is first called with `kSelectorAIGetFilterParameters`. You should get whatever parameters you need from the user and place them in a handle, storing the handle in the `parameters` field of `AIFilterMessage`. This is similar to how the `globals` field is used, only `parameters` must be a handle if it is not nil. The `parameters` handle is given back to you on subsequent calls; therefore, it is necessary to create this handle only once. Each time you receive the get-filter-parameters selector, you can use the previous parameters to set the default dialog values. If your plug-in places more than one filter in the Object menu, a separate `parameters` handle is kept for each one. Illustrator does not care about the specific contents of the `parameters` handle, but the handle must be self contained; that is, you cannot include pointers or handles to more data inside the `parameters` handle. This is because Illustrator may make copies of the parameters and does not know how to copy blocks of memory referenced by the structure. If you do not have any parameters, leave this field zero.

The parameters used by the Tutorial plug-in's filter are shown below:

```
typedef struct {
    ASInt32 corners;     // number of corners on the polygon
    ASInt32 size;        // the maximum size, in points
} MyFilterParameters;
```

These parameters are obtained from the user by the `GetFilterParameters` function in `Tutorial.cpp`. The return result from `GetFilterParameters` should be `kNoErr` if the user hit OK (or if you do not have any parameters) or `kCanceledErr` if the user cancels the filter.

Immediately after the plug-in returns from `GetFilterParameters`, it is sent the go-filter selector pair (`kCallerAIFilter`/`kSelectorAIGoFilter`). When the plug-in receives this, it performs whatever the filter does, using the globals and parameters the plug-in set up previously. The Tutorial plug-in's `GoFilter` function in `Tutorial.cpp` creates a random polygon each time it is called, by creating a new path art object and adding path segments to it.

Tool plug-ins

Illustrator allows plug-ins to add new tools to the Tools panel. To add a tool, your plug-in must do the following:

- Provide an icon to represent the tool in the Tools panel.
- Call `AIToolSuite::AddTool` on start-up, to add the tool to Illustrator.
- Handle tool-related messages relating to mouse events. For example, when the plug-in's tool is selected in the Tools panel and the mouse button goes down and is released, the plug-in is notified by

a selector message (kCallerAITool/kSelectorAIToolMouseDown). A similar approach is used to communicate mouse drag events, and so on.

The Tutorial plug-in adds a line-drawing tool by calling AIToolSuite::AddTool on start-up. For sample code, see the AddTool function in Tutorial.cpp.

The added tool appears in the Tools panel. When it is selected and used, Illustrator calls the plug-in with the tool selectors listed above. To create a minimal straight-line tool, the plug-in needs to handle only the mouse-down selector. The Tutorial plug-in's PluginMain function handles this as follows:

```
else if ( strcmp( caller, kCallerAITool ) == 0  ) {
    if ( strcmp( selector, kSelectorAIToolMouseDown ) == 0 )
        error = ToolMouseDown( ( AIToolMessage* )message );
}
```

When the mouse is clicked, the Tutorial plug-in receives this selector and can process it. See the ToolMouseDown function in Tutorial.cpp. This function draws path segments to each mouse-down location. The location of the mouse is passed in the tool-message structure; see AIToolMessage in *Adobe Illustrator API Reference*. The tool message contains the basic plug-in data and a reference to the tool being used. The cursor field contains the point on the art board where the last tool event occurred, and the Tutorial plug-in's mouse-down handler uses this to create a path. The ToolMouseDown function begins by acquiring the suites it needs to make a line. The function checks whether a selected path exists. If so, it adds path segments to it; otherwise, it creates the first point in a new path. The function ends by releasing the suites it acquired.

While the ToolMouseDown function adds a basic tool, other selectors can be processed to give the line tool more functionality, like setting the cursor or tracking a mouse drag. This is left as an exercise for the reader.

Action plug-ins

For your plug-in to be recordable by Illustrator's Actions panel, you must add special code to your plug-in. Follow these steps:

1. **Register action events** — During start-up, your plug-in must register one or more action events. An action event is a single operation your plug-in executes. An Action event is shown in Illustrator's Actions panel, if the user chooses to record it.

2. **Record action events** — During your plug-in's execution, you must check whether the user is in record mode. If so, you must record your action event and pass all relevant parameters to the Action Manager.

3. **Respond to the DoAction selector** — Once you register one or more Action Events, your plug-in must be ready to execute those Action Events when requested. Your plug-in must respond to the kActionCaller caller and kDoActionSelector selector. These are defined in the Action Manager suite header file.

Registering action events

First, determine how many action events your plug-in will register, by separating the functionality of your plug-in into discrete operations. Basically, try to think of which operations users will want to record in the Actions panel.

During start-up, your plug-in should first make sure the Action Manager suite (see `AIActionManagerSuite`) is available, by trying to acquire a pointer to the suite. This check is necessary because the Action Plug-in may be disabled by removing it from the `Plug-ins` folder.

To register an action event, your plug-in must do the following:

- Call `AIActionManagerSuite::AINewActionParamType` to create a type parameter block (TPB) that describes the parameters your action event requires.
- Populate the TPB with key-value pairs that give the name and data type of each parameter by calling `AIActionManagerSuite::AIActionSetTypeKey`.
- Call `AIActionManagerSuite::RegisterActionEvent` to register the action event.
- Call `AIActionManagerSuite::AIDeleteActionParamType` to dispose of the TPB.

For sample code, see the `AddAction` function in `Tutorial.cpp`.

Recording action events

During your plug-in's execution, if the user is in record mode, you are responsible for recording any action events you registered. Illustrator is in record mode when the user is recording actions via the Actions panel.

To record an action, your plug-in must do the following:

- Call `AIActionManagerSuite::InRecordMode` to check if actions are being recorded.
- Call `AIActionManagerSuite::AINewActionParamValue` to create a Value Parameter Block (VPB) in which parameter values are recorded. A VPB is different from a TPB, in that it can contain actual values. A TPB can contain only data type descriptions.
- Populate the VPB with key value pairs that give the name and value of each parameter, by calling the appropriate AIActionManagerSuite function for the type of data stored in the parameter. See `AIActionManagerSuite::AIActionSetBoolean`, `AIActionManagerSuite::AIActionSetInteger`, etc.
- Call `AIActionManagerSuite::RecordActionEvent` to record the action event.
- Call `AIActionManagerSuite::AIDeleteActionParamValue` to dispose of your reference to the VPB.

For sample code, see the `GoFilter` and `RecordFilterAction` functions in `Tutorial.cpp`.

Responding to the DoAction selector

To execute an action, your plug-in must handle the do-action selector pair (`kActionCaller`/ `kDoActionSelector`) for each action event the plug-in registers. This is Illustrator's way of requesting that a particular action event be executed.

Your plug-in must add code for detecting such a notification. The Tutorial plug-in's `PluginMain` function handles the action selector, as follows:

```
else if ( strcmp( caller, kActionCaller ) == 0 ) {
    if ( strcmp( selector, kDoActionSelector ) == 0 )
        error = DoAction( ( DoActionMessage* )message );
```

```
}
```

The `DoAction` function in `Tutorial.cpp` executes the requested action event. The message struct sent along with the `kDoActionSelector` is `DoActionMessage`. Documentation for this structure is in *Adobe Illustrator API Reference*. It contains the recorded parameter values the action must replay. The `DoAction` function extracts the parameter values into its own data structure. The `DoActionMessage` struct also indicates whether a dialog should be popped to allow the user to tune the parameter values before the action is executed. The `DoAction` function responds accordingly, then calls the Tutorial plug-in's filter function, `GoFilter`, to re-play the action.

Playing action events

You also can play back action events from a plug-in. These action events could originate in the Illustrator application or other plug-ins. The SnpDocumentActionHelper code snippet in the SnippetRunner plug-in demonstrates how to play action events that originate in the Illustrator application.

Menu plug-ins

Illustrator allows plug-ins to add new menus to its menu structure. To add a menu, your plug-in must do the following:

- Call `AIMenuSuite::AddMenuItem` on start-up, to add the menu to Illustrator.
- Optionally, call `AIMenuSuite::AddMenuGroupAsSubMenu` to create a group in which further menu items can be nested.
- Handle messages related to menu events. For example, when a plug-in's menu item is clicked, the plug-in is notified by a selector message (`kCallerAIMenu`/`kSelectorAIGoMenuItem`).

The Tutorial plug-in adds an About plug-in menu on start-up; see "About Plug-ins menu" on page 18. For sample code, see the `AddMenu` function in `Tutorial.cpp`. A helper class, `SDKAboutBoxHelper`, is used to create the menu that appears under Illustrator's About menu group. When it is used, Illustrator calls the plug-in with the tool selectors listed above. The Tutorial plug-in's `PluginMain` function handles this as follows:

```
else if ( strcmp( caller, kCallerAIMenu ) == 0  ) {
    if ( strcmp( selector, kSelectorAIGoMenuItem ) == 0 )
        error = GoMenu( ( AIMenuMessage* )message );
}
```

When the menu is clicked, the Tutorial plug-in receives this selector and can process it. See the `GoMenu` function in `Tutorial.cpp`. This function pops an About box that displays contact details and a copyright statement.

Next steps

To learn more about Illustrator plug-in programming, explore the samples provided in the SDK and the documentation in *Adobe Illustrator API Reference*. Instructions on running and debugging plug-ins are in *Getting Started with Adobe Illustrator CS6 Development*.

3 Plug–in Techniques

This chapter discusses plug-in property lists (PiPL) and Live Effects.

- "Plug-in property lists" on page 28
- "Handling Live Effects" on page 32

Plug-in property lists

A plug-in property list (PiPL) resource contains a list of properties that store information about a plug-in. Illustrator considers only those files with valid PiPL resources to be potential plug-ins.

PiPL samples

Sample PiPL resource files are provided on the SDK in source code form.

All sample plug-ins in the SDK define their PiPLs in a resource source-code form. For example, the Tutorial plug-in's PiPL is defined in the following source files:

- Windows — See the PiPL resource declaration in the `Tutorial.rc` file.
- Mac OS — See the PiPL resource declaration in the `Tutorial.r` file.

As the samples show, it is more flexible to work with PiPL resources in source-code form.

PiPL structure

A plug-in property list has a version number and count, followed by a sequence of arbitrary-length byte containers called *properties*. The core types that define a PiPL are documented in the *Illustrator API Reference* and listed in the following table:

Type	Note
`PIProperty`	A plug-in property. Each property has a vendor ID, key, ID, length, and property data (whose size is indicated by the property length). The vendor ID identifies the vendor that defined the property type. All PiPL properties defined by the Illustrator API use a vendor ID of ADBE. Each property must be padded such that the next property begins on a four-byte boundary.
`PIPropertyList`	A plug-in property list has a version number and count, followed by a sequence of arbitrary-length byte containers called properties.

Required PiPL properties

Your plug-in's PiPL resource must include the required properties listed in the following table.

Property key		Value	Description
PIKindProperty	kind	SPEA	Indicates the type of the plug-in file; it is akin to a file type. Illustrator loads plug-ins whose kind property have the value SPEA.
PISPVersionProperty	ivrs	2	Describes to Illustrator the calling conventions expected by the plug-in and currently has a value of 2.

Your plug-in also must have at least one *code-descriptor* property that tells Illustrator the entry point of your code. Code descriptors are available for Intel-based Mac OS, PowerPC-based Mac OS, and Windows-based plug-ins:

Property key		Description
PICodeMacIntel32Property	mi32	PIMacIntelCodeDesc code descriptor containing entry point of Intel code for plug-ins on Mac OS platforms.
PIPowerPCMachOCodeProperty	mach	PIMachCodeDesc code descriptor containing entry point of PowerPC code in Mach-O format for plug-ins on Mac OS platforms.
PIWin32X86CodeProperty	wx86	PIWin32X86CodeDesc code descriptor containing entry point of plug-ins on Windows platforms.

Your plug-in binary can contain multiple code-descriptors if it will run on different types of machines. For example, a universal binary Mac OS plug-in contains Intel and PowerPC code descriptors.

Optional PiPL properties

Your plug-in's PiPL resource can include the optional properties described in the following table.

Property key		Notes
PIExportsProperty	*expt*	Plug-ins can export one or mores suites containing functions for use by other plug-ins. Suites are discussed in "Suites" on page 13. To ensure the interdependencies of plug-ins are handled correctly, plug-ins declare in advance what they export. The loading order of plug-ins becomes important when one plug-in depends on suites provided by another plug-in. This export information is declared in PiPL export properties, *expt*, which contain the names and API version numbers of the suites a plug-in provides. The plug-in manager uses this information to load and execute plug-ins, ensuring that suites and other resources are available when needed.
PIPluginNameProperty	pinm	The plug-in name displayed in Illustrator's Help > System Info dialog.

Export property

Plug-ins can extend the functionality of the API by exporting new suites. To optimize Illustrator's plug-in initialization process, a plug-in should add an export property (`PIExportsProperty`) to its PiPL. See the following table.

Property key		Notes
`PIExportsProperty`	*expt*	Plug-ins can export one or mores suites containing functions for use by other plug-ins. This export information is declared in PiPL export properties, *expt*, which contain the names and API version numbers of the suites a plug-in provides. The plug-in manager uses this information to load and execute plug-ins, ensuring that suites and other resources are available when needed. When a suite is requested (acquired), the export properties of all plug-ins are searched for the suite, and the providing plug-in is loaded into memory. The plug-in is started if necessary. Once the plug-in providing the suite is loaded and the requested suite is available, control is returned to the requesting plug-in. One suite request could trigger a series of plug-ins to be loaded into memory in a cascading fashion.

The property data that describes the suites that are to be exported is represented in the form of C structs, below. This representation must be transcribed into a resource source code form (Windows resources (`.rc`) under

Visual Studio or Rez resources (`.r`) on Mac OS):

```
/** List of suites exported by the plug-in. */
typedef struct MyExportsDesc
    {
        /** The number of suites exported by the plug-in. */
        long fCount;
        /** A variable-length list describing each suite exported by the plug-in. */
        MyExportDesc fExports[1];
    } MyExportsDesc;

/** Description of a suite exported by the plug-in. */
typedef struct MyExportDesc
{
    /** The total length in bytes of this MyExportDesc record.*/
    long fLength;
    /** A C-style string with the name of the suite to be exported.
    * Padded to 4 bytes. */
    char fName[1];
    /** The version of the suite to be exported. */
    long fVersion;
} MyExportDesc;
```

For more information

Adobe Illustrator API Reference describes the property names and associated data structures, such as `PIPropertyList`. The sample plug-ins on the SDK show how to define a PiPL using native platform resources.

Handling Live Effects

Live Effects allow you to apply an effect to an object, then modify or remove that effect dynamically. When you apply a Live Effect to an object, it is automatically added to the Appearance panel. From the Appearance panel, you can edit the effect, move it, duplicate it, delete it, or save it as part of a graphic style.

Adding functionality to a Live Effect menu item

Your plug-in can add items to the Live Effects menu. In order to handle a Live Effect programmatically, provide handlers for these two messages:

- `kCallerAILiveEffect/kSelectorAIEditLiveEffectParameters`: Sent when the user invokes your Life Effect menu item. Your handler receives and fills in a parameters dictionary that controls the effect options.
- `kCallerAILiveEffect/kSelectorAIGoLiveEffect`: Sent when you update the effect parameters. Your handler applies the effect, with the parameters you have set, to art that has been selected by the user, or created or selected by your code.

Editing effect parameters

When a user invokes your Live Effect menu item, Illustrator sends your plug-in the `kSelectorAIEditLiveEffectParameters` message, passing an `AILiveEffectEditParamMessage` to your handler.

- The `msg->parameters` contains a pointer to an `AILiveEffectParameters` dictionary, which is empty on the first invocation.
- If no art is selected when the user invokes your Live Effect menu item, the parameter `msg->allowPreview` is false.

Your plug-in adds entries to the parameters dictionary to control the effect options. You can show a dialog to get user input, or determine the values in your own code. After filling in dictionary values, your edit handler must call:

```
sAILiveEffect->UpdateParameters( msg->context );
```

Applying the effect

When you make the call to update parameters, Illustrator sends the `kSelectorAIGoLiveEffect` message, passing an `AILiveEffectGoMessage` to your handler.

- The `msg->parameters` contain the dictionary you received and modified in the edit handler.

  IMPORTANT: Do not use the LiveEffect Go message handler to modify the dictionary passed in `msg->parameters`. Changes that you make there are not retained. Use only the Edit-parameters handler (for `kCallerAILiveEffect/kSelectorAIEditLiveEffectParameters`) to modify the dictionary.

- The `msg->art` can be the currently selected art or the output of a previous live effect; it is not necessarily a group.

  You can duplicate the art and add it to its parent, replacing the current art:

```
result = sAIArt->DuplicateArt( art, kPlaceAbove, art, &path );
```

Or you can create a group, move the current art into that group and return your group in the parameter:

```
inputArt = pMsg->art;
result = sAIArt->GetArtParent(inputArt, &inputParent);
if (result == kNoErr)
result = sAIArt->NewArt(kGroupArt, kPlaceBelow, inputArt, &outputGroup);
if (result == kNoErr)
result = sAIArt->ReorderArt(inputArt, kPlaceInsideOnTop, outputGroup);
//Add some more art to the outputGroup or modify the inputArt
pMsg->art = outputGroup; //this is important
```

- The `msg->instanceInfo` parameter allows you to store object-specific data, which is returned to you in the GoLiveEffect message whenever that object needs to be updated.

  A typical way to use this is to store a random seed. For example, suppose your Live Effect generates a random seed and uses that seed to generate new art, perhaps by applying a color change. You need to preserve that seed for every invocation of your effect on that object; otherwise each modification of your object generates a new seed, and the effect is different. Many effects generate the random seed on the first invocation, then store the seed in the `instanceInfo` dictionary. Each subsequent invocation uses the stored seed, if it exists. This ensures that the same effect on the same object produces the same appearance each time it is applied.

4 Creating an HTML/JS UI for Plug-ins

The Flash-based extension technology, which Adobe provided in previous releases to help third parties build UI components, has been replaced by an HTML5/JavaScript extension architecture in the Creative Cloud release. You are free to use any UI framework that suits your needs, but a UI solution based on HTML5/JavaScript and the CEP extensibility framework is a recommended alternative.

Existing Flash-based extensions should be ported to HTML, and all new extensions should be created using HTML and JavaScript. For more information, see documentation for the Creative Cloud 2015 Extension SDK.

Creative Cloud extensions

The Adobe Creative Cloud Extension SDK provides developers with a consistent platform in which to extend the capabilities of one or more Adobe Creative Cloud desktop applicationsextensions. It is based on the Common Extensibility Platform (CEP) and HTML5/JavaScript. Adobe extensions run in much the same way in all Adobe Creative Cloud desktop applications, providing users with a rich and uniform experience. Developers can use extensions to add services and to integrate new features across multiple desktop applications.

The extensions that you can create with the Adobe Creative Cloud Extension SDK can provide both the UI and program logic to extend any Creative Cloud application in a unified way. Such extensions can be shared across desktop applications, accessing the host application's scripting interface in order to interact with each specific application in an appropriate way.

However, if you are using an extension only to provide a UI for an Illustrator C++ plug-in, you typically put the program logic in the C++ plug-in, where you can use Illustrator's native C++ API rather than the scripting interface.

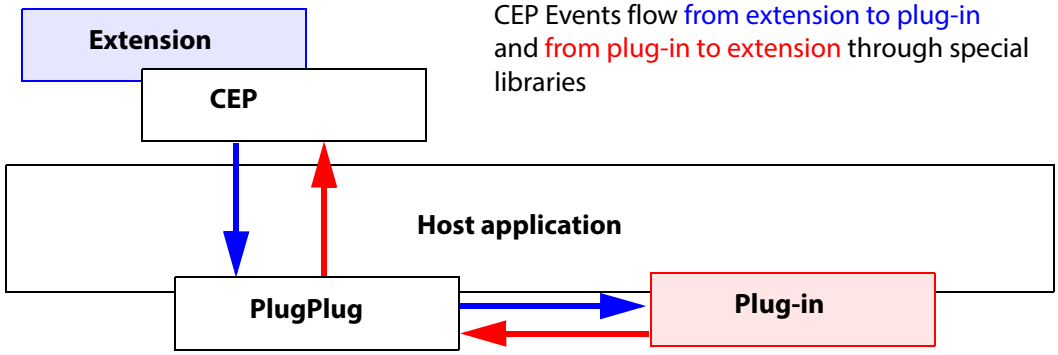
- For C++ plug-in development, it is recommended that you use Visual Studio in Windows and Xcode in Mac OS. For details, see *Getting Started with Adobe Illustrator 2019 Development*.
- For extension development, use Creative Cloud Extension Builder 3, an Eclipse-based tool that is part of the Extension SDK. The SDK provides complete documentation for installing and using the tools.

This chapter provides very general guidelines for how a C++ plug-in and HTML extension interact; each plug-in has different considerations and requirements. For additional sample code that illustrates how to modify your C++ plug-in to use the PlugPlug API, and how to write an HTML extension that provides a UI for a C++ plug-in, see the samples that are provided with the Illustrator SDK.

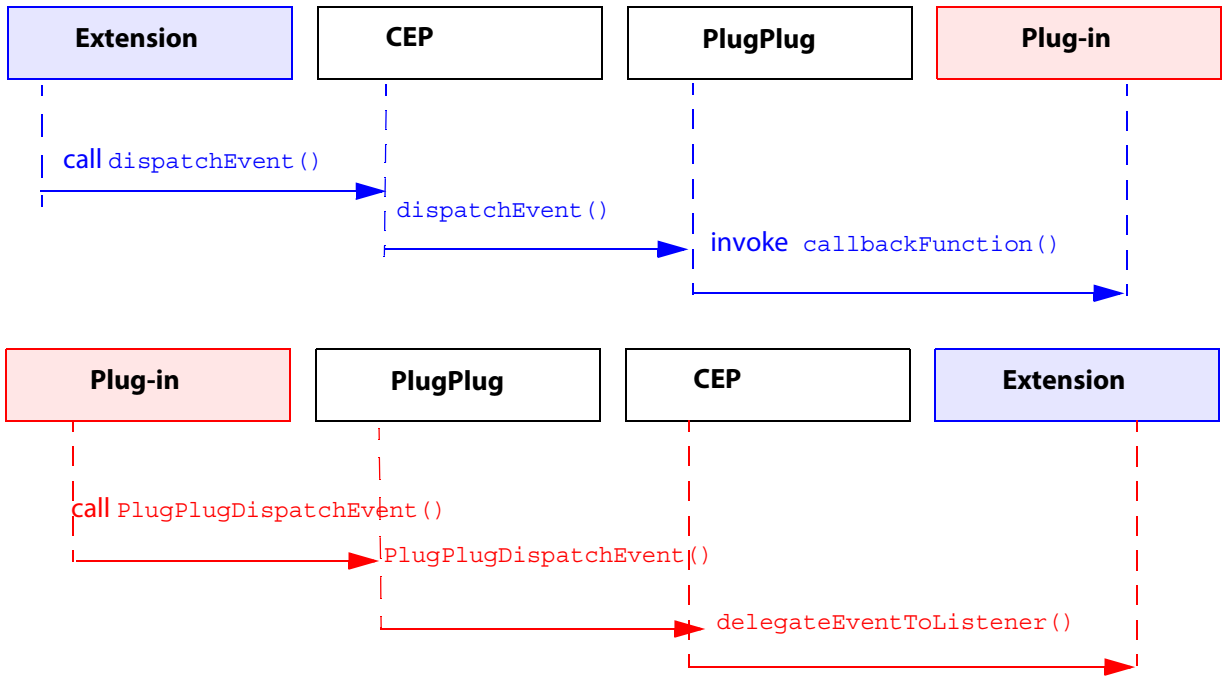
PRE-RELEASE: Extension Builder 3 is currently in pre-release, and illustrative samples are currently being updated and expanded to illustrate the recommended techniques.

Communication between plug-ins and extensions

Your plug-in communicates with your extension through a low-level messaging subsystem called CEP Events. The plug-in loads and unloads the extension, and the plug-in and extension can dispatch and respond to user-interaction events.



- The CEP library component that provides the API that the extension uses to interact with C++ plug-ins. To dispatch events from an extension to a plug-in, call the JavaScript library function `dispatchEvent()`. This causes the PlugPlug component to invoke the *callback function* that has been registered for that event type.
- The PlugPlug library is a native component that is directly integrated into the host application (Illustrator 2019). It provides the API that a C++ plug-in uses to interact with HTML/JS extensions. To dispatch events from a plug-in to an extension, call the C++ library function `PlugPlugDispatchEvent()`. This causes the CEP component to pass the event to any *event listeners* in the extension that have registered an interest for that event type.



Using the PlugPlug API

The PlugPlug library exposes these functions to C++ plug-ins. For complete reference details, see *SDK_root*/samplecode/common/includes/SDKPlugPlug.h. The class SDKPlugPlug wraps these functions for ease of use.

PlugPlugLoadExtension()	Load a given extension, making the HTML UI visible in the application and setting the window properties as specified in the extension manifest.
PlugPlugUnloadExtension()	Unload a given extension (when implemented), so that the HTML UI is no longer visible in the application.
PlugPlugDispatchEvent()	Dispatches a CEP Event, which contains related data passed as a string (const char*).
PlugPlugAddEventListener()	Registers the plug-in to receive a given event type, and defines the callback function for that event.
PlugPlugRemoveEventListener()	Removes the listener for a given event type.

- To receive CEP Events of a certain type in your C++ Plug-in, register a callback function for that event type using SDKPlugPlug::AddEventListener(), *before* loading the extension. For example:

```
static void OkClickedFunc (const csxs::event::Event* const event,
                           void* const context);

AddEventListener("com.adobe.csxs.events.OkClicked", OkClickedFunc, NULL);
```

  - The first parameter is the event type, the second is the callback function, and the third is a user-specific context pointer or NULL.
  - When the extension sends an event to the plug-in, it passes relevant data as a const char*. Your callback function must parse this string into data items useful to the plug-in.

- Before unloading the extension, you must use SDKPlugPlug::RemoveEventListener() to remove any event listeners you have registered. For example:

```
RemoveEventListener("com.adobe.csxs.events.OkClicked", OkClickedFunc, NULL);
```

- Your plug-in can load and unload the related extension using SDKPlugPlug::LoadExtension() and SDKPlugPlug::UnloadExtension().

- To dispatch events from your C++ plug-in to the HTML extension, use SDKPlugPlug::DispatchEvent(). You can encapsulate complex values in the associated data using XML format. For example:

```
std::string xmlString = "<payload>...</payload>";
csxs::event::Event event = {
    "com.adobe.csxs.events.UpdateDashPanel",
    csxs::event::kEventScope_Application,
    "test", NULL, xmlString.c_str()} ;

csxs::event::EventErrorCode testResult = DispatchEvent(&event);
```

Using the CEP API

The CEP JavaScript event class, `CSEvent`, represents a user-interaction event. (If you are porting an existing Flash-based extension, this is the same as the ActionScript equivalent.)

```
/**
  * Class CSEvent.
  * Use to dispatch a standard CEP event
  *
  * @param type         Event type.
  * @param scope        The scope of event, "GLOBAL" or "APPLICATION"
  * @param appId        The unique ID of the application that generated the event
  * @param extensionId  The unique ID of the extension that generated the event
  *
  * @return CSEvent object
  */
function CSEvent(type, scope, appId, extensionId)
```

The CEP JavaScript class `CSInterface` class defines `dispatchEvent()` and `addEventListener()` methods that allow you to send events, and to set up and register event handler callbacks.

```
/**
  * Registers an interest in a CEP event of a particular type, and
  * assigns an event handler. The handler can be a named or anonymous
  * function, or a method defined in a passed object.
  *
  * The event infrastructure notifies your extension when events of this
  * type occur, passing the event object to the registered handler function.
  *
  * @param type      The name of the event type of interest.
  * @param listener  The JavaScript handler function or method.
  *                  Takes one argument, the Event object.
  * @param obj       Optional, the object containing the handler method,
  *                  if any. Default is null.
  */
CSInterface.prototype.addEventListener = function(type, listener, obj)

/**
  * Triggers a CEP event programmatically. Use to dispatch
  * an event of a predefined type, or of a type you have defined.
  *
  * @param event     A CSEvent object.
  */
CSInterface.prototype.dispatchEvent = function(event)
```

Using the event framework

If you are already familiar with CEP event handling in Flash extensions, it is practically the same in JavaScript. Here is a JavaScript code snippet that shows how you create an event type, define a handler for it, set up an event listener to invoke the handler, and dispatch the event.

The `CSInterface.addEventListener()` method supports both named and anonymous event-handler callback functions, as shown in this code snippet:

```
// Create your local CSInterface instance
var csInterface = new CSInterface();

// Create a named event handler callback function
```

```
function myEventHandler(event)
{
  console.log("type=" + event.type + ", data=" + event.data);
}
// Register the named event handler
CSInterface.addEventListener("com.adobe.cep.test", myEventHandler);

// Register an anonymous event handler
// (the second argument is the callback function definition)
csInterface.addEventListener("com.adobe.cep.test",
        function (event) {
            console.log("type=" + event.type + ", data=" + event.data);}
  )
```

You can create a `CSEvent` object and dispatch it using `CSInterface.dispatchEvent()`.

In your event-handler callback, you can access the properties of the event object. For example, this anonymous handler function retrieves the event type and event data:

```
csInterface.addEventListener("com.adobe.cep.test", function (event)
  {
    console.log("type=" + event.type + ", data=" + event.data);
  }
  ); // Anonymous function is the second parameter
```

You can pass JavaScript objects as *`Event.data`*. For example:

```
var csInterface = new CSInterface();
csInterface.addEventListener("com.adobe.cep.test", function (event)
   {
     var obj = event.data;
     console.log("type=" + event.type + ", data.property1=" + obj.p
   }
); // Anonymous handler function expects data to be an object
```

Here are some examples of different ways to create and dispatch events in JavaScript:

```
// Create an event of a given type, set the data, and send
var csInterface = new CSInterface();
var event = new CSEvent("com.adobe.cep.test", "APPLICATION");
event.data = "This is a test!";

csInterface.dispatchEvent(event);

// Create an event, set all properties, and send
var event = new CSEvent(); // create empty event

event.type = "com.adobe.cep.test";
event.scope = "APPLICATION";
event.data = "This is a test!";

csInterface.dispatchEvent(event);

// Send an object as event data
var event = new CSEvent("com.adobe.cep.test", "APPLICATION");
var obj = new Object();
obj.a = "a";
obj.b = "b";
event.data = obj;
cSInterface.dispatchEvent(event);
```

Communication between native host API and HTML extensions

For event passing from the native host API to the JavaScript code of an HTML extension, use the PlugPlug C++ event methods: `PlugPlugAddEventListener()` and `PlugPlugDispatchEvent()`.

Unlike Flash extensions, HTML extensions do not support window state-change events.

Event type support

These event types are defined and supported by Creative Cloud desktop applications. Currently, only the `Application` scope is supported for events.

Event type	Sent after	Supported in hosts
`documentAfterActivate`	Document has been activated (new document created, existing document opened, or open document got focus)	Photoshop InDesign/InCopy Illustrator
`documentAfterDeactivate`	Active document has lost focus	Photoshop InDesign/InCopy Illustrator
`dcoumentAfterSave`	Document has been saved	Photoshop InDesign/InCopy
`applicationBeforeQuit`	Host gets signal to begin termination	InDesign/InCopy
`applicationActivate`	Host gets activation event from operating system	Mac OS only: Premiere Pro Prelude Windows and Mac OS: Photoshop InDesign/InCopy Illustrator

Delivering a plug-in with an HTML/JS UI

This section uses the FreeGrid sample plug-in and the FreeGridUI sample extension as examples to describe how to build, install, and debug a plug-in with an HTML/JavaScript UI.

Build and install the C++ plug-in

To build your C++ plug-in in Windows, use Visual Studio 2017. In Mac OS, use Xcode 9.2.

1. Open the project file:
   - ▷ In Windows: *`SDK_root`*`\samplecode\FreeGrid\FreeGrid.vcxproj`
   - ▷ In Mac OS: *`SDK_root`*`/samplecode/FreeGrid/FreeGrid.xcodeproj`
2. Build the project. The build result is placed in a subfolder of the `samplecode` folder, depending on which target you build:

- In Windows:
  `output\win\Win32\Debug` or `output\win\Win32\Release`
  `output\win\Win64\Debug` or `output\win\Win64\Release`
- In Mac OS:
  `output/mac/debug` or `output/mac/release`

3. Copy the build result, `FreeGrid.aip` to the Adobe Illustrator 2019 plug-ins folder. See "Where plug-ins live" on page 8.

Package the HTML extension

In order to distribute your Creative Suite extension, you must package it and sign it so that users can install it in their desktop applications using the Extension Manager. The Adobe Extension SDK provides an Export wizard to help you do this from Extension Builder 3.

The Adobe Extension SDK .allows you to debug your extension during development, before you actually package and install the extension. To do this, you must enable debugging in the operating system, use Extension Builder 3 to debug the extension while it is running in the host application, then check the various logs for warnings and errors.

See Adobe Extension SDK documentation for complete details of how to develop and debug an extension.

Install the extension

To run your extension in Illustrator, you must load it into one of the shared extension deployment folders.

Go to the Extension Builder workspace folder that contains your project, find your project's Output folder (the default name is `bin`). Copy your Output folder to the deployment folder; the name and location of this folder depends on the version of Illustrator you are targeting and your platform. From this version onward, Illustrator loads extensions from these locations:

- These are the system-wide deployment folders for all users:
  - In Windows:
    `C:\Program Files\Common Files\Adobe\CEP\extensions\`
  - In Mac OS:
    `/Library/Application Support/Adobe/CEP/extensions/`
- For a specific user, these are the default locations of the deployment folder.
  - In Windows:
    `C:\<username>\AppData\Roaming\Adobe\CEP\extensions\`
  - In Mac OS:
    `~/Library/Application Support/Adobe/CEP/extensions/`

On launch, Illustrator searches for extensions in the system folder first, then in the user's folder.

If there is a conflict in extension IDs, the last one loaded is used. If the same extension is found in different locations, then if they have different bundle-ID versions, the latest version is used.

When you start Illustrator, your extension's menu (as defined in the manifest file) appears in the **Window > Extensions** menu.