Developing Acrobat® Applications Using JavaScript™

Adobe® Acrobat® SDK

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Adobe® Acrobat® X SDK *Developing Acrobat Applications Using JavaScript* for Microsoft® Windows® and Mac OS®

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Preface

This guide shows how you can use JavaScript™ to develop and enhance standard Adobe® Acrobat® workflows, such as:

- Printing and viewing
- Spell-checking
- Stamping and watermarking
- Managing document security and rights
- Accessing metadata
- Facilitating online collaboration
- Creating interactive forms
- Customizing interaction with web Services
- Interacting with databases
- Accessing the 3D JavaScript engine

What's in this guide?

This guide contains detailed information about JavaScript for Acrobat, extensive examples which demonstrate its capabilities, as well as descriptions of the use of the SDK tools.

Who should read this guide?

It is assumed that you are an Acrobat solution provider or power user, and that you possess basic competency with JavaScript. If you would also like to take full advantage of Acrobat's web-based features, you will find it useful to understand XML, XSLT, SOAP, and web services. Finally, if you would like to use Acrobat's database capabilities, you will need a basic understanding of SQL.

This guide assumes that you are familiar with the non-scripting elements of the Acrobat 8 user interface that are described in Acrobat's accompanying online help documentation. To run the examples in this guide, you will need to use Acrobat 8 Professional.

About the sample scripts

This guide includes examples that give you an opportunity to work directly with JavaScript for Acrobat. If you plan to work with any of the examples, configure your computer as follows:

1. Install Acrobat Pro on your Microsoft® Windows® or Mac OS workstation.

2. Use the same directory for all the scripts, PDF documents and other files.

3. Extract the Zip files in the Acrobat SDK to a local directory.

Related documentation

This document refers to the following sources for additional information about JavaScript and related technologies. The Acrobat documentation is available through the Acrobat Family Developer Center, http://www.adobe.com/go/acrobat_developer.

For information about	**See**
Known issues and implementation details.	*Readme*
Answers to frequently asked questions about the Acrobat SDK.	*Developer FAQ*
New features in this Acrobat SDK release.	*What's New*
A general overview of the Acrobat SDK.	*Overview*
A guide to the sections of the Acrobat SDK that pertain to Adobe Reader.	*Developing for Adobe Reader*
A guide to the sample code included with the Acrobat SDK.	*Guide to SDK Samples*
Configuring and administering a system for online collaboration using comment repositories, Acrobat and Adobe Reader.	*Acrobat Online Collaboration: Setup and Administration*
Detailed descriptions of JavaScript APIs for adding interactivity to 3D annotations within PDF documents.	*JavaScript for Acrobat 3D Annotations API Reference*
Detailed descriptions of JavaScript APIs for developing and enhancing workflows in Acrobat and Adobe Reader.	*JavaScript for Acrobat API Reference*
A description of how to convert JavaScript for Acrobat for use in an Adobe® LiveCycle® Designer form.	*Converting Acrobat JavaScript for Use in LiveCycle Designer Forms*
A detailed description of the PDF file format.	*PDF Reference*
Using JavaScript to perform repetitive operations on a collection of files.	*Batch Sequences*
A description of Acrobat's digital signature capabilities, which document authors can use to create certified documents, signable forms, and custom workflows and appearances.	*Acrobat 8.0 Security User Guide*

1 Developing Acrobat Applications Using JavaScript

Introduction

This chapter introduces the JavaScript for Acrobat scripting model and containment hierarchies (its objects), as well as the primary Acrobat and PDF capabilities related to JavaScript usage.

Topic	Description
Overview	A brief history of JavaScript, its origins in HTML, and its relevance to Acrobat
Reading the JavaScript for Acrobat API Reference	Discusses important features of the JavaScript for Acrobat such as security restrictions on some of the methods, safe paths and privileged methods.
Object summary	A listing and short description of some objects that play an important role in JavaScript for Acrobat.
JavaScript applications	A far-from-complete listing of suggested applications to JavaScript.

Overview

JavaScript for Acrobat is an extension of core JavaScript, version 1.5 of ISO-16262, formerly known as ECMAScript, an object-oriented scripting language developed by Netscape Communications. JavaScript was created to offload web page processing from a server onto a client in web-based applications. Acrobat extends the core language by adding new objects and their accompanying methods and properties, to the JavaScript language. These Acrobat-specific objects enable a developer to manage document security, communicate with a database, handle file attachments, manipulate a PDF file so that it behaves as an interactive, web-enabled form, and so on. Because the Acrobat-specific objects are added on top of core JavaScript, you still have access to its standard classes, including `Math`, `String`, `Date`, and `RegExp`.

PDF documents have great versatility since they can be displayed both within the Acrobat software as well as a web browser. Therefore, it is important to be aware of the differences between JavaScript used in a PDF file and JavaScript used in a web page:

- JavaScript in a PDF file does not have access to objects within an HTML page. Similarly, JavaScript in a web page cannot access objects within a PDF file.
- In HTML, JavaScript is able to manipulate such objects as `Window`. JavaScript for Acrobat cannot access this particular object but it can manipulate PDF-specific objects.

Most people know Acrobat as a medium for exchanging and viewing electronic documents easily and reliably, independent of the environment in which they were created; however, Acrobat provides far more capabilities than a simple document viewer.

You can enhance a PDF document so that it contains form fields to capture user-entered data as well as buttons to initiate user actions. This type of PDF document can replace existing paper forms, allowing employees within a company to fill out forms and submit them via PDF files, and connect their solutions to enterprise workflows by virtue of their XML-based structure and the accompanying support for SOAP-based web services.

Acrobat also contains functionality to support *online team review*. Documents that are ready for review are converted to PDF. When a reviewer views a PDF document in Acrobat and adds comments to it, those comments (or *annotations*) constitute an additional layer of information on top of the base document. Acrobat supports a wide variety of standard comment types, such as a note, graphic, sound, or movie. To share comments on a document with others, such as the author and other reviewers, a reviewer can export just the comment "layer" to a separate comment repository.

In either of these scenarios, as well as others that are not mentioned here, you can customize the behavior of a particular PDF document, implement security policies, interact with databases and web services, and dynamically alter the appearance of a PDF document by using JavaScript. You can tie JavaScript code to a specific PDF document, a particular page within a PDF document, or a form field or button in a PDF file. When an end user interacts with Acrobat or a PDF file displayed in Acrobat that contains JavaScript, Acrobat monitors the interaction and executes the appropriate JavaScript code.

Not only can you customize the behavior of PDF documents in Acrobat, you can customize Acrobat itself. In earlier versions of Acrobat (prior to Acrobat 5), this type of customization could only be done by writing Acrobat plug-ins in a high-level language like C or C++. Now, much of that same functionality is available through Acrobat extensions to JavaScript. You will find that using JavaScript to perform a task such as adding a menu to Acrobat's user interface is much easier than writing a plug-in.

Using Acrobat Pro, you can create batch sequences for processing multiple documents, processing within a single document, processing for a given page, and processing for a single form field. For batch processing, it is possible to execute JavaScript on a set of PDF files, which enables tasks such as extracting comments from a comment repository, identifying spelling errors, and automatically printing PDF files.

Reading the *JavaScript for Acrobat API Reference*

The companion document to this document is the JavaScript for Acrobat API Reference. If you are seriously interested in developing JavaScript solutions for your PDF documents, both documents are of the highest importance to you. This being the case, it is vital to learn how to read the reference, to be aware of the many security restrictions placed on some of the methods and to know the standard ways of working with security-restricted methods.

These features are of particular importance:

- The *quick bar*: In the JavaScript for Acrobat API Reference, each object, property and method has a quick bar, a one-row table of icons that provides a summary of the item's availability and usage recommendations. Many lost hours of time can be avoided by paying attention to this quick bar. Refer to the JavaScript for Acrobat API Reference for details.
- *Privileged context*: This guide contains detailed information on executing JavaScript in a privileged context, beyond that provided in JavaScript for Acrobat API Reference, see Privileged versus non-privileged context.
- *Safe path*: Acrobat 6.0 introduced the concept of a *safe path* for JavaScript methods that write data to the local hard drive based on a path passed to it by one of its parameters. Generally, when a path is judged to be not safe, a `NotAllowedError` exception is thrown. See the JavaScript for Acrobat API Reference for more information about *safe paths*.

Note: Many sample scripts presented in this guide reference the local file system. These scripts generally use the path `"/c/temp/"`, which is a safe path.

Object summary

The Acrobat extension to core JavaScript defines many objects that allow your code to interact with the Acrobat application, a PDF document, or form fields within a PDF document. This section introduces you to the primary objects used to access and control the application and document, the development environment itself, and general-purpose JavaScript functionality.

Below is a short listing of some of the main objects used in the document and in the sample files. A brief description of each of the objects follow the table.

Object	Purpose
`app`	Acrobat
`console`	JavaScript Debugger
`dbg`	Debugger
`dialog`	Modal dialog boxes
`Doc`	PDF document
`event`	JavaScript events
`global`	Persistent and cross-document information
`search`	Searching and indexing
`security`	Encryption and digital signatures
`SOAP`	Web services
`util`	JavaScript utility methods

app

The `app` object is a static object that represents the Acrobat application itself. It offers a number of Acrobat-specific functions in addition to a variety of utility routines and convenience functions. By interacting with the `app` object, you can open or create PDF and FDF documents, and customize the Acrobat interface by setting its viewing modes, displaying popup menus, alerts, and thermometers, displaying a modal dialog box, controlling time intervals, controlling whether calculations will be performed, performing email operations, and modifying its collection of toolbar buttons, menus, and menu items. You can also query `app` to determine which Adobe product and version the end user is using (such as Adobe Reader 8 or Acrobat Pro 7.0), as well as which printer names and color spaces are available.

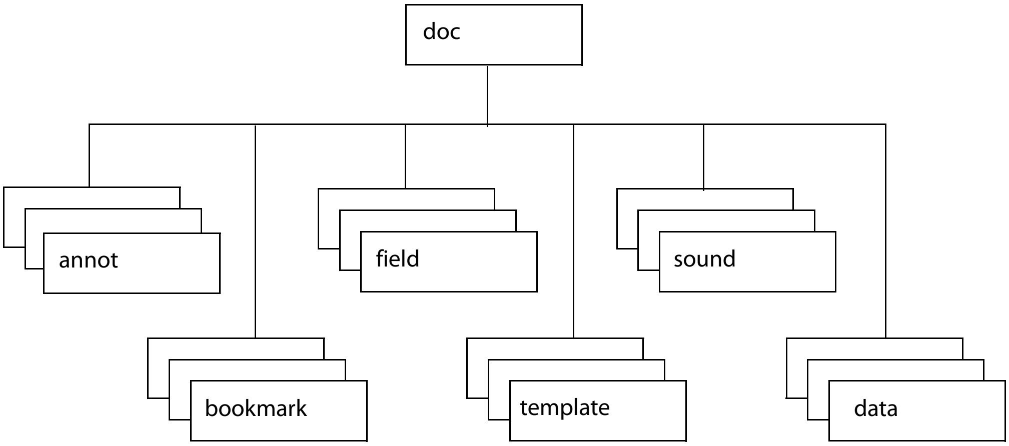
Doc

The Doc object is the primary interface to the PDF document, and it can be used to access and manipulate its content. The Doc object provides the interfaces between a PDF document open in the viewer and the

JavaScript interpreter. By interacting with the Doc object, you can get general information about the document, navigate within the document, control its structure, behavior and format, create new content within the document, and access objects contained within the document, including bookmarks, form fields, templates, annotations, and sounds.

The following graphic represents the containment hierarchy of objects related to the Doc object.

Doc object containment hierarchy



Accessing the Doc object from JavaScript can be done in a variety of ways. The most common method is using the `this` object, which is normally equivalent to the Doc object of the current underlying document.

dbg

You can use the `dbg` object, available only in Acrobat Pro, to control the JavaScript Debugger from a command line while the application is not executing a modal dialog box. The `dbg` object methods offer the same functionality as the buttons in the JavaScript debugger dialog box toolbar, which permit stepwise execution, setting, removing, and inspecting breakpoints, and quitting the debugger.

console

The `console` object is a static object that is used to access the JavaScript console for displaying debug messages and executing JavaScript. It is useful as a debugging aid and as a means of interactively testing code and is only available within Acrobat Pro.

global

The `global` object is used to store data that is persistent across invocations of Acrobat or shared by multiple documents. Global data sharing and notification across multiple documents is done through a subscription mechanism, which enables monitoring of global variables and reporting of their values to all subscribing documents. In addition, `global` can be used to store information that pertains to a group of documents, a situation that occurs when a batch sequence runs. For example, batch sequence code often stores the total number of documents to be processed as a property of `global`. If information about the documents needs to be stored in a `Report` object, it is assigned to a set of properties within `global` so it is accessible to the `Report` object.

util

The util object is a static JavaScript object that defines a number of utility methods and convenience functions for number and date formatting and parsing. It can also be used to convert information between rich content and XML representations.

dialog

The dialog object is an object literal used by the app object's execDialog method to present a modal dialog box identical in appearance and behavior to those used across all Adobe applications. The dialog object literal consists of a set of event handlers and properties which determine the behavior and contents of the dialog box, and may be comprised of the following elements: push buttons, check boxes, radio buttons, list boxes, text boxes, popup controls, and containers and frames for sets of controls.

security

The security object is a static JavaScript object, available without restriction across all Acrobat applications including Adobe Reader, that employs a token-based security model to facilitate the creation and management of digital signatures and encryption in PDF documents, thus providing a means of user authentication and directory management. Its methods and properties are accessible during batch, console, menu, or application initialization events. The security object can be used to add passwords and set security options, add usage rights to a document, encrypt PDF files for a list of recipients, apply and assign security policies, create custom security policies, add security to document attachments, create and manage digital IDs using certificates, build a list of trusted identities, and check information on certificates.

SOAP

The SOAP object can be used to make remote procedure calls to a server and invoke web services described by WSDL, and supports both SOAP 1.1 and 1.2 encoding. Its methods are available from Acrobat Pro, Acrobat Standard, and for documents with form export rights open in Adobe Reader 6.0 or later. The SOAP object makes it possible to share comments remotely and to invoke web services in form field events. It provides support for rich text responses and queries, HTTP authentication and WS-Security, SOAP headers, error handling, sending or converting file attachments, exchanging compressed binary data, document literal encoding, object serialization, XML streams, and applying DNS service discovery to find collaborative repositories on an intranet. In addition the XMLData object can be used to evaluate XPath expressions and perform XSLT conversions on XML documents.

search

The search object is a static object that can be used to perform simple and advanced searches for text in one or more PDF documents or index files, create, update, rebuild, or purge indexes for one or more PDF documents, and search through document-level and object-level metadata. The search object has properties that can be used to fine-tune the query, such as a thesaurus, words with similar sounds, case-sensitivity, and settings to search the text both in annotations and in EXIF metadata contained in JPEG images.

event

All JavaScript actions are executed when a particular event occurs. For each event, an `event` object is created. When an event occurs, the `event` object can be used to obtain and manage any information associated with the state of that particular event. An `event` object is created for each of the following type of events: Acrobat initialization, batch sequences, mouse events on bookmarks, JavaScript console actions, document print, save, open, or close actions, page open and close events, form field mouse, keystroke, calculation, format, and validation events, and menu item selection events.

JavaScript applications

JavaScript for Acrobat enables you to do a wide variety of things within Acrobat and Adobe Reader, and within PDF documents. The Acrobat extensions to JavaScript can help with the following workflows:

- Creating PDF documents
  - Create new PDF files
  - Control the appearance and behavior of PDF files
  - Convert PDF files to XML format
  - Create and spawn templates
  - Attach files to PDF documents
- Creating Acrobat forms
  - Create, modify, and fill in dynamically changing, interactive forms
  - Import and export form, attachment, and image data
  - Save form data in XML, XDP, or Microsoft Excel format
  - Email completed forms
  - Make forms accessible to visually impaired users
  - Make forms web-ready
  - Migrate legacy forms to dynamic XFA
  - Secure forms
- Facilitating review, markup, and approval
  - Set comment repository preferences
  - Create and manage comments
  - Approve documents using stamps
- Integrating digital media into documents
  - Control and manage media players and monitors
  - Add movie and sound clips
  - Add and manage renditions
  - Set multimedia preferences
- Modifying the user interface
  - Create dialog boxes
  - Add navigation to PDF documents

  - Manage PDF layers
  - Manage print production
- Searching and indexing of documents and document metadata
  - Perform searches for text in one or more documents
  - Create, update, rebuild, and purge indexes
  - Search document metadata
- Securing documents
  - Create and manage digital signatures
  - Add and manage passwords
  - Add usage rights
  - Encrypt files
  - Manage digital certificates
- Managing usage rights
  - Write JavaScript for Adobe Reader
  - Enable collaboration
- Interacting with databases
  - Establish an ADBC connection
  - Execute SQL statements
  - Support for ADO (Windows only)
- Interacting with web services
  - Connection and method invocation
  - HTTP authentication and WS-Security
  - SOAP header support
  - Error handling
  - Handle file attachments
  - Exchange compressed binary data
  - Document literal encoding
  - Serialize objects
  - XML streams
  - Apply DNS service discovery to find collaborative repositories on an intranet
- XML
  - Perform XSLT conversions on XML documents
  - Evaluate XPath expressions

2 Tools

Acrobat provides an integrated development environment that offers several tools with which to develop and test JavaScript functionality. These tools are the JavaScript Editor, Console, and Debugger. In addition, Acrobat supports the use of third-party editors for code development.

Topic	Description
Using the JavaScript Debugger console	Covers the following topics: ● Opening the Console ● Executing JavaScript ● Formatting code ● Enabling JavaScript
Using a JavaScript editor	How to access and to use the JavaScript editor built into Acrobat.
Specifying the default JavaScript editor	How to set the default JavaScript editor to an external text application.
Using an external editor	The use of an external editor to write JavaScript code.
Using the Debugger with Adobe Reader	How to use the Debugger with Adobe Reader.
Enabling the JavaScript Debugger	Debugger preferences.
JavaScript Debugger	The Debugger controls and their use.

Using the JavaScript Debugger console

The JavaScript console provides an interactive and convenient interface for testing portions of JavaScript code and experimenting with object properties and methods. Because of its interactive nature, the console behaves as an editor that permits the execution of single lines or blocks of code.

There are two ways to activate the JavaScript console: either through an Acrobat menu command or through the use of the static `console` object within JavaScript code. In either case, it appears as a component of the JavaScript Debugger, and the primary means of displaying values and results is through the `console.println` method.

Opening the console

➤ **To open the JavaScript Debugger console:**

1. Open the Debugger window using one of these methods:
   - Select **Advanced** > **Document Processing** > **JavaScript Debugger**, or
   - Type **Ctrl+J** (Windows) or **Command+J** (Mac OS)

2. Select either **Console** or **Script and Console** from the debugger View list.

To open and close the console with JavaScript code, use `console.show()` and `console.hide()` methods, respectively.

Executing JavaScript

The JavaScript console allows you to evaluate single or multiple lines of code. There are three ways to evaluate JavaScript code while using the interactive console:

- To evaluate a portion of a line of code, highlight the portion and press either the Enter key on the numeric keypad or press Ctrl + Enter.
- To evaluate a single line of code, make sure the cursor is positioned on that line and press either the Enter key on the numeric keypad or press Ctrl + Enter.
- To evaluate multiple lines of code, highlight those lines and press either the Enter key on the numeric keypad or press Ctrl + Enter.

In all cases, the result of the most recent single JavaScript statement executed is displayed in the console.

Formatting code

To indent code in the JavaScript console, use the Tab key.

- To indent four spaces to the right, position the cursor at the beginning of a single line or highlight the block of code, and press the Tab key.
- To indent four spaces to the left, position the cursor at the beginning of a single line or highlight a block of code and press Shift + Tab.

Enabling JavaScript

In order to use JavaScript, you must first verify that JavaScript has been enabled. In order to execute code from the console, you will also need to ensure that the JavaScript Debugger is enabled, since the Console window is a component within the JavaScript Debugger interface.

➤ **To enable JavaScript, the Debugger and the Console:**

1. Launch Acrobat.
2. Select **Edit** > **Preferences** to open the Preferences dialog box.
3. Select **JavaScript** from the list of options on the left side of the dialog box.
4. Select **Enable Acrobat JavaScript** if it is not already selected.
5. In the Preferences dialog box, select **Enable JavaScript Debugger After Acrobat is Restarted** from the JavaScript Debugger options.
6. Select **Enable Interactive Console**. This option enables you to evaluate code that you write in the console window.
7. Select **Show Console on Errors and Messages**. This ensures that whenever you make mistakes, the console displays helpful information.

8. Click **OK** to close the Preferences dialog box.

9. Close and restart Acrobat.

➤ **To test the interactive Console:**

1. Select **Advanced** > **Document Processing** > **JavaScript Debugger** to open the JavaScript Debugger.

2. In the debugger, select **Console** from the **View** window.

   The Console window appears.

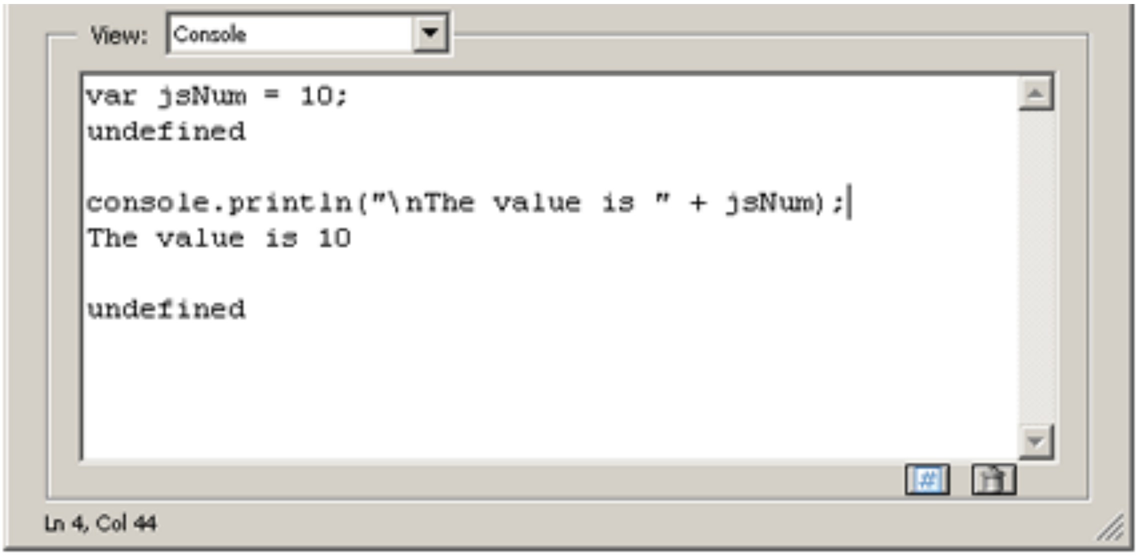
3. Click **Clear** (the trash can icon), located at the bottom right of the Console, to delete any contents that appear in the window.

4. In the text window, type the following code:

   ```
   var jsNum = 10;
   ```

5. With the mouse cursor positioned somewhere in this line of code, press **Enter** on the numeric keypad or press **Ctrl + Enter**. The JavaScript variable is created and is assigned a value of 10. The results are shown in the following graphic.

Evaluating the variable declaration



View: Console

```
var jsNum = 10;
undefined

console.println("\nThe value is " + jsNum);
The value is 10

undefined
```

Ln 4, Col 44

After each JavaScript statement executes, the console window prints out `undefined`, which is the return value of the statement. Note that the result of a statement is not the same as the value of an expression within the statement. In this case, the return value `undefined` does not mean that the value of `jsNum` is undefined; it just means that the entire JavaScript statement's value is `undefined`.

Note the use of the `console.println()` method to display the result in a more human-readable format.

Debugging with the JavaScript Console

Though Acrobat Pro has a full-featured debugger, see "JavaScript Debugger" on page 30, for simple scripts it is often easier to debug scripts by the following methods:

- testing and/or developing script snippets in the Console itself

- inserting `console.println()` commands to write information to the Console.

Example: *Test a regular expression in the JavaScript Debugger Console*

The following script, which can be created in the JavaScript Console, illustrates the use of `console.println()`.

The regular expression

```
var re = /(Professional|Pro)(\s+)(\d)/g
```

and the replacement function, `myReplace()`, are used to search the string, `str`, for the phrase `"Professional 7"` or `"Pro 7"`, and to replace the string `"7"` with the string `"8"`. The script is executed using the procedures described in "Executing JavaScript" on page 22.

After testing and debugging, the script can be copied and pasted to the target location.

Note the debugging loop inside the function `myReplace()` writes the arguments of the function to the Console. This helps in the development phase: the arguments are seen in the Console where you can verify that they are the ones expected. The loop can be deleted or commented out after testing.

```
function myReplace() {
  var l = arguments.length;
  for ( var i = 0; i < l; i++)
    console.println("arg" + i + " = " + arguments[i])
  return arguments[1] + arguments[2] + "8";
}
var str = "Acrobat Pro\n7 is a great application, "
  + "so I say on the 7th of May.\nOn a laptop Acrobat Pro 7.0 is on the go!"
var re = /(Professional|Pro)(\s+)(\d)/g;
var newStr = str.replace( re, myReplace);
console.println("\nnewStr = " + newStr);
```

Using a JavaScript editor

There are several ways to invoke the JavaScript Editor, depending on the context. To begin with, it is possible to select JavaScripts from the Advanced > Document Processing menu and choose one of the following options:

- Edit All JavaScripts
- Document JavaScripts
- Set Document Actions

A more basic approach, however, is to think of a script as an action associated with a part of the document, such as a page, bookmark, or form field. As in the following example, you can select the object of interest and edit its particular script.

➤ To write a script for a document component:

1. Right-click a document component such as a bookmark. This triggers a context menu.
2. Select **Properties** and choose the **Actions** tab.
3. Select **Run a JavaScript** from the **Select Action** drop-down list.

4. Click **Add** to open the JavaScript editor.

5. In the editor window, write the JavaScript code to run when the event that activates the code is created.

6. Click **Close**.

   If there are errors in your code, the JavaScript editor highlights the code line in question and displays an error message.

Note: JavaScript actions have a scope associated with various levels of objects in a PDF document, such as a form field, a page, or the entire document. For example, a script at the document level would be available from all other scriptable locations within the document.

Specifying the default JavaScript editor

You can choose whether to use the built-in JavaScript editor that comes with Acrobat, or an external JavaScript editor of your choice.

➤ **To set the default editor:**

1. Choose **Edit** > **Preferences** (Ctrl+K) to open the Preferences dialog box.

2. Select **JavaScript** from the list of options on the left side of the dialog box.

   This brings up the Preferences dialog box.

3. In the **JavaScript Editor** section, select the editor you would like to use.

   The **Acrobat JavaScript Editor** option sets the built-in JavaScript editor as the default.

   The **External JavaScript Editor** option sets an external editor as the default.

Note: For some external editors, Acrobat provides extra command line options for invoking the editor. For details, see "Additional editor capabilities" on page 26.

Like the JavaScript Console, the built-in JavaScript Editor can be used to evaluate portions of JavaScript code. Select a line or block of code to be evaluated, and press the Enter key on the numeric keypad or Ctrl + Enter on the regular keyboard.

When you execute script from within an JavaScript Editor window, results appear in the Console window. The Console window should be open prior to opening any JavaScript Editor window.

The JavaScript Editor provides the same formatting options as those in the console window. For details, see "Formatting code" on page 22.

Using an external editor

If an external editor program has been specified as the default application for editing scripts in Acrobat, Acrobat generates a temporary file and opens it in the external editor program. When editing a file in an external editor, note the following restrictions:

- You must save the file in order for Acrobat to detect the changes.
- Acrobat is inaccessible while the external editor is in use.
- JavaScript code cannot be evaluated within the external editor.

Additional editor capabilities

Acrobat supports some additional command line editor capabilities for Windows-based applications, and provides support for two parameters in particular: the *file name* (`%f`) and the *target line number* (`%n`). Parameters for Mac OS-based editors are not supported.

Note that Acrobat launches a new instance of the editor for each new editing session. Some editors, if already running, load new files into the same session and may close the other open files without saving them. Thus, it is important to remember to take one of the following measures: save your changes before beginning a new editing session, close the editor application before starting a new editing session, or adjust its default preferences so that it always launches a new editor instance (this is the best course of action, if available).

If you are able to set the editor preferences to launch a new instance for each editing session, and if the editor requires a command line parameter in order to invoke a new editor instance, you can add that parameter to the editor command line specified, as described in "Specifying additional capabilities to your editor" on page 26.

If your editor accepts a starting line number on the command line, Acrobat can start the editor on a line containing a syntax error by inserting the line number as a command line parameter (`%n`).

For your convenience, Acrobat provides predefined, command line templates for many current external editors. The external editor settings are defined in Edit > Preferences > JavaScript. If you use the Browse button to specify an external editor and it has a pre-defined command line template, the command line parameters and options appear to the right of the pathname for the editor application, and you can edit them. If no predefined template is available for your editor, you can still specify the appropriate command line parameters.

Specifying additional capabilities to your editor

Acrobat provides internal support for both of the commands described above on a few editors such as CodeWrite, Emacs, and SlickEdit (see the table "Supported external JavaScript editors with command line templates" on page 27).

If your editor is not one that Acrobat currently supports, it will be necessary to check the editor's documentation. You will need to search for the following information:

- What are the command switches to tell the editor to always open a new instance?

  Switches vary depending on the editor and include such parameters as `/NI` and `+new` followed by the file name (`"%f"`). Note that the quotes are required, because the file name that Acrobat sends to the editor may contain spaces.

- Is there a way to instruct the editor to open a file and jump to a line number?

  Some line number command switches are `-#`, `-L`, `+`, and `-l`, each followed by the line number (`%n`). For most editors, the line number switch and `%n` should be enclosed in square brackets `[...]`. The text inside the square brackets will be used only when Acrobat requires that the editor jump to a specific line in order to correct a JavaScript syntax error. You can use an editor that does not support a line number switch; in this case, you will need to scroll to the appropriate line in the event of a syntax error.

For example, Acrobat recognizes the Visual SlickEdit editor as `vs.exe` and automatically supplies this command line template:

```
"C:\Program Files\vslick\win\vs.exe" "%f" +new [-#%n]
```

When Acrobat opens the default JavaScript editor, it makes the appropriate substitutions in the command line and executes it with the operating system shell. In the above case, if the syntax error were on line 43, the command line generated would appear as follows:

```
"C:\Program Files\vslick\win\vs.exe" "C:\Temp\jsedit.js" +new -#43
```

Note: To insert `%`, `[`, or `]` as characters in the command line, precede each of them with the `%` escape character, thus using `%%`, `%[`, or `%]` respectively.

Supported external JavaScript editors with command line templates

Editor	Web site	Template command line arguments
Boxer	http://www.boxersoftware.com	`-G -2 "%f" [-L%n]`
ConTEXT	http://www.context.cx/	`"%f" [/g1:%n]`
CodeWright	http://www.borland.com.tr/tr/products/codewright/index.html	`-M -N -NOSPLASH "%f" [-G%n]`
Emacs	http://www.gnu.org/software/emacs/emacs.html	`[+%n] "%f"`
Epsilon	http://www.lugaru.com	`[+%n] "%f"`
Multi-Edit	http://www.multiedit.com	`/NI /NS /NV [/L%n] "%f"`
TextPad	http://www.textpad.com	`-m -q "%f"`
UltraEdit	http://www.ultraedit.com	`"%f" [-l%n]`
VEDIT	http://www.vedit.com	`-s2 "%f" [-l %n]`
Visual SlickEdit	http://www.slickedit.com	`+new "%f" [-#%n]`

➤ **To determine whether Acrobat can open your editor on a line number:**

1. Open a script in your editor.
2. Add a syntax error.
3. Move the cursor to a line other than the one containing the syntax error.
4. Close and save the file.

If a dialog box automatically appears prompting you to fix the syntax error, check whether it correctly specifies the line containing the error.

Saving and closing a file with a syntax error

If you save and close a file containing a syntax error, Acrobat displays a dialog box with a message asking if you would like to fix the error. For example, if there is an error on line 123, the following message appears:

```
There is a JavaScript error at line 123.
Do you want to fix the error?
```

Note: If you click No, Acrobat discards your file.

Always click Yes. Acrobat expands the path to the editor to include the line number in the specified syntax. The editor opens and the cursor is placed on the appropriate line.

Using the Debugger with Adobe Reader

The JavaScript Debugger is a fully capable debugger that allows you to set breakpoints and inspect variable values while stepping through code. While it is normally accessed from the Acrobat Pro user interface, it can also be triggered to appear in Adobe Reader when an exception occurs.

Though fully supported JavaScript debugging is only available in Acrobat Pro, the following instructions to make the complete Debugger functionality available in Adobe Reader on Windows and Mac OS platforms are provided as a courtesy. For Windows, note that this procedure involves editing the registry. Adobe Systems Incorporated does not provide support for editing the registry, which contains critical system and application information. It is recommended that you back up the registry before modifying it.

1. The file `debugger.js`, available at the Acrobat Developer Center or in the SDK installation (Acrobat <*version number*> SDK/JavaScriptSupport/Debugger/debugger.js), must be copied to the Acrobat <*version number*>/Reader/JavaScripts folder.

2. Create key/value pairs in the registry settings, starting at the location HKEY_CURRENT_USER\Software\Adobe\Acrobat Reader\<*version number*>\JSPrefs\ on Windows as shown in the table below, or in the property list file <user>:Library:Preferences:com.adobe.Reader<*version number*>.plist on Mac OS. For Mac OS, use an appropriate editor for the property list file, and add the following children under JSPrefs, using Type : Array in each case: ConsoleOpen, ConsoleInput, EnableDebugger, and Exceptions. Under each of these children, add the following children: 0 (number) and 1 (boolean).

3. Close and restart Adobe Reader. At this point the Debugger will be available.

Registry key/value pairs for Windows

`bConsoleInput`	`REG_DWORD`	`0x00000001`
`bEnableDebugger`	`REG_DWORD`	`0x00000001`
`iExceptions`	`REG_DWORD`	`0x00000002` (This will break into the Debugger when exceptions occur.)

Note: Since Adobe Reader does not provide access to the Debugger through its menu items or the Ctrl + J key sequence, the only ways to access the Debugger are to execute a JavaScript, cause an error, or customize the user interface (for example, you could add a button that runs a JavaScript causing the Debugger to appear).

As you learned earlier when opening the JavaScript Console, which is integrated with the Debugger dialog box, the Debugger may be opening in Acrobat Pro by selecting Advanced > Document Processing > JavaScript Debugger. In addition, the Debugger automatically opens if a running script throws an exception or encounters a previously set break point.

Note: The JavaScript Debugger cannot be used to analyze JavaScript stored in HTML pages viewed by web browsers or any other kind of scripting languages.

Enabling the JavaScript Debugger

The JavaScript Debugger can be a powerful tool for debugging complex scripts; however, it is a tool for an advanced user. For this reason, this section can be skipped at first reading. (Simple scripts can be debugged by inserting `console.println()` statements to read out debugging information to the console. For more information on this subject, see Debugging with the JavaScript Console.)

In order to make the Debugger available for use, you must enable both JavaScript and the Debugger. As you did earlier, use the Preferences dialog box (Ctrl+K) to control the behavior of the JavaScript development environment. Enabling JavaScript and the JavaScript editor are described in Enabling JavaScript. To enable the Debugger, select JavaScript from the list on the left in the Preferences dialog box and make sure the item Enable JavaScript Debugger after Acrobat is Restarted is enabled. Note that you must restart Acrobat for this option to take effect.

The Debugger options are located in the JavaScript Debugger section of the Preferences dialog box, and are explained in the following table.

JavaScript Debugger options

Option	**Meaning**
Enable Javascript Debugger after Acrobat is restarted	To enable the Debugger, check this option, which makes all Debugger features available the next time Acrobat is launched.
Store breakpoints in PDF file	This option enables you to store breakpoints so they are available the next time you start Acrobat or open the PDF file. To remove the breakpoints, do the following: ● Turn this option off. ● Select **Advanced** > **Document Processing** > **Document JavaScripts** and delete the `ACRO_Breakpoints` script. ● Save the file.
When an exception is thrown	This option provides three choices for actions when an exception is thrown: **Ignore** — ignores the exception **Trace** — displays a stack trace **Break** — stops execution and displays a message window that gives you the option to start the debugger at the line where the exception occurred.

Option	**Meaning**
Enable interactive console	This option allows you to enter JavaScript commands in the console window. If this option is not checked and you click in the console window, the following message appears: The interactive console is not enabled. Would you like to enable it now? Click **Yes** to enable this option from within the Debugger. In **Preferences** you will now see this option checked.
Show console on errors and messages	This option opens the console window in the Debugger dialog box. Regardless of whether the Debugger is enabled, this option causes the Debugger dialog box to open when an error occurs and displays the error message to the console window.

JavaScript Debugger

You can open the JavaScript Debugger at any time by selecting the Acrobat menu item Advanced > Document Processing > JavaScript Debugger. Familiarize yourself with the parts of the window and the controls as described here before you attempt interactive debugging of a script.

For information on the types and locations of scripts that may be debugged, see “Accessing scripts in the Scripts window” on page 33. The section “Starting the Debugger” on page 38 describes how to automatically start the Debugger for a script.

Caution: In Windows, while the Debugger is open and a debugging session is in progress, Acrobat will be unavailable.

Main groups of controls

The Debugger dialog box, see “Debugger dialog box” on page 31, consists of three main groups of controls. The toolbar on the top left contains six button controls that provide basic debugging session functionality.

Immediately below the toolbar, a Scripts window displays the names of scripts available for debugging. These are organized in a tree hierarchy, such as the one shown below in the graphic Debugger dialog box, and may be accompanied by the Scripts window below, which shows the code for a single script corresponding to the one highlighted in the Scripts window.

The Call Stack and Inspect drop-down lists are located at the top right of the Debugger dialog box. Selecting entries in these lists enables you to view the nesting order of function calls, and enables you to inspect the details of variables, watches, and breakpoints in the Inspect Details window.

Debugger View windows

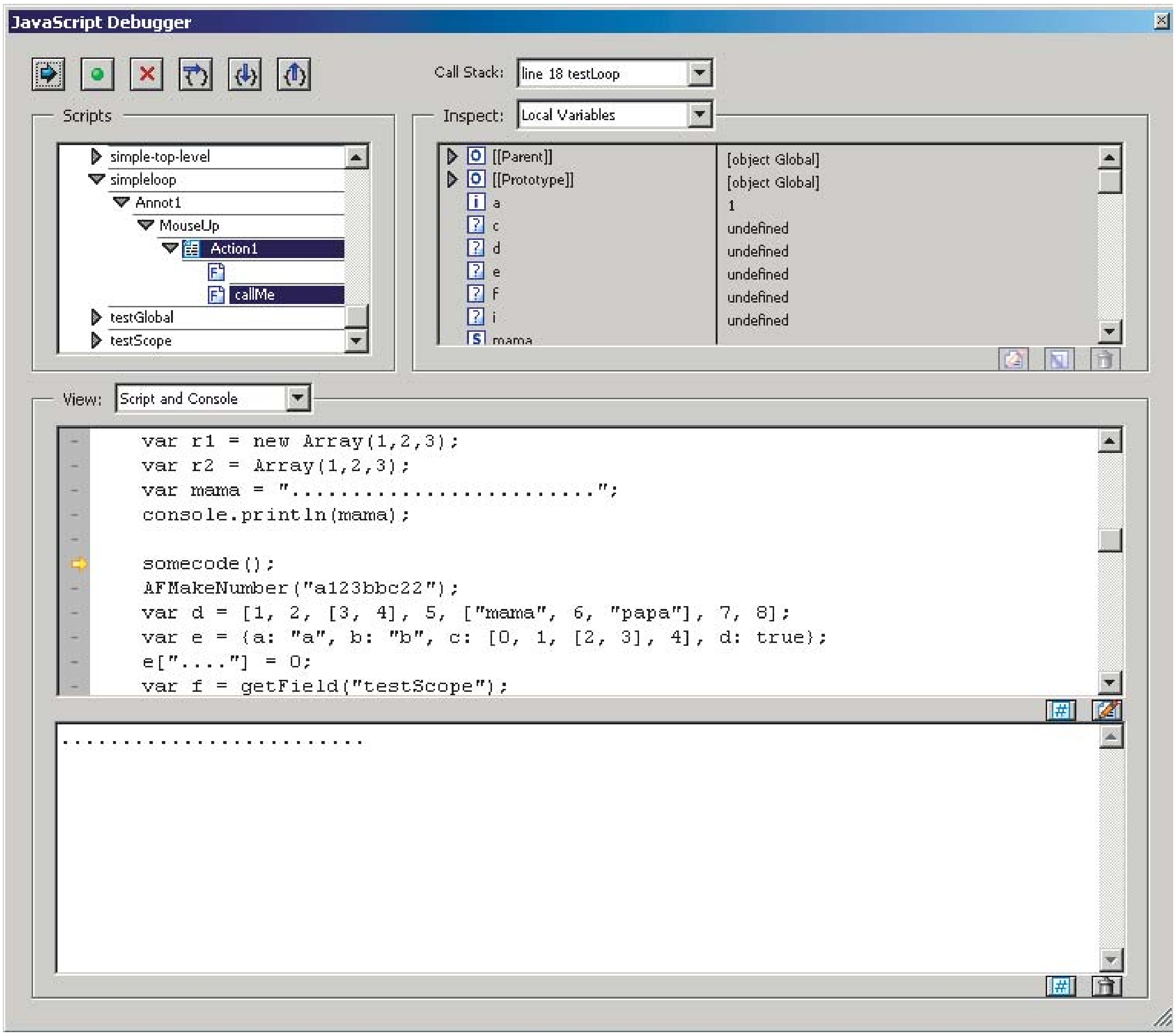
Below the main group of controls, the debugger provides a View drop-down list with the following choices:

Script — view a single JavaScript script selected from the Scripts hierarchy window

Console — view the output of a selected script as it executes in the JavaScript Console window. The Console may also be used to run scripts or individual commands. See “Using the JavaScript Debugger console” on page 21.

Script and Console — view both the Console and Script windows at the same time. The Script window displays above the console window, as shown in the following graphic.

Debugger dialog box



Call Stack: line 18 testLoop

Inspect: Local Variables

[[Parent]]	[object Global]
[[Prototype]]	[object Global]
a	1
c	undefined
d	undefined
e	undefined
f	undefined
i	undefined
mama	

View: Script and Console

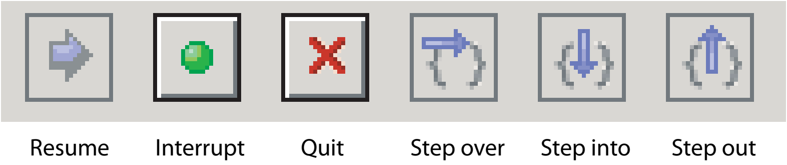
```
    var r1 = new Array(1,2,3);
    var r2 = Array(1,2,3);
    var mama = ".........................";
    console.println(mama);

    somecode();
    AFMakeNumber("a123bbc22");
    var d = [1, 2, [3, 4], 5, ["mama", 6, "papa"], 7, 8];
    var e = {a: "a", b: "b", c: [0, 1, [2, 3], 4], d: true};
    e["...."] = 0;
    var f = getField("testScope");
```

```
.........................
```

Debugger buttons

The following graphic shows the debugger buttons on the toolbar, and the table summarizes the functionality of each button, followed by detailed descriptions below.

Debugger buttons



Debugger buttons summary

Button	Description
Resume Execution	Runs a script stopped in the debugger.
Interrupt	Halts execution.
Quit	Closes the debugger and terminates script execution.
Step over	Executes the next instruction, but does not enter a function call if encountered.
Step into	Executes the next instruction, and enters a function call if encountered.
Step out	Executes the remaining code in a function call, and stops at the next instruction in the calling script.

Resume execution

When the script is stopped, the Resume Execution button cause the script to continue execution until it reaches one of the following:

- The next script to be executed
- The next breakpoint encountered
- The next error encountered
- The end of the script

Interrupt

The Interrupt button halts execution of the current script. When clicked, it appears in red, which indicates that it has been activated and causes execution to stop at the beginning of the next script that is run. If this occurs, the Interrupt button is automatically deactivated and returns to its green color. It must be activated again in order to interrupt another script.

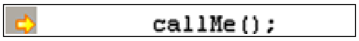
Quit

The Quit button terminates the debugging session and closes the Debugger.

Step over

The Step Over button executes a single instruction, and if it is a function call, it executes the entire function in a single step, rather than stepping into the function. For example, the position indicator (yellow arrow) in the Debugger is to the left of a function call, as shown below.

Position indicator at a function call



```
callMe();
```

Execution is currently halted before the call to `callMe`. Assuming that there are no errors or breakpoints in `callMe`, clicking Step Over executes the entire `callMe` function, and advances the position indicator to the next script instruction following the function call.

If the statement at the position indicator does not contain a function call, Step Over simply executes that statement.

Step into

The Step Into button executes the next statement, and if it is a function call, it proceeds to the first statement within the function.

Note: It is not possible to step into native functions, since they have no JavaScript implementation. This applies to Acrobat native functions as well as core JavaScript functions.

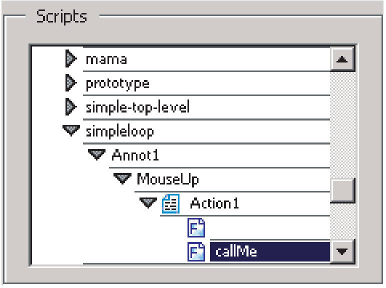
Step out

The Step Out button executes the remaining code within the current function call and stops at the instruction immediately following the call. This button provides a convenient means of eliminating cumbersome, stepwise execution of functions that do not contain bugs. If you are not inside a function call and there are no errors, the Step Out button continues executing code to the end of the current script or until a breakpoint is encountered.

Debugger Scripts window

All scripts associated with a PDF file are available in the Debugger dialog box. The Debugger displays these in the Scripts window.

Scripts window



Accessing scripts in the Scripts window

To display the content of a script, click the triangle to its left in the Scripts window. Each triangle opens the next level in the containment hierarchy. A script icon indicates the lowest level, which means that the code for the given function is available. As shown above in the graphic Scripts window, a function has been defined for a mouse-up action on a button named `Button1`. Click on the script icon to display its code.

JavaScript can be stored in several places, which may be either inside or outside PDF files. The following sections describe their possible locations.

Scripts inside PDF files

The table below lists the types of scripts that can be placed in PDF files. These can be accessed from the Scripts window within the Debugger dialog box. You can edit them from inside the Debugger, and set breakpoints as described in "Breakpoints" on page 37.

Note: Changes to scripts do not take effect until the scripts are re-run; changes cannot be applied to a running script.

Scripts inside PDF files

Location	Access
Document level	**Advanced** > **Document Processing** > **Document JavaScripts**
Document actions	**Advanced** > **Document Processing** > **Set Document Actions**
Page actions	Click the page on the **Pages** tab; right-click the thumbnail for the page and click Page Properties.
Forms	Double-click the form object in form editing mode (see below) to bring up the properties dialog box for that form object.
Bookmarks	Click the bookmark on the **Bookmarks** tab; right-click the bookmark and click on Properties.
Links	Double-click the link object in object editing mode (see below) to bring up the **Link Properties** dialog box.

Form editing mode — To switch to form editing mode, select Forms > Edit Form in Acrobat.

Scripts outside PDF files

Scripts outside of Acrobat are also listed in the Scripts window and are available for debugging in Acrobat. The following table lists these script types and how to access them.

Scripts outside PDF files

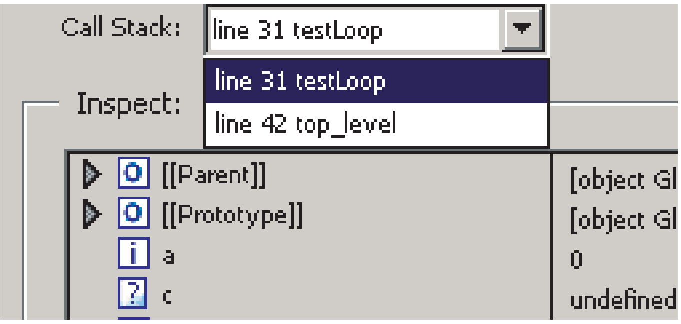
Location	Access
Folder level	Stored as JavaScript (`.js`) files in the App or User folder areas
Console	Entered and evaluated in the console window
Batch	Choose **Advanced** > Document Processing > **Batch Processing**

Folder-level scripts normally can be viewed and debugged but not edited in Acrobat. Console and batch processing scripts are not visible to the Debugger until they are executed. For this reason, you cannot set breakpoints prior to executing these scripts. You can access the scripts either using the Debug From Start option or by using the debugger keyword. See "Starting the Debugger" on page 38 for details.

Call Stack list

To the right of the Debugger control buttons is the Call Stack drop-down list which displays the currently executing function and its associated state within the current set of nested calls. An example is shown in the following graphic. When the Debugger has been used to suspend execution at a given statement, the call stack displays text indicating the current function call (stack frame). Each entry shows the current line number and function name. The most recent stack frame is displayed at the top of the Call Stack drop-down list. To inspect the local variables of a particular frame in the stack, click that entry. They appear in the Inspect details window immediately below the Call Stack list.

Call stack



Call Stack: line 31 testLoop

line 31 testLoop
line 42 top_level

Inspect:

[[Parent]]	[object Gl
[[Prototype]]	[object Gl
a	0
c	undefined

You can select any function in the call stack. Doing so selects that stack frame, and its location is shown in the Inspect details window. When Local Variables is selected in the Inspect drop-down list, the variables specific to that active frame are displayed in the Inspect details window.

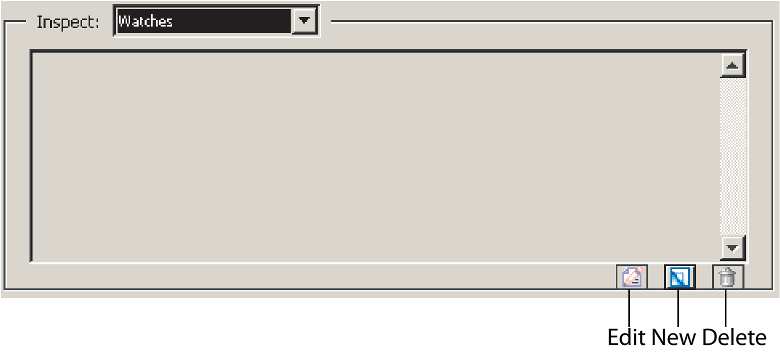
Inspect details window

The Inspect details window is located to the right of the Scripts window and below the Call Stack. Its purpose is to help you inspect the values of variables, customize the way in which variables are inspected (setting watches), and obtain detailed information about breakpoints.

Inspect details window controls

The three buttons at the bottom right of the Inspect details window, shown in the following graphic, can be used to edit, create, or delete items. The Edit, New, and Delete buttons become active when items in the Inspect drop-down list are selected.

Inspect details window button controls



Inspect: Watches

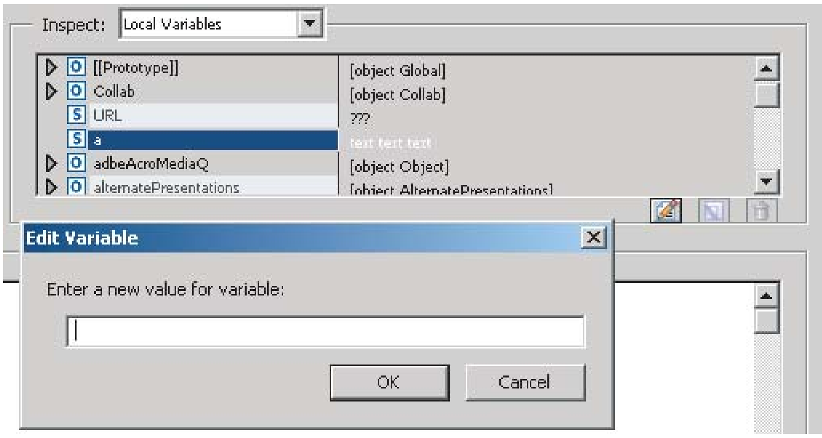
Inspecting variables

The Inspect details window is a powerful tool that you can use to examine the current state of JavaScript objects and variables. It enables you to inspect any objects and properties in a recursive manner within the current stack frame in the debugging session.

To inspect a variable, select Local Variables from the Inspect drop-down list, which displays a list of variable and value pairs in the Inspect details window. To place a value in a variable, highlight the variable in the details window (this activates the Edit button). Click the Edit button. An Edit Variable dialog box appears, allowing you to enter a new value for the variable as shown in the following graphic.

A triangle next to a name indicates that an object is available for inspection. If you would like to view its properties, click the triangle to expand the object.

Local variable details



Inspect: Local Variables

▷ O [[Prototype]]	[object Global]
▷ O Collab	[object Collab]
S URL	???
S a	text text text
▷ O adbeAcroMediaQ	[object Object]
▷ O alternatePresentations	[object AlternatePresentations]

Edit Variable

Enter a new value for variable:

Watches

The Watches list enables you to customize how variables are inspected. Watches are JavaScript expressions evaluated when the debugger encounters a breakpoint or a step in execution. The Watches list provides you with the ability to edit, add, or delete watches using the three buttons just below the Inspect details window. All results are displayed in the Inspect details window in the order in which they were created.

➤ To set a watch:

1. Select **Watches** from the **Inspect** drop-down list.
2. Click the **New** button. A dialog box prompts you for the JavaScript variable or expression to be evaluated.

➤ To change the value of a watch:

1. Select the watch from the list.
2. Click the **Edit** button, which displays a dialog box prompting you to specify a new expression for evaluation.

➤ To delete a watch:

1. Select the watch from the **Inspect** drop-down list.

2. Click the **Delete** button.

Breakpoints

The Breakpoints option in the Inspect drop-down list enables you to manage program breakpoints, which in turn make it possible to inspect the values of local variables once execution is halted. A breakpoint may be defined so that execution halts at a given line of code, and conditions may be associated with them (see "Using conditional breakpoints" on page 38).

When a breakpoint is reached, JavaScript execution halts and the debugger displays the current line of code.

To add a breakpoint, click on the gray strip to the left of the code in the script view, which causes a red dot to appear. The lines at which breakpoints are permitted have small horizontal lines immediately to their left in the gray strip.

To remove the breakpoint, click on the red dot, which subsequently disappears.

Coding styles and breakpoints

Placement of the left curly brace ({) in a function definition is a matter of style.

Style 1: Place the left curly brace on the same line as the function name, for example,

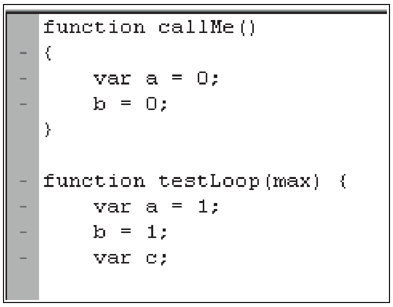
```
function callMe() { // curly brace on same line as function name
   var a = 0;
}
```

Style 2: Place the left curly brace on a separate line, for example

```
function callMe()
{ // curly brace is on a separate line
   var a = 0;
}
```

If you would like to set a breakpoint at the function heading, use Style 1. Note that the JavaScript Debugger does not set a breakpoint at the function heading for Style 2. It is only possible to set a breakpoint from the line of code containing the left curly brace. This is illustrated in the graphic below. It is possible to set the breakpoint on the line below the function heading for callMe and on the line containing the function heading for testLoop. Setting a breakpoint at a function heading causes execution to stop at the first statement within the function.

Setting a breakpoint at a function heading



```
function callMe()
{
    var a = 0;
    b = 0;
}

function testLoop(max) {
    var a = 1;
    b = 1;
    var c;
```

Listing breakpoints

To view the list of all breakpoints set for the debugging session, select the Breakpoints option from the Inspect drop-down list. You can edit and delete breakpoints using the button controls just beneath the Inspect details window, as shown in the graphic “Inspect details window button controls” on page 35.

Using conditional breakpoints

A conditional breakpoint causes the interpreter to stop the program and activate the Debugger only when a specified condition is true. Conditional breakpoints are useful for stopping execution when conditions warrant doing so, and streamline the debugging process by eliminating needless stepwise execution. For example, if you are only interested in debugging after 100 iterations in a loop, you can set a breakpoint that only becomes active when the looping index reaches the value of 100.

The condition is a JavaScript expression. If the expression evaluates to `true`, the interpreter stops the program at the breakpoint. Otherwise, the interpreter does not stop the program. An unconditional breakpoint, the default, always causes the interpreter to stop the program and to activate the Debugger when it reaches the breakpoint, because its condition is always set to `true`.

➤ **To change a breakpoint condition:**

1. Select **Breakpoint** from the **Inspect** drop-down list
2. Click **Edit**. A dialog box appears, prompting you to change the breakpoint condition

Starting the Debugger

There are four ways to invoke the JavaScript Debugger. Two of these ways begin the debugging session from the start of execution, and the other two begin the session from a specified line of code.

Debugging from the start of execution

There are two ways to start the Debugger from the start of execution. In either case, use the Step into button to proceed with the debugging session.

The first method is to choose Advanced > Document Processing and, if the option is not already checked, click on Debug From Start.

This option causes the debugging session to begin at the start of execution of any new script.

Note: Debug From Start does not turn off automatically. Be sure to turn off this option when you have finished debugging, otherwise it continues to stop on every new script you execute in Acrobat.

The second method uses the Interrupt button. Open the Debugger window and click the Interrupt button, which displays in red. At this point, performing any action that runs a script causes execution to stop at the beginning of the script.

Unlike Debug From Start, the Interrupt button is automatically deactivated after being used. To stop at the beginning of a new script, you must reactivate it by clicking it again.

Debugging from an arbitrary point in the script

To start debugging from a specific point in your script, you can set a breakpoint. For more information, see "Breakpoints" on page 37.

An alternate approach is to insert the `debugger` keyword in any line of your code to stop execution and enter the Debugger when that particular line is reached.

Note: Breakpoints created using the `debugger` keyword are not listed in the Inspect details window when you select Breakpoints from the Inspect drop-down list.

Final notes

There are limitations to debugging scripts in Acrobat from inside a browser, because not all scripts contained in a PDF file may be available if the PDF file has not been completely downloaded.

Debugging is not possible if a modal dialog box is running. This may occur when debugging a batch sequence. If a modal dialog box is running during a debugging session and the program stops responding, press the Esc key.

Debugging scripts with an event initiated by either the `app.setInterval` or `app.setTimeOut` method may trigger the appearance of a series of recurring alert messages. If this occurs, press the Esc key after the modal dialog box has exited.

3 JavaScript Contexts in Acrobat

JavaScript for Acrobat can be placed in a variety of locations, both external to the document, and within the document. This chapter discusses how to determine the appropriate location for a script, and how to create and access the scripts.

Topic	Description
The concept of a JavaScript event	A brief description of an event and how they are triggered.
About contexts	Discusses the placement of scripts at the folder, document, page, field and batch levels.
Privileged versus non-privileged context	A discussion of the execution of methods in a privileged context, and how to work around these security restrictions.

The concept of a JavaScript event

All scripts are executed in response to a particular *event*. There are several *types* of events:

- App
  When the Viewer is started, the Application Initialization Event occurs. Script files, called Folder Level JavaScripts, are read in from the application and user JavaScript folders. See Folder level for additional details.
- Batch
  A batch event occurs during the processing of each document of a batch sequence.
- Bookmark
  This event occurs whenever a user clicks on a bookmark that executes a script.
- Console
  A console event occurs whenever a user evaluates a script in the console. See Executing JavaScript.
- Doc
  This event is triggered whenever a document level event occurs. For more information, see Document level.
- External
  This event is the result of an external access, for example, through OLE, AppleScript, or loading an FDF
- field
  This event is triggered when the user interacts with an Acrobat form, see Field level for more information.
- Link
  This event is triggered when a link containing a JavaScript action is activated by the user.
- Menu
  A menu event occurs whenever JavaScript that has been attached to a menu item is executed. In Acrobat 5.0 and later, the user can add a menu item and associate JavaScript actions with it.

- Page
  This event is triggered when the user changes pages in the document. See Page level for more information.
- Screen
  This event is triggered when the user interacts with a multimedia screen annotation.

These types of events may be initiated, or triggered, in a number of different ways, for example, in response to a mouse up, a mouse down, a keystroke, on focus, or on blur. These are referred to by the JavaScript for Acrobat API Reference as the event *names*. Event types and names appear in pairs. For example, if an action is initiated by clicking a button, this would generate a Field type event, triggered by a mouse up event; consequently, we refer to such an event as a field/mouse up event.

The table that follows lists all event type/name combinations.

Event type/name combinations

Event type	Event names
`App`	`Init`
`Batch`	`Exec`
`Bookmark`	`Mouse Up`
`Console`	`Exec`
`Doc`	`DidPrint, DidSave, Open, WillClose, WillPrint, WillSave`
`External`	`Exec`
`Field`	`Blur, Calculate, Focus, Format, Keystroke, Mouse Down, Mouse Enter, Mouse Exit, Mouse Up, Validate`
`Link`	`Mouse Up`
`Menu`	`Exec`
`Page`	`Open, Close`
`Screen`	`InView, OutView, Open, Close, Focus, Blur, Mouse Up, Mouse Down, Mouse Enter, Mouse Exit`

An event manifests itself in JavaScript as an Event object. Complete documentation for the different event types of events and the ways in which they can be triggered can be found in the description of the Event object in the JavaScript for Acrobat API Reference.

About contexts

JavaScript for Acrobat can be placed at a variety of levels:

- *Folder* level
  Scripts placed here respond to App type events.
- *Document* level
  Scripts placed here respond to Doc type events.

- *Page* level
  Scripts placed here respond to Page type events.
- *Field* level
  Scripts placed here respond to Field type events.
- *Batch* level
  Scripts are placed here respond to Batch type events.

Each of these levels represents a context, or location, in which processing occurs. The list above is by no means a complete list of locations at which scripts can be placed.

The placement of a script at a given level determines its reusability. Folder level scripts are available within all documents, document level scripts are available to all form fields within a given document, field level scripts are visible to the form fields with which they are associated.

Note: For instructions on how to disallow changes to scripts or hide scripts, see Disallowing changes in scripts and Hiding scripts.

Folder level

Folder level scripts contain variable declarations and function definitions that may be generally useful to Acrobat, and are visible from all documents. Top level scripts, ones that are not contained in a function definition, are executed when the application is initialized.

There are two kinds of folder level scripts: *App* and *User*. For example, if you would like to add specialized menus and menu items to be available to all documents opened in Acrobat, you can store the code at the folder level.

Folder level scripts are placed in separate files that have the `.js` extension. App folder level scripts are stored in the Acrobat application's `JavaScripts` folder, and user folder level scripts are stored in the user's `JavaScripts` folder. These scripts are loaded when Acrobat starts execution, and are associated with the event object's *Application Initialization* (`App/Init`) event.

Note: The locations of these folders can be found by executing the following lines in the JavaScript Debugger Console:

```
// for App folder scripts
app.getPath("app", "javascript");
// for User folder scripts
app.getPath("user", "javascript");
```

When Acrobat is installed on your machine, it provides you with several standard folder level JavaScript files, including `JSByteCodeWin.bin` (this file is a pre-compiled script that supports the forms and annotation plug-ins) and `debugger.js`; these are in the App folder. Other JavaScript files in the App folder may be installed by third-party Acrobat plug-in developers.

The user folder may contain the files `glob.js` and `config.js`. The `glob.js` file is programmatically generated and contains cross-session global variables set using the `global` object's `setPersistent` method. The `config.js` file is used to set user preferences or to customize the viewer UI by adding toolbar buttons or menu items. (See Adding toolbar buttons and menu items for more information on this topic.) Any file with an extension of `.js` found in the user folder is also loaded by Acrobat during initialization, after it has loaded the files found in the App folder, and after it has loaded the `config.js` and `global.js` files.

To create folder level scripts, use an external editor running in parallel to Acrobat. Note that the external editor cannot be invoked from Acrobat for folder level scripts.

Document level

Document level scripts are variable and function definitions that are generally useful to a given document, but are not applicable outside the document.

- Variable definitions: Define variables at the document level to make them visible to any executing script. For example,

  ```
  var defaultUserColor = "red";
  ```

  The variable defined above, which has an initial value of `"red"`, may be changed as the user interacts with the document.
- Function definitions: Define functions at the document level that support the user interaction with the document. These functions may be utility functions for handling common tasks for string or number manipulation, or functions that execute lengthy scripts called by actions initiated by a user interacting with Acrobat form fields, bookmarks, page changes, and so on.

To create or access document level scripts in Acrobat, select Advanced > Document Processing > Document JavaScript, which enables you to add, modify, or delete document level scripts. Document level scripts are executed after the document has opened, but before the first Page Open event (See Page level). They are stored within the PDF document.

You can also create Doc level scripts programmatically using the `addScript` method of the Doc object.

In addition to document level scripts, there are document action scripts that execute when certain document events occur. Such document events are

- Document Will Close
  This event is triggered before the document is closed.
- Document Will Save
  This event is triggered before the document is saved.
- Document Did Save
  This event is triggered after the document is saved.
- Document Will Print
  This event is triggered, before the document is printed.
- Document Did Print
  This event is triggered after the document is closed.

To access the JavaScript Editor for each of these document actions, select Advanced > Document Processing > Set Document Action.

You can also create the document actions just described programmatically using the `setAction` method of the Doc object.

Page level

Page level scripts are scripts that are executed when a particular page is either closed or opened.

- Page Open
  This event is triggered whenever a new page is viewed and after the drawing of the page has occurred.

- Page Close
  This event is triggered whenever the page being viewed is no longer the current page; that is, the user switched to a new page or closed the document. Page Close will occur before the Document Will Close event.

➤ **To create a page level script:**

1. Click the **Pages** tab.
2. Right-click a thumbnail and select **Page Properties**.
3. Select the **Actions** tab from the Page Properties dialog box.
4. In the **Select Trigger** list, choose either **Page Open** or **Page Close**.
5. In the **Select Action** list, choose **Run a JavaScript**.
6. Click **Add** to open the JavaScript editor.

➤ **To access or delete a page level script:**

1. Click the **Pages** tab.
2. Select the page by clicking the page thumbnail.
3. Right-click a thumbnail and select **Page Properties**.
4. Select the **Actions** tab from the **Page Properties** dialog box.
5. Select any of the actions listed in the **Actions** list.
6. Click **Edit** or **Delete**.

Other actions, as listed in the Select Action Menu of the Page Properties dialog box, can be created, accessed and deleted in the same way.

Page level scripts can also be created programmatically using the `setPageAction` method of the Doc object.

Field level

Field level scripts are associated or attached to an Acrobat form field. Field events occur as the user interacts with the field, either directly or indirectly. Field scripts are typically executed to validate, format, or calculate form field values. Like document level scripts, field level scripts are stored within the PDF document.

There are several ways to create or edit field level scripts. The most straightforward manner is to right-click the form field, select the Properties context menu item and choose the Actions tab. Choose Run a JavaScript for Select Action and choose how to trigger the script from the Select Trigger Menu.

Field level scripts can also be created programmatically using the `setAction` method of the Field object.

Batch level

A batch level script is a script that can be applied to a collection of documents, and operates at the application level. For example, you can define a batch script to print a series of documents or apply security restrictions to them.

To create or edit a batch level script in Acrobat, select Advanced > Document Processing > Batch Processing. See Batch Sequences for a complete tutorial on how to write batch sequences using JavaScript.

Privileged versus non-privileged context

Some JavaScript methods have security restrictions. These methods can be executed only in a *privileged context*, which includes console, batch, and application initialization events. All other events (for example, page open and mouse-up events) are considered *non-privileged*. In the JavaScript for Acrobat API Reference, methods with security restrictions are marked by an Ⓢ in the third column of the quick bar.

The description of each security-restricted method indicates the events during which the method can be executed.

Beginning with Acrobat 6.0, security-restricted methods can execute in a non-privileged context if the document is *certified* by the document author for embedded JavaScript.

Security-restricted methods can also execute in a non-privileged context through the use of a *trusted function* (introduced in Acrobat 7.0).

In Acrobat versions earlier than 7.0, menu events were considered privileged contexts. Beginning with Acrobat 7.0, execution of JavaScript through a menu event is no longer privileged. You can execute security-restricted methods through menu events in one of the following ways:

- By enabling the preferences item named Enable Menu Items JavaScript Execution Privileges.
- By executing a specific method through a *trusted function* (introduced in Acrobat 7.0). Trusted functions allow privileged code—code that normally requires a privileged context to execute—to execute in a non-privileged context. For details and examples, see documentation of the `app.trustedFunction` method in the JavaScript for Acrobat API Reference.

Executing privileged methods in a non-privileged context

To illustrate the techniques required, let's work with a specific method, `app.browseForFile`. According to the JavaScript for Acrobat API Reference, this method can only be executed during batch or console events. This means that we are free to executed this method in the console, or to use it as a part of a batch sequence. (See Batch Sequences for a detailed discussion of the Execute JavaScript command option.)

What happens when we execute this method in a non-privileged context? Create an Acrobat form button, and attach the following script as a mouse up JavaScript action.

```
var oRetn = app.browseForDoc({bSave: true});
```

After clicking the button, an exception is thrown; the console displays the following message:

```
NotAllowedError: Security settings prevent access to this property or method.
app.browseForDoc:1:Field Button1:Mouse Up
```

This shows that we have violated the documented security restriction.

If we really want this method in our workflow what do we need to do? We need to move this method to folder JavaScript and declare it as a trusted function. Why move it to the folder context? Because you can only declare a function trusted from a folder (console or batch) context.

Navigate to the user JavaScript folder and open the file `config.js` in your text editor. Paste the following script into `config.js`:

```
myTrustedBrowseForDoc = app.trustedFunction( function ( oArgs )
{
    app.beginPriv();
        var myTrustedRetn = app.browseForDoc( oArgs );
    app.endPriv();
    return myTrustedRetn;
});
```

For the syntax details of `app.trustedFunction`, see the *JavaScript for Acrobat API Reference*. Note that the privileged script must be enclosed by the `app.beginPriv` and `app.endPriv` pair.

Save the file and restart Acrobat (folder JavaScript is read only at startup).

Now create a PDF with a single button on it. The script for that button is

```
    try {
        var oRetn = myTrustedBrowseForDoc({bSave: true});
        console.println(oRetn.toSource());
    } catch(e) {
        console.println("User cancelled Save As dialog box");
    }
```

Clicking the button now executes the `app.browseForDoc` method without throwing the security exception.

Here is another, more complex, example.

Example: *Executing privileged methods*

In this example, we use the `app.browseForDoc` and the `Doc.saveAs` methods, both of which have security restrictions.

In `config.js`, paste both the `myTrustedBrowseForDoc` script listed above, and paste this script:

```
myTrustedSaveAs = app.trustedFunction( function ( doc, oArgs )
{
    app.beginPriv();
        var myTrustedRetn = doc.saveAs( oArgs );
    app.endPriv();
    return myTrustedRetn;
});
```

Note that the Doc object is passed to this trusted function. Now, revise the button described above to read as follows:

```
try {
    var oRetn = myTrustedBrowseForDoc({bSave: true});
    try {
        myTrustedSaveAs(this, { cPath: oRetn.cPath, cFS:oRetn.cFS });
      } catch(e) { console.println("Save not allowed, perhaps readonly."); }
    } catch(e) { console.println("User cancelled Save As dialog box");}
```

Now, the PDF document, through a mouse up button action, can open a Save As dialog box and save the current document.

Executing privileged methods through the menu

In versions of Acrobat previous to 7.0, executing JavaScript through a menu was non-privileged. This is no longer the case. To execute *privileged* JavaScript through a menu event there are now two choices:

1. Ask the user to enable the Enable Menu Items JavaScript Execution Privileges option, in the JavaScript section of the Preferences.
2. Use the trusted function approach discussed above.

In this section we discuss the first alternative.

Open `config.js`, found in the user's JavaScript folder, and paste the following script:

```
app.addSubMenu({ cName: "New", cParent: "File", nPos: 0 })
app.addMenuItem({ cName: "Letter", cParent: "New", cExec: "app.newDoc();"});
app.addMenuItem({ cName: "A4", cParent: "New", cExec: "app.newDoc(420,595)"});
```

As usual, restart Acrobat so that the `config.js` file is read. Under the File menu, there is now a menu item named New, with a sub menu with two items, Letter and A4.

With the Enable Menu Items JavaScript Execution Privileges option *not* enabled, upon the execution of one of these menu items, either File > New > Letter or File > New > A4 are executed, an alert box appears declaring that "An internal error occurred", and the console shows the following error message:

```
1:Menu Letter:Exec
NotAllowedError: Security settings prevent access to this property or method.
app.newDoc:1:Menu Letter:Exec
```

The problem is `app.newDoc`, a method that has a *security restriction*.

Now enable the Enable Menu Items JavaScript Execution Privileges option and execute the same menu item again, a new document is created, the menu operates as designed.

The above discussion shows what happens when you try to executed a privileged method through the menu system and how to work around the restrictions on privileged methods by enabling the Enable Menu Items JavaScript Execution Privileges option of the JavaScript section of the Preferences.

A note of caution. An Acrobat developer, cannot assume the user has enabled the JavaScript execution privileges options; indeed, in a corporate setting, enabling this option may not be allowed for security reasons. An Acrobat developer using JavaScript should perhaps use the trusted function approach, as discussed in Executing privileged methods in a non-privileged context, which necessarily implies the installation of folder JavaScript on the user's system.

Executing privileged methods in a certified document

Many of the JavaScript methods in Acrobat are restricted for security reasons, and their execution is only allowed during batch, console or menu events. This restriction is a limitation when enterprise customers try to develop solutions that require these methods and know that their environment is secure.

Three requirements must be met to make restricted JavaScript methods available to users.

- You must obtain a digital ID.
- You must sign the PDF document containing the restricted JavaScript methods using the digital ID.

  For details on where you can obtain digital IDs and the procedures for using them to sign documents, see Acrobat Help.
- The recipient should trust the signer for certified documents and JavaScript.

  For details, see Acrobat Help.

All trusted certificates can be accessed by selecting Certificates from Advanced > Manage Trusted Identities in the Acrobat main menu.

4 Creating and Modifying PDF Documents

This chapter provides a detailed overview of how to apply JavaScript in order to dynamically create PDF files, modify them, and convert PDF files to XML format.

Topic	Description
Creating and modifying PDF files	Discusses methods for reading a document using JavaScript and surveys methods for modifying the document, by adding fields, links and even content.
Combining PDF documents	Combine multiple PDF documents.
Combining and extracting files	Combine multiple documents that are not necessarily PDF files.
Creating file attachments	Programmatically attach a file to a PDF document. This includes examples of communicating with the attachments, and extracting data from and writing to the attachments.
Cropping and rotating pages	Covers methods for cropping and rotating pages.
Extracting, moving, deleting, replacing, and copying pages	Techniques and methods for manipulating pages.
Adding watermarks and backgrounds	Applying watermarks and backgounds using JavaScript methods.
Converting PDF documents to XML format	Use the `saveAs` method of the Doc object to convert a document to XML format.

Creating and modifying PDF files

The Acrobat extensions to JavaScript provide support for dynamic PDF file creation and content generation. This means that it is possible to dynamically create a new PDF file and modify its contents in an automated fashion. This can help make a document responsive to user input and can enhance the workflow.

To create a new PDF file, invoke the `newDoc` method of the `app` object, as shown in the example below:

```
var myDoc = app.newDoc();
```

This statement creates a blank PDF document and is used primarily for testing purposes.

Once this statement has been executed from the console, you can manipulate the page by invoking methods contained within the Doc object, as indicated in the following table. Details of these methods are found in the JavaScript for Acrobat API Reference.

JavaScript for manipulating a PDF document

Content	Object	Methods
page	Doc	`newPage, insertPages, replacePages`
page	template	`spawn`
annot	Doc	`addAnnot`
field	Doc	`addField`
icon	Doc	`addIcon`
link	Doc	`addLink`
document-level JavaScript	Doc	`addScript`
thumbnails	Doc	`addThumbnails`
bookmark	Doc`.bookmarkRoot`	`createChild, insertChild`
web link	Doc	`addWebLinks`
template	Doc	`createTemplate`

The `Doc.newDoc()` method cannot write text content to the newly created document. To do that, you need to use the `Report` object.

Example: *Creating a document with content*

The following example creates a PDF document, sets the font size, sets the color to blue, and writes a standard string to the document using the `writeText` method of the Report object. Finally, it opens the document in the viewer. See the *JavaScript for Acrobat API Reference* for details of this object, its properties and methods and for additional examples.

```
var rep = new Report();
rep.size = 1.2;
rep.color = color.blue;
rep.writeText("Hello World!");
rep.open("My Report");
```

The Report object has many useful applications. With it, for example, you can create a document that reports back a list of all form fields in the document, along with their types and values; another application is to summarize all comments in a document. The JavaScript for Acrobat API Reference has an example of the latter application in the `Report` object section.

Combining PDF documents

You can customize and automate the process of combining PDF documents.

If you would like to combine multiple PDF files into a single PDF document, you can do so through a series of calls to the Doc object's `insertPages` method.

Example: *Creating a new document from two other documents*

```
// Create a new PDF document:
var newDoc = app.newDoc();

// Insert doc1.pdf:
newDoc.insertPages({
  nPage: -1,
  cPath: "/c/temp/doc1.pdf",
});

// Insert doc2.pdf:
newDoc.insertPages({
  nPage: newDoc.numPages-1,
  cPath: "/c/temp/doc2.pdf",
});

// Save the new document:
newDoc.saveAs({
  cPath: "/c/temp/myNewDoc.pdf";
});

// Close the new document without notifying the user:
newDoc.closeDoc(true);
```

Combining and extracting files

It is possible to combine several PDF files using the `Doc.insertPages()` method.

Example: *Combining several PDF files*

In this example, a document is opened with an absolute path reference, then other PDF files in the same folder are appended to the end of the document. For convenience, the files that are appended are placed in an array for easy execution and generalization.

```
var doc = app.openDoc({
   cPath: "/C/temp/doc1.pdf"
})
aFiles = new Array("doc2.pdf","doc3.pdf");
for ( var i=0; i < aFiles.length; i++) {
   doc.insertPages ({
   nPage: doc.numPages-1,
   cPath: aFiles[i],
   nStart: 0
   });
}
```

Another problem is to combine several files of possibly different file types. In recent versions of Acrobat, the notion of a *binder* was introduced. There is a nice UI for combining files of different formats. How do you do it programmatically?

Example: *Combining several files of different formats*

In this example, an initial PDF file is opened, and all other files are appended to it.

```
doc = app.openDoc({ cPath: "/C/temp/doc1.pdf" })
```

```
// List of files of different extensions
aFiles = new Array( "doc2.eps", "doc3.jpg", "doc4.pdf");

for ( var i=0; i < aFiles.length; i++) {
  // Open and convert the document
  newDoc = app.openDoc({
    oDoc: doc,
    cPath: aFiles[i],
    bUseConv: true
  })
  // Save the new PDF file to a temp folder
  newDoc.saveAs({ cPath: "/c/temp/tmpDoc.pdf" });
  // Close it without notice
  newDoc.closeDoc(true);
  // Now insert that PDF file just saved to the end of the first document
  doc.insertPages ({
    nPage: doc.numPages-1,
    cPath: "/c/temp/tmpDoc.pdf",
    nStart: 0
  });
}
```

You can also programmatically extract pages and save them to a folder.

Example: *Extracting and saving pages*

Suppose the current document consists of a sequence of invoices, each of which occupies one page. The following code creates separate PDF files, one for each invoice:

```
var filename = "invoice";
for (var i = 0; i < this.numPages; i++)
  this.extractPages({
    nStart: i,
    cPath : filename + i + ".pdf"
  });
```

Creating file attachments

Another way you can “combine files” is by attaching one or more files to your PDF document. This is useful for packaging a collection of documents and send them together by emailing the PDF file. This section describes the basic object, properties and methods of attaching and manipulating attachments.

These are the objects, properties and methods relevant to file attachments.

Name	Description
`Doc.createDataObject()`	Creates a file attachment.
`Doc.dataObjects`	Returns an array of `Data` objects representing all files attached to the document.
`Doc.exportDataObject()`	Saves the file attachment to the local file system
`Doc.getDataObject()`	Acquires the `Data` object of a particular attachment.

Name	Description
`Doc.importDataObject()`	Attaches a file to the document.
`Doc.removeDataObject()`	Removes a file attachment from the document.
`Doc.openDataObject()`	Returns the Doc object for an attached PDF file.
`Doc.getDataObjectContents()`	Allows access to the contents of the file attachment associated with a `Data` object.
`Doc.setDataObjectContents()`	Rights to the file attachment.
`util.streamFromString()`	Converts a stream from a string
`util.stringFromStream()`	Converts a string from a stream.

Example: *Saving form data to and reading form data from an attachment*

This example takes the response given in a text field of this document and appends it to an attached document. (Perhaps this document is circulating by email, and the user can add in their comments through a multiline text field.) This example uses four of the methods listed above.

```
var v = this.getField("myTextField").value;
// Get the contents of the file attachment with the name "MyNotes.txt"
var oFile = this.getDataObjectContents("MyNotes.txt");
// Convert the returned stream to a string
var cFile = util.stringFromStream(oFile, "utf-8");
// Append new data at the end of the string
cFile += "\r\n" + v;
// Convert back to a stream
oFile = util.streamFromString( cFile, "utf-8");
// Overwrite the old attachment
this.setDataObjectContents("MyNotes.txt", oFile);

// Read the contents of the file attachment to a multiline text field
var oFile = this.getDataObjectContents("MyNotes.txt");
var cFile = util.stringFromStream(oFile, "utf-8");
this.getField("myTextField").value = cFile;
```

Beginning with Acrobat 8, the JavaScript interpreter includes E4X, the ECMA-357 Standard that provides native support of XML in JavaScript. See the document *ECMAScript for XML (E4X) Specification* for the complete specification of E4X. The next example illustrates the use of E4X and file attachments.

Example: *Accessing an XML attachment using E4X*

The following script describes a simple database system. The database is an XML document attached to the PDF file. The user enters the employee ID into a text field, the JavaScript accesses the attachment, finds the employee's record and displays the contents of the retrieved record in form fields.

We have a PDF file, `employee.pdf`, with three form fields, whose names are `employee.id`, `employee.name.first` and `employee.name.last`. Attached to the PDF file is an XML document created by the following script:

```
// Some E4X code to create a database of info
x = <employees/>;
```

```
function popXML(x,id,fname,lname)
{
    y = <a/>;
    y.employee.@id = id;
    y.employee.name.first = fname;
    y.employee.name.last = lname;
    x.employee += y.employee;
}
popXML(x,"334234", "John", "Public");
popXML(x,"324234", "Jane", "Doe");
popXML(x,"452342", "Davey", "Jones");
popXML(x,"634583", "Tom", "Jefferson");
```

Copy and paste this code into the console and execute it. You'll see the XML document as the output of this script. The output was copied and pasted into a document named `employee.xml`, and saved to the same folder as `employee.pdf`.

You can attach `employee.xml` using the UI, but the script for doing so is as follows:

```
var thisPath = this.path.replace(/\.pdf$/, ".xml");
try { this.importDataObject("employees", thisPath); }
    catch(e) { console.println(e) };
```

Of the three form fields in the document `employee.pdf`, only `employee.id` has any script. The following is a custom keystroke script:

```
if (event.willCommit) {
   try {
   // Get the data contents of the "employees" attachment
   var oDB = this.getDataObjectContents("employees");
   // Convert to a string
   var cDB = util.stringFromStream(oDB);
   // Use the eval method to evaluate the string, you get an XML variable
   var employees = eval(cDB);
      // Retrieve record with the id input in the employee.id field
      var record = employees.employee.(@id == event.value);
      // If the record is an empty string, or there was nothing entered...
      if ( event.value != "" && record.toString() == "" ) {
         app.alert("Record not found");
         event.rc = false;
      }
      // Populate the two other fields
      this.getField("employee.name.first").value = record.name.first;
      this.getField("employee.name.last").value = record.name.last;
      } catch(e) {
         app.alert("The DB is not attached to this document!");
         event.rc = false;
      }
}
```

Cropping and rotating pages

In this section we discuss the JavaScript API for cropping and rotating a page.

Cropping pages

The Doc object provides methods for setting and retrieving the page layout dimensions. These are the `setPageBoxes` and `getPageBox` methods. There are five types of boxes available:

- Art
- Bleed
- Crop
- Media
- Trim

See Section 10.10.1 of the *PDF Reference* version 1.7 for a discussion of these types of boxes.

The `setPageBoxes` method accepts the following parameters:

`cBox` — the type of box

`nStart` — the zero-based index of the beginning page

`nEnd` — the zero-based index of the last page

`rBox` — the rectangle in rotated user space

For example, the following code crops pages 2-5 of the document to a 400 by 500 pixel area:

```
this.setPageBoxes({
  cBox: "Crop",
  nStart: 2,
  nEnd: 5,
  rBox: [100,100,500,600]
});
```

The `getPageBox` method accepts the following parameters:

`cBox` — the type of box

`nPage` — the zero-based index of the page

For example, the following code retrieves the crop box for page 3:

```
var rect = this.getPageBox("Crop", 3);
```

Rotating pages

You can use JavaScript to rotate pages in 90-degree increments in the clockwise direction relative to the normal position. This means that if you specify a 90-degree rotation, no matter what the current orientation is, the upper portion of the page is placed on the right side of your screen.

The Doc object's `setPageRotations` and `getPageRotation` methods are used to set and retrieve page rotations.

The `setPageRotations` method accepts three parameters:

`nStart` — the zero-based index of the beginning page

`nEnd` — the zero-based index of the last page

`nRotate` — 0, 90, 180, or 270 are the possible values for the clockwise rotation

In the following example, pages 2 and 5 are rotated 90 degrees in the clockwise direction:

```
this.setPageRotations(2,5,90);
```

To retrieve the rotation for a given page, invoke the Doc object `getPageRotation` method, which requires only the page number as a parameter. The following code retrieves and displays the rotation in degrees for page 3 of the document:

```
var rotation = this.getPageRotation(3);
console.println("Page 3 is rotated " + rotation + " degrees.");
```

Extracting, moving, deleting, replacing, and copying pages

The Doc object, in combination with the `app` object, can be used to extract pages from one document and place them in another, and moving or copying pages within or between documents.

The `app` object an be used to create or open any document. To create a new document, invoke its `newDoc` method, and to open an existing document, invoke its `openDoc` method.

The Doc object offers three useful methods for handling pages:

`insertPages` — Inserts pages from the source document into the current document

`deletePages` — Deletes pages from the document

`replacePages` — Replaces pages in the current document with pages from the source document.

These methods enable you to customize the page content within and between documents.

Suppose you would like to remove pages within a document. Invoke the Doc object's `deletePages` method, which accepts two parameters:

`nStart` — the zero-based index of the beginning page

`nEnd` — the zero-based index of the last page

For example, the following code deletes pages 2 through 5 of the current document:

```
this.deletePages({nStart: 2, nEnd: 5});
```

Suppose you would like to copy pages from one document to another. Invoke the Doc object `insertPages` method, which accepts four parameters:

`nPage` — the zero-based index of the page after which to insert the new pages

`cPath` — the device-independent path of the source file

`nStart` — the zero-based index of the beginning page

`nEnd` — the zero-based index of the last page

For example, the following code inserts pages 2 through 5 from `mySource.pdf` at the beginning of the current document:

```
this.insertPages({
  nPage: -1,
  cPath: "/C/temp/mySource.pdf",
  nStart: 2,
  nEnd: 5
});
```

You can combine these operations to extract pages from one document and move them to another (they will be deleted from the first document). The following code will extract pages 2 through 5 in `mySource.pdf` and move them into `myTarget.pdf`:

```
// The operator, this, represents myTarget.pdf
// First copy the pages from the source to the target document
this.insertPages({
  nPage: -1,
  cPath: "/C/temp/mySource.pdf",
  nStart: 2,
  nEnd: 5
});

// Now delete the pages from the source document
var source = app.openDoc({cPath:"/C/temp/mySource.pdf"});
source.deletePages({nStart: 2, nEnd: 5});
```

To replace pages in one document with pages from another document, invoke the target document's `replacePages` method, which accepts four parameters:

`nPage` — The zero-based index of the page at which to start replacing pages

`cPath` — The device-independent pathname of the source file

`nStart` — The zero-based index of the beginning page

`nEnd` — The zero-based index of the last page

In the following example, pages 2 through 5 from `mySource.pdf` replace pages 30 through 33 of `myTarget.pdf`:

```
// This represents myTarget.pdf
this.replacePages({
  nPage: 30,
  cPath: "/C/temp/mySource.pdf",
  nStart: 2,
  nEnd: 5
});
```

To safely move pages within the same document, it is advisable to perform the following sequence:

1. Copy the source pages to a temporary file.

2. Insert the pages in the temporary file at the new location in the original document.

3. Delete the source pages from the original document.

The following example moves pages 2 through 5 to follow page 30 in the document:

```
// First create the temporary document:
var tempDoc = app.newDoc("/C/temp/temp.pdf");

// Copy pages 2 to 5 into the temporary file
tempDoc.insertPages({
  cPath: "/C/temp/mySource.pdf",
  nStart: 2,
  nEnd: 5
});

// Copy all of the temporary file pages back into the original:
this.insertPages({
  nPage: 30,
  cPath: "/C/temp/temp.pdf"
});

// Now delete pages 2 to 5 from the source document
this.deletePages({nStart: 2, nEnd: 5});
```

Adding watermarks and backgrounds

The Doc object `addWatermarkFromText` and `addWatermarkFromFile` methods create watermarks within a document, and place them in *optional content groups* (OCGs).

The `addWatermarkFromFile` method adds a page as a watermark to the specified pages in the document. The example below adds the first page of `watermark.pdf` as a watermark to the center of all pages within the current document:

```
this.addWatermarkFromFile("/C/temp/watermark.pdf");
```

In the next example, the `addWatermarkFromFile` method is used to add the second page of `watermark.pdf` as a watermark to the first 10 pages of the current document. It is rotated counterclockwise by 45 degrees, and positioned one inch down and two inches over from the top left corner of each page:

```
this.addWatermarkFromFile({
  cDIPath: "/C/temp/watermark.pdf",
  nSourcePage: 1,
  nEnd: 9,
  nHorizAlign: 0,
  nVertAlign: 0,
  nHorizValue: 144,
  nVertValue: -72,
  nRotation: 45
});
```

It is also possible to use the `addWatermarkFromText` method to create watermarks. In this next example, the word `Confidential` is placed in the center of all the pages of the document, and its font helps it stand out:

```
this.addWatermarkFromText(
  "Confidential",
  0,
  font.Helv,
  24,
  color.red
);
```

Converting PDF documents to XML format

Since XML is often the basis for information exchange within web services and enterprise infrastructures, it may often be useful to convert your PDF documents into XML format.

It is a straightforward process to do this using the Doc object `saveAs` method, which not only performs the conversion to XML, but also to a number of other formats.

In order to convert your PDF document to a given format, you will need to determine the device-independent path to which you will save your file, and the conversion ID used to save in the desired format. A list of conversion IDs for all formats is provided in the JavaScript for Acrobat API Reference. For XML, the conversion ID is `com.adobe.acrobat.xml-1-00`.

The following code converts the current PDF file to XML and saves it at `C:\temp\test.xml`:

```
this.saveAs("/c/temp/test.xml", "com.adobe.acrobat.xml-1-00");
```

5 Print Production

This chapter will provide you with an in-depth understanding of the ways in which you can manage print production workflows for PDF documents.

Topic	Description
Setting print options	Gives brief descriptions of the PrintParams object, used to set print options.
Printing PDF documents	Discusses printing a document using the `print` method of the Doc object.
Silent printing	Print document with little user interaction.
Printing comments and forms	Setting the print job to print just forms.
Booklet printing	Use the `print` method to create a booklet. Various options for doing this are discussed.
Setting advanced print options	Discusses how to set the print job to some of the advanced print options: marks and bleeds, PostScript® printing, setting output and font options.

Setting print options

Since printing involves sending pages to an output device, there are many options that can affect print quality. JavaScript can be used to enhance and automate the use of these options in print production workflows, primarily through the use of the PrintParams object, whose properties and methods are described in the following table.

PrintParams properties

Property	Description
`binaryOK`	Binary printer channel is supported.
`bitmapDPI`	DPI used for bitmaps or rasterizing transparency.
`booklet`	An object used to set properties of booklet printing.
`colorOverride`	Uses color override settings.
`colorProfile`	Color profile based on available color spaces.
`constants`	Wrapper object for PrintParams constants.
`downloadFarEastFonts`	Sends Far East fonts to the printer.
`fileName`	`fileName` is used when printing to a file instead of a printer.

Property	Description
firstPage	The first zero-based page to be printed.
flags	A bit field of flags to control printing options.
fontPolicy	Used to determine when fonts are emitted.
gradientDPI	The DPI used for rasterizing gradients.
interactive	Sets the level of interaction for the user.
lastPage	The last zero-based page to be printed.
nUpAutoRotate	Auto rotate pages during multiple pages per sheet printing.
nUpNumPagesH	Number of pages to lay out horizontally during multiple pages per sheet printing.
nUpNumPagesV	Number of pages to lay out vertically during multiple pages per sheet printing.
nUpPageBorder	Determines whether a page boundary is drawn and printed during multiple pages per sheet printing.
nUpPageOrder	Determines how the multiple pages are laid out on the sheet for multiple pages per sheet printing.
pageHandling	How pages will be handled (fit, shrink, or tiled).
pageSubset	Even, odd, or all pages are printed.
printAsImage	Sends pages as large bitmaps.
printContent	Determines whether form fields and comments will be printed.
printerName	The name of the destination printer.
psLevel	The level of PostScript emitted to the printer.
rasterFlags	A bit field of flags for outlines, clips, and overprint.
reversePages	Prints pages in reverse order.
tileLabel	Labels each page of tiled output.
tileMark	Output marks to cut the page and where overlap occurs.
tileOverlap	The number of points that tiled pages have in common.
tileScale	The amount that tiled pages are scaled.
transparencyLevel	The degree to which high level drawing operators are preserved.
userPrinterCRD	Determines whether the printer Color Rendering Dictionary is used.
useT1Conversion	Determines whether Type 1 fonts will be converted.

In addition to the properties of the PrintParams object, the `app` object's `printColorProfiles` and `printerNames` properties provide a list of available color spaces and printer names, respectively.

When printing a document, any comments and form fields of the document may or may not print, depending on the settings of the individual annotations. The `print` property of the Annotation and Field objects is used to set whether an individual annotation is printed.

Printing PDF documents

It is possible to use JavaScript to specify whether a PDF document is sent to a printer or to a PostScript file. In either case, to print a PDF document, invoke the Doc object `print` method. Its parameters are described in the following table.

Print method parameters

Parameter	Description
`bAnnotations`	Determines whether to print annotations.
`bPrintAsImage`	Determines whether to print each page as an image.
`bReverse`	Determines whether to print in reverse page order.
`bShrinkToFit`	Determines whether the page is shrunk to fit the imageable area of the printed page.
`bSilent`	Suppresses the Cancel dialog box while the document is printed.
`bUI`	Determines whether to present a user interface to the user.
`nEnd`	The zero-based index of the last page.
`nStart`	The zero-based index of the beginning page.
`printParams`	The PrintParams object containing the printing settings. **Note:** The `printParams` parameter is available in Acrobat 6.0 or later. If this parameter is passed, it is passed as a literal object and any other parameters are ignored.

In the first example below, pages 1-10 of the document are sent to the default printer, printed silently without user interaction, and are shrunk to fit the imageable area of the pages:

```
this.print({
  bUI: false,
  bSilent: true,
  bShrinkToFit: true,
  nStart: 1,
  nEnd: 10
});
```

The syntax above is used for versions of Acrobat previous to 6.0.

For Acrobat 6.0 or later, the recommend method is to pass a PrintParams object to the `Doc.print` method. All the subsequent examples use this method.

To print the document to a PostScript file, obtain the PrintParams object by invoking the Doc object `getPrintParams` method. Set its `printerName` property to the empty string, and set its `fileName` property to a string containing the device-independent path of the PostScript file to which it will be printed, as shown in the following example:

```
var pp = this.getPrintParams();
pp.printerName = "";
// File name must be a safe path
pp.fileName = "/C/temp/myPSDoc.ps";
this.print(pp);
```

If you would like send the file to a particular printer, you can specify the printer by setting the `printerName` property of the PrintParams object, as shown in the following example:

```
var pp = this.getPrintParams();
pp.interactive = pp.constants.interactionLevel.automatic;
pp.printerName = "Our office printer";
this.print(pp);
```

Silent printing

There are various ways to print a document without requiring user interaction. One way is to use the Doc object `print` method and set the `bSilent` attribute to `true`, as the following example shows.

```
this.print({bUI: false, bSilent: true, bShrinkToFit: true});
```

Beginning with version 7.0, non-interactive printing can only be done in batch and console events. Using the PrintParams object, this is the script for printing silently:

```
var pp = this.getPrintParams();
pp.interactive = pp.constants.interactionLevel.silent;
this.print(pp);
```

If you would like to print without requiring user interaction, and would like the progress monitor and Cancel dialog box to be removed when printing is complete, use the `interactive` property as shown in the following example:

```
var pp = this.getPrintParams();
pp.interactive = pp.constants.interactionLevel.automatic;
```

There are many options you can choose without requiring user interaction. For example, you can select the paper tray:

```
var fv = pp.constants.flagValues;
pp.flags |= fv.setPageSize;
```

These coding approaches may be used in menus or buttons within a PDF file, may exist at the folder or batch levels, and are available through Acrobat or Adobe Reader 6.0 or later. For more information, see the JavaScript for Acrobat API Reference, as well as the Acrobat SDK samples `SDKSilentPrint.js` and `SDKJSSnippet1.pdf`.

Printing comments and forms

The `printContent` property of the PrintParams object can be used to control whether document content, form fields, and comments will be printed. In the following example, only the form field contents will be printed (this is useful when sending data to preprinted forms):

```
var pp = this.getPrintParams();
```

```
pp.interactive = pp.constants.interactionLevel.silent;
pp.printContent = pp.constants.printContent.formFieldsOnly;
this.print(pp);
```

Booklet printing

Beginning with Acrobat 8.0, you can print booklets. To do so, begin by getting the PrintParams object:

```
var pp = this.getPrintParams();
```

Then set the `pageHandling` property to booklet:

```
pp.pageHandling = pp.constants.handling.booklet;
```

Use the `booklet` property of PrintParams to set the specialized printing parameters for booklet printing. `pp.booklet` is an object with properties:

`binding` — determines the paper binding direction and the page arrange order

`duplexMode` — determines the duplex printing mode

`subsetFrom` — determines the first booklet sheet to be printed. Independently from the general page range selection

`subsetTo` — determines the last booklet sheet to be printed

All the properties above take integers for their values.

The value for `binding` is set through the properties of the `constants.bookletBindings` object of PrintParams, as illustrated in the following example.

Example: *Set up booklet printing for right-side binding of text and print*

```
var pp = this.getPrintParams();
pp.pageHandling = pp.constants.handling.booklet;
pp.booklet.binding = pp.constants.bookletBindings.Right;
this.print(pp);
```

The `constants.bookBindings` object has four properties: `Left` (the default), `Right`, `LeftTall` and `RightTall`.

The value for `duplexMode` is set through the properties of the `constants.bookletDuplexModes` object of PrintParams.

Example: *Print booklet in duplex mode, printing only the front pages*

```
pp.pageHandling = pp.constants.handling.booklet;
pp.booklet.duplexMode = pp.constants.bookletDuplexModes.FrontSideOnly;
this.print(pp);
```

`constants.bookletDuplexModes` has three properties: `BothSides`, `FrontSideOnly` and `BackSideOnly`. For printers that print only on one side, use `FrontSideOnly` first then reinsert the printed pages and print again with `BacksideOnly` to complete a manual duplex printing.

Setting advanced print options

You can set the properties of the PrintParams object to specify advanced options including output, marks and bleeds, transparency flattening, PostScript options, and font options.

Specifying output settings

You can obtain a listing of printer color spaces available by invoking the `app` object `printColorProfiles` method. You can then assign one of these values to the PrintParams object `colorProfile` property.

In addition, you can set the `flags` property of the PrintParams object to specify advanced output settings, such as applying proof settings, shown in the example below:

```
var pp = this.getPrintParams();
var fv = pp.constants.flagValues;
pp.flags |= fv.applySoftProofSettings;
this.print(pp);
```

Specifying marks and bleeds

You can specify the types of tile marks and where overlap occurs by setting the `tileMark` property of the PrintParams object. For example, in the following code, Western style tile marks are printed:

```
var pp = this.getPrintPareams();
pp.tileMark = pp.constants.tileMarks.west;
this.print(pp);
```

Setting PostScript options

You can set the `flags` property of the PrintParams object to specify advanced PostScript settings, such as emitting undercolor removal/black generation, shown in the example below:

```
var pp = this.getPrintParams();
var fv = pp.constants.flagValues;
pp.flags &= ~(fv.suppressBG | fv.suppressUCR);
this.print(pp);
```

In addition, you can set the `psLevel` property of the PrintParams object to specify the level of PostScript emitted to PostScript printers. If the printer only supports PostScript level 1, set the PrintParams object's `printAsImage` property to `true`.

Setting font options

You can control the font policy by setting the `fontPolicy` property of the PrintParams object. There are three values that may be used:

`everyPage` — emit needed fonts for every page, freeing fonts from the previous page. This is useful for printers having a small amount of memory.

`jobStart` — emit all fonts at the beginning of the print job, free them at the end of the print job. This is useful for printers having a large amount of memory.

`pageRange` — emit the fonts needed for a given range of pages, free them once those pages are printed. This can be used to optimize the balance between memory and speed constraints.

These values can be accessed through the `constants.fontPolicies` object of the PrintParams object. In the following example, all the fonts are emitted at the beginning of the print job, and freed once the job is finished:

```
var pp = this.getPrintParams();
pp.fontPolicy = pp.constants.fontPolicies.jobStart;
```

```
this.print(pp);
```

You can also control whether Type 1 fonts will be converted to alternative font representations, by setting the `useT1Conversion` property of the PrintParams object. There are three values that can be used:

`auto` — let Acrobat decide whether to disable the conversion, based on its internal list of printers that have problems with these fonts.

`use` — allow conversion of Type 1 fonts.

`noUse` — do not allow conversion of Type 1 fonts.

These values are accessed through the `constants.usages` object of the PrintParams object. In the following example, conversion of Type 1 fonts is set to automatic:

```
var pp = this.getPrintParams();
pp.useT1Conversion = pp.constants.usages.auto;
this.print(pp);
```

Finally, it is possible to send Far East fonts to the printer by setting the PrintParams object's `downloadFarEastFonts` property to `true`.

6 Using JavaScript in Forms

In this chapter you will learn how to extend the functionality of Acrobat forms through the application of JavaScript. You will learn how to generate, modify, and enhance all types of PDF forms and the elements they contain, and ensure the proper collection and export of information in various formats relevant to your workflow needs. In addition, you will understand how to leverage the XML Forms Architecture (XFA) so that your presentation format will be not only responsive to user input, but will also ensure that the information can be exchanged with web services and enterprise infrastructures.

Topic	Description
Forms essentials	Discusses the various properties and methods of Acrobat forms, and how to process user interaction.
Task-based topics	Includes such tasks as highlighting required fields, setting a field with a hierarchal naming scheme, setting tab and calculation order.
Introduction to XML forms architecture (XFA)	Gives on overview of XML forms and discusses the use of JavaScript for Acrobat in an XML context.
Making forms accessible	Guidelines for making an Acrobat form accessible.
Using JavaScript to secure forms	Discusses techniques for encrypting a document for a list of recipients.

Forms essentials

You can extend the capability of your forms by using JavaScript to automate formatting, calculations, and data validation. In addition, you can develop customized actions assigned to user events. Finally, it is possible for your forms to interact with databases and web services.

About PDF forms

There are two types of PDF forms: Acrobat forms and Adobe LiveCycle Designer forms (XML form object model).

Acrobat forms present information using form fields. They are useful for providing the user with a structured format within which to view or print information. Forms permit the user to fill in information, select choices, and digitally sign the document. Once the user has entered data, the information within the PDF form can be sent to the next step in the workflow for extraction or, in the case of browser-based forms, immediately transferred to a database. If you are creating a new form, the recommended type is LiveCycle Designer forms since its format readily allows for web service interactions and compatibility with document processing needs within enterprise-wide infrastructures.

The XML form object model uses a document object model (DOM) architecture to manage the components that comprise a form. These include the base template, the form itself, and the data contained within the form fields. In addition, all calculations, validations, and formatting are specified and managed within the DOM and XML processes.

Static XML forms were supported in Acrobat 6.0, and *dynamic XML forms* are now supported in Acrobat 7.0. Both types are created using LiveCycle Designer. A static XML form presents a fixed set of text, graphics, and field areas at all times. Dynamic XML forms are created by dividing a form into a series of subforms and repeating subforms. They support dynamically changing fields that can grow or shrink based on content, variable-size rows and tables, and intelligent data import/export features.

Elements of Acrobat forms

The form fields used in Acrobat forms are the basis of interaction with the user. They include buttons, check boxes, combo boxes, list boxes, radio buttons, text fields, and digital signature fields. In addition, you can enhance the appearance and value of your forms through the use of tables, templates, watermarks, and other user interface elements such as bookmarks, thumbnails, and dialog boxes. Finally, the JavaScript methods you define in response to events will help customize the utility and behavior of the form within the context of its workflow.

Text fields can be useful for either presenting information or collecting data entered by the user, such as an address or telephone number.

Digital signature fields can be used to ensure the security of a document.

When presenting the user with decisions or choices, you can use check boxes and radio buttons for a relatively small set of choices, or list boxes and combo boxes for a larger set of dynamically changing choices.

Guidelines for creating a new form

When designing a PDF form, consider first its purpose and the data it must manage. It may be that the same page is used in multiple contexts, depending on user interactions and decisions. In this case, there may be multiple sets of form fields. When this occurs, treat each set of form fields as a different problem, as though each set had its own page. This will also require extra logic applied to visibility settings. Your form design may have dynamically changing features such as the current date, as well as convenience options such as automatic generation of email messages. It may even have a dynamically changing appearance and layout which is responsive to user interactions.

Usability is a major factor in the design of forms since they are essentially graphical user interfaces, so layout and clarity will be a major consideration. Finally, consider the medium in which the form will be presented: screens with limited resolution may affect your decisions, and printing characteristics may also be relevant.

When creating forms programmatically, consider the form elements that will be needed for a given area. Declare those variables associated with the form elements, and apply logical groupings to those elements that belong to the same collections, such as radio buttons or check boxes. This will simplify the task of assigning properties, formatting options, validation scripts, calculation scripts, and tabbing order to each of the individual form elements.

The creation of a new form, whether done through the Acrobat layout tools or LiveCycle Designer, or programmatically through JavaScript, will require that you consider the following:

- How the form fields will be positioned.
- Which form fields will be associated in collections so that their properties can be set with consistency and efficiency.
- How size, alignment, and distribution of form fields within the document will be determined.

- When and how to set up duplicate form fields so that when the user types information into one form field, that information automatically appears in the duplicate form fields.
- When to create multiple form fields for array-based access and algorithms.
- The tab order of form fields.

Creating Acrobat form fields

There are seven types of Acrobat form fields, each associated with a field type value as shown in the following table.

Acrobat form field types

Form field	Field type value
Button	`button`
Check box	`checkbox`
Combo box	`combobox`
List box	`listbox`
Radio button	`radiobutton`
Text field	`text`
Digital signature	`signature`

You can use JavaScript to create a form field by invoking the `addField` method of the Doc object, which returns a Field object. This method permits you to specify the following information:

- The field name. This may include hierarchical syntax in order to facilitate logical groupings. For example, the name `myGroup.firstField` implies that the form field `firstField` belongs to a group of fields called `myGroup`. The advantage of creating logical hierarchies is that you can enforce consistency among the properties of related form fields by setting the properties of the group, which automatically propagate to all form fields within the group.
- One of the seven field type values listed above, surrounded by quotes.
- The page number where the form field is placed, which corresponds to a zero-based indexing scheme. Thus, the first page is considered to be page 0.
- The location, specified in rotated user space (the origin is located at the bottom left corner of the page), on the page where the form field is placed. The location is specified through the use of an array of four values. The first two values represent the coordinates of the upper left corner, and the second two values represent the coordinates of the lower right corner: `[` *`upper-left x`*, *`upper-left y`*, *`lower-right x`*, *`lower-right y`*`]`.

For example, suppose you would like to place a button named `myButton` on the first page of the document. Assume that the button is one inch wide, one inch tall, and located 100 points in from the left side of the page and 400 points up from the bottom of the page (there are 72 points in 1 inch). The code for creating this button would appear as follows:

```
var name = "myButton";
var type = "button";
var page = 0;
var location = [100, 472, 172, 400];
var myField = this.addField(name, type, page, location);
```

This approach to creating form fields is applicable to all fields, but it should be noted that radio buttons require special treatment. Since a set of radio buttons represents a set of mutually exclusive choices, they belong to the same group. Because of this, the names of all radio buttons in the same group must be identical. In addition, the export values of the set of radio buttons must be set with a single statement, in which an array of values are assigned by the `exportValues` property of the Field object.

For example, suppose we would like to create a set of three radio buttons, each 12 points wide and 12 points high, all named `myRadio`. We will place them on page 5 of the document, and their export values will be `Yes`, `No`, and `Cancel`. They can be created as shown in the code given below:

```
var name = "myRadio";
var type = "radiobutton";
var page = 5;
var rb = this.addField(name, type, page, [400, 442, 412, 430]);
this.addField(name, type, page, [400, 427, 412, 415]);
this.addField(name, type, page, [400, 412, 412, 400]);
rb.exportValues=["Yes", "No", "Cancel"];
```

Setting Acrobat form field properties

Javascript provides a large number of properties and methods for determining the appearance and associated actions of form fields. In this section you will learn what properties and methods are available, and how to write scripts that control the appearance and behavior of form fields.

The list of topics in this section is:

- Field properties
- Button fields
- Check box fields
- Combo box fields
- List box fields
- Radio button fields
- Signature fields
- Text fields
- Validation scripts
- Calculation script

Field properties

A form field has certain properties that determines its appearance, printability, orientation, and the actions performed when the user interacts with it. Some properties are common to all form fields, while others are particular to certain types of fields. The properties of a field can be set not only through the UI, but also programmatically with JavaScript.

The most basic property of every form field is its name, which provides the reference necessary for subsequent access and modification. The key to setting the properties of a field is to first acquire the Field object of that field using its name; this is done using the `getField` method of the Doc object:

```
var f = this.getField("myField");
```

The `getField` method takes as its argument the field name of the target field. The Field object can be obtained using other methods as well, for example, the `addField` method returns the Field object of the field it just created.

General properties that apply to all form fields include the display rectangle, border style, border line thickness, stroke color, orientation, background color, and tooltip. In addition, you can choose whether it should be read only, have the ability to scroll, and be visible on screen or in print.

There are also specific settings you can apply to text characteristics, button and icon size and position relationships, button appearance when pushed, check box and radio button glyph appearance, and the number and selection options for combo box and list box items.

All formatting options are listed and described in the following table.

Field properties

Property	**Description**	**Field properties**
display rectangle	Position and size of field on page.	`rect`
border style	Rectangle border appearance.	`borderStyle`
stroke color	Color of bounding rectangle.	`strokeColor`
border thickness	Width of the edge of the surrounding rectangle.	`lineWidth`
orientation	Rotation of field in 90-degree increments.	`rotation`
background color	Background color of field (gray, transparent, RGB, or CMYK).	`fillColor`
tooltip	Short description of field that appears on mouse-over.	`userName`
read only	Whether the user may change the field contents.	`readonly`
scrolling	Whether text fields may scroll.	`doNotScroll`
display	Whether visible or hidden on screen or in print.	`display`
text	Font, color, size, rich text, comb format, multiline, limit to number of characters, file selection format, or password format.	`textFont, textColor, textSize, richText, richValue, comb, multiline, charLimit, fileSelect, password`
text alignment	Text layout in text fields.	`alignment`
button alignment	Alignment of icon on button face.	`buttonAlignX, buttonAlignY`
button icon scaling	Relative scaling of an icon to fit inside a button face.	`buttonFitBounds, buttonScaleHow, buttonScaleWhen`
highlight mode	Appearance of a button when pushed.	`highlight`

Property	Description	Field properties
glyph style	Glyph style for checkbox and radio buttons.	`style`
number of items	Number of items in a combo box or list box.	`numItems`
editable	Whether the user can type in a combo box.	`editable`
multiple selection	Whether multiple list box items may be selected.	`multipleSelection`

Button fields

We will begin by creating a button named `myButton`:

```
var f = this.addField("myButton", "button", 0, [200, 250, 250, 400]);
```

In most cases, however, a form field, such as this button, is created through the UI.

If the field already exists, get the Field object as follows:

```
var f = this.getField("myButton");
```

To create a blue border along the edges of its surrounding rectangle, we will set its `strokeColor` property:

```
f.strokeColor = color.blue;
```

In addition, you can select from one of the following choices to specify its border style: solid (`border.s`), beveled (`border.b`), dashed (`border.d`), inset (`border.i`), or underline (`border.u`). In this case we will make the border appear beveled by setting its `borderStyle` property:

```
f.borderStyle = border.b;
```

To set the line thickness (in points) of the border, set its `lineWidth` property:

```
f.lineWidth = 1;
```

To set its background color to yellow, we will set its `fillColor` property:

```
f.fillColor = color.yellow;
```

To specify the text that appears on the button, invoke its `buttonSetCaption` method:

```
f.buttonSetCaption("Click Here");
```

You can set the text size, color, and font:

```
f.textSize = 16;
f.textColor = color.red;
f.textFont = font.Times;
```

To create a tooltip that appears when the mouse hovers over the button, set its `userName` property:

```
f.userName = "This is a button tooltip for myButton.";
```

In addition to the text, it is also possible to specify the relative positioning of the icon and text on the button’s face. In this case, we will set the layout so that the icon appears to the left of the text:

```
f.buttonPosition = position.iconTextH;
```

To specify whether the button should be visible either on screen or when printing, set its `display` property:

```
f.display = display.visible;
```

To set the button’s appearance in response to user interaction, set its `highlight` property to one of the following values: none (`highlight.n`), invert (`highlight.i`), push (`highlight.p`), or outline (`highlight.o`). In this example, we will specify that the button appears to be pushed:

```
f.highlight = highlight.p;
```

It is possible to specify the scaling characteristics of the icon within the button face. You can determine when scaling takes place by setting the button’s `buttonScaleWhen` property to one of the following values: always (`scaleWhen.always`), never (`scaleWhen.never`), if the icon is too big (`scaleWhen.tooBig`), or if the icon is too small (`scaleWhen.tooSmall`). In this case, we will specify that the button always scales:

```
f.buttonScaleWhen = scaleWhen.always;
```

You can also determine whether the scaling will be proportional by setting the `buttonScaleHow` property to one of the following values: `buttonScaleHow.proportional` or `buttonScaleHow.anamorphic`. In this case, we will specify that the button scales proportionally:

```
f.buttonScaleHow = buttonScaleHow.proportional;
```

To guarantee that the icon scales within the bounds of the rectangular region for the button, set the `buttonFitBounds` property:

```
f.buttonFitBounds = true;
```

You can specify the alignment characteristics of the icon by setting its `buttonAlignX` and `buttonAlignY` properties. This is done by specifying the percentage of the unused horizontal space from the left or the vertical space from the bottom that is distributed. A value of `50` would mean that 50 percent of the unused space would be distributed to the left or bottom of the icon (centered). We will center our icon in both dimensions:

```
f.buttonAlignX = 50;
f.buttonAlignY = 50;
```

Now that you have prepared the space within the button for the icon, you can import an icon into the document and place it within the button’s area. There are two methods for importing an icon for a button face and associating it with a button

- Use the `buttonImportIcon` method of the Field object, this imports and associates in one step:

  ```
  var retn = f.buttonImportIcon("/C/temp/myIcon.pdf");
  if ( retn != 0 ) app.alert("Icon not imported");
  ```

  If the argument of `buttonImportIcon` is empty, the user is prompted to choose an icon. This approach works for Adobe Reader.

- Import the icon using the `importIcon` method of the Doc object, then associate the icon with the button using the `buttonSetIcon` method of the Field object.

  ```
  this.importIcon({
    cName: "myIconName", cDIPath: "/C/temp/myIcon.pdf", nPage: 0});
  var myIcon = this.getIcon("myIconName");
  f.buttonSetIcon(myIcon);
  ```

  If the `cDIPath` parameter is specified, which is the case in this example, the importIcon method can only be executed in batch and console events; however, this restrictions can be bypassed using the techniques discussed in Executing privileged methods in a non-privileged context. When `cDIPath` is not specified, the script works for Adobe Reader.

To rotate the button counterclockwise, set its `rotation` property:

```
f.rotation = 90;
```

Finally, you will undoubtedly wish to associate an action to be executed when the button is clicked. You can do this by invoking the `setAction` method of the Field object, which requires a trigger (an indication of the type of mouse event) and an associated script. The possible triggers are `MouseUp`, `MouseDown`, `MouseEnter`, `MouseExit`, `OnFocus`, and `OnBlur`. The following code displays a greeting when the button is clicked:

```
f.setAction("MouseUp", "app.alert('Hello');" );
```

Check box fields

The check box field supports many of the same properties as the button, and actions are handled in the same manner. The properties common to both form fields are:

- `userName`
- `readonly`
- `display`
- `rotation`
- `strokeColor`
- `fillColor`
- `lineWidth`
- `borderStyle`
- `textSize`
- `textColor`

In the case of `textFont`, however, the font is always set to `Adobe Pi`.

The `style` property of the Field object is used to set the appearance of the check symbol that appears when the user clicks in the check box. Permissible values of the `style` property are check (`style.ch`), cross (`style.cr`), diamond (`style.di`), circle (`style.ci`), star (`style.st`), and square (`style.sq`). For example, the following code causes a check to appear when the user clicks in the check box:

```
f.style = style.ch;
```

The export value of the check box can be set using the `exportValues` property of the Field object. For example, the code below associates the export value "buy" with the check box:

```
var f = this.getField("myCheckBox");
f.exportValues=["buy"];
```

If there are several check box fields, you can indicate that one particular form field is always checked by default. To do this, you must do two things:

- Invoke the `defaultIsChecked` method of the Field object. Note that since there may be several check boxes that belong to the same group, the method requires that you specify the zero-based index of the particular check box.
- Reset the field to ensure that the default is applied by invoking the `resetForm` method of the Doc object.

This process is shown in the following code:

```
var f = this.getField("myCheckBox");
f.defaultIsChecked(0); // 0 means that check box #0 is checked
this.resetForm([f.name]);
```

Other useful Field methods are

- `checkThisBox` — used to check a box
- `isBoxChecked` — used test whether a check box is checked
- `isDefaultChecked` — use to test whether the default setting is the one selected by user

Combo box fields

The combo box has the same properties as the button and check box fields. Its primary differences lie in its nature. Since the combo box maintains an item list in which the user may be allowed to enter custom text, it offers several properties that support its formatting options.

If you would like the user to be permitted to enter custom text, set the `editable` property of the Field object, as shown in the following code:

```
var f = this.getField("myComboBox");
f.editable = true;
```

You can specify whether the user's custom text will be checked for spelling by setting its `doNotSpellCheck` property. The following code indicates that the spelling is not checked:

```
f.doNotSpellCheck = true;
```

A combo box can interact with the user in one of two ways: either a selection automatically results in a response, or the user first makes their selection and then takes a subsequent action, such as clicking a `Submit` button.

In the first case, as soon as the user clicks on an item in the combo box, an action can automatically be triggered. If you would like to design your combo box this way, then set its `commitOnSelChange` property to `true`. Otherwise, set the value to `false`. The following code commits the selected value immediately:

```
f.commitOnSelChange = true;
```

To set the export values for the combo box items, invoke its `setItems` method, which can be used to set both the face and export values. In this case, the face (or appearance) value (the value that appears in the combo box) is the first value in every pair, and the export value is the second. The following code results in the full state names appearing in the combo box (as the face or appearance values), and abbreviated state names as their corresponding export values:

```
f.setItems( ["Ohio", "OH"], ["Oregon", "OR"], ["Arizona", "AZ"] );
```

In many cases, it is desirable to maintain a sorted collection of values in a combo box. In order to do this, you will need to write your own sorting script. Recall that the JavaScript `Array` object has a `sort` method that takes an optional argument which may be a comparison function.

This means that you must first define a `compare` function that accepts two parameters. The function must return a negative value when the first parameter is less than the second, `0` if the two parameters are equivalent, and a positive value if the first parameter is greater.

In the following example, we define a `compare` function that accepts two parameters, both of which are user/export value pairs, and compares their user values. For example, if the first parameter is `["Ohio",` "OH"] and the second parameter is ["Arizona", "AZ"], the compare function returns 1, since "Ohio" is greater than "Arizona":

```
function compare (a,b)
{
  if (a[0] < b[0]) return -1; // index 0 means user value
  if (a[0] > b[0]) return 1;
  return 0;
}
```

Create a temporary array of values and populate it with the user/export value pairs in your combo box field. The following code creates the array, iterates through the combo box items, and copies them into the array:

```
var arr = new Array();
var f = this.getField("myCombobox");
for (var i = 0; i < f.numItems; i++)
  arr[i] = [f.getItemAt(i,false), f.getItemAt(i)];
```

At this point you can invoke the sort method of the Array object and replace the items in the combo box field:

```
arr.sort(compare); // Sort the array using your compare method
f.setItems(arr);
```

Responding to combo box changes

The Format tab of the Combo Box properties lists categories of formats available to combo box text. They are None, Number, Percentage, Date, Time, Special and Custom. For all formatting categories, except None and Custom, the JavaScript interpreter uses special formatting functions to properly process the text of a combo box; these functions are undocumented now, so comments here are focused on the None and Custom category.

If the formatting category is set to None, then processing the combo box is easy. Whereas the combo box does not process its own change in value, another form element can easily read the current setting of the combo box. For example, if the name of the combo box is myComboBox, then the following code gets the current value:

```
var f = this.getField("myComboBox");
var valueCombo = f.value;
```

The variable valueCombo contains the export value of the combo box. You cannot, by the way, get the face value, if the export value is different from the face value.

When the formatting category is set to Custom, there are two types of formatting scripts, Custom Keystroke Script and Custom Format Script.

The Custom Keystroke Script has the following general form:

```
if (event.willCommit) {
  // Script that is executed when the choice is committed
} else {
  // Script that is executed when the choice changes, or, if the
  // combox box is editable, when text is typed in.
}
```

With regard to the Custom Keystroke Script, there are three event properties that can be read: `value`, `change` and `changeEx`. To illustrate these event properties, let's use the state combo box, defined above. Here is the Custom Keystroke Script:

```
if (event.willCommit) {
   console.println("Keystroke: willCommit")
   console.println("event.value = " + event.value);
   console.println("event.change = " + event.change);
   console.println("event.changeEx = " + event.changeEx);
} else {
   console.println("Keystroke: not Committed")
   console.println("event.value = " + event.value);
   console.println("event.change = " + event.change);
   console.println("event.changeEx = " + event.changeEx);
}
```

The results of this script are listed below. Assume the combo box is set on a face value of `"Arizona"` and you change the combo box to read `"Ohio"`. Additional comments are inserted.

```
// Select Ohio, but not committed. Note that the value of event.value is still
// set to "Arizona", but event.change is now set to the face value of the new
// choice, and event.changeEx is set to the export value of the new selection.
Keystroke: not Committed
event.value = Arizona
event.change = Ohio
event.changeEx = OH

// The choice is committed. Note that the value of event.value is now "Ohio"
// and that event.change and event.changeEx are empty.
Keystroke: willCommit
event.value = Ohio
event.change =
event.changeEx =
```

The only difference between the above sequence of events when `f.commitOnSelChange=false` versus `f.commitOnSelChange=true` is that in the first case, after the user makes a (new) choice from the combo box (and the "not committed" script is executed), the user must press the Enter key or click on a white area outside the field to commit the change, at this point, the "willCommit" script will execute. When `f.commitOnSelChange=true`, these two blocks of code will execute one after the other, with the "not committed" code executing first.

A combo box can also be editable. An editable combo box is one where the user is allowed to type in, or paste in, a selection. A combo box can be made editable by checking Allow User to Enter Custom Text in the Options tab of the Combo Box Properties dialog box. For JavaScript, the `editable` field property is used, as in the following example.

```
var f = this.getField("myComboBox");
f.editable = true;
```

The above output was captured in the console from a combo box that was not editable. The output is the same when the user selects one of the items in the combo box; when the user types in a selection, the output looks like this, assuming the user has already typed in the string "`Te`"and is now typing in `"x"`:

```
/*
   Note that when the selection is not committed, event.changeEx is empty. You
   can test whether the user is typing in by using the conditional test
   if ( event.changeEx == "" ) {<type/paste in>} else {<select from list>}
```

```
    Note also that the value of event.value is "Te" and the value of
    event.change is "x"; the previous keystrokes and the current keystroke,
    respectively. When the user pastes text into the combo box, the length of
    event.change will be larger than one,
    if(event.change.length > 1 ) {<pasted text>} else {<typed text>}
*/
Keystroke: not Committed
event.value = Te
event.change = x
event.changeEx =
// ...Additional keystrokes to spell "Texas"
// Once committed, this output is the same as when the combo box is not
// editable.
Keystroke: willCommit
event.value = Texas
event.change =
event.changeEx =
```

Example: ***Custom script for a combo box***

Suppose now you want to make the combo box editable, and ask to user to pick a state from the pop-up combo box, or to type in a state. You want to format the state entered by the user so that the first letter is capitalized, and the rest are lower case.

The following script is used for the Custom Keystroke Script of the combo box:

```
if (event.willCommit) {
   // Test to be sure there something more than white spaces.
   if ( event.rc = !( event.value.replace(/\s/g,"") == "" )) {
      // On commit, split event.value into an array, convert to lower case
      // and upper case for the first letter.
      var aStr = event.value.split(" ");
      for ( var i=0; i<aStr.length; i++){
         aStr[i] = aStr[i].charAt(0).toUpperCase()
            +aStr[i].substring(1,aStr[i].length).toLowerCase();
      }
      // Join the separate words together, and return as the new value.
      event.value = aStr.join(" ");
   }

} else {
   // User is typing in something, make sure it is a letter or space
   var ch = event.change;
   if ( ch.length==1 )
   event.rc = (ch==" ") || (ch>="a" &&  ch<="z") || (ch>="A" && ch<="Z");
}
```

Format the combo box so that is reads `"State of Ohio"`, for example.

Custom format script:

```
event.value =  "State of " + event.value;
```

If the user has pasted into the editable combo box, you can catch any non-letters or spaces with the validation script. A regular expression is used to see if there is something different from a letter or space.

Custom validation script:

```
event.rc = !/[^a-zA-Z ]+/.test(event.value);
```

These various events, Keystroke, Format and Validate, define the `rc` property of the event object. In the above code, the `event.rc` is used to signal that the input is acceptable (`true`) or not acceptable (`false`). In this way, the input can be checked, validated, and formatted, or, at some stage, can be canceled by setting `event.rc = false`.

Full documentation of the objects used in the above sample script can be found in the JavaScript for Acrobat API Reference.

List box fields

A list box has many of the same properties as buttons and combo boxes, except for the fact that the user cannot enter custom text and, consequently, that spellchecking is not available.

However, the user can select multiple entries. To enable this feature, set its `multipleSelection` property to `true`, as shown in the code below:

```
var f = this.getField("myListBox");
f.multipleSelection = true;
```

The List Box Properties dialog box has a Selection Change tab, this corresponds to the `"Keystroke"` trigger of the combo box or text field. To enter script to process a change in the status of the list box, you can either use the UI, or you can install your script, like so,

```
f.setAction( "Keystroke", "myListboxJavascript();" );
```

In the above, the action is to simply call a JavaScript function, defined, perhaps, as document JavaScript.

The manner in which you process a selection change is the same as the combo box, with one exception.

```
// Note that unlike the combo box, the value of event.value is the export value
// of the field, not the face value as it is with the combo box.
Keystroke: not committed
event.value = FL
event.change = Arizona
event.changeEx = AZ
// When we commit, the value of event.value is the face value, not the export
// value.
Keystroke: willCommit
event.value = Arizona
event.change =
event.changeEx =
```

You can allow the user to make multiple selections from a list box by checking the Multiple Selection check box in the Options tab of the List Box Properties dialog box, or you can make this selection using JavaScript:

```
var f = this.getField("myListBox");
f.multipleSelection=true;
```

It is not possible to detect multiple selection using a Selection Change script; however, multiple selection can be detected from another form field, such as a button. To get and set multiple values of the list box, use the `currentValueIndices` property of the Field object. The following example illustrates the techniques.

Example: *Accessing a list from another field*

This example accesses the list box which allows multiple selections. It simply reads the current value and reports to the console. When the current value of the list box is a single selection, `currentValueIndices` returns a number type (the index of the item selected); when there are multiple selections, `currentValueIndices` returns an array of indices.

```
var f = this.getField("myListBox");
var a = f.currentValueIndices;
if (typeof a == "number") // A single selection
  console.println("Selection: " + f.getItemAt(a, false));
else {// Multiple selections
  console.println("Selection:");
  for (var i = 0; i < a.length; i ++)
    console.println(" " + f.getItemAt(a[i], false));
}
```

The field method `getItemAt` is used to get the face values of the list, using the index value returned by `currentValueIndices`.

Other relevant field properties and methods not mentioned in this section are `numItems`, `insertItemAt`, `deleteItemAt` and `setItems`. The *JavaScript for Acrobat API Reference* documents all these methods and supplies many informative examples.

Radio button fields

The unique nature of radio buttons is that they are always created in sets, and represent a collection of mutually exclusive choices. This means that when you create a set of radio buttons, you must give all of them identical names with possibly different export values.

The behavior of the radio buttons depends on several factors, whether or not there are two or more members of the same radio set that have the same export value, and whether or not the item Buttons With the Same Name and Value are Selected in Unison is checked in the Options tab of the Radio Button Properties dialog box. (The latter can be set by JavaScript using the `radiosInUnison` field property.) The differences are illustrated in the discussion below.

You have four radio buttons all in the same group (all having the same name of `"myRadio"`):

```
var f = this.getField("myRadio");
```

Suppose the export values are `export0`, `export1`, `export2`, and `export3`. This is the simplest case, all choices are mutually exclusive; the behavior does not depend on whether Buttons With the Same Name and Value are Selected in Unison is checked.

Now suppose the export values of the four radio buttons are `export0`, `export1`, `export2`, and `export2`. If `f.radiosInUnison=false`, the four buttons behave as in the simplest case above. If `f.radiosInUnison=true`, then there are only three mutually exclusive buttons; clicking either of the two radios with export value `export2` will select both of them, while clicking the radio button with export value of `export0` will select only that button.

Example: *Accessing individual radio button widgets*

This example illustrates how you can programmatically access the individual radio buttons in the same radio group (all having the same name). Assume the command name is `myRadio` and there are four widgets in the field.

```
var f = this.getField("myRadio");
// Get the second widget, change its appearance and add an action
var g = this.getField(f.name+".1");
g.strokeColor = color.red;
g.setAction("MouseUp",
   "app.alert('Export value is ' + this.getField('myRadio').value)");
```

Some properties of the Field object, such as `value`, apply to all widgets that are children of that field. Other properties, such as `strokeColor` and `setAction`, are specific to individual widgets. See the section on the Field object in the JavaScript for Acrobat API Reference for a complete list of Field properties accessible at the widget level.

Example: *Counting the number of widgets in a radio button field*

Sometimes the number of widgets in a radio button field is unknown. The code below counts the number of widgets.

```
var f = this.getField("myRadio")
var nWidgets=0;
while(true) {
   if ( this.getField(f.name + "." + nWidgets) == null ) break;
   nWidgets++;
}
console.println("There are " + nWidgets + " widgets in this radio field");
```

Signature fields

Signature fields have the usual properties, as listed under the General and Appearance tabs of the Digital Signature Properties dialog box. These can be set in the standard way, by the UI or through JavaScript, as in this example:

```
var f = this.getField("Signature1”);
f.strokeColor = color.black;
```

When the signature field is signed, you may want to execute some script in response to this event. The script can be entered through the Signed tab of the Digital Signature Properties dialog box, or through the `setAction` method of the Field object.

You can set the action of a signature field by invoking its `setAction` method and passing in the `Format` trigger name as the first parameter. When the user signs the form, you can reformat other form fields with the script you pass in to the `setAction` method.

Once a document is signed, you may wish to lock certain form fields within the document. You can do so by creating a script containing a call to the signature field’s `setLock` method and passing that script as the second parameter to the signature field’s `setAction` method.

The `setLock` method requires a `Lock` object, which you will obtain by invoking the form field’s `getLock` method. Once you obtain the `Lock` object, set its `action` and `fields` properties. The `action` property can be set to one of 3 values: `"All"` (lock all fields), `"Exclude"` (lock all fields except for these), or `"Include"` (lock only these fields). The `fields` property is an array of fields.

For example, suppose you created a signature and would like to lock the form field whose name is `myField` after the user signs the document. The following code would lock `myField`:

```
var f = this.getField("Signature1");
var oLock = f.getLock();
```

```
oLock.action = "Include";
oLock.fields = new Array("myField");
f.setLock(oLock);
```

To actually sign a document, you must do two things: choose a security handler, and then invoke the signature field's `signatureSign` method. The following code is an example of how to choose a handler and actually sign the document:

```
var f = this.getField("Signature1");
var ppklite = security.getHandler("Adobe.PPKLite");
var oParams = {
  cPassword: "myPassword",
  cDIPath: "/C/signatures/myName.pfx" // Digital signature profile
};
ppklite.login(oParams);
f.signatureSign(ppklite,
  {
    password: "myPassword",
    location: "San Jose, CA",
    reason: "I am approving this document",
    contactInfo: "userName@example.com",
    appearance: "Fancy"
  }
); //End of signature
ppklite.logout()
```

Text fields

The text field has many of the same properties as buttons and combo boxes. In addition, it offers the following specialized properties shown in the following table. (The table assumes that `f` is the field object of a text field.)

Text field properties

Property	Description	Example
`alignment`	Justify text	`f.alignment = "center";`
`charLimit`	Limit on number of characters in area	`f.charLimit = 40;`
`comb`	Comb of characters subject to limitation set by `charLimit`	`f.comb = true;`
`defaultValue`	Set a default text string	`f.defaultValue = "Name: ";`
`doNotScroll`	Permit scrolling of long text	`f.doNotScroll = true;`
`doNotSpellCheck`	Set spell checking	`f.doNotSpellCheck = true;`
`fileSelect`	Format field as a file path	`f.fileSelect = true;`
`multiline`	Allow multiple lines in the area	`f.multiline = true;`

Property	Description	Example
`password`	Use special formatting to protect the user's password	`f.password = true;`
`richText`	Set rich text formatting	`f.richText = true;`

When the user enters data into a text field, the usual `event` object can be queried to process the keystrokes, the behavior is similar to the combo box. In the output below, assume the user has already typed in the `"Te"` and types in the letter `"x"`:

```
// The value of event.value is the current text in text field, event.change has
// the current keystroke. Note that event.changeEx is always empty, and is not
// relevant to the text field.
Keystroke: not Committed
event.value = Te
event.change = x
event.changeEx =

Keystroke: willCommit
event.value = Texas
event.change =
event.changeEx =
```

Use the Custom Keystroke Script to intercept user keystrokes and process them. For example, the following script changes all input to upper case:

Custom Keystroke Script:

```
if (!event.willCommit) event.change = event.change.toUpperCase();
```

Validation scripts

You can enforce valid ranges, values, or characters entered in form fields. The main reason to use validation is to ensure that users are only permitted to enter valid data into a form field. Validation is used whenever the user enters text into a form field, for text fields and for editable combo boxes.

Enter the validation script through the Validation tab of the Text Field Properties dialog box, or through the `setAction` method of the Field object. In the latter case, pass `Validate` as the first parameter, as follows:

```
   var f = this.getField("myText");
   f.setAction("Validate", "myValidateRange(true, -1, true, 5)");
```

Normally, however, such a script is entered through the UI.

Example: *Inputting numbers and checking the range in a text field*

This is a simple example of a Custom Keystroke Script for inputting a number, and a simple validation script for checking the range of the number.

Custom Keyboard Script:

```
   if ( event.willCommit ) {
      var value = ""+event.value.replace(/\s*/g,"");
      if ( value != "" ) {
         if (!isFinite(value)) {
            app.beep(0);
            event.rc = false;
         }
      }
   } else
      if ( event.change == " " ) event.change = "";
```

A representative Custom Validation Script is

```
myValidateRange(true, -1, true, 5);
```

which checks whether the value entered is strictly between `-1` and `5`. The validation script calls the following document JavaScript:

```
function myRangeCheck(bGreater, nGreater, bLess, nLess)
{
   value = event.value;
   if ( bGreater && ( value <= nGreater ) ) {
      app.alert("Value must be greater than " + nGreater);
      app.beep();
      event.rc = false;
      return;
   }
   if ( bLess && ( value >= nLess ) ) {
      app.alert("Value must be less than " + nLess);
      app.beep();
      event.rc = false;
      return;
   }
}
```

Calculation script

Calculation options make it possible to automate mathematical calculations associated with form fields. To apply a calculation to a form field action, enter the script through the Calculate tab of the Text Field Properties dialog box. On this tab there are three options:

1. The value is the sum(+)/product(x), average/minimum/maximum of a specified collection of fields.

2. The value is the result of simplified field notation.

3. The value is the result of a Custom Calculation Script.

Options (1) and (2) are entered through the UI, option (3) is entered through the UI or through the `setAction` method of the Field object. If you use the `setAction` method, pass `"Calculate"` as the first parameter, and pass a script containing a call to a calculation script as the second parameter.

The calculation script makes all necessary calculations, perhaps drawing values from other text fields, then reports the calculated value to the field by setting `event.value`.

Example: *Calculating the average of several text fields*

The script presented here calculates the average of several text fields. If one of the fields has no value, it is not figured into the average. The example assumes all fields require a number for their value.

The following script is entered as a custom calculation script:

```
var aNumFields = new Array("Text1.0", "Text1.1", "Text1.2","Text1.3",
  "Text1.4");
myAverageFunction(aNumFields);
```

The script above simply calls the `myAverageFunction`, it is this function that calculates the average of the array of fields passed as its argument, and sets `event.value`. The function is placed in the document as document JavaScript.

```
function myAverageFunction(aNumFields)
{
  // n = number of fields that have a numerical value
  var n=0, sum = 0;
  for ( var i=0; i<aNumFields.length; i++) {
    var v = this.getField(aNumFields[i]).value;
      if ( v != "" ) {
        n++;
        sum += v;
      }
  }
  if ( n == 0 ) event.value = "";
  else event.value = sum/n;
}
```

Task-based topics

In this section, common problems/tasks are presented, including such topics as highlighting required fields, positioning form fields, duplicating form fields, importing and exporting form data and global variables.

Highlighting required form fields

You can require that some text fields on a form are not left blank: these are called *required form fields*. It is helpful to the user to highlight them so that they can be easily recognized. The following example demonstrates one approach to the problem.

Example: *Highlighting required fields*

Create two buttons in a document containing form fields. One button has the JavaScript mouse up action

```
showRequired();
```

that will highlight all required fields, the other button has the following mouse up action

```
restoreRequired();
```

that restores the fields to the appearance state they were in before the `showRequired()` function executed.

The script that follows is a document-level JavaScript that defines the functions called by the two buttons.

```
var oFieldNames = new Object(); // used to save the appearance of the fields
function showRequired() {
  // Search through all fields for those that are set to required, excluding
  // any button fields.
```

```
   for ( var i=0; i < this.numFields; i++) {
      var fname = this.getNthFieldName(i);
      var f = this.getField(fname);
      if ( (f.type != "button") && f.required) {
         // Save appearance data in oFieldNames
         oFieldNames[fname]={ strokeColor: f.strokeColor,
            fillColor: f.fillColor};
         // Assign a red boundary color, and fill color
         f.strokeColor=color.red;
         f.fillColor=app.runtimeHighlightColor;
      }
   }
}
// Now restore the fields.
function restoreRequired() {
   if ( typeof oFieldNames == "object") {
      for ( var o in oFieldNames ) {
         var f = this.getField(o);
         f.strokeColor=oFieldNames[o].strokeColor;
         f.fillColor=oFieldNames[o].fillColor;
      }
   }
   oFieldNames = new Object();
}
```

Making a form fillable

In order for a form to be fillable, its text fields or combo boxes must be formatted so that the user can edit them.

If you would like a text area to be enabled for typing, set its `readonly` property to `false`, as shown in the following code:

```
f.readonly = false;
```

If you would like a combo box to be enabled for typing, set its `editable` property to `true`, as shown in the following code:

```
f.editable = true;
```

Setting the hierarchy of form fields

Fields can be arranged hierarchically within a document. For example, form fields with names like `"FirstName"` and "`LastName`" are called flat names and there is no association between them. To change an attribute of these fields requires you to change the attribute for each field:

```
var f = this.getField("FirstName");
f.textColor = color.red;
var f = this.getField("LastName");
f.textColor = color.red;
```

The above code changes the text color of each of the two fields to red.

By changing the field names, a hierarchy of fields within the document can be created. For example, "`Name.First`" and "`Name.Last`" forms a tree of fields. The period (.) separator in Acrobat forms denotes a hierarchy shift. "`Name`" in these fields is the parent; "`First`" and "`Last`" are the children. Also, the field "`Name`" is an internal field because it has no visible appearance. "`First`" and "`Last`" are terminal fields that appear on the page.

Acrobat form fields that share the same name also share the same value. Terminal fields can have different presentations of that data. For example, they can appear on different pages, be rotated differently, or have a different font or background color, but they have the same value. Therefore, if the value of one presentation of a terminal field is modified, all others with the same name are updated automatically.

To repeat the above example using the naming scheme of "`Name.First`" and "`Name.First`", the code is

```
var f = this.getField("Name");
f.textColor=color.red;
```

This changes the text color of both fields to red.

Of course, if you with to give the two fields different text colors, then you reference each field individually,

```
var f = this.getField("Name.First");
f.textColor = color.red;
var f = this.getField("Name.Last");
f.textColor = color.blue;
```

Each presentation of a terminal field is referred to as a widget. An individual widget does not have a name but is identified by index (0-based) within its terminal field. The index is determined by the order in which the individual widgets of this field were created (and is unaffected by tab-order).

You can determine the index for a specific widget by using the Fields navigation tab in Acrobat. The index is the number that follows the '#' sign in the field name shown. (In Acrobat 6.0 or later, the widget index is displayed only if the field has more than one widget.) You can double-click an entry in the Fields panel to go to the corresponding widget in the document. Alternatively, if you select a field in the document, the corresponding entry in the Fields panel is highlighted.

Beginning with Acrobat 6.0, `getField` can be used to retrieve the Field object of one individual widget of a field. This notation consists of appending a period (.) followed by the widget index to the field name passed. When this approach is used, the Field object returned by `getField` encapsulates only one individual widget. You can use the Field objects returned this way anywhere you would use a Field object returned by passing the unaltered field name.

For example, suppose you have four text fields all with the same name of `"myTextField"`. Executing the following code changes the text color of all four fields to red.

```
this.getField("myTextField").textColor=color.red;
```

To change the text color of an individual field, you would execute the following code:

```
this.getField("myTextField.1").textColor=color.blue;
```

This code changes the text color of the text in the second field, the one labeled as `"myTextField#1"` in the Fields navigation tab, to blue.

The technique of referencing individual widgets is especially useful with radio button fields, see Radio button fields for additional discussion and examples.

Some properties of the Field object, such as `value`, apply to all widgets that are children of that field. Other properties, such as `textColor` and `setAction`, are specific to individual widgets. See the section on the Field object in the JavaScript for Acrobat API Reference for a complete list of Field properties accessible at the widget level.

Creating forms

In this section you learn how to create a form field using the Doc object `addField` method. Topics include:

- Positioning form fields
- Duplicating form fields
- Creating multiple form fields

Positioning form fields

Remember that form field positioning takes place in Rotated User Space, in which the origin of a page is located at the bottom left corner.

If you are accustomed to calculating the positions of form fields from the top left corner of a page, the following example will serve as a template for obtaining the correct position.

In this example, we will position a 1 inch by 2 inch form field 0.5 inches from the top of the page and 1 inch from the left side:

```
// 1 inch = 72 points
var inch = 72;

// Obtain the page coordinates in Rotated User Space
var aRect = this.getPageBox({nPage: 2});

// Position the top left corner 1 inch from the left side
aRect[0] += 1 * inch;

// Make the rectangle 1 inch wide
aRect[2] = aRect[0] + 1*inch;

// The top left corner is 0.5 inch down from the top of the page
aRect[1] -= 0.5*inch;

// Make the rectangle 2 inches tall
aRect[3] = aRect[1] - 2*inch;

// Draw the button
var f = this.addField("myButton", "button", 2, aRect);
```

Normally, when you create a form field, you do so using the UI; creating a form field using the `addField` has limited applications because the exact positioning of the field on the page (and relative to its content) is usually not known. The `addField` method is useful in situations when you either know the positioning of the field, or you can acquire that information from another method; the Example Inserting navigation buttons on each page illustrates the use of `addField` when the positioning of the fields are known in advance.

Duplicating form fields

It may sometimes be useful to duplicate a form field in other pages of the document. For example, you may wish to insert navigation form buttons at the bottom of your document to help the user navigate.

Example: ***Inserting navigation buttons on each page***

The script that follows can be executed in the console, or it can be used as batch sequence JavaScript. Additional customizations are possible.

```
var aPage = this.getPageBox();
var w = 45;         // Width of each button
var h = 12          // Height of each button
var nNavi = 4;       // Number of buttons to be placed
var g = 6;          // Gap between buttons
var totalWidth = nNavi * w + (nNavi - 1) * g; // total width of navi bar

var widthPage = aPage[2] - aPage[0];
// Horizontal offset to center navi bar
var hoffset = (widthPage - totalWidth) / 2;
var voffset = 12; // vertical offset from bottom

for (var nPage = 0; nPage < this.numPages; nPage++) {
       // Create the fields
       var pp = this.addField("PrevPage", "button", nPage,
          [ hoffset, voffset, hoffset + w, voffset + h ] );
          pp.buttonSetCaption(pp.name);
          pp.fillColor=color.ltGray;
          pp.setAction("MouseUp", "this.pageNum--");
       var np = this.addField("NextPage", "button", nPage,
          [ hoffset + w + g, voffset, hoffset + 2*w + g, voffset + h ] );
          np.buttonSetCaption(np.name);
          np.fillColor=color.ltGray;
          np.setAction("MouseUp", "this.pageNum++");
       var pv = this.addField("PrevView", "button", nPage,
          [ hoffset + 2*w + 2*g, voffset, hoffset + 3*w + 2*g, voffset + h ] );
          pv.buttonSetCaption(pv.name);
          pv.fillColor=color.ltGray;
          pv.setAction("MouseUp", "app.goBack()");
       var nv = this.addField("NextView", "button", nPage,
          [ hoffset + 3*w + 3*g, voffset, hoffset + 4*w + 3*g, voffset + h ] );
          nv.buttonSetCaption(nv.name);
          nv.fillColor=color.ltGray;
          nv.setAction("MouseUp", "app.goForward()");
}
```

Creating multiple form fields

The best approach to creating a row, column, or grid of form fields is to use array notation in combination with hierarchical naming.

For example, the following code creates a column of three text fields:

```
var myColumn = new Array();
myColumn[0] = "myFieldCol.name";
myColumn[1] = "myFieldCol.birthday";
myColumn[2] = "myFieldCol.ssn";
var initialPosition = [ 36, 36 ];
var w = 2*72;
var h = 12;
var vGap = 6;
var aRect = [initialPosition[0], initialPosition[1]-(h+vGap),
initialPosition[0]+w, initialPosition[1]-h-(h+vGap)];
for (var i=0; i<myColumn.length; i++)
{
    aRect[1] += (h+vGap); // move the next field down 100 points
    aRect[3] += (h+vGap); // move the next field down 100 points
    var f = this.addField(myColumn[i], "text", 0, aRect);
}
f = this.getField("myFieldCol");
f.strokeColor = color.black; // set some common properties
```

Defining the tabbing order

You can specify the tabbing order on a given page by invoking the `setPageTabOrder` method of the Doc object, which requires two parameters: the page number and the order to be used.

There are three options for tabbing order: you can specify tabbing by rows (`"rows"`), columns (`"columns"`), or document structure (`"structure"`).

For example, the following code sets up tabbing by rows for page 2 of the document:

```
this.setPageTabOrder(2, "rows");
```

To set the tab order on each page of the document, you would execute a script like this:

```
for (var i = 0; i < this.numPages; i++)
this.setPageTabOrder(i, "rows");
```

Defining form field calculation order

When you add a text field or combo box that has a calculation script to a document, the new form field's name is appended to the *calculation order array*. When a calculation event occurs, the calculation script for each of the form fields in the array runs, beginning with the first element in the array (array index `0`) and continuing in sequence to the end of the array.

If you would like one form field to have calculation precedence over another, you can change its calculation index, accessed through the Field object's `calcOrderIndex` property. A form field script with a lower calculation index executes first. The following code guarantees that the calculation script for form field `subtotal` will run before the one for form field `total`:

```
var subtotal = this.getField("subtotal");
var total = this.getField("total");
total.calcOrderIndex = subtotal.calcOrderIndex + 1;
```

Making PDF forms web-ready

PDF forms can be used in workflows that require the exchange of information over the web. You can create forms that run in web browsers, and can submit and retrieve information between the client and server by making a Submit button available in the form. The button can perform similar tasks to those of HTML scripts.

You will need a CGI application on the web server that can facilitate the exchange of your form's information with a database. The CGI application must be able to retrieve information from forms in HTML, FDF, or XML formats.

In order to enable your PDF forms for data exchange over the web, be sure to name your form fields so that they match those in the CGI application. In addition, be sure to specify the export values for radio buttons and check boxes.

The client side form data may be posted to the server using the HTML, FDF, XFDF, or PDF formats. Note that the use of XFDF format results in the submission of XML-formatted data to the server, which will need an XML parser or library to read the XFDF data.

The equivalent MIME types for all posted form data are shown in the following table.

MIME types for data formats

Data format	MIME type
HTML	application/x-www-form-urlencoded
FDF	application/vnd.fdf
XFDF	application/vnd.adobe.xfdf
PDF	application/pdf
XML	application/xml

Creating a submit button

To create a submit button, begin by showing the Forms toolbar (Tools > Forms > Show Forms Toolbar). From the toolbar, select the Button tool. Once selected, you can either double-click the page, or drag a rectangle. On the Actions tab of the Button Properties dialog box, use the Mouse Up trigger and select Submit a Form action. You can specify which data format is used when you select the Export Format option. If it is necessary for the server to be able to recognize and reconstruct a digital signature, it is advisable that you choose the Incremental Changes to the PDF option.

Creating a reset form button

Create a button using the Button tool as described in Creating a submit button, above. On the Actions tab of the Button Properties dialog box, use the Mouse Up trigger and select the Reset a Form action. Click the Add button to select which fields you want to reset to their default values.

Defining CGI export values

The face value of a form is not necessarily the same as its export value. When a form is submitted, the export value of each form field is the value that is used. For text fields, the face and export value is the same; for combo boxes, list boxes, radio buttons and check boxes, the face value is not the same as the export value. You need to check all the export values of your form to be sure they are values that your server-side application recognizes and accepts. The values may represent identifying information that the server-side application uses to process the incoming data.

Importing and exporting form data

Form data can be exported to a separate file, which can then be sent using email or over the web. When doing this, save either to Forms Data Format (FDF) or XML-based FDF (XFDF). This creates an export file much smaller than the original PDF file. To programmatically save your data in one of these formats use the Doc object methods `exportAsFDF` and `exportAsXFDF`.

On the server-side, use the FDF Toolkit to read the FDF data, or use a XML parser or library to read the XFDF data

Note that Acrobat forms support the FDF, XFDF, tab-delimited text, and XML formats, and that XML forms support XML and XDP formats.

Emailing completed forms

Recent versions of Acrobat have offered an entire workflow around email submittal of form data. To email a completed form in FDF format, invoke the `mailForm` method of the Doc object, which exports the data to FDF and sends it via email.

To make an interactive email session, pass `true` to the first parameter, which specifies whether a user interface should be used, as shown in the code below:

```
this.mailForm(true);
```

To send the exported FDF data automatically, pass `false` to the first parameter, and specify the `cTO`, `cCc`, `cBcc`, `cSubject`, and `cMsg` fields (all of which are optional), as shown in the code below:

```
this.mailForm(false, );
this.mailForm({
   bUI: false,
   cTo: "recipient@example.com",
   cSubject: "You are receiving mail",
   cMsg: "A client filled in your online form and "
          + "submitted the attached data."
})
```

Unless this command is executed in a privileged context, see Privileged versus non-privileged context, the mail client will appear to the user.

Use date objects

This section discusses the use of `Date` objects within Acrobat. The reader should be familiar with the JavaScript `Date` object and the `util` methods that process dates. JavaScript `Date` objects actually contain both a date and a time. All references to `Date` in this section refer to the date-time combination.

Note: All date manipulations in JavaScript, including those methods that have been documented in this specification are Year 2000 (Y2K) compliant.

Note: When using the `Date` object, do not use the `getYear` method, which returns the current year minus 1900. Instead use the `getFullYear` method which always returns a four digit year. For example,

```
var d = new Date()
d.getFullYear();
```

Converting from a date to a string

Acrobat provides several date-related methods in addition to the ones provided by the JavaScript `Date` object. These are the preferred methods of converting between `Date` objects and strings. Because of

Acrobat's ability to handle dates in many formats, the `Date` object does not always handle these conversions correctly.

To convert a `Date` object into a string, the `printd` method of the `util` object is used. Unlike the built-in conversion of the `Date` object to a string, `printd` allows an exact specification of how the date should be formatted.

```
/* Example of util.printd */
var d = new Date(); // Create a Date object containing the current date
/* Create some strings from the Date object with various formats with
** util.printd */
var s = [ "mm/dd/yy", "yy/m/d", "mmmm dd, yyyy", "dd-mmm-yyyy" ];
for (var i = 0; i < s.length; i++) {
   /* Print these strings to the console */
   console.println("Format " + s[i] + " looks like: "
      + util.printd(s[i], d));
}
```

The output of this script would look like:

```
Format mm/dd/yy looks like: 01/15/05
Format yy/mm/dd looks like: 05/1/15
Format mmmm dd, yyyy looks like: January 15, 2005
Format dd-mmm-yyyy looks like: 15-Jan-2005
```

Note: You should output dates with a four digit year to avoid ambiguity.

Converting from a string to a date

To convert a string to a `Date` object, use the `util` object's `scand` method. It accepts a format string that it uses as a hint as to the order of the year, month, and day in the input string.

```
/* Example of util.scand */
/* Create some strings containing the same date in differing formats. */
var s1 = "03/12/97";
var s2 = "80/06/01";
var s3 = "December 6, 1948";
var s4 = "Saturday 04/11/76";
var s5 = "Tue. 02/01/30";
var s6 = "Friday, Jan. the 15th, 1999";
/* Convert the strings into Date objects using util.scand */
var d1 = util.scand("mm/dd/yy", s1);
var d2 = util.scand("yy/mm/dd", s2);
var d3 = util.scand("mmmm dd, yyyy", s3);
var d4 = util.scand("mm/dd/yy", s4);
var d5 = util.scand("yy/mm/dd", s5);
var d6 = util.scand("mmmm dd, yyyy", s6);
/* Print the dates to the console using util.printd */
console.println(util.printd("mm/dd/yyyy", d1));
console.println(util.printd("mm/dd/yyyy", d2));
console.println(util.printd("mm/dd/yyyy", d3));
console.println(util.printd("mm/dd/yyyy", d4));
console.println(util.printd("mm/dd/yyyy", d5));
console.println(util.printd("mm/dd/yyyy", d6));
```

The output of this script would look like this:

```
03/12/1997
06/01/1980
12/06/1948
04/11/1976
01/30/2002
01/15/1999
```

Unlike the date constructor (`new Date(...)`), `scand` is rather forgiving in terms of the string passed to it.

Note: Given a two digit year for input, `scand` resolves the ambiguity as follows: if the year is less than 50 then it is assumed to be in the 21st century (i.e. add 2000), if it is greater than or equal to 50 then it is in the 20th century (add 1900). This heuristic is often known as the *Date Horizon*.

Date arithmetic

It is often useful to do arithmetic on dates to determine things like the time interval between two dates or what the date will be several days or weeks in the future. The JavaScript `Date` object provides several ways to do this. The simplest and possibly most easily understood method is by manipulating dates in terms of their numeric representation. Internally, JavaScript dates are stored as the number of milliseconds (one thousand milliseconds is one whole second) since a fixed date and time. This number can be retrieved through the `valueOf` method of the `Date` object. The `Date` constructor allows the construction of a new date from this number.

```
/* Example of date arithmetic. */
/* Create a Date object with a definite date. */
var d1 = util.scand("mm/dd/yy", "4/11/76");
/* Create a date object containing the current date. */
var d2 = new Date();
/* Number of seconds difference. */
var diff = (d2.valueOf() - d1.valueOf()) / 1000;
/* Print some interesting stuff to the console. */
console.println("It has been "
   + diff + " seconds since 4/11/1976");
console.println("It has been "
   + diff / 60 + " minutes since 4/11/1976");
console.println("It has been "
   + (diff / 60) / 60 + " hours since 4/11/1976");
console.println("It has been "
   + ((diff / 60) / 60) / 24 + " days since 4/11/1976");
console.println("It has been "
   + (((diff / 60) / 60) / 24) / 365 + " years since 4/11/1976");
```

The output of this script would look something like this:

```
It has been 718329600 seconds since 4/11/1976
It has been 11972160 minutes since 4/11/1976
It has been 199536 hours since 4/11/1976
It has been 8314 days since 4/11/1976
It has been 22.7780821917808 years since 4/11/1976
```

The following example shows the addition of dates.

```
/* Example of date arithmetic. */
/* Create a date object containing the current date. */
var d1 = new Date();
```

```
/* num contains the numeric representation of the current date. */
var num = d1.valueOf();
/* Add thirteen days to today’s date, in milliseconds. */
/* 1000 ms/sec, 60 sec/min, 60 min/hour, 24 hours/day, 13 days */
num += 1000 * 60 * 60 * 24 * 13;
/* Create our new date, 13 days ahead of the current date. */
var d2 = new Date(num);
/* Print out the current date and our new date using util.printd */
console.println("It is currently: "
   + util.printd("mm/dd/yyyy", d1));
console.println("In 13 days, it will be: "
   + util.printd("mm/dd/yyyy", d2));
```

The output of this script would look something like this:

```
It is currently: 01/15/1999
In 13 days, it will be: 01/28/1999
```

Defining global variables in JavaScript

In this section we discuss how to define, set, get and manage global variables.

Enable the global object security policy

Beginning with version 8, the access to global variables has changed somewhat. The JavaScript category in the Preferences dialog box (Ctrl+K) has a new security check box, Enable Global Object Security Policy.

- When checked, the default, each time a global variable is written to, the origin which set it is remembered. Only origins that match can then access the variable.
  - For files, this means only the file that set it, having the same path it had when the variable was set, can access the variable.
  - For documents from URLs it means only the host which set it can access the variable.

    There is an important exception to the restrictions described above, global variables can be defined and accessed in a privileged context, in the console, in a batch sequence and in folder JavaScript. A global variable set at the folder level can be accessed at the folder level, or from within the console.
- When not checked, documents from different origins are permitted to access the variable; this is the behavior previous to version 8.0.

Additional discussion and examples, see Global object security policy.

Setting and getting a global variable

The Acrobat extensions to JavaScript define a `global` object to which you can attach global variables as properties. To define a new global variable called `myVariable` and set it equal to the number 1, you would type:

```
global.myVariable = 1;
```

A global variable can be read in the usual way,

```
console.println("The value of global.myVariable is " + global.myVariable);
```

The life of this variable ends when the application is closed.

In versions of Acrobat previous to 8.0, any document open in Acrobat (or Adobe Reader) had access to any global variable and its value. This same behavior can be maintained in version 8 provided the item Enable Global Object Security Policy, found in the JavaScript section of the Preference, is unchecked. When checked, however, which is the default, a global variable is restricted to only that document that created the global variable in the case of viewing PDF files in Acrobat or Adobe Reader, or to only those documents that come from the same web host where the global variable was set. See the JavaScript for Acrobat API Reference for a more detailed description of this policy.

Deleting global variables

Once you have finished using a global variable, it can be deleted with the `delete` operator.

```
global.myVariable = 1;
delete global.myVariable;
```

Making global variables persistent

Global data does not persist across user sessions unless you specifically make your global variables persistent. The predefined `global` object has a method designed to do this. To make a variable named `myVariable` persist across sessions, use the following syntax:

```
global.setPersistent("myVariable",true);
```

In future sessions, the variable will still exist with its previous value intact.

Beginning with Acrobat version 8, there is a new security policy for global variables that applies to global persistent variables as well. See the description above of this policy for more details.

Querying an Acrobat form field value in another open form

Use the `global` object `subscribe` method to make the field(s) of interest available to others at runtime. For example, a document (Document A) may contain a document script (invoked when that document is first opened) that defines a global field value of interest:

```
global.xyz_value = some value;
```

Then, when your document (Document B) wants to access the value of interest from the other form (Document A), it can subscribe to the variable in question:

```
global.subscribe("xyz_value", ValueUpdate);
```

In this case, `ValueUpdate` refers to a user-defined function that is called automatically whenever `xyz_value` changes. If you were using `xyz_value` in Document B as part of a field called `MyField`, you might define the callback function this way:

```
function ValueUpdate( newValue ) {
  this.getField("MyField").value = newValue;}
```

Beginning with version 8.0 of Acrobat, there is a new security policy for global variables that applies to global variables. For the above solution to work, the Enable Global Object Security Policy, found in the JavaScript section of the Preferences, is unchecked, or both documents must be served from the same web host. See the previous description of this policy for more details.

Global object security policy

The new global security policy places restrictions on document access to global variables. For more information and exceptions, see Enable the global object security policy.

In a document, named docA.pdf, execute the following script in a non-privileged context (mouse-up button):

```
global.x = 1
global.setPersistent("x", true);
```

The path for docA.pdf is the origin saved with the global.x variable; consequently, docA.pdf can access this variable:

```
console.println("global.x = " + global.x);
```

To set this global from docA.pdf, we execute global.x = 3, for example, in any context.

To have a document with a different path get and set this global variable, the getting and setting must occur in a trusted context, with a raised level of privilege. The following scripts are folder JavaScript.

```
myTrustedGetGlobal = app.trustedFunction ( function()
{
   app.beginPriv();
   var y = global.x;
   return y
   app.endPriv();
});
myTrustedSetGlobal = app.trustedFunction ( function(value)
{
   app.beginPriv();
   global.x=value;
   app.endPriv();
});
```

Another document, docB.pdf can access the global.x variable through the above trusted functions:

```
// Mouse up button action from doc B
console.println("The value of global.x is " + myTrustedGetGlobal());
```

The global can also be set from docB.pdf:

```
// Set global.x from docB.pdf
myTrustedSetGlobal(2);
```

Once global.x has been set from docB.pdf, the origin is changed; docA.pdf cannot access global.x directly unless it is through a trusted function:

```
// Execute a mouse up button action from docA.pdf
console.println("The value of global.x is " + myTrustedGetGlobal());
```

Intercepting keystrokes in an Acrobat form

Create a custom keystroke script (see the Format tab in the Properties dialog box for any text field or combo box) in which you examine the value of event.change. By altering this value, you can alter the user's input as it takes place. See the discussion of the Text fields.

Constructing custom colors

Colors are `Array` objects in which the first item in the array is a string describing the color space (`"T"` for transparent, "G" for grayscale, `"RGB"` for RGB, `"CMYK"` for CMYK) and the following items are numeric values for the respective components of the color space. Hence:

```
color.blue = new Array("RGB", 0, 0, 1);
color.cyan = new Array("CMYK", 1, 0, 0, 0);
```

To make a custom color, just declare an array containing the color-space type and channel values you want to use.

Prompting the user for a response

Use the `response` defined in the `app` object. This method displays a dialog box containing a question and an entry field for the user to reply to the question. (Optionally, the dialog box can have a title or a default value for the answer to the question.) The return value is a string containing the user's response. If the user clicks Cancel, the response is the null object.

```
var dialogTitle = "Please Confirm";
var defaultAnswer = "No.";
var reply = app.response("Did you really mean to type that?",
          dialogTitle, defaultAnswer);
```

Fetching an URL from JavaScript

Use the `getURL` method of the Doc object. This method retrieves the specified URL over the Internet using a GET. If the current document is being viewed inside the browser or Acrobat Web Capture is not available, it uses the Weblink plug-in to retrieve the requested URL.

Creating special rollover effects

You can create special rollover effects using buttons. Create a button with the border and fill colors set to transparent, and place it where you want to detect mouse entry or exit. Then attach scripts to the mouse-enter and/or mouse-exit actions of the field. When the user enters or exists the button region, the JavaScript you created will execute. For example, the following is a mouse enter JavaScript action:

```
console.println("You have entered my secret area");
```

Introduction to XML forms architecture (XFA)

The XML forms architecture (XFA) is an XML-based architecture which supports the production of business form documents through the use of templates based on the XML language. Its features address a variety of workflow needs including dynamic reflow, dynamic actions based on user interaction or automated server events, headers, footers, and complex representations of forms capable of large-scale data processing.

XFA can be understood in terms of two major components: templates and content. The templates define presentation, calculation, and interaction rules, and are based on XML. Content is the static or dynamic data, stored in the document, that is bound to the templates.

Dynamic XFA indicates that the content will be defined later after binding to a template. This also means that the following is possible:

- Form fields may be moved or resized.
- Form fields automatically grow or shrink according to the amount of text added or removed.
- As a form field grows, it can span multiple pages.
- Repeating subforms may be spawned as needed, and page contents shifted accordingly.
- Elements on the page are shown or hidden as needed.

To take advantage of the rich forms functionality offered by the XFA plug-in, use Adobe LiveCycle Designer to create or edit the templates, and save your forms in the XML Data Package format (XDP) or as a PDF document. Use XDP if the data is processed by server applications, and PDF if the data is processed by Acrobat.

Enabling dynamic layout and rendering

In order to enable dynamic layout and rendering for a form, save it from LiveCycle Designer as a dynamic PDF form file.

Growable form fields

The elements, which include Fields, Subforms, Areas, Content Areas, and Exclusion Groups, expand to fit the data they contain. They may relocate in response to changes in the location or extent of their containing elements, or if they flow together with other elements in the same container.

If the element reaches the nominal content region of the containing page, then it splits so that it may be contained across both pages.

Variable-size rows and tables

Subforms may repeat to accommodate incoming data. For example, when importing a variable number of subforms containing entries for name, address, and telephone number, form fields need to be added or removed based on the volume of data. This means that the number of rows in a table may increase.

Multiple customized forms within a form based on user input

Subforms may also be subject to conditions. For example, form fields for dependent children would become visible if the user checks a box indicating that there are dependent children. In addition, XFA allows multiple form fields with the same name and multiple copies of the same form.

Handling image data

Images are handled as data and are considered to have their own field type. There is automatic support for browsing images in all standard raster image formats (including PNG, GIF, TIFF, and JPEG).

Dynamic tooltips

XFA forms support dynamic tooltips, including support for individual radio buttons in a group.

XFA-specific JavaScript methods

JavaScript for Acrobat provides access to the XFA `appModel` container, which provides the properties and methods indicated in the following two tables.

XFA appModel properties

appModel property	Description
`aliasNode`	Returns the node represented by the alias for this model.
`all`	Returns all nodes with the same name or class.
`appModelName`	Returns `xfa.`
`classAll`	Returns all nodes with the same class name.
`classIndex`	Returns the position of this node in the collection of nodes having the same class name.
`className`	Returns the class name of the object.
`context`	Returns the current node (needed for resolveNode and resolveNodes).
`id`	Returns the ID of the current node.
`index`	Returns the position of this node in the collection of nodes having the same name.
`isContainer`	Returns true if this is a container object.
`isNull`	Returns true if the node has a null value.
`model`	Returns the XFA model for this node.
`name`	Returns the name of this node.
`nodes`	Returns a list of child nodes for this node.
`ns`	Returns the namespace for this node (or XFAModel).
`oneOfChild`	Retrieves or sets the child that has the XFA::oneOfChild relationship to its parent.
`parent`	Retrieves the parent of this node.
`somExpression`	Retrieves the SOM expression for this node.
`this`	Retrieves the current node (starting node for resolveNode and resolveNodes).

XFA appModel methods

appModel method	Description
`applyXSL`	Performs an XSL transformation of the current node
`assignNode`	Sets the value of the node, and creates one if necessary
`clearErrorList`	Clears the current list of errors
`clone`	Clones a node (and its subtree if specified)
`createNode`	Creates a new XFA node based on a valid classname
`getAttribute`	Retrieves a specified attribute value
`getElement`	Retrieves a specified property element
`isCompatibleNS`	Determines if two namespaces are equivalent
`isPropertySpecified`	Checks if a specific property has been defined for the node
`loadXML`	Loads and appends the current XML document to the node
`resolveNode`	Obtains the node corresponding to the SOM expression
`resolveNodes`	Obtains the XFATreeList corresponding to the SOM expression
`saveXML`	Saves the current node to a string
`setAttribute`	Sets a specified attribute value
`setElement`	Sets a specified property element

The XFA DOM model contains a root object that consists of either a `treeList` or a `Tree`. A `treeList` consists of a list of nodes (which is why it is sometimes called a NodeList). A `Tree` consists of a hierarchical structure of nodes, each of which may contain content, a model, or a `textNode`.

The following properties and methods are available in a `treeList` object:

Properties:

`length`

Methods:

`append, insert, item, namedItem, remove`

The following properties and methods are available in a `Tree` object:

Properties:

`all, classAll, classIndex, index, name, nodes, parent, somExpression`

Methods:

`resolveNode, resolveNodes`

Each `Node` element represents an element and its children in the XML DOM. To obtain a string representation of the node, invoke its `saveXML` method. To apply an XSL transform (XSLT) to the node and its children, invoke its `applyXSL` method. The following properties and methods are available in a `Node` object:

Properties:

```
id, isContainer, isNull, model, ns, oneOfChild
```

Methods:

```
applyXSL, assignNode, clone, getAttribute, getElement,
isPropertySpecified, loadXML, saveXML, setAttribute, setElement
```

There are two approaches to accessing content in an XML stream. In the first approach, XFA syntax may be used to manipulate the XML DOM. In the second approach, you can use standard XPath syntax.

The `XMLData` object provides two methods useful for manipulating XML documents: `applyXPath` and `parse`.

The `applyXPath` permits the manipulation of an XML document via an XPath, and the `parse` method creates an object representing an XML document tree. Both of these return an `XFA` object.

The first approach involves the usage of the `parse` method of the `XFAData` object for accessing and manipulating XML streams. The second approach involves the usage of the `applyXPath` method of the `XFAData` object.

Both approaches are illustrated below.

In this first example, the usage of the `parse` method is illustrated below. We create our XML data using an Acrobat 8.0 specific feature, E4X (ECMA-357).

```
// Create the XML stream using E4X
var myXML = <purchase>
    <product>
        <price>300</price>
    <name>Media Player</name>
    </product>
    <product>
        <price>49.95</price>
            <name>case</name>
    </product>
</purchase>
// Now convert to a string so we can use XMLData.parse()
var parseString = myXML.toXMLString()

// Now create the DOM
var x = XMLData.parse(parseString);
```

List our data in a human readable form:

```
console.println("----------------------");
for ( var i=0; i<x.nodes.length; i++) {
    y = x.nodes.item(i);
    console.println("Name: " + y.name.value);
    console.println("Price: " + y.price.value);
    console.println("----------------------");
}
```

This is the output to the console:

```
----------------------
```

```
Name: Media Player
Price: 299.00
----------------------
Name: case
Price: 49.95
----------------------
// Change the price of the Media Player
x.nodes.item(0).price.value = "400";
```

Now verify the price has changed by executing the loop listed above. This is the output to the console:

```
----------------------
Name: Media Player
Price: 400
----------------------
Name: case
Price: 49.95
----------------------
```

This next example accomplishes the same task through the `applyXPath` method:

```
// Create the XML stream using E4X
var myXML = <purchase>
  <product>
    <price>300</price>
  <name>Media Player</name>
  </product>
  <product>
    <price>49.95</price>
      <name>case</name>
  </product>
</purchase>
// Now convert to a string so we can use XMLData.parse()
var parseString = myXML.toXMLString()

// Now create the DOM
var x = XMLData.parse(parseString,false);

// Set up the XPath expression
var xPathExpr = "//purchase/product[name='iPod']/price";

// Now get the media player price
var price = XMLData.applyXPath(x, xPathExpr);

// Give the media player price a new price
price.value = "400";
```

JavaScript methods not enabled in XML Forms

The following methods are not available from an XML form:

- `getField`
- `getNthFieldName`
- `addNewField`
- `addField`

- `removeField`
- `setPageTabOrder`

For additional details on the use of JavaScript within XML forms created by LiveCycle Designer, see the document *Converting Acrobat JavaScript for Use in LiveCycle Designer Forms*, available through the Acrobat Developer Center.

ADO support for Windows

You can access both individual and multiple records. Forms can be enabled with ADO support for more direct database interaction.

Detecting XML forms and earlier form types

To determine whether a PDF document is an XML form (static or dynamic) or an Acrobat form, test for the presence of the `xfa` object, then further subclassify using the `dynamicXFAForm` and `XFAForeground` properties of the Doc object.

Example: *Detecting and classifying XML forms in batch*

The following script can be used as a batch sequence to find all PDF documents, from a given collection, that are XML forms documents (created by LiveCycle Designer). The script reports the file name to the console along with its classification as a dynamic or static XML form, or an Acrobat form.

```
// This script assumes you are using Acrobat 8.0.
console.println("Document name: " + this.documentFileName);
// The xfa object is undefined in an Acrobat form.
if ( typeof xfa == "object" ) {
  if ( this.dynamicXFAForm )
    console.println("  This is a dynamic XML form.");
  else
    console.println("  This is a static XML form.");
  if ( this.XFAForeground )
    console.println("  This document has imported artwork");
}
else console.println("  This is an Acrobat Form.");
```

Saving form data as XML or XML Data Package (XDP)

To save your form data in XML format, invoke the `saveAs` method of the Doc object using the conversion ID for XML, as shown in the code below:

```
this.saveAs("myDoc.xml", "com.adobe.acrobat.xml-1-00");
```

To take advantage of XFA functionality, you can save your forms in the XML Data Package format (XDP). This simply requires the usage of the conversion ID for XDP, as shown in the code below:

```
this.saveAs("myDoc.xml", "com.adobe.acrobat.xdp");
```

Global submit

Suppose you have a document that contains multiple attachments, from which you would like to compile information for submission to a server in XML format. You can create a global submit button whose mouse up action contains a script that collects the data from each of the attachments and creates a unified collection in XML format.

To do this, you will need to invoke the Doc object `openDataObject` method in order to open the attachments, followed by its `submitForm` method to upload the combined XML data to the server.

The following example merges the data from several XML form attachments and submits it to a server:

```
var oParent = event.target;

// Get the list of attachments:
var oDataObjects = oParent.dataObjects;
if (oDataObjects == null)
  app.alert("This form has no attachments!");
else {
  // Create the root node for the global submit:
  var oSubmitData = oParent.xfa.dataSets.createNode(
    "dataGroup",
    "globalSubmitRootNode"
  );

  // Iterate through all the attachments:
  var nChildren = oDataObjects.length;
  for (var iChild = 0; iChild < nChildren; i++) {

    // Open the next attachment:
    var oNextChild = oParent.openDataObject(
      oDataObjects[iChild].name
    );
    // Transfer its data to the XML collection:
    oSubmitData.nodes.append(
      oNextChild.xfa.data.nodes.item(0)
    );

    close the attachment//
    oNextChild.closeDoc();
  }

  // Submit the XML data collection to the server
  oParent.submitForm({
    cURL: "http://www.example.com/cgi-bin/thescript.cgi",
    cSubmitAs: "XML",
    oXML: oSubmitData
  });
}
```

Making forms accessible

The accessibility of electronic information is an increasingly important issue. Creating forms that adhere to the accessibility tips below will make your forms usable by all users.

Making a PDF form accessible to users who have impaired motor or visual ability requires that the document be structured, which means that PDF tags present in the document ensure that the content is organized according to a logical structure tree. This means that you will have added tags to the document. Once you do this, you can specify alternative text within the tags.

You can make forms accessible through the use of text-to-speech engines and tagged annotations containing alternative text.

Text-to-speech engines can translate structured text in a PDF document into audible sound, and tagged annotations containing alternative text can provide substitute content for graphical representations, which cannot be read by a screen reader. It is useful to consider embedding alternative text in links and bookmarks, as well as specifying the language of the document.

Text-to-speech

In order for text-to-speech engines to be able to work with your document, it must be structured. You can create structured documents using Adobe FrameMaker® 7.0 or Adobe FrameMaker SGML 6.0 running in structured mode.

To access the text-to-speech engine with JavaScript, use the `TTS` object, which has methods to render text as digital audio and present it in spoken form to the user.

For example, the following code displays a message stating whether the TTS engine is available:

```
console.println("TTS available: " + tts.available);
```

The next code sample illustrates how to enumerate through all available speakers, queue a greeting into the `TTS` object for each one, and present the digital audio version of it to the user:

```
for (var i=0; i < tts.numSpeakers; i++) {
   var cSpeaker = tts.getNthSpeakerName(i);
   console.println("Speaker[" + i + "] = " + cSpeaker);
   tts.speaker = cSpeaker;
   tts.qText("Hello");
   tts.talk();
}
```

The properties and methods of the `TTS` object are summarized in the following two tables, TTS properties and TTS methods, see JavaScript for Acrobat API Reference for more details.

TTS properties

Property	**Description**
`available`	Returns `true` if the text-to-speech engine is available.
`numSpeakers`	Returns the number of speakers in the engine.
`pitch`	The baseline pitch between 0 and 10.
`speaker`	A speaker with desired tone quality.
`speechRate`	The rate in words per minute.
`volume`	The volume between 0 and 10.

TTS methods

Method	Description
`getNthSpeakerName`	Retrieves the Nth speaker in the current text-to-speech engine.
`pause`	Pauses the audio output.
`qSilence`	Queues a period of silence into the text.
`qSound`	Inserts a sound cue using a `.wav` file.
`qText`	Inserts text into the queue.
`reset`	Stops playback, flushes the queue, and resets all text-to-speech properties.
`resume`	Resumes playback on a paused `TTS` object.
`stop`	Stops playback and flushes the queue.
`talk`	Sends queue contents to a text-to-speech engine.

Tagging annotations

Tagged files provide the greatest degree of accessibility, and are associated with a logical structure tree that supports the content. Annotations can be dynamically associated with a new structure tree that is separate from the original content of the document, thus supporting accessibility without modifying the original content. The annotation types supported for accessibility are:

```
Text, FreeText, Line, Square, Circle, Polygon, Polyline, Highlight,
Underline, Squiggly, Strikeout, Stamp, Caret, Ink, Popup, FileAttachment,
Sound
```

To add an accessible tag, select Advanced > Accessibility and choose Add Tags to Document.

Document metadata

The metadata for a document can be specified using File > Properties > Description.

When a document is opened, saved, printed, or closed by a screen reader, the document title is spoken to the user. If the title has not been specified in the document metadata, then the file name is used. Often, file names are abbreviated or changed, so it is advised that the document author specify a title. For example, if a document has a file name of `IRS1040.pdf`, a good document title would be *Form 1040: U.S. Individual Income Tax Return for 2007*.

In addition, third-party screen readers usually read the title in the window title bar. You can specify what appears in the window title bar by using File > Properties > Initial View and in the Window Options, choose to Show either the file name or document title.

Providing all of the additional metadata associated with a document (Author, Subject, Keywords) also makes it more easily searchable using Acrobat Search and Internet search engines.

Short description

Every field that is not hidden must contain a user-friendly name (tooltip). The tooltip is accessible through the UI or through the Field object `userName` property.

The tooltip name is spoken when a user acquires the focus to that field and should give an indication of the field's purpose. For example, if a field is named `name.first`, a good short description would be `First Name`. The name should not depend on the surrounding context. For instance, if both the main section and spouse section of a document contain a `First Name` field, the field in the spouse section might be named `Spouse's First Name`. This description is also displayed as a tooltip when the user positions the mouse over the field.

Setting tab order

In order to traverse the document in a reasonable manner, the tab order for the fields must be set in a logical way. This is important as most users use the tab key to move through the document. For visually impaired users, this is a necessity as they cannot rely on mouse movements or visual cues.

Pressing the tab (shift-tab) key when there is no form field that has the keyboard focus will cause the first (last) field in the tab order on the current page to become active. If there are no form fields on the page then Acrobat will inform the user of this via a speech cue.

Using tab (shift-tab) while a field has the focus tabs forward (backward) in the tab order to the next (previous) field. If the field is the last (first) field on the page and the tab (shift-tab) key is pressed, the focus is set to the first (last) field on the next (previous) page if one exists. If such a field does not exist, then the focus "loops" to the first (last) field on the current page.

Reading order

The reading order of a document is determined by the Tags tree. In order for a form to be used effectively by a visually impaired user, the content and fields of a page must be included in the Tags tree. The Tags tree can also indicate the tab order for the fields on a page.

Using JavaScript to secure forms

As you learned earlier in Signature fields, you can lock any form fields you deem appropriate once a document has been signed. In addition, you can also encrypt a document.

JavaScript provides a number of objects that support security. These are managed by the `security` and `securityHandler` objects for building certificates and signatures, as well as the `certificate`, `directory`, `SignatureInfo`, and `dirConnection` objects which are used to access the user certificates. (The `certificate` object provides read-only access to an X.509 public key certificate).

These objects, in combination, provide you with the means to digitally sign or encrypt a document. Once you have built a list of authorized recipients, you can then encrypt the document using the `encryptForRecipients` method of the Doc object, save the document to commit the encryption, and email it to them.

For example, you can obtain a list of recipients for which the encrypted document is available, and then encrypt the document:

```
// Invoke the recipients dialog box to select which recipients
```

```
  // will be authorized to view the encrypted document:
  var oOptions = {
    bAllowPermGroups: false,
    cNote: "Recipients with email and certificates",
    bRequireEmail: true,
    bUserCert: true
  };
  var oGroups = security.chooseRecipientsDialog(oOptions);

  // Build the mailing list
  var numCerts = oGroups[0].userEntities.length;
  var cMsg = "Encrypted for these recipients:\n";
  var mailList = new Array;
  for (var i=0; i<numCerts; i++) {
    var ue = oGroups[0].userEntities[i];
    var oCert = ue.defaultEncryptCert;
    if (oCert == null) oCert = ue.certificates[0];
    cMsg += oCert.subjectCN + ", " + ue.email + "\n";
    var oRDN = oCert.subjectDN;
    if (ue.email) mailList[i] = ue.email;
    else if (oRDN.e) mailList[i] = oRDN.e;
  }
  // Now encrypt the document
  this.encryptForRecipients(oGroups);
  // Mail the document.
  this.mailDoc({
    cTo: mailList.toString(),
    cSubject: "For your review",
    cMsg: "Please read this before the meeting on Monday."
})
```

The properties and methods of the `security` object are described in the following two tables.

Security properties

Property	Description
`handlers`	Returns an array of security handler names
`validateSignaturesOnOpen`	User preference to be automatically validated when document opens

Security methods

Method	Description
`chooseRecipientsDialog`	Opens a dialog box to choose a list of recipients
`chooseSecurityPolicy`	Displays a dialog box to allow a user to choose from a list of security policies, filtered according to the options.
`exportToFile`	Saves a `Certificate` object to a local disk
`getHandler`	Obtains a security handler object

Method	Description
`getSecurityPolicies`	Returns the list of security policies currently available, filtered according to the options specified.
`importFromFile`	Reads in a `Certificate` object from a local disk

See the JavaScript for Acrobat API Reference for documentation on these properties and methods.

7 Review, Markup, and Approval

In this chapter you will learn how to make use of Acrobat's ability to facilitate online collaborative reviews for many types of content. At the heart of this process is the set of commenting, markup, and approval tools available to the reviewers, and the tools available to the initiator for managing the review.

You can use JavaScript to customize the review process and how comments are handled, to add additional annotations, and to configure a SOAP-based online repository.

For more information about online collaboration, see Acrobat Online Collaboration: Setup and Administration.

Topics	Description
Working with comments using JavaScript	Topics in this section include a discussion of the relationship between the UI name of a comment and its JavaScript counterpart, methods of gathering all comments in a document, and techniques of setting the properties of a comment.
Online collaboration essentials	Discusses encrypting a document for a list of recipients for review, emailing the document for review and customizing the reviewing state model.
Managing comments	Methods of managing comments: gathering and sorting, importing and exporting, and saving to an Excel spreadsheet.
Approving documents using stamps (Japanese workflows)	Describes the Hanko approval workflow, used for Japanese document workflow.

Working with comments using JavaScript

The Commenting toolbar provides reviewers with the tools necessary to create comments, which may be placed in the document in the form of notes, highlighting, and other markup. In this section, you are introduced to the various annotation types from the JavaScript point of view. In Getting annotation data you will learn how to extract content from comments and later, in Setting comment properties, you will learn to set the properties of a comment.

Annotation types

Each annotation has a JavaScript type. In the paragraphs that follow, the relation between each UI name and its corresponding type is delineated.

UI tool name	Type
Sticky Note tool	`Text`
Text Box tool	`FreeText`

UI tool name	Type
Highlight Text tool	`HighLight`
Cross-Out Text tool	`StrikeOut`
Underline Text tool	`Underline`
Stamp tool	`Stamp`
Cloud tool. Polygon tool	`Polygon`
Arrow tool	`Line`
Rectangle tool	`Square`
Pencil Tool	`Ink`
Oval Tool	`Circle`
Attach a File as a Comment tool	`FileAttachment`
Record Audio Comment tool	`Sound`
Polygon Line tool	`PolyLine`

Getting annotation data

There are two methods for getting annotation information present in a document, or a collection of documents. These methods are `getAnnot` and `getAnnots` of the Doc object.

The `getAnnot` method returns an Annotation object, an object that holds all data of the annotation. This method takes two parameters, `nPage` (page number) and `cName` (the name of the annot). For example,

```
var a = this.getAnnot({ nPage: 2, cName: "myAnnot" });
if ( a != null ) {
  console.println("This annot has type " + a.type);
  if ( (a.type != "FileAttachment") || (a.type != "Sound") )
    console.println("The comment of this annot is " + a.contents);
}
```

When the user makes a comment using the UI, the name of the comment is randomly assigned. As a consequence, unless the annotation is created with the `addAnnot` method, in which the name of the annot can be assigned at the time of creation, the name is not typically known to the developer.

In normal workflows, the problem is to gather all comments in a document and process them in some way. The tool for doing this is `getAnnots`. The method returns an array of Annotation objects based on the search parameters, all of which are optional:

`nPage` - The page number to search for annotations, if not provided, the whole document is searched.

`nSortBy` - The method used to sort the search results, these include page, author, and modification date.

`bReverse` - If true, the array is reverse-sorted.

`nFilterBy` - Get anntotations satisfying certain criteria, such as getting only those annotations that can be printed, that can be viewed, or that can be edited.

Additional discussion can be found in "Sorting comments" on page 120. See the *JavaScript for Acrobat API Reference* for full descriptions of these parameters.

The following code retrieves all annotations in the document, and sorts them by author name:

```
var annots = this.getAnnots({
    nSortBy: ANSB_Author
});
console.println("\nAnnot Report for document: " + this.documentFileName);
if ( annots != null ) {
    console.show();
    console.println("Number of Annotations: " + annots.length);
    var msg = " %s in a %s annot said: \"%s\"";
    for (var i = 0; i < annots.length; i++)
    console.println(util.printf(msg, annots[i].author, annots[i].type,
    annots[i].contents));
} else
    console.println(" No annotations in this document.");
```

Adding comments with JavaScript

You can include a text box comment in a document and control its border, background color, alignment, font, and size characteristic. To create a `Square` type annotation, such as one created by the Rectangle tool in the UI, use the Document method `addAnnot` as follows:

```
this.addAnnot({
    page: 0,
    type: "Square",
    rect: [0,0,100,100],
    name: "OnMarketShare",
    author: "A.C. Robat",
    contents: "This section needs revision"
});
```

Refer to the JavaScript for Acrobat API Reference for full descriptions of the properties specified above.

All annotations can be constructed in this way, in the case of sound and file attachment annotations, there is no JavaScript method for associating a recording with a sound annotation or a file with a file attachment.

Setting comment properties

To set the properties of a comment, create an object literal containing the properties to be applied to your comment. Then apply the properties to your annotation:

```
// Create the common properties in an object literal:
var myProps = {
  strokeColor: color.red,
  popupOpen: true,
  arrowBegin: "Diamond",
  arrowEnd: "OpenArrow"
};

// Assign the common properties to a previously created annot:
myAnnot.setProps(myProps);
```

The object literal, `myProps`, can be used again to change the properties of a collection of annotations, perhaps ones returned by the `getAnnots`, as discussed in "Getting annotation data" on page 112.

Online collaboration essentials

You can initiate several types of review workflows for PDF documents:

- Email the document to all reviewers, and import the returned comments into the original document.
- Set up an automated email-based review.
- Set up an automated browser-based review through the use of a shared server.
- Initiate an email-based approval workflow.
- Initiate an JavaScript-based review.

Online collaboration essentials topics

- Reviewing documents with additional usage rights
- Emailing PDF documents
- JavaScript-based collaboration driver
- Spell-checking in comments and forms
- Approval

Reviewing documents with additional usage rights

For email-based reviews, the specification of additional usage rights within a document enables extra capabilities within Adobe Reader. This enables the reviewer to add comments, import and export form-related content, save the document, or apply a digital signature.

For example, when using the Doc object `encryptForRecipients` method, you can specify the following permissions for reviewers:

`allowAll` — Permits full and unrestricted access to the entire document.

`allowAccessibility` — Permits content accessed for readers with visual or motor impairments.

`allowContentExtraction` — Permits content copying and extraction.

`allowChanges` — Permits either no changes, or changes to part or all of the document assembly, content, forms, signatures, and notes.

`allowPrinting` — Permits no printing, low-quality printing, or high-quality printing.

The following code allows full and unrestricted access to the entire document for one set of users (`importantUsers`), and allows high quality printing for another set of users (`otherUsers`):

```
var sh = security.getHandler("Adobe.PPKMS");
var dir = sh.directories[0];
var dc = dir.connect();
dc.setOutputFields({oFields:["certificates","email"]});
var importantUsers = dc.search({oParams:{lastName:"Smith"}});
var otherUsers = dc.search({oParams:{lastName:"Jones"}});
this.encryptForRecipients({
  oGroups:[
    {
      userEntities: importantUsers,
      permissions: { allowAll: true }
    },
    {
      userEntities: otherUsers,
      permissions: { allowPrinting: "highQuality" }
    }
  ],
  bMetaData: true
});
eMailList = "";
for ( var i=0; i < importantUsers.length; i++)
  eMailList +=  (importantUsers[i].email + ",");
for ( var i=0; i<otherUsers.length; i++)
  eMailList +=  (otherUsers[i].email + ",");
// Now email the secured document.
this.mailDoc({
  cTo: eMailList,
  cSubject: "For your eyes only",
  cMsg: "Please review for the meeting on Friday."
})
```

Emailing PDF documents

In addition to the email options available in the Acrobat menu and toolbar, it is also possible to use JavaScript to set up an automated email review workflow. This may be done through the Doc object `mailDoc` method. In the code shown below, the document is automatically sent to `recipient@example.com`:

```
this.mailDoc({
  bUI: false,
  cTo: "recipient@example.com",
  cSubject: "Review",
  cMsg: "Please review this document and return. Thank you."
});
```

Note: For Windows systems, the default mail program must be MAPI-enabled.

JavaScript-based collaboration driver

JavaScript can be used to describe the workflow for a given document review, and can be used in review management. This is done by specifying a state model for the types of annotations a reviewer may use and creating an annotation store on the server for customized comment and review within browser-based workflows. The `Collab` object provides you with control over the possible states annotation objects may have, and may be used in conjunction with the `SOAP` object to create an annotation store.

There are several methods available within the `Collab` object that enable you to describe the state model for the review: these include `addStateModel`, `getStateInModel`, `transitionToState`, and `removeStateModel`.

The `addStateModel` method is used to add a new state model to Acrobat describing the possible states for an `annot` object using the model, and the `removeStateModel` method removes the model, though it does not affect previously created `annot` objects. Their usage is shown in the code below:

```
// Add a state model, this script can be placed at the folder level to
// install a custom state model for enterprise users, for example.
try{
  var myStates = new Object;
  myStates["initial"] = {cUIName: "Haven’t reviewed it"};
  myStates["approved"] = {cUIName: "I approve"};
  myStates["rejected"] = {cUIName: "Forget it"};
  myStates["resubmit"] = {cUIName: "Make some changes"};
  Collab.addStateModel({
    cName: "ReviewStates",
    cUIName: "My Review",
    oStates: myStates,
    cDefault: "initial"
  });
}
catch(e){console.println(e);}

// Now transition all annots to the "rejected" state.
var myAnnots = this.getAnnots();
for ( var i=0; i<myAnnots.length; i++ )
  myAnnots[i].transitionToState("ReviewStates", "rejected");

// Now remove the state model.
try {Collab.removeStateModel("ReviewStates");}
catch(e){console.println(e);}
```

You can also use the `SOAP` object’s `connect`, `request`, and `response` methods to create customized commenting and review within browser-based workflows. You can do this by setting up a SOAP-based annotation store on the server using the `Collab` object’s `addAnnotStore` and `setStoreSettings` methods.

The `Collab` object's `addAnnotStore` method requires three parameters:

`cIntName` — The internal name for the annotation store.

`cDispName` — The display name for the annotation store.

`cStore` — The definition for the new `Collab` store class.

The new `Collab` store class must contain the following definitions for the functions used to add, delete, update, and enumerate through the array of annotations:

`enumerate` — Communicates with the web service to request the array of annotations stored on the server. It is used when the PDF document is loaded for online review, or when the user clicks Upload or Send on the Commenting toolbar.

`complete` — Passes the annotation data to the collaboration server so that it can be updated.

`update` — Uploads new and modified annotations to the server.

The class `SDKSampleSOAPAnnotStore`, as shown in the sample code below, is defined in `sdkSOAPCollabSample.js` in the Acrobat SDK, and contains complete definitions of the three functions described above.

The sample code below provides a standard example of how to use the `SOAP` and `Collab` objects to customize your online collaborative review. Note that all of the reviewers must have a copy of the JavaScript collaboration store code. In Acrobat 7.0 and later, the `Custom` collaboration store type allows you to put the JavaScript on the server. The store type used is `CUSTOM`, and the setting is a URL to the JavaScript file:

```
// Here is the URL for a SOAP HTTP service:
var mySetting = "http://sampleSite/comments.asmx?WSDL";

// Here is the internal name for the collaborative store:
var myType = "mySOAPCollabSample";

// Set the connection settings for the SOAP collab store:
Collab.setStoreSettings(mySetting, myType);

// Set the default collab store:
Collab.defaultStore = myType;

// Add the collab store to the Acrobat Collab servers:
if (typeof SOAPFileSys == "undefined")
  Collab.addAnnotStore(
    myType,
    "SOAP Sample",
    {
      // Annot store instantiation function is required:
      create: function(doc, user, settings)
      {
        if (settings && settings != "")
          return new SDKSampleSOAPAnnotStore(
            doc, user, settings
          );
        else
          return null;
      }
    }
  );
```

Spell-checking in comments and forms

You can check the spelling of any word using the `spell` object' `checkWord` method. This can be applied to any form field or annotation. First retrieve the contents, and submit each word to the method.

Setting spelling preferences

To set the dictionary order, first retrieve the array of dictionaries using the Doc object's `spellDictionaryOrder` property. Then modify the order of the array entries, and assign the array to the same property. An array of currently available dictionaries can be obtained using the `spell` object's `dictionaryNames` property.

To set the language order, perform a similar algorithm using the Doc object's `spellLanguageOrder` property. An array of currently available dictionaries can be obtained using the `spell` object's `languages` property.

Adding words to a dictionary

You can add words to a dictionary by invoking the `spell` object's `addWord` method, as shown in the code sample below:

```
spell.addWord(myDictionary, "myNewWord");
```

Approval

Approval workflows may include an automated process in which a PDF document is automatically sent via email to a recipient for their approval. For example, this may be accomplished through the usage of the Doc object's `mailDoc` method. The user may then use a standard approval stamp, use a custom stamp, or use a Hanko stamp to create a secure digital signature.

Managing comments

In this section, you will look in a more detailed way at the method of managing the comments in a document. The topics covered are:

- Selecting, moving, and deleting comments
- Using the comments list
- Exporting and importing comments
- Comparing comments in two PDF documents
- Aggregating comments for use in Excel
- Extracting comments in a batch process

Selecting, moving, and deleting comments

Just as you can access the Comments List in the Acrobat user interface, you can likewise do so through using the `syncAnnotScan` and `getAnnots` methods of the Doc object. The `syncAnnotScan` method guarantees that all annotations in the document are scanned, and the `getAnnots` method returns a list of annotations satisfying specified criteria.

For example, the following code scans all the annotations on page 2 of the document and captures them all in the variable `myAnnotList`:

```
this.syncAnnotScan();
var myAnnotList = this.getAnnots({nPage: 1}); // Zero-based page number
```

To move a comment, use the corresponding `setProps` method of the Annotation object to specify a new location or page. To delete the comment, invoke the corresponding `destroy` method of the Annotation object. In the code sample below, all the free text comments on page 2 of the document are deleted:

```
for (var i=0; i<myAnnotList.length; i++)
  if (myAnnotList[i].type == "FreeText")
    myAnnotList[i].destroy();
```

Using the comments list

Once you have acquired the comments list through the `syncAnnotScan` and `getAnnots` methods of the Doc object, you can change their status, appearance, order, and visibility. In addition, you will be able to search for comments having certain characteristics.

Changing the status of comments

To change the status of a comment, invoke the corresponding `transitionToState` method of the Annotation object, as shown in the code below:

```
// Transition myAnnot to the "approved" state:
myAnnot.transitionToState("ReviewStates", "approved");
```

The code above assumes `myAnnot` is an Annotation object of the document.

Changing the appearance of comments

You can change the appearance of a comment in a variety of ways. In general, the appearance of any comment may be changed by invoking the `setProps` method of the Annotation object, as shown in the code below:

```
myAnnot.setProps({
  page: 0,
  points: [[10,40], [200,200]],
  strokeColor: color.red,
  popupOpen: true,
  popupRect: [200,100,400,200],
  arrowBegin: "Diamond",
  arrowEnd: "OpenArrow"
});
```

Sorting comments

To sort comments, use `getAnnots` method of the Doc object and specify a value for the `nSortBy` parameter. Permissible values of `nSortBy` are

`ANSB_None` — Do not sort.

`ANSB_Page` — Sort by page number.

`ANSB_Author` — Sort by author.

`ANSB_ModDate` — Sort by modification date.

`ANSB_Type` — Sort by annotation type.

In addition, you can specify that the sorting be performed in reverse order by submitting the optional `bReverse` parameter to the method.

The code sample given below shows how to obtain a list of comments from page 2 of the document, sorted in reverse order by author:

```
this.syncAnnotScan();
var myAnnotList = this.getAnnots({
    nPage: 2,
    nSortBy: ANSB_Author,
    bReverse: true
});
```

Showing and hiding comments

To show or hide a comment, set its corresponding `hidden` property of the Annotation object. For example, the following code hides `myAnnot`:

```
myAnnot.hidden = true;
```

Exporting and importing comments

To export all the comments in a file, invoke the `exportAsFDF` or `exportAsXFDF` methods of the Doc object. In both cases, set the `bAnnotations` parameter to `true`, as shown in the code sample below, which exports only the comments and nothing else:

```
this.exportAsFDF({bAnnotations: true});
```

To import comments from an FDF or XFDF into a file, invoke the `importAnFDF` or `importAnXFDF` methods of the Doc object.

Aggregating comments for use in Excel

The `createDataObject` method of the Doc object may be used to create a tab-delimited text file, which can then be used in Excel. To aggregate comments for use in Excel, collect all the comments using the `getAnnots` method, iterate through them and store them into a tab-delimited string, create a text file attachment object using the `createDataObject` method of the Doc object, pass the string to the `cValue` parameter in the `createDataObject` method, and optionally, save the attachment to the local hard drive using `exportDataObject`. Below is a sample script which follows the above outline:

```
var annots = this.getAnnots();
var cMyC = "Name\tPage\tComment";
for ( var i=0; i<annots.length; i++ )
```

```
        cMyC += ("\n"+annots[i].author + "\t" + annots[i].page + "\t\""
          + annots[i].contents+"\"");

    this.createDataObject({cName: "myCommentList.xls", cValue: cMyC});
    this.exportDataObject({cName: "myCommentList.xls", nLaunch: 1});
```

Comparing comments in two PDF documents

While the Acrobat user interface provides you with a menu choice for comparing two documents, it is possible to customize your comparisons using JavaScript. To gain access to multiple documents, invoke the app object's openDoc method for each document you would like to analyze. Each Doc object exposes the contents of each document, such as an array of annotations. You can then compare and report any information using customized algorithms. For example, the code below reports how many annotations exist in the two documents:

```
var doc2 = app.openDoc("/C/secondDoc.pdf");
var annotsDoc1 = this.getAnnots();
var annotsDoc2 = doc2.getAnnots();
console.println("Doc 1: " + annotsDoc1.length + " annots.");
console.println("Doc 2: " + annotsDoc2.length + " annots.");
```

The above code will work if executed in the console. If executed from a non-privileged context, the secondDoc.pdf must be disclosed for app.openDoc to return its Doc object. Disclosed means that the code this.disclosed=true is executed when the document is opened, either as an open page action, or as part of a top level execution of document scripts. See the documentation of app.openDoc in the JavaScript for Acrobat API Reference for details.

Extracting comments in a batch process

In a batch process, you can open any number of Doc objects using the app object openDoc method. For each open document, you can invoke its corresponding Doc object getAnnots method to collect the comments in that file. If you would like to put all the comments together in one file, you can do so by creating a new document and saving the various arrays of comments into that new file.

Batch Sequences includes a sequence called Comments to Tab-Delimited File. This sequence uses the techniques described in the previous paragraph.

Approving documents using stamps (Japanese workflows)

Approval workflows are similar to other email-based collaborative reviews, and provide you with the ability to set the order in which participants are contacted. This means that, based on the approval issued by a participant, the document can be mailed to the next participant, and an email can be sent to the initiator.

Setting up a Hanko approval workflow

A registered Hanko is a stamp used in Japanese document workflows, and can be used to sign official contracts. Every registered hanko is unique and is considered a legal form of identification.

A personal Hanko is not registered, and is used for more common types of signatures, such as those used in meeting notes or budget proposals. Everyone in an organization who is involved in a document review must add their Hanko to the document in order for it to gain final approval.

Acrobat provides an assistant to help you set up an approval workflow. You can customize your workflow as well, by adding form fields to the document containing recipient lists to be chosen by the participant. This way, in case there are multiple directions for a given branch in the workflow, the participant may invoke automated functions that send the document to the correct participants, as well as an email to the initiator containing a record of activity.

You can use JavaScript to automate various steps within the workflow by sending the document and other information by email using the `Doc.mailDoc` method.

Participating in a Hanko approval workflow

A participant receives an email with instructions for opening the document and completing their portion of the approval process. As noted above, this can be customized and automated through the use of form fields if the workflow is complex.

A Hanko stamp is a commenting tool used in approval workflows, and an Inkan stamp is a unique image that can represent an individual's identity and can be used in place of a signature. Both are created, customized, and managed through the Acrobat user interface.

In order to use a Hanko or Inkan stamp, you will need to create a custom stamp and add digital signature information. Once the stamp has been created, you can apply it in your workflows.

Installing and customizing Hanko stamps

Creating custom Hanko stamp information involves the combination of user information and a digital signature. Once you have set this up, it can be saved in a PDF file which is stored in the Stamps folder.

Creating custom Inkan stamps

To create an Inkan stamp, add your name, title, department, and company, choose a layout, and provide a name to use for the stamp. You can also import a PDF form to add customized features and additional fields containing personal information. In addition, it is possible to add secure digital signature information to an Inkan stamp.

Deleting custom stamps

You can delete any Hanko and Inkan stamps that you created, though it is not possible to delete any of the predefined stamps in the Stamps palette.

8 Working with Digital Media in PDF Documents

In this chapter you will learn how to use JavaScript to extend Acrobat's ability to integrate digital media into PDF documents. You will learn how to set up, control, and customize properties and preferences for media players and monitors, how to integrate movie and sound clips into your documents, and how to add, edit, and control the settings for their renditions.

Topics	Description
Media players: control, settings, renditions, and events	Lists the basic objects used in creating a multimedia document.
Monitors	For systems with multiple monitors, this section describes how to select which monitor is best suited for the media event.
Integrating media into documents	The techniques use to play media clips, in a screen annotation, as a floating window, or in full screen.
Setting multimedia preferences	A brief discussion of multimedia preferences.

Media players: control, settings, renditions, and events

There are several objects that provide you with the means to customize the control, settings, renditions, and events related to media players. These are shown in the following table.

Media player objects

Object	Description
`app.media`	Primary object for media control, settings, and renditions.
`MediaOffset`	Time or frame position within a media clip.
`Event`	A multimedia event fired by a `Rendition` object.
`Events`	A collection of multimedia event objects.
`MediaPlayer`	An instance of a multimedia player.
`Marker`	A location representing a frame or time value in a media clip.
`Markers`	All the markers in the currently loaded media clip.
`MediaReject`	Error information when a `Rendition` object is rejected.
`MediaSelection`	A media selection object used to create the `MediaSettings` object.
`MediaSettings`	An object containing settings used to create a `MediaPlayer` object.
`Monitor`	A display monitor used for playback.

Object	Description
Monitors	An array of display monitors connected to the user’s system.
PlayerInfo	An available media player.
PlayerInfoList	An array of PlayerInfo objects.
Rendition	Information needed to play a media clip.
ScreenAnnot	A display area used for media playback.

Accessing a list of active players

To obtain a list of available players, call the getPlayers method of the app.media object, which accepts an optional parameter specifying the MIME type and returns a PlayerInfoList object. The PlayerInfoList object is an array of PlayerInfo objects that can be filtered using its select method.

The following code sample shows how to obtain a list of all available players:

```
var mp = app.media.getPlayers();
```

The following code sample shows how to obtain a list of all available MP3 players and print them to the console:

```
var mp = app.media.getPlayers("audio/MP3");
for (var i = 0; i < mp.length; i++) {
  console.println("\nmp[" + i + "] Properties");
  for (var p in mp[i])
    console.println(p + ": " + mp[i][p]);
}
```

To filter the list of players using the select method of the PlayerInfoList object, you can supply an optional object parameter which can contain any combination of id, name, and version properties, each of which may be either a string or a regular expression. For example, the following code obtains the QuickTime media player:

```
var mp = app.media.getPlayers().select({id: /quicktime/i});
```

In addition, the getOpenPlayers method of the doc.media object returns an array of all currently open MediaPlayer objects. With this array, you can stop or close all players, and manipulate any subset of the open players. The following example stops all running players in the document:

```
var players = doc.media.getOpenPlayers(oDoc);
for (var i in players) players[i].stop();
```

Specifying playback settings

You can obtain and adjust the media settings offered by a player. To do this, invoke the getPlaySettings method of the Rendition object, which returns a MediaSettings object, as shown in the code below:

```
var settings = myRendition.getPlaySettings();
```

In addition to the `app.media` properties and methods, a `MediaSettings` object, which is used to create a `MediaPlayer` object, contains many properties related to the functional capabilities of players. These are described in the following table.

MediaSettings object properties

Property	Description
`autoPlay`	Determines whether to play the media clip automatically when the player is opened.
`baseURL`	Resolves any relative URLs used in the media clip.
`bgColor`	Specifies the background color for the media player window.
`bgOpacity`	Specifies the background opacity for the media player window.
`endAt`	Defines the ending time or frame for playback.
`data`	The contents of the media clip (`MediaData` object).
`duration`	The number of seconds required for playback.
`floating`	An object containing the location and size properties of a floating window used for playback.
`layout`	A value indicating whether and how the content should be resized to fit the window.
`monitor`	Defines the rectangle containing the display monitor used for playback.
`monitorType`	The category of display monitor used for playback (such as primary, secondary, best color depth, etc.)
`page`	The document page number used in case a docked media player is used.
`palindrome`	Indicates that the media can play from beginning to end, and then in reverse from the end to the beginning.
`players`	The list of available players for this rendition.
`rate`	The playback speed.
`repeat`	The number of times the playback repeats.
`showUI`	Indicates whether the media player controls will be visible.
`startAt`	Defines the starting time or frame for playback.
`visible`	Indicates whether the media player will be visible.
`volume`	The playback volume.
`windowType`	An enumeration obtained from `App.media.WindowType` indicating whether the media player window will be docked or floating.

The example that follows illustrates the use of these properties to control how the media file is played. Other examples can be found in "Integrating media into documents" on page 127, as well as in the *JavaScript for Acrobat API Reference*.

Example: *Customizing the number of repetitions for playback*

This minimal example is a custom script from the Actions tab in the Multimedia Properties panel of a screen annotation. To override the parameters specified by the UI of the screen annotation, the args parameter is passed.

```
// Obtain the MediaSettings object, and store its repeat value
var nRepeat = event.action.rendition.getPlaySettings().repeat;

nRepeat =(nRepeat == 1) ? 2 : 1;

// Set the new repeat value when opening the media player
var args = { settings: {repeat: nRepeat} };
app.media.openPlayer(args);
```

Monitors

The `Monitors` object is a read-only array of `Monitor` objects, each of which represents a display monitor connected to the user's system. It is available as a property of the `app` object, and you can write customized JavaScript code to iterate through this array to obtain information about the available monitors and select one for a full-screen or popup media player.

It is possible to apply filtering criteria to select a monitor. For example, you can select the monitor with the best color, or if there are multiple instances, additionally select the monitor with the greatest color depth. These criteria are methods of the `Monitor` object, and are listed in the following table.

Monitors filter criteria methods

Method	Description
`bestColor`	Returns the monitors with the greatest color depth.
`bestFit`	Returns the smallest monitors with minimum specified dimensions.
`desktop`	Creates a new monitor representing the entire virtual desktop.
`document`	Returns the monitors containing the greatest amount of the document.
`filter`	Returns the monitors having the highest rank according to a ranking function supplied as a parameter.
`largest`	Returns the monitors with the greatest area in pixels.
`leastOverlap`	Returns the monitors overlapping the least with a given rectangle.
`mostOverlap`	Returns the monitors overlapping the most with a given rectangle.
`nonDocument`	Returns the monitors displaying the least amount (or none) of the document.
`primary`	Returns the primary monitor.

Method	Description
`secondary`	Returns all monitors except for the primary one.
`select`	Returns monitors filtered by monitor type.
`tallest`	Returns the monitors with the greatest height in pixels.
`widest`	Returns the monitors with the greatest width in pixels.

In addition to the capabilities within the `Monitors` object, the `Monitor` object provides the properties shown in the following table.

Monitor object properties

Property	Description
`colorDepth`	The color depth of the monitor in bits per pixel.
`isPrimary`	Returns `true` if the monitor is the primary one.
`rect`	The boundaries of the monitor in virtual desktop coordinates.
`workRect`	The monitor's workspace boundaries in virtual desktop coordinates.

The example below illustrates how to obtain the primary monitor and check its color depth:

```
var monitors = app.monitors.primary();
if (monitors.length > 0)
  console.println("Color depth: " + monitors[0].colorDepth);
```

The next example illustrates how to obtain the monitor with the greatest color depth, with a minimum specified depth of 24:

```
var monitors = app.monitors.bestColor(24);
if (monitors.length > 0)
  console.println("Found the best color depth over 24!");
```

The next example illustrates how to obtain the monitor with the greatest width in pixels, and determines whether it is the primary monitor:

```
var monitors = app.monitors.widest();
var isIsNot = (monitors[0].isPrimary) ? " is " : " is not ";
console.println("Widest monitor" + isIsNot + "the primary.");
```

Integrating media into documents

You can integrate media into documents, which can be played in either a screen annotation, a floating window, or in full screen mode. Media can be embedded in the document itself through the UI, played from the local hard drive, or played from an external URL. There are no JavaScript methods for embedding a movie or sound clip into the document.

When a movie or sound clip is played, there is a default behavior. For a movie, the user clicks on a screen annotation to start the movie. A customized behavior can be developed for when the user clicks the screen annotation or a form button. (The mechanism for activating a clip is not restricted to clicking the screen annotation or a button, for example such events can be activated from a bookmark action or a page open action.)

➤ To embed a movie or sound file in a document

1. Open a document and change to the page on which you wish to place a screen annotation.
2. Display the Editing toolbar by selecting **View** > **Toolbars > Advanced Editing**.
3. Select either the **Movie** tool or the **Sound** tool from the Advanced Editing toolbar, as appropriate.
4. Marquee-select the desired movie screen area for your sound.
5. In the Add Movie or Add Sound dialog box, click the **Browse** button and browse for your media file.
6. From the toolbar, select the **Hand** tool, and click the screen annotation. The media file will play. This is the default behavior of a new screen annotation.

Select the Object tool on the Editing toolbar and double click on your screen annotation to bring up the Multimedia Properties dialog box. The dialog box has three tabs, Settings, Appearance and Actions. See Acrobat help for detailed descriptions of these tabs.

The Actions tab of the Multimedia Properties dialog box is the same as that for any Acrobat form field. Of particular interest are the Play Media (Acrobat 6 or Later Compatible) and the Run a JavaScript actions. These are extensively discussed below.

Select the Object tool from the Editing tool bar and double click on the screen annotation to bring up the Multimedia Properties dialog box again, and choose the Actions tab. Note that in the Actions window, a Mouse Up trigger is listed, and the action is "Play Media (Acrobat 6 or Later Compatible)". Highlight the Action, click the Edit button below. You now see the "Play Media (Acrobat 6 or Later Compatible)" dialog box. At the top of this dialog box there is a menu "Operation to Perform". The operations are

- Play
- Stop
- Pause
- Resume
- Play from beginning
- Custom JavaScript

The operation should be set to Play from Beginning, the default operation for a new screen annotation. The other operations of Play, Stop, Pause, and Resume can be used with buttons so that the user can pause and resume the media clip.

In this chapter, however, we are most interested in the Custom JavaScript option, and you will learn how to play a media clip and to add event listeners.

When using a button to play a media clip, there are two possible actions to be selected from the Button Properties dialog box.

- Play Media (Acrobat 6 or Later Compatible)
- Run a JavaScript

In the first case, a media clip can be played by setting the UI to play the selected clip, or by executing a custom JavaScript the rendition to be used. In second case, that of Run a JavaScript, is used when setting the action of a form field, such as a button. Both these cases are discussed in the paragraphs that follow.

Controlling multimedia through a rendition action

In this section, you will learn how to write JavaScript to play a media clip from a screen annotation in the context of a *rendition action*.

➤ To control the Play Media option using a JavaScript rendition action

1. Create a screen annotation by embedding a movie into your document, as described on "To embed a movie or sound file in a document" on page 128.

2. In the Actions tab of the Multimedia Properties dialog box, click **Play Media (Acrobat 6 or Later Compatible)** for a mouse up trigger, and click the **Edit** button.

3. In the Play Media (Acrobat 6 or Later Compatible) dialog box, select **Custom JavaScript** from the Operations to Perform menu, and click the **Specify JavaScript** button.

4. In the Select Rendition dialog box, choose the rendition you want to control, and click **Next**. The JavaScript editor appears with the following text:

```
/* var player = */ app.media.openPlayer({
  /* events, settings, etc. */
});
```

This is a rough template for starting your clip, the text suggests that you can define events and settings. Custom JavaScript like this is referred to as a *rendition action*.

A minimal example for playing the clip is

```
app.media.openPlayer();
```

Close all dialog boxes and select the Hand tool. The movie plays when you click the screen annotation.

Additional examples follow.

Example: *Running openPlayer with settings and events as a rendition action*

For a rendition action, the `event` object carries certain multimedia specific information, for example, `event.action.annot` is the annotation object to be used to play the media, and `event.action.rendition` is the rendition to be played. In this example, we set the number of times this media is to play to three, and we install some event listeners.

```
// Get the rendition.
var rendition = event.action.rendition;
// Get the play settings for this rendition
var settings = rendition.getPlaySettings();
// Change the repeat property to 3.
settings.repeat = 3;

// Create some event listeners for this action.
var events = new app.media.Events(
{
  onPlay: function() { console.println( "Playing..." ); },
  onClose: function() { console.println( "Closing..." ); },
});

// Set these into an args object, with property names expected by
//openPlayer.
args = { events: events, settings: settings };
// Play the media with specified argument.
app.media.openPlayer(args);
```

The `app.media.openPlayer` method calls `app.media.createPlayer`, then calls the method `MediaPlayer.open`, which, by default, begins playback of the media. In the next example, the `createPlayer` method is used, and playback is delayed to add in some listener events. Compare the techniques of the previous example with the next.

Example: *Play a clip in full screen*

The script below is for a rendition action. The movie clip is played in full screen with the UI controls visible. An event listener is added that causes an alert box to appear when the clip is closed.

```
// Get the rendition chosen in a Select Rendition dialog box.
// We need the rendition to change its settings.
var rendition = event.action.rendition;
// Get the play settings for this rendition
var settings = rendition.getPlaySettings();
// Make the window type to be full screen.
settings.windowType=app.media.windowType.fullScreen;
// Play the clip only once.
settings.repeat = 1;
// Show the UI of the player
settings.showUI = true;
// Form an args object to pass to createPlayer.
var args = { settings: settings };

// Get the returned MediaPlayer object
var player = app.media.createPlayer(args);
// Use the MediaPlayer object to add an onClose event.
player.events.add({ onClose: function() {
  app.alert("That's the end of the clip. Any questions?")
} });
// Now, open the player, which begins playback, provided
// player.settings.autoPlay is true (the default). If
// player.settings.autoPlay is false, we would have to
// use player.play();
player.open()
```

Controlling multimedia with a Run a JavaScript action

Controlling a multimedia clip with a Run a JavaScript action is similar to a rendition action, except the multimedia events, `event.action.rendition` and `event.action.annot`, are not defined. The rendition and screen annotation need to be specified, and passed as part of the argument to the `openPlayer` or `createPlayer` method.

When working with a Run a JavaScript action, the methods `app.media.getAnnot` and `app.media.getAnnots` are fundamental for acquiring a particular screen annotation or an array of screen annotations; the method `app.media.getRendition` is used to get the rendition of the selected clip. Some of these methods are illustrated by the following example.

Example: *Playing a rendition in a screen annotation from a form button*

This script is for a Run a JavaScript action of a form button. It gets a media clip and plays it in a screen annotation.

```
// Get the screen annotation with a title of myScreen
var annot= this.media.getAnnot
   ({ nPage: 0,cAnnotTitle: "myScreen" });
// Get the rendition present in this document with a rendition name of
// myClip
var rendition = this.media.getRendition("myClip");
// Get the set of default settings for this rendition.
var settings = rendition.getPlaySettings();
// Play the clip in a docked window.
settings.windowType=app.media.windowType.docked;
// Set the arguments to be passed to openPlayer, the rendition, the
//annotation and the settings.
var args = {
   rendition: rendition,
   annot: annot,
   settings: settings
};
// Open the the media player and play.
app.media.openPlayer( args );
```

The above example assumes that `myClip` is embedded in the document. In the next two examples, techniques for playing media from the local hard drive and from a URL are illustrated.

Example: *Playing a media clip from a URL*

This example references a media clip on the Internet and plays it in a floating window.

```
var myURLClip = "http://www.example.com/myClips/myClip.mpg";
var args = {
   URL: myURLClip,
   mimeType: "video/x-mpg",
   doc: this,
   settings:
   {
      players: app.media.getPlayers("video/x-mpg"),
      windowType: app.media.windowType.floating,
      data: app.media.getURLData( myURLClip,"video/x-mpg" ),
      floating: { height: 400, width: 600 }
   }
}
var settings = app.media.getURLSettings(args)
args.settings = settings;
app.media.openPlayer(args);
```

Here is the same example with the media on the local hard drive.

Example: ***Playing a media clip from a file***

The problem with playing a file from the local hard drive is locating it. This example assumes the media clip is in the same folder as the document.

```
// Get the path to the current folder.
var folderPath = /.*\//i.exec(this.URL);
// Form the path to the clip.
var myURLClip = folderPath+"/myClip.mpg";
var args = {
  URL: myURLClip,
  mimeType: "video/x-mpg",
  doc: this,
  settings:
  {
    players: app.media.getPlayers("video/x-mpg"),
    windowType: app.media.windowType.floating,
    data: app.media.getURLData( myURLClip,"video/x-mpg" ),
    floating: { height: 400, width: 600 }
  }
}
var settings = app.media.getURLSettings(args)
args.settings = settings;
app.media.openPlayer(args);
```

Playing sound clips is handled in the same way, as the following example shows.

Example: ***Playing a sound clip from a URL.***

```
var myURLClip = "http://www.example.com/myClips/dream.mp3";
var args = {
  URL: myURLClip,
  mimeType: "audio/mp3",
  doc: this,
  settings: {
    players: app.media.getPlayers("audio/mp3"),
    windowType: app.media.windowType.floating,
    floating: {height: 72, width: 128},
    data: app.media.getURLData(myURLClip, "audio/mp3"),
    showUI: true
  },
};
var settings = app.media.getURLSettings(args);
args.settings = settings;
app.media.openPlayer(args);
```

Adding and editing renditions

A `rendition` object contains information needed to play a media clip, including embedded media data (or a URL), and playback settings, and corresponds to the rendition in the Acrobat user interface. When you add a movie or sound clip to your document, a default rendition is listed in the Multimedia Properties dialog box and is assigned to a `Mouse Up` action. In case the rendition cannot be played, you can add other renditions or edit the existing ones.

If you add alternate versions of the media clip, these become new renditions that can serve as alternates in case the default choice cannot be played. It is then possible to invoke the `rendition` object's `select` method to obtain the available media players for each rendition.

There are several types of settings that can be specified for a given rendition: media settings, playback settings, playback location, system requirements, and playback requirements. You can use JavaScript to customize some of these settings through the `rendition` object. There are several properties to which you have read-only access when editing a rendition. These are listed in the following table.

Rendition object properties

Property	**Description**
`altText`	The alternate text string for the rendition.
`doc`	The document that contains the rendition.
`fileName`	Returns the file name or URL of an external media clip.
`type`	A `MediaRendition` object or a rendition list.
`uiName`	The name of the rendition.

In addition to these properties, you can invoke the `rendition` object's `getPlaySettings` method, which returns a `MediaSettings` object. As you learned earlier in Specifying playback settings, you can adjust the settings through this object. You can also invoke its `testCriteria` method, with which you can test the rendition against any criteria specified in the PDF file, such as minimum bandwidth.

Setting multimedia preferences

In general, you can choose which media player should be used to play a given clip, determine whether the Player Finder dialog box is displayed, and set accessibility options for impaired users (these include subtitles, dubbed audio, or supplemental text captions).

In addition, you can use JavaScript to access or customize multimedia preferences. For example, the `doc.media` object's `canPlay` property may be used to indicate whether multimedia playback is allowed for the document. The `MediaSettings` object's `bgColor` property can be used to specify the background color for the media player window. Examples of each are given below:

```
var canPlay = doc.media.canPlay;
if (canPlay.no) {
   // Determine whether security settings prohibit playback:
   if (canPlay.no.security) {
      if (canPlay.canShowUI)
         app.alert("Security prohibits playback.");
      else
         console.println("Security prohibits playback.");
   }
}

// Set the background color to red:
settings.bgColor = ["RGB", 1, 0, 0];
```

9 Modifying the User Interface

This chapter will provide you with an understanding of the ways in which you can present and modify the user interface. You will learn how to use JavaScript to add menu items and toolbars, customize navigation in PDF documents and customize PDF layers.

Topics	Description
Adding toolbar buttons and menu items	Discusses the techniques and methods of creating toolbar buttons and menu items.
Adding navigation to PDF documents	Discusses how to aid the user to navigate through a PDF document with thumbnails, bookmarks and links. Also discussed are using actions for special effects, highlighting form fields, numbering pages and creating buttons.
Working with PDF layers	The fundamental methods of working with layers of content (Optional Content Groups).

Adding toolbar buttons and menu items

You can add menu items and toolbar buttons to help the user navigate through your application, or to help the user perform designated tasks.

Use `app.addSubMenu` and/or `app.addMenuItem` to add a menu item. The following example uses only `app.addMenuItem`.

Example: *Adding a menu item*

The intention of this menu is to add a button set to the toolbar; the button set will only appear on the toolbar if there is no document open in the window. Once the button set is installed on the toolbar, the menu item is only enabled if there is a document open in the window.

This code is placed in the user JavaScript folder and uses a variable `atbtoolbuttons` to detect if this menu item should be marked. It is set to marked if `atbtoolbuttons` is defined and is `false`.

```
   var atbtoolbuttons;
   app.addMenuItem({
      cName: "atbToolButtonSet",
      cUser: "My Menu",
      cParent: "Tools",
      cMarked: "event.rc = ( (typeof atbtoolbuttons != 'undefined')
         && !atbtoolbuttons )",
      cEnable: "event.rc = (event.target == null);",
      cExec: "loadATBToolButton();", nPos: 0
});
```

There is brief example of `app.addSubMenu` and `app.addMenuItem`, see Executing privileged methods through the menu.

The Example Adding a menu item installs a menu item under the main Tools menu. When executed, the menu calls the function `loadATBToolButton()`. This function loads the custom toolbar set, the definition of which follows.

Example: *Installing and uninstalling a toolbar*

If this function is called with `atbtoolbuttons` set to `false`, it means the toolbar is already installed, and the function uninstalls the toolbar set; otherwise, the toolbar set is installed.

The method `app.addToolButton` is used to add a toolbar button, and `app.removeToolButton` is used to remove a toolbar button.

For Acrobat 8, this script assumes that the Enable Global Object Security Policy is enabled in the JavaScript section of the Preferences, see the discussion in Enable the global object security policy.

The function `loadATBToolButton` is a trusted function because it executes privileged methods, such as `app.getPath` and `app.openDoc`.

The icons for the toolbar buttons are contained in `icon_toolbar.pdf`, which resides in the same folder as this script. The document contains two named icons with the names of `myIcon1` and `myIcon2`. Note that according to the JavaScript for Acrobat API Reference, the icon size is restricted to 20 by 20 pixels. If an icon of larger dimensions is used, an exception is thrown.

```
var loadATBToolButton = app.trustedFunction( function ()
{
   if ( typeof atbtoolbuttons == "undefined" )
      atbtoolbuttons = true;
   else {
      if (!atbtoolbuttons) {
         app.removeToolButton("atbToolButton1");
         app.removeToolButton("atbToolButton2");
         atbtoolbuttons = true;
         return;
      }
   }
   if ( atbtoolbuttons ) {
      app.beginPriv();
      // Get the path to the user JavaScript folder
      var atbPath=app.getPath({cCategory: "user", cFolder: "javascript"});
      try {
         // Try opening the icon doc as in hidden mode, and retrieve its doc
         // object.
         var doc=app.openDoc({
            cPath: atbPath+"/icon_toolbar.pdf", bHidden: true});
      } catch (e) { console.println("Could not open icon file"); return;}
      // Get the icon stream for myIcon1 from the hidden doc
      var oIcon = util.iconStreamFromIcon(doc.getIcon("myIcon1"));
      // Add a tool button using this icon
      app.addToolButton({
         cName: "atbToolButton1",
         oIcon: oIcon,
         cExec: "atbTask1();",
         cTooltext: "My toolbar button 1",
         nPos: 0
      });
```

```
            // Now get myIcon2 from the hidden document.
            oIcon = util.iconStreamFromIcon(doc.getIcon("myIcon2"));
            // and install this toolbar button as well
            app.addToolButton({
               cName: "atbToolButton2",
               oIcon: oIcon,
               cExec: "atbTask2()",
               cTooltext: "My toolbar button 2",
               nPos: 0
            });
            // Close our hidden document containing the icons.
            doc.closeDoc();
            app.endPriv();
            // Set this variable to signal that the toolbars are installed.
            atbtoolbuttons = false;
         }
      })
```

Adding navigation to PDF documents

JavaScript for Acrobat provides a number of constructs that enable you to add and customize navigation features within PDF documents. These features make it convenient for the user to see and visit areas of interest within the document, and you can associate a variety of actions with navigation events. In addition, you can customize the appearance of your form fields and pages, manipulate multiple documents, add and delete pages, and add headers, footers, watermarks, backgrounds, and buttons.

The list of topics in this section is:

- Thumbnails
- Bookmarks
- Links
- Using actions for special effects
- Highlighting form fields and navigational components
- Setting up a presentation
- Numbering pages
- Creating buttons

Thumbnails

This section discusses how to embed thumbnail images in a PDF document and how to add page actions.

Creating page thumbnails

Acrobat renders thumbnail images of each page on the fly. Should you want to store the images as part of the PDF document, there are methods for adding and removing thumbnails in a document. To add a set of thumbnails, invoke the Doc object `addThumbnails` method, which creates thumbnails for a specified set of pages in the document. It accepts two optional parameters: `nStart` and `nEnd` represent the beginning and end of an inclusive range of page numbers.

For example, to add thumbnails for pages 2 through 5, use the following command:

```
this.addThumbnails({nStart: 2, nEnd: 5});
```

To add a thumbnail for just one page, just provide a value for `nStart`. The following example adds a thumbnail for page 7:

```
this.addThumbnails({nStart: 7});
```

To add thumbnails from page 0 to a specified page, just provide a value for `nEnd`. The following example adds thumbnails for pages 0-7:

```
this.addThumbnails({nEnd: 7});
```

To add thumbnails for all the pages in the document, omit both parameters:

```
this.addThumbnails();
```

To remove a set of thumbnails, invoke the Doc object's `removeThumbnails` method, which accepts the same parameters as the `addThumbnails` method. For example, to remove the thumbnails for pages 2 to 5, use the following code:

```
this.removeThumbnails({nStart: 2, nEnd: 5});
```

Adding page actions with page thumbnails

You can associate a `Page Open` event with a page thumbnail. The most straightforward way of doing this is to specify a `Page Open` or `Page Close` action in the Page Properties dialog box.

To customize a page action using JavaScript, invoke the Doc object `setPageAction` method for the page to be opened. In the following example, a greeting is displayed when the user clicks on the thumbnail for page 2:

```
this.setPageAction({ nPage: 2, cTrigger: "Open",
   cScript: "app.alert('Hello');"}
);
```

The advantage of this approach is that you can dynamically build JavaScript strings to be used in the method call.

Bookmarks

You can use JavaScript to customize the appearance and behavior of the bookmarks that appear in the Bookmarks navigation panel. Every PDF document has an object known as the `bookmarkRoot`, which is the root of the bookmark tree for the document. It is possible to recursively add and modify levels of bookmarks underneath the root. Each node is a `bookmark` object which can have any number of children.

Acrobat makes the `bookmarkRoot` object available as a property of the Doc object. This root node contains a property called `children`, which is an array of `bookmark` objects. The `bookmark` object has the properties shown in the table Bookmark properties, and the methods shown in the table Bookmark methods.

Bookmark properties

Property	Description
`children`	Returns the array of child objects for the current node.
`color`	Specifies the color for the bookmark.
`doc`	The Doc object for the bookmark.
`name`	The text string appearing in the navigational panel.
`open`	Determines if children are shown.
`parent`	The parent bookmark.
`style`	Font style.

Bookmark methods

Method	Description
`createChild`	Creates a new child bookmark.
`execute`	Executes the `Mouse Up` action for the bookmark.
`insertChild`	Inserts a bookmark as a new child for this bookmark (this may be used to move existing bookmarks).
`remove`	Removes the bookmark and all its children.
`setAction`	Sets a `Mouse Up` action for the bookmark.

Creating bookmarks

To create a bookmark, it is necessary to navigate through the bookmark tree and identify the parent of the new node. Begin by accessing the `bookmarkRoot`, which is a property of the current document representing the top node in the bookmark tree:

```
var myRoot = this.bookmarkRoot;
```

Assume there are no bookmarks in the document. To create a new bookmark, invoke the Bookmark object `createChild` method to which you can submit the following parameters: `cName` (the name to appear in the navigation panel), `cExpr` (an optional JavaScript to be executed when the bookmark is clicked), and `nIndex` (an optional zero-based index into the `children` array).

The following code creates a bookmark that displays a greeting when clicked. Note that the omission of the `nIndex` value means that it is placed at position 0 in the `children` array:

```
myRoot.createChild("myBookmark", "app.alert('Hello!');");
```

The following code adds a bookmark called `grandChild` as a child of `myBookmark`:

```
var current = myRoot.children[0];
current.createChild("grandChild");
```

To move `grandChild` so that it becomes a child of the root, invoke the Bookmark object `insertChild` method, and provide a reference to `grandChild` as a parameter:

```
var grandChild = myRoot.children[0].children[0];
myRoot.insertChild(grandChild, 1);
```

Managing bookmarks

You can use JavaScript to change the `name`, `color`, and `style` properties of a bookmark. Note that the `style` property is an integer: `0` means normal, `1` means italic, `2` means bold, and `3` means bold-italic. The code below changes the name to `New Name`, the color to red, and the font style to bold:

```
var myRoot = this.bookmarkRoot;
var myChild = myRoot.children[0];
myChild.name = "New Name";
myChild.color = color.red;
myChild.style = 2;
```

In addition to adding new or existing bookmarks as you learned in Creating bookmarks, you can also delete a bookmark and its children by invoking its `remove` method. The following line of code removes all bookmarks from the document:

```
this.bookmarkRoot.remove();
```

Creating a bookmark hierarchy

Because of the tree structure associated with bookmarks, it is possible to construct a hierarchy of bookmarks; a child of a bookmark represents a subsection of the section represented by that bookmark. To create a hierarchy, first add bookmarks to the root, then to the children of the root, and recursively to their children.

The following code creates bookmarks `A`, `B`, `C`. Each section has 3 children. Child `A` has children `A0`, `A1`, and `A2`. Child `B` has children `B0`, `B1`, and `B2`. Child `C` has children `C0`, `C1`, and `C2`:

```
var myRoot = this.bookmarkRoot;
myRoot.createChild("A");
myRoot.createChild({cName: "B", nIndex: 1});
myRoot.createChild({cName: "C", nIndex: 2});
for (var i = 0; i < myRoot.children.length; i++) {
   var child = myRoot.children[i];
   for (var j = 0; j < 3; j++) {
      var name = child.name + j;
      child.createChild({cName: name, nIndex: j});
   }
}
```

To print out the hierarchy to the console, you can keep track of levels as shown in the following code. Note its recursive nature:

```
function DumpBookmark(bm, nLevel){
   // Build indents to illustrate the level
   var s = "";
   for (var i = 0; i < nLevel; i++) s += " ";

   // Print out the bookmark's name:
   console.println(s + "+-" + bm.name);

   // Recursively print out the bookmark's children:
   if (bm.children != null)
```

```
      for (var i = 0; i < bm.children.length; i++)
        DumpBookmark(bm.children[i], nLevel+1);
  }

  // Open the console to begin:
  console.clear(); console.show();

  // Recursively print out the bookmark tree
  DumpBookmark(this.bookmarkRoot, 0);
```

Links

JavaScript provides support for the addition, customization, or removal of links within PDF documents. These links may be used to access URLs, file attachments, or destinations within the document.

The Doc object contains methods for adding, retrieving, and removing links. These include the methods listed in the table Doc object link methods. This is used in conjunction with the `link` object, which contains properties as well as a `setAction` method for customizing the appearance and behavior of a given link. Its properties are listed in the table Link properties.

In addition, the `app` object contains a property called `openInPlace`, which can be used to specify whether cross-document links are opened in the same window or in a new one.

Doc object link methods

Method	Description
`addLink`	Adds a new link to a page.
`addWeblinks`	Converts text instances to web links with URL actions.
`getLinks`	Retrieves the links within a specified area on a page.
`getURL`	Opens a web page.
`gotoNamedDest`	Goes to a named destination within the document.
`removeLinks`	Removes the links within a specified area on a page.
`removeWeblinks`	Removes web links created with the Acrobat user interface.

Link properties

Property	Description
`borderColor`	The border color of the bounding rectangle.
`borderWidth`	The border width of the surrounding rectangle.
`highlightMode`	The visual effect when the user clicks the link.
`rect`	The rotated user space coordinates of the link.

Adding and removing web links from text

If a PDF document contains text beginning with http://, such as http://www.example.com, you can convert all such instances to links with URL actions by invoking the Doc object `addWeblinks` method. The method returns an integer representing the number of text instances converted, as shown in the code below:

```
var numberOfLinks = this.addWeblinks();
console.println("Converted " + numberOfLinks + " links.");
```

To remove web links that were authored in Acrobat, invoke the Doc object `removeWeblinks` method. It accepts two optional parameters: `nStart` and `nEnd` represent the beginning and end of an inclusive range of page numbers. The following examples illustrate how to remove web links from different page ranges in the document:

```
// Remove the web links from pages 2 through 5:
this.removeWeblinks({nStart: 2, nEnd: 5});

// Remove the web links from page 7
this.removeWeblinks({nStart: 7});

// Remove the web links from pages 0 through 7:
this.removeWeblinks({nEnd: 7});

// Remove all the web links in the document:
this.removeWeblinks();
```

Adding and removing links

To add a single link to a PDF document, first invoke the Doc object `addLink` method, and then customize the returned `link` object properties. The `addLink` method requires two parameters: the page number and the coordinates, in rotated user space, of the bounding rectangle. The next example illustrates the use of `addLink`.

Example: *Add navigation links to the document*

In this example, navigational links are added to the lower left and right corners of each page in the document. The left link opens the previous page, and the right link opens the next page:

```
var linkWidth = 36, linkHeight = 18;
for (var i = 0; i < this.numPages; i++)
{
  // Create the coordinates for the left link:
  var lRect = [0, linkHeight, linkWidth, 0];

  // Create the coordinates for the right link:
  var cropBox = this.getPageBox("Crop", i);
  var offset = cropBox[2] - cropBox[0] - linkWidth;
  var rRect = [offset, linkHeight, linkWidth + offset, 0];

  // Create the Link objects:
  var leftLink = this.addLink(i, lRect);
  var rightLink = this.addLink(i, rRect);

  // Calculate the previous and next page numbers:
  var nextPage = (i + 1) % this.numPages;
```

```
      var prevPage = i - 1;
      if (prevPage < 0) prevPage = this.numPages - 1;

      // Set the link actions to go to the pages:
      leftLink.setAction("this.pageNum = " + prevPage);
      rightLink.setAction("this.pageNum = " + nextPage);

      // Customize the link appearance:
      leftLink.borderColor = color.red;
      leftLink.borderWidth = 1;
      rightLink.borderColor = color.red;
      rightLink.borderWidth = 1;
   }
```

To remove a known link object from a given page, retrieve its bounding rectangle coordinates and invoke the Doc object `removeLinks` method. In the following example, `myLink` is removed from page 2 of the document. In the script below, it is assumed that `myLink` is a Link object:

```
var linkRect = myLink.rect;
this.removeLinks(2, linkRect);
```

To remove all links from the document, simply use the crop box for each page, as shown in the code below:

```
for (var page = 0; page < this.numPages; page++)
{
   var box = this.getPageBox("Crop", page);
   this.removeLinks(page, box);
}
```

Defining the appearance of a link

The Example Add navigation links to the document contains a script that sets the appearance of the bounding rectangle for the links through their `borderColor` and `borderWidth` properties. You can also specify how the link will appear when it is clicked by setting its `highlightMode` property to one of four values: `None`, `Outline`, `Invert` (the default), or `Push`.

For example, the following code sets the border color to blue, the border thickness to 2, and the highlight mode to `Outline` for `myLink`:

```
myLink.borderColor = color.blue;
myLink.borderWidth = 2;
myLink.highlightMode = "Outline";
```

Opening links

To open a web page for a given link, invoke the Link object `setAction` method, and pass in a script containing a call to the Doc object `getURL` method.

For example, suppose you have created a Link object named `myLink`. The following code opens `http://www.example.com`:

```
myLink.setAction("this.getURL('http://www.example.com')");
```

To open a file that resides in a known location on your local hard drive, use the `app` object `openDoc` method.

The following example opens `myDoc.pdf` when `myLink` is clicked:

```
myLink.setAction("app.openDoc('/C/temp/myDoc.pdf');");
```

Opening file attachments

To open a file that is an attachment of the document, use the Doc object `exportDataObject` method. The method takes up to three parameters: `cName`, the name of the data object to extract; `bAllowAuth`, a Boolean value which, if true, uses a dialog box to obtain user authorization; `nLaunch`, a number that controls how the attachment is launched, permissible values are 0 (user is prompted to save, file not launched), 1 (user is prompted to save, and the file is launched), and 2 (file is saved to a temporary file and launched, file will be deleted by Acrobat upon application shutdown).

```
this.exportDataObject({ cName: "myDoc.pdf", nLaunch: 2 });
```

The file `myDoc.pdf` can be attached to a PDF document by executing the following script in the console:

```
   var thisPath = "/c/temp/myDoc.pdf";
this.importDataObject({cName:"myDoc.pdf", cDIPath: thisPath })
```

Using destinations

To go to a named destination within a document, embed a script in the call to the Link object `setAction` method. The script contains a call to the Doc object `gotoNamedDest` method.

The following example goes to the destination named as `myDest` in the current document when `myLink` is clicked:

```
myLink.setAction("this.gotoNamedDest('myDest');");
```

The following example opens a document, then goes to a named destination within that document. The example assumes the document being opened by `openDoc` is `disclosed` and can be used for a link action.

```
// Open a new document
var myDoc = app.openDoc("/c/temp/myDoc.pdf");
// Go to a destination in this new doc
myDoc.gotoNamedDest("myDest");
// Close the old document
this.closeDoc();
```

Beginning with Acrobat 8, there is an additional parameter, `cDest`, for the `app.openDoc` method to set the destination. With this parameter, the target document need not be `disclosed`. For example,

```
app.openDoc({ cPath: "/c/temp/myDoc.pdf", cDest: "myDest" });
this.closeDoc();
```

Using actions for special effects

Thumbnails, bookmarks, links, and other objects have actions associated with them, and you can use JavaScript to customize these actions. For example, you can display messages, jump to destinations in the same document or any other, open attachments, open web pages, execute menu commands, or perform a variety of other tasks.

As you learned earlier, you can associate a thumbnail with a `Page Open` event, and associate bookmarks and links with `Mouse Up` events.

You can use JavaScript to customize the actions associated with a thumbnail by invoking the Doc object `setPageAction` method. To customize the actions associated with bookmarks and links, create a string containing script and pass it to the object's `setAction` method. In the examples shown below, a greeting is displayed when a thumbnail, bookmark, and link are clicked:

```
// Open action for thumbnail:
this.setPageAction(2, "Open", "app.alert('Hello!');");

// MouseUp actions for bookmark and link:
myBookmark.setAction("app.alert('Hello!');");
myLink.setAction("app.alert('Hello!');");
```

Highlighting form fields and navigational components

You can use JavaScript to customize the actions associated with buttons, links, and bookmarks so that they change their appearance after the user has clicked them.

For a button, which is a field, you can invoke its `highlight` property, which allows you to specify how the button appears once it has been clicked. There are four choices, as shown in the following table.

Button appearance

Type	Keyword
`none`	`highlight.n`
`invert`	`highlight.i`
`push`	`highlight.p`
`outline`	`highlight.o`

For example, the following code makes the button appear pushed when clicked:

```
// Set the highlight mode to push
var f = this.getField("myButton");
f.highlight = highlight.p;
```

As you learned earlier, the `link` object also has a `highlight` property.

There are other ways in which you can creatively address the issue of highlighting. For example, you can change the background color of the button when clicked, by including a line of code in the script passed into its `setAction` method.

In the following example, the button displays a greeting and changes its background color to blue when the mouse enters its area:

```
var script = "app.alert('Hello!');";
script += "var myButton = this.getField('myButton');";
script += "myButton.fillColor = color.blue;";
f.setAction("MouseEnter", script);
```

The above script can also be entered through the UI as well.

This idea can be applied to the `bookMark` object's `color` property, as well as the `link` object's `borderColor` property. In both cases, similar code to that shown in the example above can be used in the scripts passed into their `setAction` methods.

For bookMark objects, you can change the text or font style through its name and style properties. For example, the following code adds the word VISITED to myBookmark and changes the font style to bold:

```
myBookmark.name += " - VISITED");
myBookmark.style = 2;
```

Setting up a presentation

There are two viewing modes for Acrobat and Adobe Reader: full screen mode and regular viewing mode. Full screen mode is often appropriate for presentations, since PDF pages can fill the entire screen with the menu bar, toolbar, and window controls hidden.

You can use JavaScript to customize the viewing mode when setting up presentations. The app object fs property may be used to set the viewing mode. (Media clips can also be played in full screen, see the Example Play a clip in full screen.)

Defining the initial view in full screen view

To cause Acrobat and Adobe Reader to display in full screen mode, include the following statement in a document JavaScript triggered when the document is opened.

```
app.fs.isFullScreen=true;
```

app.fs is the FullScreen object, which can be used to set your full screen preferences.

Example: *Setting full screen preferences and resetting them*

You want the document to be viewed in full screen, but as a courtesy, you want to restore the screen preferences of the user back to the original settings. Place the following script as document JavaScript, it will be executed once and only once upon loading the document.

```
// Save the settings we plan to change.
var _clickAdvances = app.fs.clickAdvances;
var _defaultTransition = app.fs.defaultTransition;
var _escapeExits = app.fs.escapeExits;

// Change these settings now.
app.fs.clickAdvances=true;
app.fs.defaultTransition = "UncoverLeft";
app.fs.escapeExits=true;

// Now, go into full screen.
app.fs.isFullScreen=true;
```

To restore the settings, place the following code in the Will Close section of the Document JavaScripts, located at Advanced > Document Processing > Set Document Actions.

```
// Restore the full screen preferences that we changed.
app.fs.clickAdvances = _clickAdvances;
app.fs.defaultTransition = _defaultTransition;
app.fs.escapeExits = _escapeExits;
```

You can use JavaScript to customize how page transitions occur for any pages within a document. This is accomplished through the Doc object’s setPageTransitions and getPageTransitions methods.

The `setPageTransitions` method accepts three parameters:

- **`nStart`** — the zero-based index of the beginning page
- **`nEnd`** — the zero-based index of the last page
- **`aTrans`** — a page transition array containing three values:
  - **`nDuration`** — the time a page is displayed before automatically changing
  - **`cTransition`** — the name of the transition to be applied
  - **`nTransDuration`** — the duration in seconds of the transition effect

The name of the transition to be applied can be chosen from a comprehensive list made available through the FullScreen object `transitions` property. To obtain the list, type the following code into the console:

```
console.println("[" + app.fs.transitions + "]");
```

In addition, you can set up a default page transition through the FullScreen object `defaultTransition` property, as the Example Setting full screen preferences and resetting them demonstrates.

Example: *Adding page transitions*

In the following example, page transitions are applied to pages 2 through 5. Each page displays for 10 seconds, and then an automatic transition occurs for one second:

```
this.setPageTransitions({
  nStart: 2,
  nEnd: 5,
  aTrans: {
    nDuration: 10,
    cTransition: "WipeLeft",
    nTransDuration: 1
  }
});

// Set the viewing mode to full screen
app.fs.isFullScreen = true;
```

Defining an initial view

In addition to specifying whether the full screen or regular viewing mode will be used, you can also use JavaScript to set up the document view. You can customize the initial view in terms of magnification, page layout, application and document viewing dimensions, the initial page to which the document opens, and whether parts of the user interface will be visible.

The Doc object `layout` property allows you to specify page layout by assigning one of the following values:

- `SinglePage`
- `OneColumn`
- `TwoColumnLeft`
- `TwoColumnRight`
- `TwoPageLeft`
- `TwoPageRight`

For example, the script `this.layout = "SinglePage"` puts the document into single page viewing.

To set up the magnification, assign a value to the Doc object `zoom` property. For example, the following code sets up a magnification of 125%:

```
this.zoom = 125;
```

You can also set the zoom type by assigning one of the settings, shown in the following table, to the Doc object's `zoomtype` property:

ZoomType settings

Zoom type	Property value
`NoVary`	`zoomtype.none`
`FitPage`	`zoomtype.fitP`
`FitWidth`	`zoomtype.fitW`
`FitHeight`	`zoomtype.fitH`
`FitVisibleWidth`	`zoomtype.fitV`
`Preferred`	`zoomtype.pref`
`ReflowWidth`	`zoomtype.refW`

The following example sets the zoom type of the document to fit the width:

```
this.zoomType = zoomtype.fitW;
```

To specify the page to which the document initially opens (or to simply change the page), set the Doc object `pageNum` property. If the following code is included in the script used in the document `Open` event, the document automatically opens to page 30:

```
this.pageNum = 30;
```

Finally, you can choose whether menu items and toolbar buttons will be visible by invoking the following methods of the `app` object:

`hideMenuItem` — Removes a specific menu item

`hideToolbarButton` — Removes a specific toolbar button

For example, if the following code is placed in a folder-level script, the Hand toolbar button is removed when Acrobat or Adobe Reader is started:

```
app.hideToolbarButton("Hand");
```

Numbering pages

You can customize the page numbering schemes used throughout a document. There are three numbering formats:

- decimal (often used for normal page ranges)
- roman (often used for front matter such as a preface)
- alphabetic (often used for back matter such as appendices)

The Doc object `getPageLabel` and `setPageLabels` methods can be used to control and customize the appearance of numbering schemes within a PDF document.

The `getPageLabel` method accepts the zero-based page index and returns a string containing the label for a given page.

The `setPageLabels` method accepts two parameters: `nPage` is the zero-based index for the page to be labeled, and `aLabel` is an array of three values representing the numbering scheme. If `aLabel` is not supplied, the method removes page numbering for the specified page and any others up to the next specified label.

The `aLabel` array contains three required values:

`cStyle` — the style of page numbering as shown in the following table

`cPrefix` — the string used to prefix the numeric portion of the page label

`nStart` — the ordinal with which to start numbering the pages

Page numbering style values

cStyle value	Description
D	Decimal numbering
R	Upper case Roman numbering
r	Lower case Roman numbering
A	Upper case alphabetic numbering
a	Lower case alphabetic numbering

For example, the code shown below labels 10 pages within a document using the following scheme: `i`, `ii`, `iii`, `1`, `2`, `3`, `4`, `5`, `Appendix-A`, `Appendix-B`:

```
// Pages 0-2 will have lower case roman numerals i, ii, iii:
this.setPageLabels(0, ["r", "", 1]);

// Pages 3-7 will have decimal numbering 1-5:
this.setPageLabels(3, ["D", "", 1]);

// Pages 8-9 will have alphabetic numbering:
this.setPageLabels(8, ["A", "Appendix-", 1]);

// The page labels will be printed to the console:
var labels = this.getPageLabel(0);
for (var i=1; i<this.numPages; i++)
   labels += ", " + this.getPageLabel(i);
console.println(labels);
```

It is also possible to remove a page label by omitting the `aLabel` parameter, as shown in the code below (which assumes the existence of the labels in the previous example:

```
// The labels for pages 3-7 will be removed:
this.setPageLabels(3);
```

Creating buttons

Though buttons are normally considered form fields, you can add them to any document. A button may be used for a variety of purposes, such as opening files, playing sound or movie clips, or submitting data to a web server. As you learned earlier, you can place text and images on a button, making it a user-friendly interactive portion of your document. To show or hide portions of graphic buttons, use the `Mouse Enter` and `Mouse Exit` events or other types of control mechanisms to manage the usage of the Field object `buttonSetIcon` method.

Example: *Creating a rollover effect*

The following code shows one icon when the mouse enters the button field, and a different icon when the mouse exits:

```
// Mouse enter script.
var f = event.target;
f.buttonSetIcon(this.getIcon('oneIcon'));

// Mouse exit script.
var f = event.target;
f.buttonSetIcon(this.getIcon('otherIcon'));
```

Working with PDF layers

PDF layers (called Optional Content Groups in Section 4.10 of the *PDF Reference* version 1.7) are sections of content that can be selectively viewed or hidden by document authors or consumers. Multiple components may be visible or hidden depending on their settings, and may be used to support the display, navigation, and printing of layered PDF content by various applications. It is possible to edit the properties of layers, to lock layers, to add navigation to them, to merge or flatten layers, and to combine PDF layered documents. Properties and methods for handling PDF layers are accessed through the OCG object.

To obtain an array of the OCG objects for a given page in the document, invoke the Doc object `getOCGs` method. The following code obtains the array of OCG objects contained on page 3 of the document:

```
var ocgArray = this.getOCGs(3);
```

The getOCGs method returns an array of OCG objects or `null`, if there are none; consequently, in situations in which it is uncertain if there are any OCGs on the page, you need to test the return value for null:

```
var ocgArray = this.getOCGs(3);
if ( ocgArray != null ) {
   <some action script>
}
```

Navigating with layers

Since information can be stored in different layers of a PDF document, navigational controls can be customized within different layers, whose visibility settings may be dynamically customized so that they are tied to context and user interaction. For example, if the user selects a given option, a set of navigational links belonging to a corresponding optional content group may be shown.

Example: *Toggling a PDF layer*

This example is a Mouse Up action for a button. The action is to toggle the visibility of a particular layer. The methodology is to get the array of OCGs on the page, search through them to find the particular layer of interest, and finally, to toggle its state property, which determines the visibility of the layer, see OCG properties.

```
var ocgLayerName = "myLayer";
var ocgArray = this.getOCGs(this.pageNum);
for ( var i=0; i < ocgArray.length; i++) {
   if ( ocgArray[i].name == ocgLayerName ) {
      ocgArray[i].state = !ocgArray[i].state;
      break;
   }
}
```

Editing the properties of PDF layers

The OCG object provides properties that can be used to determine whether the object's default state should be on or off, whether its intent should be for viewing or design purposes, whether it should be locked, the text string seen in the user interface, and the current state. The properties are shown in the following table.

OCG properties

Property	Description
`initState`	Determines whether the `OCG` object is on or off by default
`intent`	The intent of the `OCG` object (View or Design)
`locked`	Whether the on/off state can be toggled through the user interface
`name`	The text string seen in the user interface for the `OCG` object
`state`	The current on/off state of the `OCG` object

The `initState` property can be used to set the default state for an optional content group. In the following example, `myLayer` is set to `on` by default:

```
myLayer.initState = true;
```

The `intent` property, which is an array of values, can be used to define the intent of a particular optional content group. There are two possible values used in the array: `View` and `Design`. A `Design` layer is created for informational purposes only, and does not affect the visibility of content. Its purpose is to represent a document designer's structural organization of artwork. The `View` layer is intended for interactive use by document consumers. If `View` is used, the visibility of the layer is affected.

In the following example, the intent of all the `OCG` objects in the document is set to both values:

```
var ocgs = this.getOCGs();
for (var i=0; i<ocgs.length; i++)
   ocgs[i].intent = ["View", "Design"];
```

The `locked` property is used to determine whether a given layer can be toggled through the user interface. In the following example, `myLayer` is locked, meaning that it cannot be toggled through the user interface:

```
myLayer.locked = true;
```

The `state` property represents the current on/off state for a given OCG. In the following example, all the OCGs are turned on:

```
var ocgs = this.getOCGs();
for (var i=0; i<ocgs.length; i++)
     ocgs[i].state = true;
```

The `name` property represents the text string seen in the user interface that is used to identify layers. In the following example, the `Watermark` OCG is toggled:

```
var ocgs = this.getOCGs();
for (var i=0; i<ocgs.length; i++)
   if (ocgs[i].name == "Watermark")
      ocgs[i].state = !ocgs[i].state;
```

Reordering layers

It is possible to determine the order in which layers are displayed in the user interface by invoking the Doc object `getOCGOrder` and `setOCGOrder` methods. In the following example, the display order of all the layers is reversed:

```
var ocgOrder = this.getOCGOrder();
var newOrder = new Array();
for (var i=0; i<ocgOrder.length; i++)
   newOrder[i] = ocgOrder[ocgOrder.length - i - 1];
this.setOCGOrder(newOrder);
```

10 Acrobat Templates

This chapter will help you understand the role of templates in PDF form structures, and the options and implications related to their use. You will also learn about the parameters for the `template` object methods.

Topics	Description
The role of templates in PDF form architecture	Discusses templates as a way of dynamically creating additional pages to hold form data.
Spawning templates	Methods and techniques of working with templates.

The role of templates in PDF form architecture

The Acrobat extension of JavaScript defines a template object that supports interactive form architectures. In this context, a *template* is a named page within a PDF document that provides a convenient format within which to automatically generate and manipulate a large number of form fields. These pages contain visibility settings, and can be used to spawn new pages containing identical sets of form controls to those defined within the template.

As you learned earlier, it is possible to use templates to dynamically generate new content within a document. Templates help to create reusable content, and can be used for replicating logic.

A template is used to reproduce the logic on a given page at any new location in the document. This logic may include form fields such as text fields and buttons, digital signatures, and embedded logic such as scripts that email form data to another user. To create a template based on a page, invoke the Doc object `createTemplate` method, in which you will name your template and specify the page from which it will be created. The code below creates a template called `myTemplate` based on page 5 of the current document:

```
this.createTemplate({cName: "myTemplate", nPage: 5});
```

There are two steps required to generate pages based on a template contained in the document:

1. Select a template from the Doc object `templates` property, which is an array of `template` objects.

2. Spawn a page invoking the `template` object `spawn` method.

The following code adds a new page at the end of the current document that is based on the first template contained in the document:

```
var myTemplateArray = this.templates;
var myTemplate = myTemplateArray[0];
myTemplate.spawn(this.numPages, false, false);
```

Spawning templates

In this section you will learn how to spawn a page and about the naming convention for any form fields residing on a template page. Finally, a detailed example is presented.

Dynamic form field generation

When spawning templates, you an specify whether the form fields are renamed on the new page or retain the same names as those specified in the template. This is done through the optional `bRename` parameter. If you set the parameter's value to `true`, the form fields on each spawned page have unique names, and values entered into any of those fields do not affect values in their counterparts on other pages. This would be useful, for example, in forms containing expense report items. If you set the parameter's value to `false`, the form fields on each spawned page have the same name as their counterparts on all the other spawned pages. This might be useful if you would like, for example, to duplicate a button or display the date on every page, since entering it once results in its duplication throughout all the spawned pages.

Suppose the `bRename` parameter is `true` and the field name on the template is `myField`. If the template is named `myTemplate` and is spawned onto page 4, the new corresponding field name is `P4.myTemplate.myField`. The page number embedded in the new field guarantees its uniqueness.

Dynamic page generation

When templates are used to spawn new pages, those pages contain an identical set of form fields to those defined in the template. Depending on the parameters used, this process may result in a file size inflation problem. This is because there are two ways to specify page generation: one option is to repeatedly spawn the same page which results in the duplication of `XObject` objects (external graphics objects), and the other is to generate page contents as `XObject` objects, which only requires that those objects be repositioned.

The `nPage` parameter is used to specify the zero-based index of the page number used to create the page. If the `bOverlay` value is set to `true`, the new page overlays on to the page number specified in the `nPage` parameter. If the `bOverlay` value is set to `false`, the new page is inserted as a new page before the specified page. To append a page at the end of the document, set the `bOverlay` value to false and the `nPage` parameter to the total number of pages in the document.

Template syntax and usage

In this first example, all the templates will be spawned once, the field names will not be unique in each resultant page (`bRename` will be `false`), and the resultant pages will be appended to the end of the document (`bOverlay` will be `false`). The `oXObject` parameter will be used to prevent file size inflation:

```
// Obtain the collection of templates:
var t = this.templates;

// Spawn each template once as a page appended at the end:
for (var i = 0; i < t.length; i++)
  t[i].spawn(this.numPages, false, false);
```

In this next example, the same template will be spawned 10 times, will overlay on to pages 0 through 9 (`bOverlay` will be `true`), and the field names will be unique on each page (`bRename` will be `true`):

```
// Obtain the template:
var t = this.templates;
var T = t[0];

// Prevent file size inflation by using the XObject. Do this by
// spawning once, saving the result (an XObject), and passing
// the resultant XObject to the oXObject parameter in
// the subsequent calls to the spawn method:
```

```
var XO = T.spawn(0, true, true);
for (var i = 1; i < 10; i++)
  T.spawn(i, true, true, XO);
```

In this next example, we will retrieve the template named `myTemplate`, overlay it onto pages 5 through 10 (`bOverlay` will be `true`), and use the same field names on each page (`bRename` will be `false`):

```
// Obtain the template name "myTemplate":
var t = this.getTemplate("myTemplate");

// Prevent file size inflation:
var XO = t.spawn(5, true, false);

// Spawn the remaining pages:
for (var i = 6; i <= 10; i++)
  t.spawn(i, true, false, XO);
```

Example: *Gathering personal data using templates*

In this example, we have a two page document and one hidden template page named `datapage`. On the first page of the document, the head of household fills in his/her name, as well as the names of the dependents, the spouse and children. After doing this, a button is clicked. The button action spawns the hidden template, `datapage`, for a number of instances equal to the number of people in the household. The names of each member of the household are pre-populated into each of the templates. On each of these template pages, the head of household fills in personal data of each household member: name (pre-populated), age, gender (combo box, Male or Female), and income.

The button action on the first page looks like this:

```
// Define an array of field names for the first page, up to five children
var aFamily = ["family.head","family.spouse", "family.child1",
  "family.child2", "family.child3", "family.child4", "family.child5" ]
// Get the template object of the template datapage.
var T = this.getTemplate("datapage");
var fName = "P1.datapage.name";
// Put this just before the last page.
var XO = T.spawn(this.numPages-1, true, false);
var f = this.getField(aFamily[0]);
var g = this.getField(fName);
// Populate this name field of the first template with the name of
//the head of household
g.value = f.value;
// Now, go through the other fields, extracting names, and spawning
// templates
for ( var i=1; i < aFamily.length; i++ ) {
  var f = this.getField(aFamily[i]);
  if ( f.value != "" ) {
    // Insert a new template just before the last page.
    var fName = "P"+(this.numPages-1)+".datapage.name";
      T.spawn(this.numPages-1, true, false, XO);
      console.println("fName = " + fName);
      g.value = f.value;
  } else break;
}
```

Now for the last page. On this page we have a series of four fields that summarizes the information entered in the template pages. These fields give the total number of dependents; the spouse’s name, age, and gender; and each of the children’s names, genders and ages. The following script is placed as a Page Open event for the last page, the one that contains the summary information.

```
if ( this.pageNum != 1 ) {
   // Number of dependents = number of pages - 3
   var numDependents = this.numPages - 3
   this.getField("dependents").value = numDependents;

   var totalincome = 0;
   // Get the head of household's income
   var income = this.getField("P1.datapage.income").value;
   totalincome += income;

   // Spouse's name and gender is on P2
   if ( numDependents > 0 ) {
      var gender = this.getField("P2.datapage.gender").value;
      var age =  this.getField("P2.datapage.age").value;
      var spouseStr = this.getField("P2.datapage.name").value
         +" (" + gender +", " + age + ")";
      this.getField("spouse").value = spouseStr
      income = this.getField("P2.datapage.income").value;
      totalincome += income;
   }
   if ( numDependents > 1 ) {
      var nChildren = numDependents - 1;
      var l = nChildren + 3;
      var childStr = "";
      for ( var i=3; i < l; i++) {
         var childName = this.getField("P"+i+".datapage.name").value;
         var gender = this.getField("P"+i+".datapage.gender").value;
         var age =  this.getField("P"+i+".datapage.age").value;
         childStr += (childName + " (" + gender +", "+ age +"); ");
         var income = this.getField("P"+i+".datapage.income").value;
         totalincome += income;
      }
      this.getField("children").value = childStr;
   }
   this.getField("totalincome").value = totalincome;
}
```

In the script above, the field names of the spawned templates have been renamed. To extract the information contained in these template pages, the field names have to be built. Knowledge of the naming convention used by templates, as well as the structure of the document and the placement of the templates in the document is essential.

11 Search and Index Essentials

This chapter will enable you to customize and extend searching operations for PDF document content and metadata, as well as indexing operations. The principal JavaScript objects used in searching and indexing are the `search`, `catalog`, and `index` objects. In this chapter we shall see how to use these objects.

Topics	Description
Searching for text in PDF documents	A survey of the methods for conducing a search of a document, multiple documents, or an index collection of files.
Indexing multiple PDF documents	Methods of rebuilding and updating an index.
Searching metadata	A brief indication of how to search a document's XMP metadata.

Searching for text in PDF documents

JavaScript provides a static `search` object, which provides powerful searching capabilities that may be applied to PDF documents and indexes. Its properties and methods are described in the following tables.

Search properties

Property	Description
`attachments`	Searches PDF attachments along with the base document.
`available`	Determines if searching is possible.
`docInfo`	Searches document metadata information.
`docText`	Searches document text.
`docXMP`	Searches document XMP metadata.
`bookmarks`	Searches document bookmarks.
`ignoreAccents`	Ignores accents and diactrics in search.
`ignoreAsianCharacterWidth`	Matches Kana characters in query.
`indexes`	Obtains all accessible `index` objects.
`jpegExif`	Searches EXIF data in associated JPEG images.
`markup`	Searches annotations.
`matchCase`	Determines whether query is case-sensitive.
`matchWholeWord`	Finds only occurrences of complete words.
`maxDocs`	Specifies the maximum number of documents returned.

Property	Description
`proximity`	Uses proximity in results ranking for `AND` clauses.
`proximityRange`	Specifies the range of proximity search in number of words.
`refine`	Uses previous results in query.
`stem`	Uses word stemming in searches.
`wordMatching`	Determines how words will be matched (phrase, all words, any words, Boolean query).

Search methods

Method	Description
`addIndex`	Adds an index to the list of searchable indexes.
`getIndexForPath`	Searches the index list according to a specified path.
`query`	Searches the document or index for specified text.
`removeIndex`	Removes an index from the list of searchable indexes.

Finding words in an PDF document

The `search` object `query` method is used to search for text within a PDF document. It accepts three parameters:

`cQuery` — the search text

`cWhere` — where to search:

`ActiveDoc` — within the active document

`Folder` — within a specified folder

`Index` — within a specified index

`ActiveIndexes` — within the active set of available indexes (the default)

`cDIPath` — the path to a folder or index used in the search

The simplest type of search is applied to the text within the PDF document. For example, the following code performs a case-insensitive search for the word Acrobat within the current document:

```
search.query("Acrobat", "ActiveDoc");
```

Using advanced search options

You can set the `search` object properties to use advanced searching options, which can be used to determine how to match search strings, and whether to use proximity or stemming.

To determine how the words in the search string will be matched, set the `search` object `wordMatching` property to one of the following values:

`MatchPhrase` — match the exact phrase

`MatchAllWords` — match all the words without regard to the order in which they appear

`MatchAnyWord` — match any of the words in the search string

`BooleanQuery` — perform a Boolean query for multiple-document searches (the default)

For example, the following code matches the phrases “My Search” or “Search My”:

```
search.wordMatching = "MatchAllWords";
search.query("My Search");
```

To determine whether proximity is used in searches involving multiple documents or index definition files, set the `search` object `wordMatching` property to `MatchAllWords` and set its `proximity` property to `true`. In the example below, all instances of the words `My` and `Search` that are not separated by more than 900 words will be listed in the search:

```
search.wordMatching = "MatchAllWords";
search.proximity = true;
search.query("My Search");
```

To use stemming in the search, set the `search` object `stem` property to `true`. For example, the following search lists words that begin with “run”, such as “running” or “runs”:

```
search.stem = true;
search.query("run");
```

To specify that the search should only identify occurrences of complete words, set the `search` object `matchWholeWord` property to `true`. For example, the following code matches “nail”, but not “thumbnail” or “nails”:

```
search.matchWholeWord = true;
search.query("nail");
```

To set the maximum number of documents to be returned as part of a query, set the `search` object `maxDocs` property to the desired number (the default is 100). For example, the following code limits the number of documents to be searched to 5:

```
search.maxDocs = 5;
```

To refine the results of the previous query, set the `search` object `refine` property to `true`, as shown in the following code:

```
search.refine = true;
```

Searching across multiple PDF documents

This section discusses searches involving more than one PDF document.

Searching all PDF files in a specific location

To search all the PDF files within a folder, set the `cWhere` parameter in the `search` object `query` method to `Folder`. In the following example, all documents in `/C/MyFolder` will be searched for the word “Acrobat”:

```
search.query("Acrobat", "Folder", "/C/MyFolder");
```

Using advanced search options for multiple document searches

In addition to the advanced options for matching phrases, using stemming, and using proximity, it is also possible to specify whether the search should be case-sensitive, whether to match whole words, to set the maximum number of documents to be returned as part of a query, and whether to refine the results of the previous query.

To specify that a search should be case sensitive, set the `search` object `matchCase` property to `true`. For example, the following code matches “Acrobat” but not “acrobat”:

```
search.matchCase = true;
search.query("Acrobat", "Folder", "/C/MyFolder");
```

Searching PDF index files

A PDF index file often covers multiple PDF files, and the time required to search an index is much less than that required to search each of the corresponding individual PDF files.

To search a PDF index, set the `cWhere` parameter in the `search` object’s `query` method to `Index`. In the following example, `myIndex` is searched for the word “Acrobat”:

```
search.query("Acrobat", "Index", "/C/MyIndex.pdx");
```

Using Boolean queries

You can perform a Boolean query when searching multiple document or index files. Boolean queries use the following operations as logical connectors:

- `AND`
- `OR`
- ^ (exclusive or)
- `NOT`

For example, the phrase `"Paris AND France"` used in a search would return all documents containing both the words `Paris` and `France`.

The phrase `"Paris OR France"` used in a search would return all documents containing one or both of the words `Paris` and `France`.

The phrase `"Paris ^ France"` used in a search would return all documents containing exactly one (not both) of the words `Paris` and `France`.

The phrase `"Paris NOT France"` used in a search would return all documents containing `Paris` that do not contain the word `France`.

In addition, parentheses may be used. For example, the phrase `"Acrobat AND (Standard OR Professional OR Pro)"`. The result of this query would return all documents that contain the word “Acrobat” and either “Standard”, “Professional” or “Pro” in it.

```
search.wordMatching="BooleanQuery";
search.query("Acrobat AND (Standard OR Professional OR Pro)", "Folder",
  "/C/MyFolder");
```

To specify that a Boolean query will be used, be sure that the `search` object `wordMatching` property is set to `BooleanQuery` (which is the default).

Indexing multiple PDF documents

It is possible to extend and customize indexes for multiple PDF documents using the JavaScript `catalog`, `catalogJob`, and `index` objects. These objects may be used to build, retrieve, or remove indexes. The `index` object represents a `catalog`-generated index, contains a `build` method that is used to create an index (and returns a `catalogJob` object containing information about the index), and has the properties shown below the following table.

Index properties

Property	**Description**
`available`	Indicates whether an index is available
`name`	The name of the index
`path`	The device-independent path of the index
`selected`	Indicates whether the index will participate in the search

The `catalog` object may be used to manage indexing jobs and retrieve indexes. It contains a `getIndex` method for retrieving an index, a `remove` method for removing a pending indexing job, and properties containing information about indexing jobs.

Creating, updating, or rebuilding indexes

To determine which indexes are available, use the `search` object `indexes` property, which contains an array of `index` objects. For each object in the array, you can determine its name by using its `name` property. In the code below, the names and paths of all available selected indexes are printed to the console:

```
var arr = search.indexes;
for (var i=0; i<arr.length; i++)
{
  if (arr[i].selected)
  {
    var str = "Index[" + i + "] = " + arr[i].name;
    str += "\nPath = " + arr[i].path;
    console.println(str);
  }
}
```

To build an index, first invoke the `catalog` object `getIndex` method to retrieve the `index` object. This method accepts a parameter containing the path of the `index` object. Then invoke the `index` object `build` method, which returns a `catalogJob` object. The method accepts two parameters:

`cExpr` — a JavaScript expression executed once the build operation is complete

`bRebuildAll` — indicates whether to perform a clean build in which the existing index is first deleted and then completely built

Finally, the returned `catalogJob` object contains three properties providing useful information about the indexing job:

`path` — the device-independent path of the index

`type` — the type of indexing operation (`Build`, `Rebuild`, or `Delete`)

`status` — the status of the indexing operation (`Pending`, `Processing`, `Completed`, or `CompletedWithErrors`)

In the code shown below, the index `myIndex` is completely rebuilt, after which its status is reported:

```
// Retrieve the Index object
var idx = catalog.getIndex("/C/myIndex.pdx");

// Build the index
var job = idx.build("app.alert('Index build');", true);

// Confirm the path of the rebuilt index:
console.println("Path of rebuilt index: " + job.path);

// Confirm that the index was rebuilt:
console.println("Type of operation: " + job.type);

// Report the job status
console.println("Status: " + job.status);
```

Searching metadata

PDF documents contain document metadata in XML format, which includes information such as the document title, subject, author's name, keywords, copyright information, date modified, file size, and file name and location path.

To use JavaScript to search a document's XMP metadata, set the `search` object's `docXMP` property to `true`, as shown in the following code:

```
search.docXMP = true;
```

12 Security

This chapter will introduce you to the various security options available through JavaScript for Acrobat. You will understand how to customize security in PDF documents by applying passwords and digital signatures, certifying documents, encrypting files, adding security to attachments, managing digital IDs and certificates, and customizing security policies.

Topics	Description
Security essentials	Overview for securing a document: encryption and certification.
Digitally signing PDF documents	Methods of signing a signature field using JavaScript.
Adding security to PDF documents	A more detailed look at encryption using certificates and security policies.
Digital IDs and certification methods	Discussed are how to customize and extend the management and usage of digital IDs using JavaScript, to share digital ID certificates, to build a list of trusted identities, and to analyze the information contained within certificates.

Security essentials

JavaScript for Acrobat provides a number of objects that support security. These are managed by the `security`, securityPolicy, and securityHandler objects for managing certificates, security policies, and signatures. The certificate, directory, signatureInfo, and dirConnection objects are used to manage digital signatures and access the user certificates.

Methods for adding security to PDF documents

The general procedures for applying various types of security to a PDF document are described below. Details and examples are provided in the later sections of this chapter.

Passwords and restrictions

The basic way to protect a document from unauthorized access is to encrypt it for a list of authorized recipients using the Doc object `encryptForRecipients` method. This essentially requires that the authorized recipients use a private key or credential to gain access to it. Restrictions may be applied so that the recipients' access to the document may be controlled.

Certifying documents

The certification signature for a document makes modification detection and prevention (mdp) possible. When this type of signature is applied, it is possible to certify the document, and thereby specify information about its contents and the types of changes that are allowed in order for the document to remain certified.

To apply an author signature to a document, create an certification signature field using the Doc object `addField` method. Then sign the field using the Field object `signatureSign` method, in which you will provide parameters containing the security handler, a signatureInfo object containing an `mdp` property value other than `allowAll`, and a legal attestation explaining why certain legal warnings are embedded in the document. The SignatureInfo object has properties common to all security handlers. These properties are described below in the following table.

SignatureInfo properties

Property	Description
`buildInfo`	Software build and version for the signature.
`date`	Date and time of the signature.
`dateTrusted`	A Boolean value, which if `true`, specifies that the date is to be trusted.
`handlerName`	Security handler name specified in the `Filter` attribute in the signature dictionary.
`handlerUserName`	Security handler name specified by `handlerName`.
`handlerUIName`	Security handler name specified by `handlerName`.
`location`	Physical location or hostname.
`mdp`	Modification detection and prevention setting (`allowNone`, `allowAll`, `default`, `defaultAndComments`).
`name`	Name of the user.
`numFieldsAltered`	Number of fields altered since the previous signature.
`numFieldsFilledIn`	Number of fields filled in since the previous signature.
`numPagesAltered`	Number of pages altered since the previous signature.
`numRevisions`	The number of revisions in the document.
`reason`	Reason for signing.
`revision`	Signature revision.
`sigValue`	Raw bytes of the signature, as a hex-encoded string.
`status`	Validity status (`4` represents a completely valid signature).
`statusText`	String representation of signature status.
`subFilter`	Formats used for public key signatures.
`timeStamp`	The URL of the server for time-stamping the signature.
`verifyDate`	The date and time that the signature was verified.

Property	**Description**
verifyHandlerName	Security handler used to validate signature.
verifyHandlerUIName	Handler specified by verifyHandlerName.

Encrypting files using certificates

When you invoke the Doc object encryptForRecipients method, it encrypts the document using the public key certificates of each recipient. The groups of recipients are specified in the oGroups parameter, which is an array of Group objects, each of which contains two properties: permissions and userEntities. The userEntities property is an array of UserEntity objects (described below in the UserEntity object properties table), each of which describes a user and their associated certificates, and is returned by a call to the DirConnection object search method. The associated certificates are represented in a property containing an array of Certificate objects (described below in Certificate object properties table), each of which contains read-only access to the properties of an X.509 public key certificate.

To obtain a group of recipients (the oGroups parameter mentioned above), you can invoke the security object chooseRecipientsDialog method, that opens a dialog box prompting the user to choose a list of recipients.

UserEntity object properties

Property	**Description**
firstName	The first name of the user.
lastName	The last name of the user.
fullName	The full name of the user.
certificates	Array of certificate objects for the user.
defaultEncryptCert	An array of preferred certificate objects.

Certificate object properties

Property	**Description**
binary	The raw bytes of the certificate.
issuerDN	The distinguished name of the user.
keyUsage	The value of the certificate key usage extension.
MD5Hash	The MD5 digest of the certificate.
SHA1Hash	The SHA1 digest of the certificate.
serialNumber	A unique identifier for the certificate.
subjectCN	The common name of the signer.

Property	**Description**
`subjectDN`	The distinguished name of the signer.
`usage`	The purposes for which the certification may be used: end-user signing or encryption.
`ubrights`	An application `Rights` object.

Security policies

Security policies are groups of reusable security settings that may include the type of encryption, the permission settings, and the password or public key to be used. You can create folder-level scripts containing objects that reflect these policies. Security policies may be customized through the use of `securityPolicy` objects, which can be accessed and managed by the `security` object `getSecurityPolicies` and `chooseSecurityPolicy` methods as well as the Doc object `encryptUsingPolicy` method.

Secure forms

You can lock form fields by creating a script containing a call to the Field object `setLock` method, and passing that script as the second parameter to the `signature` field `setAction` method.

In addition, you can sign an embedded FDF data object by invoking its `signatureSign` method, and subsequently validate the signature by invoking its `signatureValidate` method.

Digitally signing PDF documents

A certification signature contains identifying information about the person signing the document. When applying an certification signature, which must be the first signature in the document, it is also possible to certify the document. This involves providing a legal attestation as to the document's contents and specifying the types of changes allowed for the document in order for it to remain certified.

Signing a PDF document

To sign a document, create a signature field, choose a security handler, and invoke the field object `signatureSign` method. The `signatureSign` method accepts the following parameters:

`oSig` — the security handler object

`oInfo` — a `signatureInfo` object

`cDIPath` — the device-independent path to which the file will subsequently be saved

`bUI` — whether the security handler will display a user interface when signing

`cLegalAttest` — a string that describes content or feature and explains why it is present (for certification signatures only)

The creation and usage of these parameters are explained below in the following sections: The security handler object, The SignatureInfo object, and Applying the signature.

The security handler object

To obtain a security handler (the `oSig` parameter), invoke the `security` object `getHandler` method. The method, which returns a security handler object, takes the following parameters:

`cName` — The name of the security handler (contained in the `security` object's `handlers` property)

`bUIEngine` — If `true`, the method returns the existing engine associated with the Acrobat user interface; if `false`, the default, it returns a new engine.

The following code illustrates how to set up signature validation whenever the document is opened, lists all available security handlers, and selects the `Adobe.PPKLite` engine associated with the Acrobat user interface:

```
// Validate signatures when the document is opened:
security.validateSignaturesOnOpen = true;

// List all the available signature handlers
for (var i=0; i<security.handlers.length; i++)
  console.println(security.handlers[i]);

// Select the Adobe.PPKLite engine with the Acrobat user interface:
var ppklite = security.getHandler(security.PPKLiteHandler, true);
```

After obtaining the security handler, invoke the securityHandler object login method, which makes it possible to access and select your digital ID as shown in the following code:

```
var oParams = {
  cPassword: "myPassword",
  cDIPath: "/C/signatures/myName.pfx" // Digital signature profile
};
ppklite.login(oParams);
```

The SignatureInfo object

To create the `oInfo` parameter for the signature field's `signatureSign` method, create a generic object containing the properties as described in the table SignatureInfo properties:

```
var myInfo = {
  password: "myPassword",
  location: "San Jose, CA",
  reason: "I am approving this document",
  contactInfo: "userName@example.com",
  appearance: "Fancy",
  mdp: "allowNone" // An mdp value is needed for certification signatures
};
```

Applying the signature

Now that the security handler and signature information have been created, you can invoke the signature field's `signatureSign` method, as shown in the code below:

```
// Obtain the signature field object:
var f = this.getField("Signature1");

// Sign the field:
f.signatureSign({
   oSig: ppklite,
   oInfo: myInfo,
   cDIPath: "/C/temp/mySignedFile.pdf",
   cLegalAttest: "Fonts are not embedded to reduce file size"
}); //End of signature
```

See also the discussion of "Signature fields" on page 81.

Clearing a digital signature from a signature field

To clear a signature, invoke the Doc object `resetForm` method. In the example below, `Signature1` is cleared:

```
this.resetForm(["Signature1"]);
```

Getting signature information from another user

You can maintain a list of trusted user identities by adding the certificates contained within FDF files sent to you by other users. You can also obtain signature information from an FDF file by invoking the FDF object `signatureValidate` method, which returns a `signatureInfo` object, as shown in the example below:

```
// Open the FDF file sent to you by the other user:
var fdf = app.openFDF("/C/temp/myDoc.fdf");

// Obtain the security handler:
var engine = security.getHandler("Adobe.PPKLite");

// Check to see if the FDF has been signed:
if (fdf.isSigned)
{
   // Obtain the other user's signature info:
   sigInfo = fdf.signatureValidate({
      oSig: engine,
      bUI: true
   });

   // Display the signature status and description:
   console.println("Signature Status: " + sigInfo.status);
   console.println("Description: " + sigInfo.statusText);
}
else
   console.println("This FDF was not signed.");
```

Removing signatures

To remove a signature field, invoke the Doc object `removeField` method. In the example below, `Signature1` is removed:

```
var sigFieldName = "Signature1"
this.resetForm([sigFieldName]); // clear the signature
this.removeField(sigFieldName); // remove the field
```

Certifying a document

When applying a signature to certify a document, check the `trustFlags` property of the `signatureInfo` object. If its value is `2`, the signer is trusted for certifying documents.

Validating signatures

To validate a signature, invoke the signature field's `signatureValidate` method. It returns one of the following integer validity status values:

`-1` — not a signature field

`0` — signature is blank

`1` — unknown status

`2` — signature is invalid

`3` — signature is valid, identity of signer could not be verified

`4` — signature and identity of signer are both valid

The method accepts two parameters:

`oSig` — the security handler used to validate the signature (a `securityHandler` or `SignatureParameters` object)

`bUI` — determines whether the user interface is shown when validating the data file

A `SignatureParameters` object contains two properties:

`oSecHdlr` — the security handler object

`bAltSecHdlr` — determines whether an alternate security handler may be used

In the following example, `mySignatureField` is analyzed for validity:

```
// Obtain the signature field:
var f = this.getField("mySignatureField");

// Validate the signature field:
var status = f.signatureValidate();

// Obtain the signature information
var sigInfo = f.signatureInfo();

// Check the status returned from the validation:
if (status < 3)
  var msg = "Signature is not valid: " + sigInfo.statusText;
else
  var msg = "Signature is valid: " + sigInfo.statusText;

// Display the status message:
app.alert(msg);
```

Setting digital signature properties with seed values

Sometimes form authors need to limit the choices a user can make when signing a particular signature field. In enterprise settings, document authors can craft documents with behaviors and features that meet specific business needs, thereby enabling administrative control of signature properties such as appearance, signing reasons, and so on.

Such customizations are possible by using signature field seed values. A seed value specifies an attribute and attribute value. The author can make the seed value a preference or a requirement.

The Field method `signatureSetSeedValue` sets the properties that are used when signing signature fields. The properties are stored in the signature field and are not altered when the field is signed, the signature is cleared, or when `resetForm` is called.

Refer to the *Acrobat 8.0 Security User Guide* to obtain a deeper understanding of the use of signature seed values.

Example: *Certification signature*

The following script sets the seed values for the certification signature, and forces a certifying signature.

Certified signatures are always associated with modification detection and prevention (MDP) settings that control which changes are allowed to be made to a document before the signature becomes invalid. Changes are stored in the document as incremental saves beyond the original version of the document that was covered by the certifying signature.

```
// Obtain the signature field object:
var f = this.getField("theAuthorSignature");
f.signatureSetSeedValue({
  mdp: "defaultAndComments",
  legalAttestations: ["Trust me and be at ease.",
  "You can surely trust the author."],
  reasons: ["This is a reason", "This is a better reason"],
  flags: 8
});
```

Adding security to PDF documents

This section discusses various aspects of security: adding security, including encrypting files for a list of recipients, encrypting files using security policies and adding security to document attachments.

Adding passwords and setting security options

Since the Standard security handler, used for password encryption of documents, is not JavaScript-enabled, the most direct way to add passwords is through the creation of user or master passwords in the Acrobat user interface.

As described in “Encrypting files using certificates” on page 164, you can encrypt a document for a number of recipients using certificates, and can set security policies through the application of a certification signature accompanied by the desired modification, detection, and prevention settings shown in the table “SignatureInfo properties” on page 163.

Adding usage rights to a document

You can decide which usage rights will be permitted for a set of users. You can specify either full, unrestricted access to the document, or rights that address accessibility, content extraction, allowing changes, and printing. You can use JavaScript to customize these rights when encrypting a document for a list of recipients. For more information, see "Rights-Enabled PDF Files" on page 181.

Encrypting PDF files for a list of recipients

The Doc object `encryptForRecipients` method is the primary means of encrypting PDF files for a list of recipients using JavaScript. In "Reviewing documents with additional usage rights" on page 114, the certificates used were gathered by connecting to a directory, which is a repository of user information. The directory object contains an `info` property with which it is possible to create and activate a new directory. It is accessible either through the `directories` property or the `newDirectory` method of the securityHandler object.

The value of the `info` property is a DirectoryInformation object, that may contain standard properties related to the name of the directory as well as additional properties specific to a particular directory handler (these may include server and port information).

To create a new directory, create a DirectoryInformation object, obtain a SecurityHandler object and invoke its `newDirectory` method, and assign the DirectoryInformation object to the new directory's `info` property.

```
// Create and activate a new directory:
var newDirInfo = {
   dirStdEntryID: "dir0",
   dirStdEntryName: "Employee LDAP Directory",
   dirStdEntryPrefDirHandlerID: "Adobe.PPKMS.ADSI",
   dirStdEntryDirType: "LDAP",
   server: "ldap0.example.com",
   port: 389
};

// Obtain the security handler:
var sh = security.getHandler("Adobe.PPKMS");

// Create the new directory object:
var newDir = sh.newDirectory();

// Store the directory information in the new directory:
newDir.info = newDirInfo;
```

In order to obtain certificates from a directory, you must first connect to it using the Directory object `connect` method, and return a DirConnection object. An example is given below:

```
// Obtain the security handler:
var sh = security.getHandler("Adobe.PPKMS");
var dc = sh.directories[0].connect();
```

It is then possible to use the DirConnection object to search for certificates. You can specify the list of attributes to be used for the search by invoking the DirConnection object `setOutputFields` method, that accepts two parameters:

`oFields` — an array of attributes to be used in the search

`bCustom` — whether the attributes are standard output attribute names

For example, the following code specifies standard output attributes (`certificates` and `email`):

```
dc.setOutputFields({oFields: ["certificates", "email"]});
```

To perform the search, invoke the DirConnection object `search` method. It takes the following parameters:

`oParams` — an array of key-value pairs consisting of search attribute names and their corresponding strings

`cGroupName` — the name of the group to which to restrict the search

`bCustom` — whether `oParams` contains standard attribute names

`bUI` — whether a user interface is used to collect the search parameters

In the following example, the directory is searched for certificates for the user whose last name is "Smith", and displays the user's email address:

```
var retval = dc.search({oParams: {lastName: "Smith"}});
if (retval.length > 0) console.println(retval[0].email);
```

When you invoke the Doc object `encryptForRecipients` method, the `oGroups` parameter is an array of `Group` objects, each of which contains a `permissions` property. The `permissions` property is an object containing the properties described in the following table.

Permissions object

Property	Description
`allowAll`	Full, unrestricted access.
`allowAccessibility`	Content access for the visually impaired.
`allowContentExtraction`	Content copying and extraction.
`allowChanges`	Allowed changes (`none`, `documentAssembly`, `fillAndSign`, `editNotesFillAndSign`, `all`).
`allowPrinting`	Printing security level (`none`, `lowQuality`, `highQuality`).

The following code allows full and unrestricted access to the entire document for one set of users (`importantUsers`), and allows high quality printing for another set of users (`otherUsers`):

```
// Obtain the security handler:
var sh = security.getHandler("Adobe.PPKMS");

// Connect to the directory containing the user certificates:
var dir = sh.directories[0];
var dc = dir.connect();

// Search the directory for certificates:
dc.setOutputFields({oFields:["certificates"]});
var importantUsers = dc.search({oParams:{lastName:"Smith"}});
var otherUsers = dc.search({oParams:{lastName:"Jones"}});

// Allow important users full, unrestricted access:
var importantGroup = {
  userEntities: importantUsers,
  permissions: {allowAll: true}
};

// Allow other users high quality printing:
```

```
var otherGroup = {
  userEntities: otherUsers,
  permissions: {allowPrinting: "highQuality"}
};

// Encrypt the document for the intended recipients:
this.encryptForRecipients({
  oGroups:[importantGroup, otherGroup],
  bMetaData: true
});
```

See a related example in the section "Reviewing documents with additional usage rights" on page 114.

Encrypting PDF files using security policies

It is possible to define a security policy for a PDF document. The policy can contain a list of people who can open the document, restrictions limiting their ability to modify, print, or copy the document, and an expiration date for the document after which it cannot be opened.

There are two kinds of security policies: a personal policy is one created by a user and is stored on a local computer, and a organizational policy is developed by an administrator and stored on a policy server such as Adobe LiveCycle® Policy Server.

There are three types of custom policies. You can create policies for password security, certificate security, and policies used on Policy Server.

JavaScript for Acrobat defines a securityPolicy object that contains the following properties:

`policyID` — a machine-readable policy ID string

`name` — the policy name

`description` — the policy description

`lastModified` — the date when the policy was last modified

`handler` — the handler that implements the policy (`Adobe.APS`, `Adobe.PubSec`, and `Adobe.Standard`)

`target` — the target data covered by the policy (`document` or `attachments`)

To obtain a list of the security policies currently available, invoke the `security` object `getSecurityPolicies` method. The method accepts two parameters:

`oOptions` — a SecurityPolicyOptions object containing parameters used to filter the list

`bUI` — determines whether the user interface will be displayed (affects `bCheckOnline` in the `oOptions` parameter)

The SecurityPolicyOptions object is a generic object used to filter the list of security policies that will be returned by the method, and contains the following properties:

`bFavorites` — determines whether to return policies are favorites or not

`cFilter` — returns policies using the specified security filter (`Adobe.APS`, `Adobe.PubSec`, and `Adobe.Standard`)

`cTarget` — returns policies using the specified `target` (`document` or `attachments`)

The following example illustrates how to request and display a list of favorite security policies:

```
// Set up the filtering options (SecurityOptionsPolicy object):
var options = {
  bFavorites: true,
  cFilter: "Adobe.PubSec"
};

// Obtain the filtered list of security policies:
var policyArray = security.getSecurityPolicies(options);

// Display the list of security policies by name:
for (var i=0; i<policyArray.length; i++)
  console.println(policyArray[i].name);
```

To encrypt a PDF file using a security policy, you must first choose a security policy by invoking the `security` object `chooseSecurityPolicy` method and then encrypt the file by invoking the Doc object's `encryptUsingPolicy` method.

The `security` object `chooseSecurityPolicy` method opens a dialog box that permits the user to choose from a list of security policies filtered according to a SecurityPolicyOptions object.

The Doc object `encryptUsingPolicy` method accepts three parameters:

`oPolicy` — the policy object to use when encrypting the document

`oGroups` — an array of Group objects that the handler should use when applying the policy

`oHandler` — the SecurityHandler object to be used for encryption

`bUI` — whether the UI is displayed

In the following example, a newly created document is encrypted for a list of recipients, using the `encryptUsingPolicy` method, by choosing and applying a security policy. A Policy Server must be configured for publishing before running this example.

```
// Create the new document
var myDoc = app.newDoc();

// Choose the list of recipients
var recipients = [{
  userEntities: [
    {email: "user1@example.com"},
    {email: "user2@example.com"},
    {email: "user3@example.com"}
  ]
}];

// Encrypt the document using the security policy:
var results = myDoc.encryptUsingPolicy({
  oPolicy: "adobe_secure_for_recipients",
  oGroups: recipients
});

if ( results.errorCode == 0)
  console.println("The policy applied was: " + results.policyApplied.name);
```

Adding security to document attachments

You can add security to a document by encrypting its attachments and enclosing them in an *eEnvelope*. To do this with JavaScript, invoke the Doc object `addRecipientListCryptFilter` method, which is used to encrypt data objects and accepts two parameters:

`oCryptFilter` — the name of the encryption filter

`oGroup` — an array of `Group` objects representing the intended recipients

Note: For Acrobat 7.0, the value of `cCryptFilter` must be the string `DefEmbeddedFile`, beginning with Acrobat 8, the value of `cCryptFilter` can be any string.

Thus, an eEnvelope is a PDF file that contains encrypted attachments. The name of the crypt filter, which represents the recipient list, is defined and used when importing the attachment. An example is given below:

```
// Create instructions to be used in the recipient dialog box:
var note = "Select the recipients. Each must have ";
note += "an email address and a certificate.";

// Specify the remaining options used in the recipient dialog box:
var options = {
  bAllowPermGroups: false,
  cNote: note,
  bRequireEmail: true
};

// Obtain the intended recipient Group objects:
var groupArray = security.chooseRecipientsDialog(options);

// Open the eEnvelope document:
var env = app.openDoc("/C/eEnvelopes/myeEnvelope.pdf");

// Set up the crypt filter:
env.addRecipientListCryptFilter("myFilter", groupArray);

// Attach the current document to the eEnvelope:
env.importDataObject("secureMail0", this.path, "myFilter");

// Save the eEnvelope:
env.saveAs("/C/output/outmail.pdf");
```

Digital IDs and certification methods

It is possible to customize and extend the management and usage of digital IDs using JavaScript. In addition, it is possible to share digital ID certificates, build a list of trusted identities, and analyze the information contained within certificates.

Digital IDs

A digital ID is represented with a SignatureInfo object, which contains properties of the digital signature common to all handlers, in addition to other properties defined by public key security handlers. These additional properties are described in the following table.

SignatureInfo public key security handler properties

Property	Description
appearance	User-configured appearance name.
certificates	Chain of certificates from signer to certificate authority.
contactInfo	User-specified contact information for determining trust.
byteRange	Bytes covered by this signature.
docValidity	Validity status of the document byte range digest.
idPrivValidity	Validity of the identity of the signer.
idValidity	Numerical validity of the identity of the signer.
objValidity	Validity status of the object digest.
trustFlags	What the signer is trusted for.
password	Password used to access the private key for signing.

About digital ID providers

A digital ID provider is a trusted 3rd party, or *certificate authority*, that verifies the digital ID owner's identity, and issues the certificate or private key. The `certificates` property of the SignatureInfo object contains an array of certificates that reflects the certificate chain leading from the signer's certificate to that issued by the certificate authority. Thus, you can inspect the details of the certificate issued by the digital ID provider (such as its `usage` property).

For example, the following code encrypts the current document for everyone in the address book. It does this by creating a collection of certificates suitable for encrypting documents, that are filtered from the overall collection. This is accomplished by examining all the certificates in the address book and excluding those entries containing sign-only certificates, CA certificates, no certificates, or certificates otherwise unsuitable for encryption:

```
// Obtain the security handler:
var eng = security.getHandler("Adobe.AAB");

// Connect to the directory containing the certificates:
var dc = eng.directories[0].connect();

// Obtain the list of all recipients in the directory:
var rcp = dc.search();

// Create the filtered recipient list:
var fRcp = new Array();

// Populate the filtered recipient list:
for (var i=0; i<rcp.length; i++) {
  if (rcp[i].defaultEncryptCert &&
      rcp[i].defaultEncryptCert.usage.endUserEncryption)
     fRcp[fRcp.length] = rcp[i];
```

```
      if (rcp[i].certificates) {
         for (var j=0; j<rcp[i].certificates.length; j++)
            if (rcp[i].certificates[j].usage.endUserEncryption)
               fRcp[fRcp.length] = rcp[i];
      }
   }

   // Now encrypt for the filtered recipient list:
   this.encryptForRecipients({ oGroups:[{userEntities: fRcp}] });
```

Creating a digital ID (default certificate security)

If you would like to create a certificate for a new user, invoke the `securityHandler` object `newUser` method, which supports enrollment with the `Adobe.PPKLite` and `Adobe.PPKMS` security handlers by creating a new self-sign digital ID, and prevents the user from overwriting the file. It accepts the following parameters:

`cPassword` — the password needed to access the digital ID file

`cDIPath` — the location of the digital ID file

`oRDN` — the *relative distinguished name* (represented as an `RDN` object) containing the issuer or subject name for the certificate

`oCPS` — the certificate policy information, which is a generic object containing the following properties:

- **`oid`** — the certificate policy object identifier
- **`url`** — URL pointing to detailed policy information
- **`notice`** — shortened version of detailed policy information

`bUI` — determines whether to use the user interface to enroll the new user

The relative distinguished name is a generic object containing the properties shown in the following table.

RDN object

Property	Description
`c`	Country or region
`cn`	Common name
`o`	Organization name
`ou`	Organization unit
`e`	Email address

An example is given below:

```
// Obtain the security handler:
var ppklite = security.getHandler("Adobe.PPKLite");

// Create the relative distinguished name:
var newRDN = {
   cn: "newUser",
   c: "US"
};

// Create the certificate policy information:
var newCPS = {
  oid: "1.2.3.4.5",
  url: "www.example.com/newCPS.html",
  notice: "This is a self-generated certificate"
};

// Create the new user's certificate:
security.newUser({
  cPassword: "newUserPassword",
  cDIPath: "/C/temp/newUser.pfx",
  oRDN: newRDN,
  oCPS: newCPS,
  bUI: false
});
```

The `securityHandler` object has a `DigitalIDs` property that contains the certificates associated with the currently selected digital IDs for the security handler. The `DigitalIDs` property is a generic object containing the following properties:

`oEndUserSignCert` — the certificate used when signing

`oEndUserCryptCert` — the certificate used when encrypting

`certs` — an array of certificates corresponding to all the digital IDs

`stores` — an array of strings (one for every `certificate` object) indicating where the digital IDs are stored

You can use the `security` object `exportToFile` method to save a certificate file to disk. In the following example, the signing certificate is written to disk:

```
// Obtain the security handler:
var sh = security.getHandler("Adobe.PPKMS");

// Obtain the certificates:
var ids = sh.DigitalIDs;

// Write the signing certificate to disk:
security.exportToFile(ids.oEndUserSignCert, "/C/mySignCert.cer");
```

Using digital IDs (default certificate security)

As you learned earlier, you can obtain signature information from a signature field by invoking its `signatureInfo` method. In addition to this, you can also use an existing certificate to create a digital ID. To do this, obtain the certificate from an existing, signed field and create the relative distinguished name using the information it contains:

```
// Obtain the security handler:
var ppklite = security.getHandler("Adobe.PPKLite");

// Obtain the signature field:
var f = this.getField("existingSignature");

// Validate the signature:
f.signatureValidate();
```

```
// Obtain the signature information:
var sigInfo = f.signatureInfo();

// Obtain the certificates and distinguished name information
var certs = sigInfo.certificates;
var rdn = certs[0].subjectDN;

// Now create the digital signature:
ppklite.newUser({
  cPassword: "newUserPassword",
  cDIPath: "/C/temp/newUser.pfx",
  oRDN: rdn,
});
```

Managing digital IDs (Windows certificate security)

A Directory object is a repository of user information, including public key certificates. On Windows, the `Adobe.PPKMS` security handler provides access to the directories created by the user through the Microsoft Active Directory Script Interface (ADSI). These are created sequentially with the names `Adobe.PPKMS.ADSI.dir0`, `Adobe.PPKMS.ADSI.dir1`, etc. In this case, the `Adobe.PPKMS.ADSI` directory handler includes the directory information object properties shown in the following table.

Adobe.PPKMS.ADSI directory handler object properties

Property	Description
`server`	The server hosting the data
`port`	The port number (standard LDAP port is 389)
`searchBase`	Used to narrow the search to a section of the directory
`maxNumEntries`	Maximum number of entries retrieved from search
`timeout`	Maximum time allowed for search

For example, the following code displays information for an existing directory:

```
// Obtain the security handler:
var ppkms = security.getHandler("Adobe.PPKMS");

// Obtain the directory information object:
var info = ppkms.directories[0].info;

// Display some of the directory information:
console.println("Directory: " + info.dirStdEntryName);
console.println("Address: " + info.server + ":" + info.port);
```

Managing digital ID certificates

This section contains a brief discussion on sharing digital ID certificates and extracting information from the certificate of a digital ID.

Sharing digital ID certificates

You can share a self-signed digital ID certificate by exporting it as an FDF file. To do this, sign the FDF file by invoking the FDF object `signatureSign` method. The `signatureSign` method works similarly to that of the Doc object:

```
// Obtain the security handler:
var eng = security.getHandler("Adobe.PPKLite");

// Access the digital ID:
eng.login("myPassword", "/C/temp/myID.pfx");

// Open the FDF:
var myFDF = app.openFDF("/C/temp/myFDF.fdf");

// Sign the FDF:
if (!myFDF.isSigned) {
   // Sign the FDF
   myFDF.signatureSign({
      oSig: eng,
      nUI: 1,
      cUISignTitle: "Sign Embedded File FDF",
      cUISelectMsg: "Please select a digital ID"
   });

   // Save the FDF
   myFDF.save("/C/temp/myFDF.fdf");
}
```

Building a list of trusted identities

The trust level associated with a digital ID is stored in the `trustFlags` property defined in the `signatureInfo` object's public key security handler properties. The bits in this number indicate the level of trust associated with the signer and are valid only when the `status` property has a value of `4`. These trust settings are derived from those in the recipient's trust database, such as the *Acrobat Address Book* (`Adobe.AAB`). The following bit assignments are described below:

1 — trusted for signatures

2 — trusted for certifying documents

3 — trusted for dynamic content such as multimedia

4 — Adobe internal use

5 — the JavaScript in the PDF file is trusted to operate outside the normal PDF restrictions

Checking information on certificates

You can obtain a certificates through the `certificates` property of a SignatureInfo object, that is returned by a call to the signature field's `signatureInfo` method. The certificate properties are described in the table Certificate object properties and the relative distinguished name properties are defined in the table RDN object.

In the following example, the signer's common name, the certificate's serial number, and the distinguished name information are displayed:

```
// Obtain the signature field:
var f = this.getField("mySignatureField");

// Validate the signature field:
var status = f.signatureValidate();

// Obtain the signature information
var sigInfo = f.signatureInfo();

// Obtain the certificate:
var cert = sigInfo.certificates[0];

console.println("signer’s common name: " + cert.subjectCN);
console.println("serial number: " + cert.serialNumber);

// Distinguished name information:
console.println("distinguished common name: " + cert.subjectDN.cn);
console.println("distinguished organization: " + cert.subjectDN.o);
```

Task based topics

This section contains a discussion of a few security-oriented tasks.

Disallowing changes in scripts

Go to File > Properties and select the Security tab. Set up either password or certificate security for the document by clicking Security Method and choosing either Password Security or Certificate Security. In the Permissions area of the dialog box that pops up, click Changes Allowed and select any of the options except Any Except Extracting Pages. You can verify that changes to scripts have been disabled by returning to the Security tab. In the Document Restrictions Summary portion, Changing the Document should be set to Not Allowed.

Hiding scripts

Go to File > Properties and select the Security tab. Set up either password or certificate security for the document by clicking Security Method and choosing either Password Security or Certificate Security. In the Permissions area of the dialog box that pops up, ensure that Enable Copying of Text, Images, and Other Content is unchecked. You can verify that changes to scripts have been disabled by returning to the Security tab. In the Document Restrictions Summary portion, Changing the Document should be set to Not Allowed.

13 Rights-Enabled PDF Files

When creating a PDF document, it is possible to create certified documents by assigning special rights to it that enable users of Adobe Reader to fill in forms, participate in online reviews, and attach files. Adobe LiveCycle® Reader Extensions may be used to activate additional functionality within Adobe Reader for a particular document, thereby enabling the user to perform such operations as save, fill in, annotate, sign, certify, authenticate, and submit the document, thus streamlining collaboration for document reviews and automating data capture with electronic forms. In addition, users of Acrobat Pro can Reader-enable collaboration.

Topics	Description
Additional usage rights	Describes usage rights set by LiveCycle Reader Extensions.
LiveCycle Reader Extensions	A brief description of LiveCycle Reader Extensions is presented.
Writing JavaScript for Adobe Reader	Discusses how usage rights in Adobe Reader affects JavaScript for Acrobat API.
Enabling collaboration	Discusses the API that is enabled when collaboration is enabled through LiveCycle Reader Extensions.

Additional usage rights

LiveCycle ES Reader Extensions sets permissions within a PDF document that would otherwise be disabled through the usage of a certificate issued by the Adobe Reader Extension Root Certificate Authority. Permissions for Reader-enabled PDF files are determined by the combination of the user rights settings in the PDF file and a special Object Identifier (OID), embedded within the certificate, specifying the additional permissions to be made available. The permissions are listed below:

Form: fill-in and document full-save

Form: import and export

Form: add and delete

Form: submit standalone

Form: spawn template, spawn page from template, and delete spawned pages.

Note: Changing page visibility using `template.hidden` is not allowed through JavaScript.

Signature: modify

Annotation: create, delete, modify, and copy

Annotation: import and export

Form: barcode plain text

Annotation: online

Form: online

Note: JavaScript allows SOAP access in forms. For Adobe Reader 6.0, SOAP access is allowed in Acrobat forms. For Adobe Reader 6.02, OleDb database access is allowed in Windows for static XML forms. For Adobe Reader 7.0.5, SOAP access is allowed for static and dynamic XML forms.

Embedded File: create, delete, modify, copy, and import.

Note: The ability to manipulate embedded data objects is available in Adobe Reader 6.0 and later.

LiveCycle Reader Extensions

During the design process, a PDF document may be generated by LiveCycle ES or other products. The document creator may then assign appropriate usage rights using the LiveCycle ES Reader Extensions. The PDF document is made available on the web, and users may complete the form on the web site, or save it locally and subsequently complete and annotate it, digitally sign it, add attachments, and return it.

In effect, LiveCycle ES Reader Extensions will enable functionality within Adobe Reader for a given document that is not normally available. After the user has finished working with the document, those functions will be disabled until the user receives another rights-enabled PDF file.

One major advantage of LiveCycle ES Reader Extensions is that the client application (Adobe Reader) is on the user's desktop, which means that there is no cost to the end user.

Writing JavaScript for Adobe Reader

It is possible to access or assign additional usage rights within a PDF file by using the LiveCycle ES Reader Extensions API or its web user interface.

Note: For rights-enabled documents, certain editing features normally available within the Acrobat Standard and Acrobat Pro products will be disabled. This will ensure that the user does not inadvertently invalidate the additional usage rights in a document under managed review before passing the document on to an Adobe Reader user for further commenting.

The methods shown in the following table are disabled in Acrobat Standard and Acrobat Pro by LiveCycle Reader Extensions.

Features disabled by LiveCycle Reader Extensions

Features	Methods
delete, add, replace, and move pages	`Doc.deletePages, Doc.newPage, Doc.replacePages, Doc.movePage, Doc.insertPages, Doc.spawnPageFromTemplate`
modify page content	`Doc.addWatermarkFromText, Doc.addWatermarkFromFile, Doc.flattenPages, Doc.deleteSound`
add or modify JavaScripts	`Doc.setAction, Doc.setPageAction, Field.setAction, Link.setAction, Ocg.setAction, Bookmark.setAction, Doc.importAnFDF`
invoke web services	`SOAP.connect, SOAP.request, SOAP.response`

In Acrobat Standard and Acrobat Pro, the following controls are disabled for rights-enabled documents:

- Menu items that allow the addition or modification of scripts (except for the Debugger).
- Menu items that allow the creation, modification, or deletion of form fields (except the Import and Export menu items).
- Certain operations within the Security Panel marked as Not Allowed.

In addition, since the following menu operations will be affected in Acrobat Standard and Acrobat Pro, so will their corresponding JavaScript methods, indicated in the following table.

Controls affected by LiveCycle Reader Extensions in Acrobat Standard and Professional

Menu operation	Equivalent JavaScript method
Insert Pages	`Doc.insertPage`
Replace Pages	`Doc.replacePages`
Delete Pages	`Doc.deletePages`
Crop Pages	`Doc.setPageBoxes`
Rotate Pages	`Doc.setPageRotations`
Set Page Transitions	`app.defaultTransitions` (read-only), `Doc.setPageTransitions`
Number Pages	`Doc.setPageLabels`
Add Watermark & Background	`Doc.addWatermarkFromText`, `Doc.addWatermarkFromFile`
Add Bookmark	`Bookmark.createChild`

If a document is rights-enabled but commenting is not allowed, then the JavaScript methods shown in the following table will be disabled.

When commenting is not allowed in Reader-enabled documents

Feature	Method
Add a comment	`Doc.addAnnot`
Import comments	`Doc.importAnFDF`
Export comments	`Doc.exportAsFDF` (when `bAnnotations` is set to `true`)

If a document is rights-enabled but file attachments are not allowed, then the following JavaScript methods will be disabled:

- `Doc.createDataObject`
- `Doc.importDataObject`
- `Doc.setDataObjectContents`
- `Doc.removeDataObject`

If a document is rights-enabled but digital signatures are not allowed, then the following JavaScript methods will be disabled:

- `Doc.getField` (for signature fields)
- `Doc.addField` (when `cFieldType = "signature"`)
- `Field.removeField` (when `cFieldType = "signature"`)
- `Field.signatureSign`

For more information on developing JavaScript solutions for Adobe Reader see *Developing for Adobe Reader*.

Enabling collaboration

By using RSS, collaboration servers can provide customized XML-based user interfaces directly inside of Acrobat itself, thus providing a more dynamic and personalized tool, and providing JavaScript developers a means to extend collaboration, including full user interfaces.

In addition, it is now straightforward to migrate comments from one document to another, carry comments across multiple versions of a document, and anchor comments to content so that the annotations remain in the right place even if the content changes.

The advantages of this are that it is possible to automate discovery of collaboration servers, initiation workflows, and RSS feeds which may be used to populate content inside Adobe Reader.

It is significant to note that users of Acrobat Pro can enable both file-based and online collaboration, thus enabling them to invite users of Adobe Reader to participate in the review process.

The following JavaScript methods will be enabled in Adobe Reader when collaboration is enabled:

- `Doc.addAnnot`
- `Doc.importAnFDF`
- `Doc.exportAnFDF`

When collaboration is not enabled, it is still possible for annotations to appear in a browser by embedding the following statement in the FDF file:

```
Collab.showAnnotToolsWhenNoCollab = true;
```

A complete example of an FDF file that makes it possible for annotations to appear in a browser is shown below:

```
%FDF-1.2
%âãÏÓ
1 0 obj
<<
/FDF
<<
/F (file:///C:/ReaderAnnots/seafood_wallet_re.pdf)
/JavaScript
<<
/AfterPermsReady 2 0 R
>>
>>
>>
```

```
endobj
2 0 obj
<<
>>
stream
app.alert("DocumentOpen Script Start");
Collab.showAnnotToolsWhenNoCollab = true;
endstream
endobj
trailer
<<
/Root 1 0 R
>>%%EOF
```

14 Interacting with Databases

It is possible to use JavaScript for Acrobat to interact with Windows databases through an ODBC connection. This means that you can use JavaScript objects to connect to a database, retrieve tables, and execute queries. The object model associated with database interaction is centered on the `ADBC` object, which provides an interface to the ODBC connection. The `ADBC` object interacts with other objects to facilitate database connectivity and interaction `DataSourceInfo`, `connection`, `statement`, `Column`, `ColumnInfo`, `row`, and `TableInfo`. These objects can be used in document-level scripts to execute database queries.

Topics	Description
About ADBC	A brief overview of ADBC as a Windows only interface to ODBC.
Establishing an ADBC connection	Discusses how to made a connection with a database and how to extract data.
Executing SQL statements	Show how to use SQL statements to filter the type of data brought back from the database.

About ADBC

The Acrobat extensions to JavaScript provides an ODBC-compliant object model called Acrobat Database Connectivity (ADBC), which can be used in document-level scripts to connect to a database for the purposes of inserting new information, updating existing information, and deleting database entries. ADBC provides a simplified interface to ODBC, which it uses to establish a connection to a database and access its data, and supports the usage of SQL statements for data access, update, deletion, and retrieval.

Thus, a necessary requirement to the usage of ADBC is that ODBC must be installed on a client machine running a Microsoft Windows operating system. In addition, ADBC does not provide security measures with respect to database access; it is assumed that the database administrator will establish and maintain the security of all data.

The `ADBC` object provides methods through which you can obtain a list of accessible databases and form a connection with one of them. These methods are called `getDataSourceList` and `newConnection`. In addition, the `ADBC` object provides a number of properties corresponding to all supported SQL and JavaScript data types, which include representations of numeric, character, time, and date formats.

Note: To activate ADBC, create a registry key of type DWORD with the name “bJSEnable” and a value of “true” (1) in the following location:

```
HKEY_CURRENT_USER\SOFTWARE\Adobe\Adobe Acrobat\8.0\ADBC
```

This activates ADBC in Acrobat 8.0. In previous releases of Acrobat, ADBC was active by default. In Acrobat 8.0 and later, this setting was changed to require user intervention to activate ADBC because most users do not want to have ADBC accessible from PDF.

Establishing an ADBC connection

There are normally two steps required to establish an ADBC connection. First, obtain a list of accessible databases by invoking the ADBC object's getDataSourceList method. Then establish the connection by passing the Data Source Name (DSN) of one of the databases in the list to the ADBC object's newConnection method.

The getDataSourceList method returns an array of DataSourceInfo generic objects, each of which contains the following properties:

name — a string identifying the database

description — a description containing specific information about the database

In the following example, a list of all available databases is retrieved, and the DSN of the DataSourceInfo object representing Q32000Data is identified and stored in the variable DB:

```
// Obtain a list of accessible databases:
var databaseList = ADBC.getDataSourceList();

// Search the DataSourceInfo objects for the “Q32000Data” database:
if (databaseList != null) {
  var DB = "";
  for (var i=0; i<databaseList.length; i++)
    if (databaseList[i].name == "Q32000Data") {
      DB = databaseList[i].name;
      break;
    }
}
```

To establish the database connection, invoke the ADBC object's newConnection method, which accepts the following parameters:

cDSN — the Data Source Name (DSN) of the database

cUID — the user ID

cPWD — the password

The newConnection method returns a connection object, which encapsulates the connection by providing methods which allow you to create a statement object, obtain information about the list of tables in the database or columns within a table, and close the connection.

In the following example, a connection is established with the Q32000Data database:

```
if (DB != "") {
  // Connect to the database and obtain a Connection object:
  var myConnection = ADBC.newConnection(DB.name);
}
```

Normally, the DSN is known on the system, so searching for it is not necessary. You can connect in a more direct way:

```
    var myConnection = ADBC.newConnection("Q32000Data");
```

The connection object provides the methods shown in the following table.

Connection object

Method	Description
`close`	Closes the database connection.
`newStatement`	Creates a statement object used to execute SQL statements.
`getTableList`	Retrieves information about the tables within the database.
`getColumnList`	Retrieves information about the various columns within a table.

The connection object's `getTableList` method returns an array of `TableInfo` generic objects, each of which corresponds to a table within the database and contains the following properties:

`name` — the table name

`description` — a description of database-dependent information about the table

In the following example, the name and description of every table in the database is printed to the console:

```
// Obtain the array of TableInfo objects representing the database tables:
var tableArray = myConnection.getTableList();

// Print the name and description of each table to the console:
for (var i=0; i<tableArray.length; i++) {
   console.println("Table Name: " + tableArray[i].name);
   console.println("Table Description: " + tableArray[i].description);
}
```

The connection object's `getColumnList` method accepts a parameter containing the name of one of the database tables, and returns an array of `ColumnInfo` generic objects, each of which corresponds to a column within the table and contains the following properties:

`name` — the name of the column

`description` — a description of database-dependent information about the column

`type` — a numeric identifier representing an `ADBC` SQL type

`typeName` — a database-dependent string representing the data type

In the following example, a complete description of every column in the `Q32000Data` database table called `Sales` is printed to the console:

```
// Obtain the array of ColumnInfo objects representing the Sales table:
var columnArray = myConnection.getColumnList("Sales");

// Print a complete description of each column to the console:
for (var i=0; i<columnArray.length; i++) {
   console.println("Column Name: " + columnArray[i].name);
   console.println("Column Description: " + columnArray[i].description);
   console.println("Column SQL Type: " + columnArray[i].type);
   console.println("Column Type Name: " + columnArray[i].typeName);
}
```

Executing SQL statements

To execute SQL statements, first create a statement object by invoking the connection object `newStatement` method. The newly created statement object can be used to access any row or column within the database table and execute SQL commands.

In the following example, a statement object is created for the `Q32000Data` database created in the previous sections:

```
myStatement = myConnection.newStatement();
```

The statement object provides the methods shown the following table.

Statement object

Method	Description
`execute`	Executes an SQL statement.
`getColumn`	Obtains a column within the table.
`getColumnArray`	Obtains an array of columns within the table.
`getRow`	Obtains the current row in the table.
`nextRow`	Iterates to the next row in the table.

In addition to the methods shown above, the statement object provides two useful properties:

`columnCount` — the number of columns in each row of results returned by a query

`rowCount` — the number of rows affected by an update

To execute an SQL statement, invoke the statement object `execute` method, which accepts a string parameter containing the SQL statement. Note that any names containing spaces must be surrounded by escaped quotation marks, as shown in the following example:

```
// Create the SQL statement:
var SQLStatement = 'Select * from \"Client Data\"';

// Execute the SQL statement:
myStatement.execute(SQLStatement);
```

There are two steps required to obtain a row of data. First, invoke the statement object `nextRow` method; this makes it possible to retrieve the row's information. Then, invoke the statement object `getRow` method, which returns a `Row` generic object representing the current row.

In the example shown below, the first row of information will be displayed in the console. Note that the syntax is simplified in this case because there are no spaces in the column names:

```
// Create the SQL statement:
var st = 'Select firstName, lastName, ssn from \"Employee Info\"';

// Execute the SQL statement:
myStatement.execute(st);

// Make the next row (the first row in this case) available:
myStatement.nextRow();
```

```
// Obtain the information contained in the first row (a Row object):
var firstRow = myStatement.getRow();

// Display the information retrieved:
console.println("First name: " + firstRow.firstName.value);
console.println("Last name: " + firstRow.lastName.value);
console.println("Social Security Number: " + firstRow.ssn.value);
```

If the column names contain spaces, the syntax can be modified as shown below:

```
// Create the SQL statement:
var st = 'Select \"First Name\", \"Last Name\" from \"Employee Info\"';

// Execute the SQL statement:
myStatement.execute(st);

// Make the next row (the first row in this case) available:
myStatement.nextRow();

// Obtain the information contained in the first row (a Row object):
var firstRow = myStatement.getRow();

// Display the information retrieved:
console.println("First name: " + firstRow["First Name"].value);
console.println("Last name: " + firstRow["Last Name"].value);
```

15 SOAP and Web Services

Acrobat 7.0 and later provides support for the SOAP 1.1 and 1.2 standards in order to enable PDF forms to communicate with web services. This support has made it possible to include both SOAP header and body information, send binary data more efficiently, use document/literal encoding, and facilitate authenticated or encrypted communications. In addition, it provides the ability to locate network services using DNS Service Discovery. All of this makes it possible to integrate PDF files into existing workflows by binding XML forms to schemas, databases, and web services. These workflows include the ability to share comments remotely or invoke web services through form field actions.

Topics	Description
Using SOAP and web services	Describes the major methods and properties of the SOAP object; also discusses such topics as synchronous and asynchronous information exchange, exchanging file attachments and binary data, accessing SOAP header information and authentication.
DNS service discovery	How to the `queryServices` and `resolveService` methods to locate the service on the network and bind to it for communications.
Managing XML-based information	How to use XPath to extract XML data.
Workflow applications	Discusses how a SOAP-based collaboration server can be used to share comments remotely via a web-based comment repository.

Note: Beginning with version 8, the `SOAP` object is deprecated, though support will continue. Use the `Net.SOAP` when developing any new web services. See the documentation of the `Net` object in the JavaScript for Acrobat API Reference for details.

Using SOAP and web services

JavaScript for Acrobat provides a `SOAP` object that encapsulates the support for web services and service discovery. Through the usage of this object, you can extend and customize your workflows by engaging in XML-based communication with remote servers.

The `SOAP` object has a `wireDump` property that sends all XML requests and responses to the JavaScript Console for debugging purposes. In addition, the `SOAP` object provides the methods described in the following table.

SOAP object

Method	Description
`connect`	Obtains a WSDL proxy object used to invoke a web service.
`queryServices`	Locates network services using DNS Service Discovery.
`resolveService`	Binds a service name to a network address and port.
`request`	The principal method used to invoke a web service.

Method	Description
`response`	A callback method used in asynchronous web method calls.
`streamDecode`	Decodes a Base64 or Hex stream object.
`streamEncode`	Applies Base64 or Hex encoding to a stream object.
`streamFromString`	Converts a string to a stream object.
`stringFromStream`	Converts a stream object to a string.

SOAP and web services topics

- Using a WSDL proxy to invoke a web service
- Synchronous and asynchronous information exchange
- Using document/literal encoding
- Exchanging file attachments and binary data
- Converting between string and readstream information
- Accessing SOAP version information
- Accessing SOAP header information
- Authentication
- Error handling

Using a WSDL proxy to invoke a web service

When connecting to a web service, your JavaScript code may use a WSDL proxy object to generate a SOAP envelope. The envelope contains a request for the server to run a web method on behalf of the client. To obtain the WSDL proxy object, invoke the `SOAP` object's `connect` method, which accepts a single parameter containing the HTTP or HTTPS URL of the WSDL document.

The returned proxy object contains the web methods available in the web service described by the WSDL document. If the web service uses SOAP/RPC encoding, the parameters in the proxy object's methods will match the order specified in the WSDL document. If the web service uses document/literal encoding, the methods will accept a single parameter describing the request message.

In the example shown below, a connection to a web service will be established, and its RPC-encoded web methods will be invoked. Assume that `myURL` contains the address of the WSDL document:

```
// Obtain the WSDL proxy object:
var myProxy = SOAP.connect(myURL);

// Invoke the echoString web service, which requires a string parameter:
var testString = "This is a test string.";
var result = myProxy.echoString(testString);

// Display the response in the console:
console.println("Result is " + result);

// Invoke the echoInteger web service, which requires an integer parameter:
// Since JavaScript does not support XSD-compliant integer values,
// we will create an integer object compliant with the XSD standard:
var myIntegerObject = {
  soapType: "xsd:int",
  soapValue: "10"
};
var result = myProxy.echoInteger(myIntegerObject);

// Display the response in the console:
console.println("Result is " + result);
```

Note that each call to a web method generates a SOAP envelope that is delivered to the web service, and that the return value is extracted from the corresponding envelope returned by the web service. Also, since XML relies on text, there is no problem sending a string to the web service. In the case of integers, however, it is necessary to create an XSD-compliant object to represent the integer value. JavaScript for Acrobat does support some of the standard data types specified in the XSD. These are shown in the following table.

XSD-compliant data types supported in JavaScript

JavaScript type	Equivalent XSD-compliant type
`String`	`xsd:string`
`Number`	`xsd:float`
`Date`	`xsd:dateTime`
`Boolean`	`xsd:boolean`
`ReadStream`	`SOAP-ENC:base64`
`Array`	`SOAP-ENC:Array`

Synchronous and asynchronous information exchange

The `SOAP` object `request` method may be used to establish either synchronous or asynchronous communication with a web service, and provides extensive support for SOAP header information, firewall support, the type of encoding used, namespace qualified names, compressed or uncompressed attachments, the SOAP protocol version to be used, authentication schemes, response style, and exception handling.

The `request` method accepts the parameters shown in the following table.

Request method

Parameter	Description
`cURL`	URL for SOAP HTTP endpoint.
`oRequest`	Object containing RPC information.
`oAsync`	Object used for asynchronous method invocation.
`cAction`	SOAPAction header used by firewalls and servers to filter requests.

Parameter	Description
bEncoded	Indicates whether SOAP encoding is used.
cNamespace	Message schema namespace when SOAP encoding is not used.
oReqHeader	SOAP header to be included with request.
oRespHeader	SOAP header to be included with response.
cVersion	SOAP protocol version to be used (1.1 or 1.2).
oAuthenticate	Authentication scheme.
cResponseStyle	The type and structure of the response information (JS, XML, Message).
cRequestStyle	Indicates how oRequest is interpreted.
cContentType	Specifies the HTTP content-type header.

Establishing a synchronous connection

The SOAP object request method may be used to establish a synchronous connection with a web service. To establish the connection and invoke the web methods, it is necessary to provide the cURL, oRequest, and cAction parameters. The example below demonstrates how to invoke the same web services used in the previous example.

Similar to the parameter used in the connect method, the cURL parameter contains the URL for the WSDL document. For the purposes of our example, assume that myURL represents the WSDL document location.

The oRequest parameter is a fully qualified object literal specifying both the web method name and its parameters, in which the namespace is separated from the method name by a colon. It may also contain the following properties:

soapType — the SOAP type used for the value

soapValue — the SOAP value used when generating the message

soapName — the element name used when generating the SOAP message

soapAttributes — an object containing the XML attributes in the request node

soapQName — the namespace-qualified name of the request node

soapAttachment — determines whether soapValue is encoded as an attachment according to the SwA/MTOM specification. In this case, soapValue will be a stream.

Assume that the namespace is http://www.example.com/methods, the method name is echoString, and it accepts a string parameter called inputString. The following code represents the oRequest parameter:

```
var echoStringRequest = {
  "http://www.example.com/methods:echoString {
    inputString: "This is a test."
  }
};
```

The cAction parameter contains header information described by the WSDL document that is used by firewalls to filter SOAP requests. In our example, we will supply the location of the WSDL document:

```
var mySOAPAction = "http://www.example.com/methods";
```

We may now invoke the echoString web method:

```
var response = SOAP.request ({
   cURL: myURL,
   oRequest: echoStringRequest,
   cAction: mySOAPAction
});
```

In the case of synchronous requests such as this one, the value returned by the request method (response in this example) is an object containing the result of the web method, which will be one of the JavaScript types corresponding to XSD types. The default format for the response value is an object describing the SOAP body (or header) of the returned message.

Note: In the case of base64 or hex encoding of binary information, the type returned will be a readStream object.

We may now obtain the returned value by using syntax that corresponds to the SOAP body sent back by the web method:

```
var responseString = "http://www.example.com/methods:echoStringResponse";
var result = response[responseString]["return"];

// Display the response in the console:
console.println("Result is " + result);
```

Similarly, we can invoke the echoInteger method. To do this, we will use the same value for the cURL and cAction parameters, and develop an oRequest parameter like the one we used for the echoString method. In this case, however, we must supply an XSD-compliant object to represent the integer value:

```
var myIntegerObject = {
   soapType: "xsd:int",
   soapValue: "10"
};

var echoIntegerRequest = {
   "http://www.example.com/methods:echoInteger {
      inputInteger: myIntegerObject
   }
};
```

Now we may invoke the echoInteger web method and display its results:

```
var response = SOAP.request ({
   cURL: myURL,
   oRequest: echoIntegerRequest,
   cAction: mySOAPAction
});

var responseString = "http://www.example.com/methods:echoIntegerResponse";
var result = response[responseString]["return"];

// Display the response in the console:
```

```
console.println("Result is " + result);
```

Asynchronous web service calls

The SOAP object request method may be used in conjunction with the response method to establish asynchronous communication with a web service. In this case, the request method calls a method on the notification object, and does not return a value.

Asynchronous communication is made possible by assigning a value to the request method's aSync parameter, which is an object literal that must contain a function called response that accepts two parameters: oResult (the result object) and cURI (the URI of the requested HTTP endpoint).

In the example below, the aSync parameter named mySync contains an attribute called isDone, which is used to monitor the status of the web service call, and an attribute called val which will contain the result of the web service call. When the response function is called by the web service, it sets isDone to true indicating that the asynchronous call has been completed:

```
// Create the aSync parameter:
var mySync = {
  isDone: false,
  val: null,

  // Generates the result of the web method:
  result: function(cMethod)
  {
    this.isDone = false;
    var name = "http://www.example.com/methods/:" + cMethod + "Response";

    if (typeof this.val[name] == "undefined")
      return null;
    else
      return this.val[name]["return"];
  },

  // The method called by the web service after completion:
  response: function(oResult, cURI)
  {
    this.val = oResult;
    this.isDone = true;
  },

  // While the web service is not done, do something else:
  wait: function()
  {
    while (!this.isDone) doSomethingElse();
  }
};

// Invoke the web service:
SOAP.request({
  cURL: myURL,
  oRequest: echoIntegerRequest,
  oAsync: mySync,
  cAction: mySOAPAction
});
```

```
// The response callback function could contain the following code:

// Handle the asynchronous response:
var result = mySync.result("echoInteger");

// Display the response in the console:
console.println("Result is " + result);
```

Using document/literal encoding

You can use document/literal encoding in your SOAP messages by assigning values to the following parameters of the `request` method:

`bEncoded` — Assign a value of `false` to this parameter.

`cNamespace` — Specify a namespace for the message schema.

`cResponseStyle` — Assign `SOAPMessageStyle.JS`, `SOAPMessageStyle.XML`, or `SOAPMessageStyle.Message` value to this parameter.

Once this is done, fill the `oRequest` parameter with an object literal containing the data. An example is given below:

```
// Set up two integer values to be added in a web method call:
var aInt = {soapType: "xsd:int", soapValue: "10"};
var bInt = {soapType: "xsd:int", soapValue: "4"};

// Set up the document literal:
var req = {};
req["Add"] = {a: aInt, b: bInt};

// Invoke the web service:
var response = SOAP.request({
  cURL: myURL,
  oRequest: req,
  cAction: mySOAPAction,
  bEncoded: false,
  cNamespace: myNamespace,
  cResponseStyle: SOAPMessageStyle.Message
});
// Display the response to the console:
var value = response[0].soapValue[0].soapValue;
console.println("ADD(10 + 4) = " + value);
```

Exchanging file attachments and binary data

As you learned earlier, the `oRequest` parameter provides alternative options for sending binary-encoded data. This may be useful for sending information such as serialized object data or embedded images. You can embed binary information in text-based format in the SOAP envelope by using base64 encoding, or take advantage of the Soap With Attachments (SwA) standard or the Message Transmission Optimization Mechanism (MTOM) to send the binary data in a more efficient format. Both SwA and MTOM can significantly reduce network transmission time, file size, and XML parsing time.

SwA can be used by setting the `oRequest` parameter `soapAttachment` value to `true`, as shown in the example below. Assume `myStream` is a `readStream` object containing binary data:

```
// Use the SwA standard:
var SwARequest = {
   "http://www.example.com/methods:echoAttachment": {
      dh:
      {
         soapAttachment: true,
         soapValue: myStream
      }
   }
};

var response = SOAP.request ({
   cURL: myURL,
   oRequest: SwARequest
});

var responseString =
      "http://www.example.com/methods:echoAttachmentResponse";
var result = response[responseString]["return"];
```

MTOM is used by additionally setting the `request` method's `bEncoded` parameter to `false` and the `cNamespace` parameter to an appropriate value. This is illustrated in the following code, which creates an `oRequest` object:

```
// Use the MTOM standard:
var MTOMRequest = {
   "echoAttachmentDL": {
      dh:
      {
         inclusion:
         {
            soapAttachment: true,
            soapValue: myStream
         }
      }
   }
};

var response = SOAP.request({
   cURL: myURL,
   oRequest: MTOMRequest,
   bEncoded: false,
   cNamespace: myNamespace
});
```

Converting between string and readstream information

The `SOAP` object `streamFromString` and `stringFromStream` methods are useful for converting between formats. The `streamFromString` method is useful for submitting data in a web service call, and the `stringFromStream` method is useful for examining the contents of a response returned by a web service call. An example is shown below:

```
// Create a ReadStream object from an XML string:
```

```
var myStream = streamFromString("<mom name = 'Mary'></mom>");

// Place the information in an attachment:
this.setDataObjectContents("org.xml", myStream);

// Convert the ReadStream object back to a string and display in console:
console.println(stringFromStream(myStream));
```

Accessing SOAP version information

Acrobat 7.0 and later provides improved support for SOAP Version 1.1 and support for Version 1.2. To encode the message using a specific version, assign one of the following values to the `request` method's `cVersion` parameter: `SOAPVersion.version_1_1` (SOAP Version 1.1) or `SOAPVersion.version_1_2` (SOAP Version 1.2). Its usage is shown in the following example:

```
var response = SOAP.request ({
  cURL: myURL,
  oRequest: myRequest,
  cVersion: SOAPVersion.version_1_2
});
```

Accessing SOAP header information

You can send SOAP header information to the web service using the `request` method's `oReqHeader` parameter, and access the returned header information using the `oRespHeader` parameter. The `oReqHeader` is identical to the `oRequest` object, with the addition of two attributes:

`soapActor` — the SOAP actor that should interpret the header

`soapMustUnderstand` — determines whether the SOAP actor must understand the header contents

Their usage is shown in the following example:

```
// Set up the namespace to be used:
var myNamespace = "http://www.example.com/methods/:";

// Create the oReqHeader parameter:
var sendHeader = {};
sendHeader[myNamespace + "testSession"] = {
  soapType: "xsd:string",
  soapValue: "Header Test String"
};

// Create the intially empty oRespHeader parameter:
var responseHeader = {};
responseHeader[myNamespace + "echoHeader"] = {};

// Exchange header information with the web service:
var response = SOAP.request({
  cURL: myURL,
  oRequest: {},
  cAction: "http://www.example.com/methods",
  oReqHeader: sendHeader,
  oRespHeader: responseHeader
});
```

Authentication

You can use the `request` method's `oAuthenticate` parameter to specify how to handle HTTP authentication or provide credentials used in Web Service Security (WS-Security). Normally, if authentication is required, an interface will handle HTTP authentication challenges for BASIC and DIGEST authentication using the SOAP header, thus making it possible to engage in encrypted or authenticated communication with the web service. This parameter helps to automate the authentication process.

The `oAuthenticate` parameter contains two properties:

`Username` — A string containing the username

`Password` — A string containing the authentication credential

Its usage is shown in the following example:

```
// Create the oAuthenticate object:
var myAuthentication = {
   Username: "myUsername",
   Password: "myPassword"
};

// Invoke the web service using the username and password:
var response = SOAP.request ({
   cURL: myURL,
   oRequest: echoStringRequest,
   cAction: mySOAPAction
   oAuthenticate: myAuthentication
});
```

Error handling

The `SOAP` object provides extensive error handling capabilities within its methods. In addition to the standard JavaScript for Acrobat exceptions, the `SOAP` object also provides `SOAPError` and `NetworkError` exceptions.

A `SOAPError` exception is thrown when the SOAP endpoint returns a SOAPFault. The `SOAPError` exception object will include information about the SOAP Fault code, the SOAP Actor, and the details associated with the fault. The `SOAP` object's `connect` and `request` methods support this exception type.

A `NetworkError` exception is thrown when there is a problem with the underlying HTTP transport layer or in obtaining a network connection. The `NetworkError` exception object will contain a status code indicating the nature of the problem. The `SOAP` object's `connect`, `request`, and `response` methods support this exception type.

DNS service discovery

Suppose the exact URL for a given service is not known, but that it is available locally because it has been published using *DNS Service Discovery* (DNS-SD). You can use the `SOAP` object `queryServices` and `resolveService` methods to locate the service on the network and bind to it for communications.

The `queryServices` method can locate services that have been registered using Multicast DNS (mDNS) for location on a local network link, or through unicast DNS for location within an enterprise. The method performs an asynchronous search, and the resultant service names can be subsequently bound to a network location or URL through the SOAP object resolveService method.

The queryServices method accepts the following parameters:

cType — The DNS SRV service name (such as “http” or “ftp”)

oAsync — A notification object used when services are located or removed (implements addServices and removeServices methods). The notification methods accept a parameter containing the following properties:

name — the Unicode display name of the service

domain — the DNS domain for the service

type — the DNS SRV service name (identical to cType)

aDomains — An array of domains for the query. The valid domains are ServiceDiscovery.local (searches the local networking link using mDNS) and ServiceDiscovery.DNS (searches the default DNS domain using unicast DNS).

An example of its usage is shown below:

```
// Create the oAsync notification object:
var myNotifications = {
  // This method is called whenever a service is added:
  addServices: function(services)
  {
    for (var i=0; i<services.length; i++) {
      var str = "ADD: ";
      str += services[i].name;
      str += " in domain ";
      str += services[i].domain;
      console.println(str);
    }
  },
  // This method is called whenever a service is removed:
  removeServices: function(servces)
  {
      var str = "DEL: ";
      str += services[i].name;
      str += " in domain ";
      str += services[i].domain;
      console.println(str);
  }
};

// Perform the service discovery:
SOAP.queryServices({
  cType: "http",
  oAsync: myNotifications,
  aDomains: [ServiceDiscovery.local, ServiceDiscovery.DNS]
});
```

Once a service has been discovered, it can be bound through the `SOAP` object `resolveService` method to a network address and port so that a connection can be established. The `resolveService` method accepts the following parameters:

`cType` — the DNS SRV service name (such as “http” or “ftp”).

`cDomain` — the domain in which the service is located.

`cService` — the service name to be resolved.

`oResult` — a notification object used when the service is resolved. It implements a `resolve` method that accepts parameters `nStatus` (`0` if successful) and `oInfo` (used if successful, contains a `serviceInfo` object). The `serviceInfo` object contains the following properties:

`target` — the IP address or DNS name of the machine providing the service.

`port` — the port on the machine.

`info` — an object with name/value pairs supplied by the service.

Its usage is illustrated in the following example:

```
// Create the oAsync notification object:
var myNotification = {
   // This method is called when the service is bound:
   resolve: function(nStatus, oInfo)
   {
      // Print the location if the service was bound:
      if (nStatus == 0){
         var str = "RESOLVE: http://";
         str += oInfo.target;
         str += ":";
         str += oInfo.port;
         str += "/";
         str += oInfo.info.path;
         console.println(str);
      }
      // Display the error code if the service was not bound:
      else
         console.println("ERROR: " + nStatus);
   }
};

// Attempt to bind to the service:
SOAP.resolveService({
   cType: "http",
   cDomain: "local.",
   cService: "My Web Server",
   oResult: myNotification
});
```

Managing XML-based information

JavaScript for Acrobat provides support for XML-based information generated within your workflows by providing an `XMLData` object, which represents an XML document tree that may be manipulated via the

XFA Data DOM. (For example, it is possible to apply an XSL transformation (XSLT) to a node and its children using the `XFA` object). The `XMLData` object provides two methods for manipulating XML documents:

`parse` — Creates an object representing an XML document tree.

`applyXPath` — Permits the manipulation and query of an XML document via XPath expressions.

You can convert a string containing XML information into a document tree using the `XMLData` object `parse` method, and then manipulate and query the tree using its `applyXPath` method.

The `XMLData` object's `parse` method accepts two parameters:

`param1` — A string containing the text in the XML document.

`param2` — A Boolean value that determines whether the root node should be ignored.

Its usage is illustrated below:

```
// XML string to be converted into a document tree:
myXML = "<family name = 'Robat'>\
       <mom id = 'm1' name = 'Mary' gender = 'F'>\
         <child> m2 </child>\
         <personal>\
           <income>75000</income>\
         </personal>\
       </mom>\
       <son id = 'm2' name = 'Bob' gender = 'M'>\
         <parent> m1 </parent>\
         <personal>\
           <income>35000</income>\
         </personal>\
       </son>\
     </family>";

// Generate the document tree:
var myTree = XMLData.parse(myXML, false);

// Print mom's name:
console.println("Mom: " + myXML.family.mom.value);

// Change son's income:
myXML.family.son.personal.income.value = 40000;
```

The `XMLData` object `applyXPath` method accepts two parameters:

`oXML` — An object representing the XML document tree.

`cXPath` — A string containing an XPath query to be performed on the document tree.

In the following example, assume that `myXML` is the document tree obtained in the previous example:

```
// Obtain mom's information:
var momInfo = XMLData.applyXPath(myXML, "//family/mom");

// Save the information to a string:
momInfo.saveXML('pretty');

// Give mom a raise:
momInfo.personal.income.value = "80000";
```

Workflow applications

Support for SOAP in JavaScript for Acrobat has a major impact on collaboration workflows. A SOAP-based collaboration server can be used to share comments remotely via a web-based comment repository. Through the DNS Service Discovery support, it is possible to enable dynamic discovery of collaboration servers, initiation workflows, and RSS feeds that can provide customized user interfaces, via XML, directly inside of Acrobat 7.0 or later.

In addition, it is possible to deploy web-based scripts that always maintain the most updated information and processes, and to connect to those scripts via form field actions that invoke web services.

In the following example, a form is submitted to a server using a SOAP-based invocation:

```
// Populate the content object with form and SOAP information:
var location = "http://example.com/Acrobat/Form/submit/"
var formtype = location + "encodedTypes:FormData";
var content = new Array();
for(var i = 0; i < document.numFields; i++) {
     var name = document.getNthFieldName(i);
     var field = document.getField(name);
     content[i] = new Object();
     content[i].soapType = formtype;
     content[i].name = field.name;
     content[i].val = field.value;
}

// Send the form to the server:
   SOAP.request({
      cURL: cURL,
      oRequest: {
         location + ":submitForm":
         {
            content: content
         }
      },
      cAction: location + "submitForm"
   }
```

16 Interfacing with 3D JavaScript

In this chapter, you will learn about how to connect the JavaScript engine for Acrobat with the JavaScript engine used for 3D annotations, giving you access to the entire 3D JavaScript API. Though this chapter is not a tutorial on the 3D JavaScript API, some of the APIs will be demonstrated through the examples.

Topics	Description
Basic concepts	Overview of the 3D JavaScript engine and how to access it using the JavaScript engine for Acrobat.
Getting the Annot3D object of the 3D annotation	Discusses how to get a Annot3D object and how it is used to access the JavaScript 3D engine.
Using the default script of a 3D annotation	The default script of a 3D annotation is executed by the JavaScript 3D engine, here, techniques for calling functions defined as default script form the JavaScript engine for Acrobat.
Initializing upon activation	Techniques for initializing variables defined in the default script of a 3D annotation, when that annotation is activated.

Basic concepts

To create 3D annotations and attach scripts to them using the JavaScript for 3D API you need Acrobat Pro or Acrobat 3D. Those scripts can run on Acrobat 3D, Acrobat Pro, Acrobat Standard, and Adobe Reader for Windows and Mac OS platforms. Unless otherwise noted, all JavaScript objects, properties, and methods have support starting in version 7.0.

When you create a 3D annotation, it has certain default behaviors that allow the user to interact with the 3D model. These behaviors, which are accessed through the 3D Annotation's toolbar, are Rotate, Spin, Pan, Zoom, Measurement, Play/Pause Animation, Use Perspective/Orthographic Projection, Model Render Mode, Lighting Scheme, Background Color and Toggle Cross Section.

If you wish to enhance the user's 3D experience beyond the default behaviors, you must use the JavaScript API for 3D annotations. With the 3D JavaScript engine, you can specify the render modes and 3D matrix transformations of any of the individual meshes; set camera position, target, and field of view; detect mouse and keyboard events; control animations, and many more behaviors. The document JavaScript for Acrobat 3D Annotations API Reference is the complete reference for the JavaScript API for 3D annotations.

The 3D JavaScript engine, which is distinct from the JavaScript engine for Acrobat, can be accessed in one of two ways:

- The primary way is by attaching a *default script* to the 3D annotation. This can be accomplished while placing a 3D annotation using the 3D Tool or on an existing 3D annotation by accessing its properties dialog box using the Select Object tool. This script will be run directly by the 3D JavaScript engine.
- Acrobat provides a mechanism to directly access the entire 3D JavaScript engine API from within Acrobat's own scripting engine by means of the JavaScript `Annot3D.context3D` property. This allows the author to wire up elements on the PDF page, such as buttons and links, to manipulate the 3D content.

The second method is the primary focus of this chapter, but we must necessarily address the default script of the 3D annotation.

Getting the Annot3D object of the 3D annotation

To get access to the JavaScript 3D API engine from an Acrobat form or link, you must first get the Annot3D object of the annotation. There are two methods for doing this: `Doc.getAnnot3D` and `Doc.getAnnots3D`.

The Doc method `getAnnot3D` takes two parameters:

`nPage` — The 0-based page number that contains the 3D annotation

`cName` — The `name` of the 3D annotation

A 3D annotation is not required to have a name, and there is no UI for entering the name of the annotation, so this method may not be useful unless you've already programmatically assigned a name to the 3D annotation, see the Example Assigning a name to a 3D annotation. For a 3D annotation on page 1 of the document with a name of `my3DAnnot`, we can acquire the Annot3D object as follows:

```
var oMy3DAnnot = this.getAnnot3D(0, "my3DAnnot");
```

Note that the first argument has a value of 0 because the index of the page is one less than the page number.

The Doc method `getAnnots3D` returns the array of all Annot3D objects on a specified page. This method takes only a parameter of `nPage`, the 0-based page number,

```
var aMy3DAnnots = this.getAnnots3D(0);
```

The variable `aMy3DAnnots` is either undefined, or is an array of Annot3D objects.

Example: *Assigning a name to a 3D annotation*

Suppose your target annotation is the first annotation on page 0 of the document. The following script is executed from the JavaScript console.

```
var aMy3DAnnots = this.getAnnots3D(0);
aMy3DAnnots[0].name = "my3DAnnot";
```

Annot3D properties

The Annot3D has a number of properties, as summarized in the table below.

Property	Description
`activated`	A Boolean value, which if `true`, indicates that the 3D model is activated.
`context3D`	If `activated` is `true`, this property returns the context of the 3D annotation, a `global` object containing the 3D scene.
`innerRect`	An array of four numbers specifying the lower-left x, lower-left y, upper-right x and upper-right y coordinates, in the coordinate system of the annotation (lower-left is [0, 0], top right is [width, height]), of the 3D annotation's 3D bounding box, where the 3D artwork is rendered.

Property	Description
`name`	The name of the annotation.
`page`	The 0-based page number of the page containing the annotation.
`rect`	Returns an array of four numbers specifying the lower-left x, lower-left y, upper-right x and upper-right y coordinates, in default user space, of the rectangle defining the location of the annotation on the page.

Of particular importance is the `context3D` property. The object returned is, in fact, the handle to the JavaScript 3D engine.

Acquiring the JavaScript 3D engine

Having acquired the Annot3D object of your 3D annotation, as described above, the next step is to get the object that gives you access to the JavaScript 3D engine. This is done through the `context3D` property of the Annot3D object. In the script below, we get the Annot3D object of the first annotation on page 0 of the document, then we get the object that gives us access to the 3D engine.

```
var aMy3DAnnots = this.getAnnots3D(0);
var c3d = aMy3DAnnots[0].context3D;
```

Alternatively, we can use a single line of code.

```
var c3d = this.getAnnots3D(0)[0].context3D;
```

The `context3D` will be undefined until the corresponding annotation is activated. You may need to check in your script for this condition before attempting to execute script commands on the 3D annotation.

```
var c3d = this.getAnnots3D(0)[0].context3D;
if ( typeof c3d != "undefined" ) {
   // 3D annotation activated
   ....
} else {
   // 3D annotation not activated
   ...
}
```

The example below demonstrates how to acquire the JavaScript 3D engine, and to use it to rotate a component of the 3D content.

Example: ***Rotating a named object in a 3D model***

Suppose that you have a 3D annotation and that you wish to create a button or link to rotate a U3D object. Suppose that the object you wish to rotate is named "Axes". The following script is a mouse-up button action, or perhaps, a link action, that does the job.

```
// Get index of the page containing the Annot3D object (count starts at 0).
pageIndex = this.pageNum;

// Index of the Annot3D (count starts at 0).
annotIndex = 0;

// Get a reference to the Annot3D script context.
var c3d = this.getAnnots3D( pageIndex )[ annotIndex ].context3D;
```

```
if ( typeof c3d != "undefined" ) {
   // Get a reference to the node in the scene named "Axes".
   axes = c3d.scene.nodes.getByName( "Axes" );

   // Rotate the object about the X-Axis PI/6 radians (30 degrees).
   axes.transform.rotateAboutXInPlace( Math.PI / 6 );
}
```

Using the default script of a 3D annotation

The rotation problem of the Example Rotating a named object in a 3D model was simple enough that it was not necessary to use the default script of the 3D annotation. In this section, we present several examples illustrating the use of the default script.

Unlike JavaScript for Acrobat, which has a build-in Acrobat editor, the default script of a 3D annotation must be written using an external text editor and imported into the 3D annotation via the UI. The script is saved with a `.js` extension.

➤ To import a script into a 3D annotation

1. If not already showing, display the Advanced Editing toolbar, by selecting **Tools** > **Advanced Editing** > **Show Advanced Editing Toolbar**.
2. On the page containing your 3D annotation, select the **Select Object** tool from the Advanced Editing toolbar.
3. Double-click the 3D annotation to view the 3D Properties dialog box.
4. Click the **Edit Content** button.
5. In the Add 3D Content dialog box, click the **Browse** button corresponding to the Default Script, and browse for your `.js` file.
6. Once located, click **Open** to import the file as the default script of the 3D annotation.
7. Click **OK** to exit the Add 3D Content dialog box, then click **OK** to exit the 3D Properties dialog box.
8. Click the **Hand** tool to exit Select Object mode.

Note: The default script for a 3D annotation is executed directly by the JavaScript 3D engine.

Example: *Setting the render mode of a 3D model*

Create a button that changes the render mode of a 3D annotation to "transparent".

The default script of the 3D annotation defines a function `setRenderMode`, which goes through all the meshes of the scene and changes the render mode of that mesh to the mode passed to the function.

```
function setRenderMode( renderModeName ) {
   for (var i=0; i < scene.meshes.count; i++) {
      scene.meshes.getByIndex(i).renderMode = renderModeName;
   }
}
```

Now to call the function `setRenderMode` from a button or link using the JavaScript engine for Acrobat, you would have script as follows:

```
// Get the Annot3D script context of the targeted annot.
var c3D = getAnnots3D(0)[0].context3D;

// Call the JavaScript function setRenderMode() defined in the default
// script of the referenced 3D annotation.
c3D.setRenderMode("transparent");
```

Initializing upon activation

When you have developed a general “library” of JavaScript functions to manipulate 3D content, you might want to set the values of certain parameters of one or more of these functions when the 3D annotation is activated without having to edit the default script itself. One approach for this is to insert a script at the document level to make the initialization. Below is a template for an initialization function:

```
   function initialize()
   {
      console.println( "\nchecking for 3D Annotation activation..." );

      if ( waitingFor3DActivated )
      {
         var a3d = getAnnots3D(0)[0];
         if ( a3d.activated )
         {
            waitingFor3DActivated = false;
            console.println( "...3D Annotation is activated." );
            app.clearInterval( timeout );

            c3D = a3d.context3D;

            // 3D annotation has been activated, do any initializations here
         }

         if ( timeout.count >= 10 ) // Set to 10 seconds
         {
            console.println( "The 3D annotation is still not activated" );
            console.println(    "Time limit exceeded, terminating
initialization");
            app.clearInterval( timeout );
         }
      }
      timeout.count++;
   }

   // Check for activation every second
   timeout = app.setInterval( "initialize()", 1000 );
   timeout.count = 0;
   var waitingFor3DActivated = true;
```

See the example that follows.

Example: ***Setting the background color of the canvas on activation***

A simple example of this initialization is to set the background color when the 3D annotation becomes activated.

The following script is executed as a document level script.

```
   function initialize()
   {
      console.println( "\nchecking for 3D Annotation activation..." );

      if ( waitingFor3DActivated )
      {
         var a3d = getAnnots3D(0)[0];
         if ( a3d.activated )
         {
            waitingFor3DActivated = false;
            console.println( "...3D Annotation is activated." );
            app.clearInterval( timeout );

            c3D = a3d.context3D;

            // The function setBackgroundColor is defined as part of the
            // default script, so it must be executed using the 3D JS engine
            // Here, we set the background color of the canvas to dark green.
            c3D.setBackgroundColor( 0, 0.6, 0 );
         }

         if ( timeout.count >= 10 ) // set to 10 seconds
         {
            console.println( "The 3D Annotation is still not activated" );
            console.println(    "Time limit exceeded, terminating
initialization");
            app.clearInterval( timeout );
         }
      }

      timeout.count++;
   }

   // Check for activation every second
   timeout = app.setInterval( "initialize()", 1000 );
   timeout.count = 0;
   var waitingFor3DActivated = true;
```

The default script of the 3D annotation contains the following script:

```
// The variable theBackground is initially set to null. When the
// renderEventHandler is set to canvas background just before the runtime
// engine renders the 3D model.
var theBackground = null;

function setBackgroundColor( r, g, b )
{
   theBackground.setColor(new Color( r, g, b ));
}
```

```
// Create a new render event handler
renderEventHandler = new RenderEventHandler();
// Define the onEvent property that will handle things when the 3D is
// rendered
renderEventHandler.onEvent = function( event )
{
  // Remove this handler after it has executed once.
  runtime.removeEventHandler( this );
  // Set theBackground to point to the background of the canvas.
  theBackground = event.canvas.background;
}
// Add our new handler using the addEventHandler method of the runtime
// object.
runtime.addEventHandler( renderEventHandler );
```

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