EXHIBIT 3

Adobe Flash

From Wikipedia, the free encyclopedia

Adobe Flash (formerly **Macromedia Flash**) is a multimedia platform used to add animation, video, and interactivity to web pages. Flash is frequently used for advertisements and games. More recently, it has been positioned as a tool for "Rich Internet Applications" ("RIAs").

Flash manipulates vector and raster graphics to provide animation of text, drawings, and still images. It supports bidirectional streaming of audio and video, and it can capture user input via mouse, keyboard, microphone, and camera. Flash contains an Object-oriented language called ActionScript.

Flash content may be displayed on various computer systems and devices, using Adobe Flash Player, which is available free of charge for common web browsers, some mobile phones and a few other electronic devices (using Flash Lite).

Some users feel that Flash enriches their web experience, while others find the extensive use of Flash animation, particularly in advertising, intrusive and annoying, giving rise to a cottage industry that specializes in blocking Flash content.[1] Flash has also been criticized for adversely affecting the usability of web pages.[2]

Contents

History

Originally developed by Macromedia, Flash was introduced in 1996, and is currently developed and distributed by Adobe Systems, as the result of their 2005 purchase of the company. The precursor to the Flash application was SmartSketch, a drawing application for pen computers running the PenPoint OS developed by Jonathan Gay, who began working on it in college and extended the idea for Silicon Beach Software and its successors.[3][4] When PenPoint failed in the marketplace, SmartSketch was ported to Microsoft Windows and Mac OS. With the Internet becoming more popular, SmartSketch was re-released as FutureSplash, a vector-based web animation in competition with Macromedia Shockwave. In 1995, SmartSketch was further modified with frame-by-frame animation features and re-released as FutureSplash Animator on multiple platforms.[5] The product was offered to Adobe and used by Microsoft in its early work with the Internet (MSN). In 1996, FutureSplash was acquired by Macromedia and released as **Flash,** contracting "Future" and "Splash".

Recent developments

Adobe Labs (previously called *Macromedia Labs*) is a source for news and pre-release versions of emerging products and technologies from Adobe. Most innovations, such as Flash 10, Flex 3, and ActionScript 3.0 have all been discussed and/or trialled on the site.

One area Adobe is focusing on (as of February 2009) is the deployment of Rich Internet Applications (RIAs). To this end, they released Adobe Integrated Runtime (AIR), a cross-platform runtime environment which can be used to build, using Adobe Flash, rich Internet applications that can be deployed as desktop applications. It surpassed 100 million installations worldwide in February 2009.[6] Flash is installed silently when Acrobat Reader is installed.[7]

Two additional components designed for large-scale implementation have been proposed by Adobe for future releases of Flash: first, the option to require an ad to be played in full before the main video piece is played; and second, the integration of digital rights management (DRM) capabilities. This way Adobe can give companies the option to link an advertisement with content and make sure that both are played and remain unchanged.[8]

Flash Player for smart phones is available to handset manufacturers at the end of 2009.[9]

Open Screen Project

On May 1, 2008 Adobe announced *Open Screen Project*, which hopes to provide a consistent application interface across devices such as personal computers, mobile devices and consumer electronics.[10] When the project was announced, several goals were outlined: the abolition of licensing

fees for Adobe Flash Player and Adobe Integrated Runtime, the removal of restrictions on the use of the Shockwave Flash (SWF) and Flash Video (FLV) file formats, the publishing of application programming interfaces for porting Flash to new devices and the publishing of The Flash Cast protocol and Action Message Format (AMF), which let Flash applications receive information from remote databases.[10]

As of February 2009, the specifications removing the restrictions on the use of SWF and FLV/F4V specs have been published.[11] The Flash Cast protocol—now known as the Mobile Content Delivery Protocol—and AMF protocols have also been made available,[11] with AMF available as an open source implementation, BlazeDS. Work on the device porting layers is in the early stages. Adobe intends to remove the licensing fees for Flash Player and Adobe AIR for devices at their release for the Open Screen Project.

The list of mobile device providers who have joined the project includes Palm, Motorola and Nokia,[12] who, together with Adobe, have announced a $10 million Open Screen Project fund.[13]

Format

Main article: SWF

Flash files are in the *SWF* format, traditionally called "**S**hock**W**ave **F**lash" movies, "Flash movies," or "Flash applications", usually have a .swf file extension, and may be used in the form of a web page plug-in, strictly "played" in a standalone Flash Player, or incorporated into a self-executing Projector movie (with the .exe extension in Microsoft Windows). Flash Video files[spec 1] have a .flv file extension and are either used from within .swf files or played through a flv-aware player, such as VLC, or QuickTime and Windows Media Player with external codecs added.

The use of vector graphics combined with program code allows Flash files to be smaller — and thus for streams to use less bandwidth — than the corresponding bitmaps or video clips. For content in a single format (such as just text, video, or audio), other alternatives may provide better performance and consume less CPU power than the corresponding Flash movie, for example when using transparency or making large screen updates such as photographic or text fades.

In addition to a vector-rendering engine, the Flash Player includes a virtual machine called the ActionScript Virtual Machine (AVM) for scripting interactivity at run-time, support for video, MP3-based audio, and bitmap graphics. As of Flash Player 8, it offers two video codecs: On2 Technologies VP6 and Sorenson Spark, and run-time support for JPEG, Progressive JPEG, PNG, and GIF. In the next version, Flash is slated to use a just-in-time compiler for the ActionScript engine.

Flash Player is a browser plugin, and cannot run within a usual e-mail client, such as Outlook. Instead, a link must open a browser window. A Gmail labs feature allows playback of YouTube videos linked in emails.

Flash Video

Main article: Flash Video

Virtually all browser plugins for video are free of charge and cross-platform, including Adobe's offering of Flash Video, which was first introduced with Flash version 6. Flash Video has been a popular choice for websites due to the large installed user base and programmability of Flash. In 2010, Apple publicly

criticized Adobe Flash, including its implementation of video playback for not taking advantage of hardware acceleration, one reason Flash is not to be found on Apple's mobile devices. Soon after Apple's criticism, Adobe demoed and released a beta version of Flash 10.1, which takes advantage of GPU hardware acceleration even on a Mac. Flash 10.2 beta, released December 2010, adds hardware acceleration for the whole video rendering pipeline.

Flash Audio

Flash Audio is most commonly encoded in MP3 or AAC (Advanced Audio Coding) however it does also support ADPCM, Nellymoser (Nellymoser Asao Codec) and Speex audio codecs. Flash allows sample rates of 11, 22 and 44.1 kHz. It does not support 48 kHz audio sample rate which is the standard TV, DVD sample rate.

On August 20, 2007, Adobe announced on its blog that with Update 3 of Flash Player 9, Flash Video will also support some parts of the MPEG-4 international standards.[14] Specifically, Flash Player will have support for video compressed in H.264 (MPEG-4 Part 10), audio compressed using AAC (MPEG-4 Part 3), the F4V, MP4 (MPEG-4 Part 14), M4V, M4A, 3GP and MOV multimedia container formats, 3GPP Timed Text specification (MPEG-4 Part 17) which is a standardized subtitle format and partial parsing support for the 'ilst' atom which is the ID3 equivalent iTunes uses to store metadata. MPEG-4 Part 2 and H.263 will not be supported in F4V file format. Adobe also announced that it will be gradually moving away from the FLV format to the standard ISO base media file format (MPEG-4 Part 12) owing to functional limits with the FLV structure when streaming H.264. The final release of the Flash Player supporting some parts of MPEG-4 standards had become available in Fall 2007.[15]

Adobe Flash Player 10.1 does not support acoustic echo cancellation, unlike the VoIP offerings of Skype and Google Voice. This makes Flash less suitable for group calling or meetings, as use of headphones for all participants is essential, or at least highly advised.

Scripting language

Further information: ActionScript

Proprietary restrictions

See also: Proprietary software

The proprietary nature of Flash has been a concern to advocates of open standards and free software. Its widespread use has, according to such observers, harmed the otherwise open nature of the World Wide Web.[16] A response may be seen in Adobe's Open Screen Project: Adobe's restrictions on the use of the SWF/FLV specifications have been lifted.

Representing open standards, inventor of CSS and co-author of HTML5, Håkon Wium Lie explained in a Google tech talk entitled "the <video> element" the proposal of Theora as the format for HTML5 video:[17]

> I believe very strongly, that we need to agree on some kind of baseline video format if [the video element] is going to succeed. Flash is today the baseline format on the web. The problem with Flash is that it's not an open standard.

Disclosure

In October 1998, Macromedia disclosed the Flash Version 3 Specification to the world on its website. It did this in response to many new and often semi-open formats competing with SWF, such as Xara's Flare and Sharp's Extended Vector Animation formats. Several developers quickly created a C library for producing SWF. In February 1999, the company introduced MorphInk 99, the first third-party program to create SWF files. Macromedia also hired Middlesoft to create a freely available developers' kit for the SWF file format versions 3 to 5.

Macromedia made the Flash Files specifications for versions 6 and later available only under a non-disclosure agreement, but they are widely available from various sites.

In April 2006, the Flash SWF file format specification was released with details on the then newest version format (Flash 8). Although still lacking specific information on the incorporated video compression formats (On2, Sorenson Spark, etc.), this new documentation covered all the new features offered in Flash v8 including new ActionScript commands, expressive filter controls, and so on. The file format specification document is offered only to developers who agree to a license agreement that permits them to use the specifications only to develop programs that can export to the Flash file format. The license forbids the use of the specifications to create programs that can be used for playback of Flash files. The Flash 9 specification was made available under similar restrictions.[18]

In June 2009, Adobe launched the Open Screen Project (Adobe link (http://www.adobe.com/openscreenproject/faq/)), which made the SWF specification available without restrictions. Previously, developers could not use the specification for making SWF-compatible players, but only for making SWF-exporting authoring software. The specification still omits information on codecs such as Sorenson Spark, however.[19]

Authoring tools

Adobe Flash Professional

The Adobe Flash

Adobe Flash Professional

Adobe Flash CS5 Professional (11.0.2.489)

Developer(s)	Adobe Systems (formerly by Macromedia)

Stable release	CS5 (11.0.2) (http://en.wikipedia.org/w/index.php?title=Template:Latest_stable_software_release/Adobe_Flash&action=edit) (December 7, 2010) [+/− (http://en.wikipedia.org/w/index.php?title=Template:Latest_stable_software_release/Adobe_Flash_Professional&action=edit&preload=Template:LSR/syntax)]
Written in	C++
Operating system	Microsoft Windows and Mac OS X
Type	Multimedia
License	Proprietary commercial software
Website	adobe.com/products/flash/flashpro/ (http://www.adobe.com/products/flash/flashpro/)

Professional multimedia authoring program is used to create content for the Adobe Engagement Platform, such as web applications, games and movies, and content for mobile phones and other embedded devices.

History

Adobe Flash Professional is the successor of a software product known as **FutureSplash Animator**, a vector graphics and vector animations program released in May 1996. FutureSplash Animator was developed by FutureWave Software, a small software company whose first product, SmartSketch, was a vector-based drawing program for pen-based computers. In 1995, the company decided to add animation capabilities to their product and to create a vector-based animation platform for World Wide Web; hence FutureSplash Animator was created. Initially, the only way to deploy such animations on the web was through the use of Java platform; however, the Java platform was later replaced with the Netscape's plug-in architecture. The FutureSplash animation technology was used on several notable websites such as MSN, the official *The Simpsons* website and *Disney Daily Blast* of The Walt Disney Company.[20]

In December 1996, Macromedia bought FutureWave and so re-branded and released FutureSplash Animator as *Macromedia Flash* v1.0. In 2005, Adobe Systems acquired Macromedia; subsequently, in 2007, *Adobe Flash CS3 Professional*, the next version of Macromedia Flash was released.

Release	Year	Description
FutureSplash Animator	1996	Initial version of Flash with basic editing tools and a timeline
Macromedia Flash 1	1996	A re-branded version of the FutureSplash Animator
Macromedia Flash 2	1997	Released with Flash Player 2, new features included: the object library
Macromedia Flash 3	1998	Released with Flash Player 3, new features included: the movieclip element, JavaScript plug-in integration, transparency and an external stand alone player
Macromedia Flash 4	1999	Released with Flash Player 4, new features included: internal variables, an input field, advanced ActionScript, and streaming MP3
Macromedia Flash 5	2000	Released with Flash Player 5, new features included: ActionScript 1.0 (based on ECMAScript, making it very similar to JavaScript in syntax), XML support, Smartclips (the precursor to components in Flash), HTML text formatting added for dynamic text
Macromedia Flash MX(6)	2002	Released with Flash Player 6, new features included: a video codec (Sorenson Spark), Unicode, v1 UI Components, compression, ActionScript vector drawing API
Macromedia Flash MX 2004(7)	2003	Released with Flash Player 7, new features included: Actionscript 2.0 (which enabled an object-oriented programming model for Flash, although it lacked the Script assist function of other versions, meaning Actionscript could only be typed out manually), behaviors, extensibility layer (JSAPI), alias text support, timeline effects. Macromedia Flash MX Professional 2004 included all Flash MX 2004 features, plus: Screens (forms for non-linear state-based development and slides for organizing content in a linear slide format like PowerPoint), web services integration, video import wizard, Media Playback components (which encapsulate a complete MP3 and/or FLV player in a component that may be placed in an SWF), Data components (DataSet, XMLConnector, WebServicesConnector, XUpdateResolver, etc.) and data binding APIs, the Project Panel, v2 UI components, and Transition class libraries.
Macromedia Flash 8	2005	Macromedia Flash Basic 8, a less feature-rich version of the Flash authoring tool[*citation needed*] targeted at new users who only want to do basic drawing, animation and interactivity. Released with Flash Player 8, this version of the product has limited support for video and advanced graphical and animation effects. Macromedia Flash Professional 8 added features focused on expressiveness, quality, video, and mobile authoring. New features included Filters and blend modes, easing control for animation, enhanced stroke properties (caps and joins), object-based drawing mode, run-time bitmap caching, FlashType advanced anti-aliasing for text, On2 VP6 advanced video codec, support for alpha transparency in video, a stand-alone encoder and advanced video importer, cue point support in FLV files, an advanced video playback component, and an interactive mobile device emulator.

Adobe Flash CS3(9) Professional	2007	Flash CS3 is the first version of Flash released under the Adobe name. CS3 features full support for ActionScript 3.0, allows entire applications to be converted into ActionScript, adds better integration with other Adobe products such as Adobe Photoshop, and also provides better Vector drawing behavior, becoming more like Adobe Illustrator and Adobe Fireworks.
Adobe Flash CS4(10) Professional	2008	Contains inverse kinematics (bones), basic 3D object manipulation, object-based animation, a text engine, and further expansions to ActionScript 3.0. CS4 allows the developer to create animations with many features absent in previous versions.
Adobe Flash Professional CS5 (10.1)	2010	Flash CS5 was released on April 12, 2010 and launched for trialling and normal buying on April 30, 2010. Flash CS5 Professional includes support for publishing iPhone applications.[21] However, on April 8, 2010 Apple changed the terms of its Developer License to effectively ban the use of the Flash-to-iPhone compiler[22] and on April 20, 2010 Adobe announced that they will be making no additional investments in targeting the iPhone and iPad in Flash CS5. [23] Other features of Flash CS5 are a new text engine (TLF), further improvement to inverse kinematics, and the Code Snippets panel. [24]

Third-party tools

Open Source projects like Ajax Animator and the (now defunct) UIRA aim to create a Flash development environment, complete with a graphical user environment. Alternatively, programs such as swfmill, SWFTools, and MTASC provide tools to create SWF files, but do so by compiling text, actionscript or XML files into Flash animations. It is also possible to create SWF files programmatically using the Ming library, which has interfaces for C, PHP, C++, Perl, Python, and Ruby. haXe is an open source, high-level object-oriented programming language geared towards web-content creation that can compile Flash files.

Many shareware developers produced Flash creation tools and sold them for under US$50 between 2000 and 2002. In 2003 competition and the emergence of free Flash creation tools had driven many third-party Flash-creation tool-makers out of the market, allowing the remaining developers to raise their prices, although many of the products still cost less than US$100 and support ActionScript. As for open source tools, KToon can edit vectors and generate SWF, but its interface is very different from Macromedia's. Another, more recent example of a Flash creation tool is SWiSH Max made by an ex-employee of Macromedia. Toon Boom Technologies also sells a traditional animation tool, based on Flash.

In addition, several programs create .swf-compliant files as output from their programs. Among the most famous of these are Screencast tools, which leverage the ability to do lossless compression and playback of captured screen content in order to produce demos, tutorials, or software simulations of programs. These programs are typically designed for use by non-programmers, and create Flash content quickly and easily, but cannot actually edit the underlying Flash code (i.e. the tweening and transforms, etc.) Screencam is perhaps the oldest screencasting authoring tool to adopt Flash as the preferred output

format, having been developed since the mid-90s. The fact that screencasting programs have adopted Flash as the preferred output is testament to Flash's presence as a ubiquitous cross-platform animation file format.

Other tools are focused on creating specific types of Flash content. Anime Studio is a 2D animation software package specialized for character animation which creates SWF files. Express Animator is similarly aimed specifically at animators. Question Writer publishes its quizzes to Flash file format.

Users who are not programmers or web designers will also find on-line tools that allow them to build full Flash-based websites. One of the oldest services available (1998) is FlashToGo (http://www.flashtogo.com/) . Such companies provide a wide variety of pre-built models (templates) associated to a Content Management System that empowers users to easily build, edit and publish their websites. Other sites, that allows for greater customization and design flexibility are Wix.com and CirclePad.

Adobe wrote a software package called Adobe LiveMotion, designed to create interactive animation content and export it to a variety of formats, including SWF. LiveMotion went through two major releases, but failed to gain any notable user base.

In February 2003, Macromedia purchased Presedia, which had developed a Flash authoring tool that automatically converted PowerPoint files into Flash. Macromedia subsequently released the new product as Breeze, which included many new enhancements. In addition, (as of version 2) Apple's Keynote presentation software also allows users to create interactive presentations and export to SWF.

User experience

Flash as a format has become widespread on the desktop market; one estimate is that 95% of PCs have it,[25] while Adobe claims that 98 percent of U.S. web users and 99.3 percent of all Internet desktop users have installed the Flash Player,[26][27][28] with 92 to 95% (depending on region) having the latest version.[29] Numbers vary depending on the detection scheme and research demographics.

The Adobe Flash Player exists for a variety of systems and devices: Windows, Mac OS 9/X, Linux, Solaris, HP-UX, Pocket PC/Windows CE, OS/2, QNX, Android, Symbian, Palm OS, BeOS, and IRIX, although the performance is typically best on Windows (see Performance). For compatibility with devices (embedded systems), see Macromedia Flash Lite.

Among mobile devices, Flash has less penetration because Apple does not bundle or allow third-party runtimes on its iPhone, which accounts for more than 60% of global smartphone web traffic, or the iPod touch, which makes up more than 95% of "mobile Internet device" traffic. This hurts Adobe's ability to market Flash as a ubiquitous mobile platform. However, Flash is enabled on competing mobile platforms, including the version 2.2 Android[30] while other O.S.s such as Symbian and Palm have versions coming.[*citation needed*]

Some websites rely on Flash so heavily that they are totally unusable without this plugin

Downloading Flash is blocked in countries that are under U.S sanctions (such as Syria & Sudan). Users in these countries are blocked (by Adobe) from downloading Flash plug-ins for both Internet Explorer and Firefox browsers.[*citation needed*]

Flash content is usually embedded using the <object> html tag, or the nonstandard <embed> tag.[31] Software that does not support either of these tags, and users who cannot or will not install a plugin, will see the replacement text if this is supplied by the web page.

Accessibility

Using Flash tends to break conventions associated with normal HTML pages. Selecting text, scrolling, [32] form control and right-clicking act differently than with a regular HTML webpage. Many such interface unexpectancies are fixable by the designer. Usability expert Jakob Nielsen published an Alertbox in 2000 entitled, *Flash: 99% Bad* which listed issues like these.[33] Some problems have been improved upon since Nielsen's complaints:

- Text size can be controlled using full page zoom, found in many modern browsers.
- It has been possible for authors to include alternative text in Flash since Flash Player 6. This accessibility feature is compatible only with certain screen readers and only under Windows.[34]

Performance

- Any Flash player has to be able to animate on top of video renderings, which makes hardware accelerated video rendering at least not as straightforward as with a purpose-built multimedia player.[35] Therefore, even when only displaying video, Flash players are more resource-intensive than dedicated video player software.
- Comparisons have shown Adobe Flash Player to perform better on Windows than Mac OSX and Linux with the same hardware.[36][37] However, the 10.1 update significantly improved performance for Mac OS X.[38]

Flash blocking in web browsers

Some web browsers default to not play Flash content before the user clicks on it, e.g. Konqueror, K-Meleon. Equivalent "Flash blocker" extensions also exist for many popular browsers: Firefox has NoScript and Flashblock, and Opera versions since 10.5 feature native Flash blocking. Opera Turbo requires the user to click to play Flash content. Internet Explorer has Foxie, which contains a number of features, one of them also named Flashblock. WebKit-based browsers under Mac OS X, such as Apple's Safari, have ClickToFlash.[39]

Flash client security

Flash's security record[40] has caused several security experts to recommend to either not install Flash or to block it.[41] The US-CERT recommends to block Flash using NoScript.[42] Charlie Miller recommended "not to install Flash"[43] at the computer security conference CanSecWest. As of October 31, 2010, The Flash Player has over 100 CVE entries,[44] 65 of which have been ranked with a high severity (leading to arbitrary code execution), and 40 ranked medium. In February 2010, Adobe officially apologized[45] for not fixing a known vulnerability for over 1 year. In June 2010 Adobe announced a "critical vulnerability" in recent versions, saying there are reports that this vulnerability is being actively exploited in the wild against both Adobe Flash Player, and Adobe Reader and Acrobat.

[46][47] Later, in October 2010, Adobe announced[48] another critical vulnerability, this time also affecting Android-based mobile devices. Android users have been recommended to disable Flash or make it only on demand.[49]

Symantec's Internet Security Threat Report[50] states that a remote code execution in Adobe Reader and Flash Player[51] was the second most attacked vulnerability in 2009. The same report also recommends to employ browser add-ons wherever possible to disable Adobe Flash Player when visiting untrusted sites. McAfee predicted that Adobe software, especially Reader and Flash, will have been primary target for attacks in 2010.[52] Adobe applications had become, at least at some point, the most popular client-software targets for attackers during the last quarter of 2009.[53]

Local Shared Objects ("Flash cookies")

Main article: Local Shared Object

Like the HTTP cookie, a flash cookie (also known as a "Local Shared Object") can be used to save application data. Flash cookies are not shared across domains. An August 2009 study by the Social Science Research Network found that 50% of websites using Flash were also employing flash cookies, yet privacy policies rarely disclosed them, and user controls for privacy preferences were lacking.[54] Most browsers' cache and history suppress or delete functions do not affect Flash Player's writing Local Shared Objects to its own cache, and the user community is much less aware of the existence and function of Flash cookies than HTTP cookies.[55] Thus, users having deleted HTTP cookies and purged browser history files and caches may believe that they have purged all tracking data from their computers when in fact Flash browsing history remains. Adobe's own Flash Website Storage Settings panel (http://www.macromedia.com/support/documentation/en/flashplayer/help/settings_manager07.html) , a submenu of Adobe's Flash Settings Manager web application (http://www.macromedia.com/support/documentation/en/flashplayer/help/settings_manager.html) , and other editors and toolkits can manage settings for and delete Flash Local Shared Objects.[56]

64-bit support

Adobe's 64-bit Flash player is available as a preview3 release ("Square"), which was released in September 2010. The "Square" preview is available for Windows, Mac and Linux.[57] This new version can be downloaded at the Adobe lab site.[58]

The key new capabilities in the Flash Player "Square" preview are:

- 64-bit support — Native support for 64-bit operating systems and 64-bit web browsers on Linux, Mac OS, and Windows. (Hulu and Amazon which depends on RTMPE are not currently functioning because there are some 64-bit libs that need to be integrated into the branch"Adobe Forums: Flash Player "Square": 64-bit" (http://forums.adobe.com/thread/738761?tstart=0) . http://forums.adobe.com/thread/738761?tstart=0.)
- Internet Explorer 9 hardware accelerated rendering support — Enhanced support for Internet Explorer 9 Beta. It takes advantage of hardware accelerated graphics in Internet Explorer 9 Beta, utilizing hardware rendering surfaces to improve graphics performance and enable seamless composition.

The first experimental release of 64-bit builds of Adobe Flash Player was for the Linux platform,[59] on November 11, 2008.[60]

The project was closed temporarily on June 15, 2010,[61] while Adobe was preparing for the preview release on September 15, 2010.

The official 32-bit player is still distributed in 64-bit Linux distributions e.g. Ubuntu, openSUSE, of which some users have reported problems with the 32-bit player on some websites.[62][63][64] Affected users can install the 64-bit player manually[65] or through a special repository.[66]

Adobe expects to provide 64-bit versions of its Flash Player for Windows, Macintosh and Linux with an upcoming major release of Adobe Flash Player.[67][68]

Alternatives to Flash

HTML5

Main article: Comparison of HTML5 and Flash

HTML 5 is gaining ground as a competitor to Flash: the canvas element assists animation, and text can be more easily synchronized with audio and video element timeupdate events. In one example of this, Scribd, a 50 million user a month document sharing website, announced in May 2010 that after three years of investment in Flash, it is changing from that platform to the HTML5 standard.[69] YouTube introduced HTML5 support in January 2010,[70] and on Jan 11 2011, the Google Chromium Project announced on their blog that support for closed codecs (particularly H.264) would be removed from future releases of Chrome. The Chromium announcement specifically mentioned that this was an effort to increase the use of license-free HTML5 and the <video> tag, and drive web-wide adoption of the open-source codecs VP8 and Theora.

Microsoft Silverlight

In recent years, Microsoft Silverlight has emerged as a potential competitor to Flash[*citation needed*]. While not yet as prevalent on websites as Flash, Silverlight has been used to provide video streaming for many high profile events, including the 2008 Summer Olympics in Beijing,[71] the 2010 Winter Olympics in Vancouver,[72] and the 2008 conventions for both major political parties in the United States.[73] Silverlight is also used by Netflix for its instant video streaming service.[74]

Java

Java applets are used both to create interactive visualisations and to present video, three dimensional objects and other media. Java applets are more appropriate for complex visualizations that require significant programming effort in high level language or communications between applet and originating server. Sun's new JavaFX is considered as another competitor for Rich Internet Applications.

Other open alternatives

See also: Open format

There are equivalent open standards for many simple uses of Flash. Most notably the SVG and SMIL file formats, the *canvas*, *audio* and *video* HTML elements, and the JavaScript programming language. More complex use cases can be achieved by combining these.

The W3C's SVG and SMIL standards are seen as the nearest equivalents of Flash.[75][76] Opera has supported SVG since version 8 and Safari has since version 3,[77] and Mozilla Firefox's built-in support for SVG continues to grow.[78][79] Adobe formerly developed and distributed the 'Adobe SVG Viewer' client plug-in for MS Internet Explorer, but discontinued support and distribution on January 1, 2009.[80] This was in a time when Adobe went from competing with Macromedia's Flash to owning the technology itself.[81]

UIRA was a free software project that intended to become a complete replacement for Adobe Flash. The project collapsed in mid 2007, though people are now discussing reviving or continuing it,[82] and a few other projects like Ajax Animator (http://osflash.org/ajaxanimator) still exist.

Third-party players

Since Flash files do not depend on an open standard such as SVG, this reduces the incentive for non-commercial software to support the format, although there are several third party tools which use and generate the SWF file format. Flash Player cannot ship as part of a pure open source, or completely free operating system, as its distribution is bound to the Macromedia Licensing Program (http://www.macromedia.com/software/flash/open/licensing/) and subject to approval.

There is, as of late 2008, no complete free software replacement which offers all the functionality of the latest version of Adobe Flash Player.

Presenting the free software movement, Richard Stallman stated in a speech in October 2004 that:[83]

> The use of Flash in websites is a major problem for our community.

Stallman's argument then was that no free players were comparatively good enough. As of February 2010, Gnash and Swfdec have seen limited success in competing with Adobe's player. Many important and popular websites require users to have a Flash player, sometimes with no fallback for non-Flash web users. Therefore, the lack of a good free Flash player is arguably an obstacle to enjoying the web with free software, and the aforementioned ubiquity of Flash makes the problem very evident for anyone who tries. The continual high ranking of Gnash on the Free Software Foundation's list of high priority projects[84] might indicate the severity of the problem, as judged by the free software community.

Gnash is an active project that aims to create a free player and browser plugin for the Adobe Flash file format and so provide a free alternative to the Adobe Flash Player under the GNU General Public License. Despite potential patent worries because of the proprietary nature of the files involved,[85] Gnash supports most SWF v7 features and some SWF v8 and v9.[86][87] Gnash runs on Windows, Linux and other operating systems on 32-bit, 64-bit and other architectures.

Swfdec is another open-source flash player available for Linux, FreeBSD and OpenBSD. See also SWFOpener.

Lightspark is a new implementation aiming to create a more modern and fast player. Besides hardware-accelerated rendering, it exploits multithreading and JIT compilation. It supports only the new ActionScript 3 VM introduced in Flash 9.

Scaleform GFx is a commercial alternative Flash player that features full hardware acceleration using the GPU and has high conformance with both Flash 10 ActionScript 3[88] and Flash 8 AS2. Scaleform GFx is licensed as a game middleware solution and used by many PC and console 3D games for user interfaces, HUDs, mini games, and video playback.

rtmpdump (http://rtmpdump.mplayerhq.hu/) is an open source software implementation of an RTMP client, Flash's own streaming protocol. rtmpdump was removed from Sourceforge on request by Adobe.[89] As a result, flvstreamer (http://savannah.nongnu.org/projects/flvstreamer) was forked from rtmpdump, removing all cryptography (i.e. support for RTMPE and SWF verification).

Smokescreen (http://smokescreen.us) allows playback of Flash files using javascript in the webpage.

See also

Adobe Flash

- SWF file format, the files generated by the Flash application and played by Flash Player.
- ActionScript
- ActionScript code protection
- Adobe Flash Player, the runtime that executes and plays back Flash movies.
- Adobe Flash Lite, a lightweight version of Flash Player for devices that lack the resources to run regular Flash movies such as mobile phones, some laptop computers and other portable devices.
- List of 2D animation software
- Flash Video
- Flash emulator
- Saffron Type System, the anti-aliased text-rendering engine used in version 8 onwards.
- Local Shared Object
- SWFObject, a JavaScript library used to embed Flash content into webpages.
- Flash CMS, content management for Flash content.

Other

- Gnash
- HTML5 video
- Microsoft Silverlight
- JavaFX
- OpenLaszlo
- Synfig
- Lightspark

Footnotes

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   F4V is based on ISO base media file format standard:freely available ISO standards (http://standards.iso.org/ittf/PubliclyAvailableStandards/c051533_ISO_IEC_14496-12_2008.zip) , and also available via subscription [1] (http://www.iso.org/iso/catalogue_detail?csnumber=41828)

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External links

- Adobe Flash Platform Blog (http://blogs.adobe.com/flashplatform/) - official news channel about Adobe Flash
- Adobe Flash for MS WinXP/Vista and Mac OS X (http://www.adobe.com/products/flash/)
- Flash plug-in for MS Windows 9x / Macintosh OSX 10.1-10.3 / Red Hat Enterprise Linux 3 and 4 (http://kb2.adobe.com/cps/406/kb406791.html)
- FLA format specification (http://wiki.benjaminwolsey.de/FLA_Format)
- Detect if Flash Player is installed (http://ipaddress.net16.net)

Communities

- Adobe's Flash Forum (http://forums.adobe.com/community/flash)
- FlexFlashForum.com - Flash Forum (http://www.flexflashforum.com)

- Actionscript.org - Community Resource / Tutorials (http://www.actionscript.org)
- Flash Forum / Questions and Answers (http://www.flashcomponents.net/community/)

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Categories: Animation software | Cross-platform software | C++ software | Graphics file formats | Mac OS software | Mac OS X software | Macromedia software | Adobe software | Adobe Creative Suite | Vector graphics editors | Web development software | Adobe Flash | 2D animation software | American inventions | Windows software | 1996 software