



NES Cafe Nintendo Emulator for Java

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To learn how to setup NES Cafe quickly on your Web Server or on your PC, please turn to the first chapters of this PDF where there are Quick Start guides for those versions of NES Cafe.

Welcome to NES Cafe

NES Cafe is distributed under the GNU General Public License. A copy of this license agreement has been included with this distribution of NES Cafe. If you have a question or wish to give me any feedback on the NES Cafe Nintendo emulator then please do not hesitate to contact me via email (my address is above) as your comments and suggestions are always welcome. More information on NES Cafe can also be found on the NES Cafe website (address also shown above).

Introduction

Welcome to the NES Cafe Nintendo Emulator for Java. In a nutshell, the NES Cafe emulator allows you to play your old 8-bit Nintendo Entertainment System (NES) games on your computer by emulating the original hardware of the NES and tricking the games into thinking that they are running on the original machine. To play one of your old Nintendo games all what you need is the NES Cafe emulator, a copy of the game in NES format and a Java Virtual Machine installed.

NES Cafe was the first Java-based emulator for the Nintendo with sound support and the only one to offer such a high level of compatibility with the original hardware, by correctly emulating the microprocessors and additional controllers. I started work on NES Cafe in May 2000 for my final year Computer Science project. Since the first release back in 2001, I have been continually working on and improving NES Cafe during my spare time (not that I get a lot of this). NES Cafe is now a stable and powerful emulator that is being run on many websites and can also be run as a standalone application from your desktop. It runs the vast majority of published Nintendo games.

Since the very first release NES Cafe has always been an Open Source project and it will always remain so. Keeping NES Cafe Open Source has enabled the project to go from strength to strength thanks to the helpful feedback and suggestions that I have received from the public over the years. This is something that I am very grateful for and I hope that you will all continue to push and improve NES Cafe further by adding more hardware support, or use the information from this project to build bigger and better Java emulators for the legendary 8-bit NES console.

Thanks for downloading NES Cafe!

David de Niese



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1 Quick Start Guide for installing the NES Cafe Applet

This checklist should be completed to install the NES Cafe Applet on your Website:

-
- ① Log into (FTP into) your Web-site so that you are able to upload files.
 - ② Create a new /nescafe/ directory from the root of your Web Site.
If you are using the Apache Web Server then this directory is usually created inside of the /htdocs/ Apache directory. If you are using Microsoft IIS then you should use the Internet Information Services application, which can be accessed from the Administration Tools section of the Control Panel. Please consult the documentation for your Web Server if you are unsure.
 - ③ Download the NES Cafe Applet version from the NES Cafe website and copy the following files from the distribution ZIP file to the /nescafe/ directory:
 - nescafe.html
 - nescafe.jar
 - nescafe.settings
 - nescafeproxy.php
 - ④ Create a subdirectory (folder) for your ROM files at /nescafe/roms/. Ensure that you are legally allowed to host whichever ROM game files you host from your site. If you do not have ROM images then you should Google 'NES roms', although you still need to check that you are entitled to host such files.
 - ⑤ Change the ROMFILE tag inside the nescafe.html Applet Tag to point at the ROM file that you want NES Cafe to load upon start-up. If you have uploaded a ROM game file called mario.zip (which may be mario.nes inside a ZIP file) to the /nescafe/roms directory on your Web Server then you should change the ROMFILE tag to point at roms/mario.zip using the following syntax:


```
<param name=ROMFILE value="roms/mario.zip">
```
 - ⑥ Ensure PHP is installed on your Web Server computer. PHP is freely available on the Internet and is already installed on most Websites. If you use a commercial company to host your website then you should contact them to ask if PHP has already been installed. NES Cafe will work without PHP installed, but your visitors will get an error message when they start it.
 - ⑦ Use an Internet Browser (such as Fire Fox or Microsoft Internet Explorer) to browse to your website. If your domain is called localhost then you should browse to `http://localhost/nescafe/nescafe.html` to start NES Cafe. You will also have to ensure your visitors have installed Java in order to run it.
 - ⑧ NES Cafe should start and you should see the NES Cafe logo.
-



2 Quick Start Guide for installing standard NESCaFe

This checklist should be completed to install the standard version of NESCaFe on your PC:

-
- ① Download NESCaFe Standalone version from the NESCaFe website and copy the files from the distribution ZIP file to a /nescafe/ directory on your PC.
 - ② Download a Java Virtual Machine (Plugin) from the java.sun.com website and install it onto your computer. A Java VM is required in order to run NESCaFe.
 - ③ Go to the directory in which you installed NESCaFe and then:

If using the Windows operating system:
Double-click the nescafe.bat file to run NESCaFe

If using the Mac OS, Unix or Linux operating systems:
Run the command `java -jar nescafe.jar`
 - ④ NESCaFe should start and you should see the NESCaFe logo.
-



3 Distributions

The NES Cafe emulator is available in 3 main distribution packages. NES Cafe is available as a compiled application (Standard Distribution), as a compiled Applet for your website (Applet Distribution) or as source code. There are also some additional Special Edition releases of NES Cafe, such as the Punch-Out Special Edition that is available from the NES Cafe website and both the Applet and Application versions are also available without sound (for use on slower computers). The following table lists the different NES Cafe distributions available and what kind of person might be interested in downloading each.

3.1 Standard Distributions

Distribution	Person
Standard	<p>[most people]</p> <p>The majority of people will want this standalone version of the NES Cafe emulator. It contains everything (apart from the Nintendo games) that you will require to get NES Cafe running on your PC.</p>
Applet	<p>[website developers]</p> <p>Anyone wishing to host NES Cafe on their own web-site and allow their visitors to play Nintendo games online will want to download the Applet version of NES Cafe (again, no games are included).</p>
Source Code	<p>[hard-core techie's]</p> <p>People that want to understand more about NES Cafe, or people looking to improve NES Cafe, will want to download this distribution. This version contains all the Java source code for the emulator. At present, the source code that is available is for NES Cafe 0.56. This version is available on request, if you want it please get in touch.</p>



3.2 Special Distributions

There are two special distributions of NES Cafe available. The Punch-Out Special Edition is a modified version of the NES Cafe emulator that allows players to record their times against the boxers online and also to compete to unlock special challenges. The NES Cafe ROM Image and Source distribution contains the source code for the NES Cafe ROM.

Distribution	Person
Standard Mute	[people who have slower computers and want to run NES Cafe] Those that want the Standard version of NES Cafe (above), but whose computers are a little slower may want to download this version instead. This version has the sound processing removed.
Applet Mute	[web site developers, who cater for slower client computers] Those that want to host NES Cafe on their websites may also want to cater for slower client computers. This version is a cut-down version of NES Cafe which has the sound processing removed.
Punch-Out Special Edition	[nostalgic Punch-out players] This is a special edition of the NES Cafe emulator that is available from the NES Cafe Online website that allows players to record their times against each other and compete to unlock special challenges.
NES Cafe ROM Image and Source	[6502 techie's] This distribution contains the 6502 source code for the NES Cafe ROM image that is distributed with the emulator. People interested in writing NES ROMs in 6502 assembler may find this interesting.



4 Requirements for Running NES Cafe

Depending on the version of NES Cafe that you download (Standard or Applet), you will need to meet the following software and hardware requirements to use NES Cafe. You should ensure that these requirements are met prior to installing NES Cafe on your PC.

4.1 Standard Distribution

Category	Requirement
Operating System	<p>An Operating System is run when you turn on your computer and allows you to launch other applications. NES Cafe supports all the major Microsoft, Mac and Linux Operating Systems.</p> <p>Microsoft Windows XP Microsoft Windows 2000 Microsoft Windows ME Mac OS X (Tiger) Any Linux OS that supports Java</p>
Java Virtual Machine Runtime	<p>A Java Virtual Machine allows you to play Java applications on your computer. Any of the following two Java Virtual Machine Runtimes are supported by the NES Cafe emulator:</p> <p>Sun Java Virtual Machine 1.4.2 (or higher) IBM Java Virtual Machine 1.3.0 (fastest)</p>



4.2 Applet Distribution

Category	Requirement
Operating System	<p>If you are hosting the Applet from your website then you will need to ensure that the Web Server is running one of the Operating Systems listed below. If you are planning to only run the Applet locally then please refer to the requirements for the Standard distribution.</p> <p>Microsoft Windows Server 2003 Microsoft Windows XP Microsoft Windows Server 2000 Microsoft Windows 2000 Mac OS X (Tiger) Any Linux OS that supports Java</p>
Java Virtual Machine Runtime	<p>There is no requirement for a Java Virtual Machine to be installed on the Web Server because the Applet code will not be executed on the Web Server, instead the Applet will run on the remote computer that is connected.</p> <p>Therefore, you should ensure that your visitors have a Java Virtual Machine installed prior to being presented with the NES Cafe Applet.</p>
HTTP Web Server	<p>An HTTP Web Server is a software program that allows your computer to serve web page requests from remote computers. Any of the following HTTP Web Servers are supported:</p> <p>Microsoft IIS Web Server 5.0 Apache 1.3.X (or later)</p>
PHP	<p>If you intend to host NES Cafe on your Web Server then it must be PHP-enabled. You can download and install PHP from www.php.net.</p>



4.3 Source Code Distribution

Support will not be provided for the Source Code distribution. Furthermore, the Source Code version is no longer available directly from the NES Cafe site, if you wish to get hold of it you can either download it from other sites on the Internet that still host it, or you can contact NES Cafe via the website to request it. Please note that the version of Source Code provided will be a couple releases behind the latest Applet distribution version.

Category	Requirement
Operating System	<p>An Operating System is run when you turn on your computer and allows you to launch other applications. NES Cafe supports all the major Microsoft, Linux and Mac Operating Systems.</p> <p>Microsoft Windows XP Microsoft Windows 2000 Microsoft Windows ME</p> <p>Mac OS X (Tiger) [Developer Tools installed] Any Linux OS that supports J2SE SDK</p>
Java Software Development Kit	<p>A Java SDK contains the Java Virtual Machine runtime environment, plus the tools that you will need to develop and compile NES Cafe. The suggested Java SDK is shown below:</p> <p>Sun J2SE Development Kit 1.4.2 (or later)</p>
Java Pre-Processor (SJPP)	<p>The Java Pre-Processor was used during the development of NES Cafe to minimise the amount of redundant code contained with each distribution. For example, pre-processor directives were given to ensure that the weight of the GUI code from the Standard distribution would not be included in the streamlined Applet distribution. The pre-processor used is the Simple Java Pre-Processor (SJPP).</p>



4.4 Downloading Java

A Java Virtual Machine is required to be able to run NES Cafe. You can download Java from the link provided in the following section under the heading *Sun Java Virtual Machine and SDK*. When you click on the link, follow the path to *J2SE (Core/Desktop)* and then download *J2SE 1.X* (or higher). Please note that *J2SE 5.X* has not been fully tested yet with NES Cafe but preliminary tests have shown that it is compatible.

You can download Java at <http://java.sun.com>

4.5 Linked Websites

Application	Website
Apache HTTP Web Server	http://httpd.apache.org/
Every Video Game NES Cafe Forums	http://www.everyvideogame.com/
Microsoft IIS Web Server	http://www.microsoft.com/iis/
Microsoft Windows	http://www.microsoft.com
NES Cafe Website	http://www.davieboy.net/nescafe/
Red Hat Linux	http://www.redhat.com
Simple Java Pre-Processor	https://sjpp.dev.java.net/
Sun Java Virtual Machine and SDK	http://java.sun.com
Suse Linux	http://www.suse.com

4.6 Play NES Cafe Online

If you want to see NES Cafe in action then visit one the following sites shown below. There are many other sites that you can play NES Cafe online from, for a more complete listing please visit the NES Cafe Online Website (above), or do a search in Google.

Website	
NES Cafe Online Website	http://www.davieboy.net/play/
Every Video Game	http://www.everyvideogame.com
Online Video Game Player	http://www.onvgp.com
Excessively	http://www.excessively.net
1980-games	http://www.1980-games.net



5 Installing NES Cafe

To learn how to configure NES Cafe on your Web Server or on your PC, please turn to the first chapters of this document where Quick Start guides for those versions are provided.

Depending on the version of NES Cafe that you downloaded (Standard or Applet) and the Operating System that you are using, you will need to install NES Cafe using one of the following approaches. It is assumed that the reader is proficient in using the Operating System of their choice before continuing, and that they are familiar with concepts such as directories (folders for Windows users), and how to install and run applications.

5.1 Installing the Standard Distribution

1 Check the requirements for the Standard Distribution and ensure that they are met.

2 Unzip the distribution files (NES Cafe.xxxbin.zip) to a directory (folder) on your PC.

3 Microsoft Windows:

Go to the folder that you uncompressed NES Cafe to and run NES Cafe.bat

UNIX, Linux or Mac OS X:

Change to the directory that you uncompressed NES Cafe to and type:

```
java -jar nescafe.jar
```

4 NES Cafe should now be running on your computer.



5.2 Installing the Applet Distribution

- 1 Check the requirements for the Applet Distribution and ensure that they are met.
- 2 Unzip the distribution files (NES Cafexxxapp.zip) to a directory on your Web Server.
- 3 If you are hosting NES Cafe on a website then you must copy the nescafeproxy.php PHP script to the *same* directory that you copied the NES Cafe.jar file to. This PHP script is required to allow NES Cafe to access the NES Cafe website. If you receive the error that NES Cafe could not authorise then you have either not copied this file to the same directory as the NES Cafe.jar file, or you have not installed PHP.

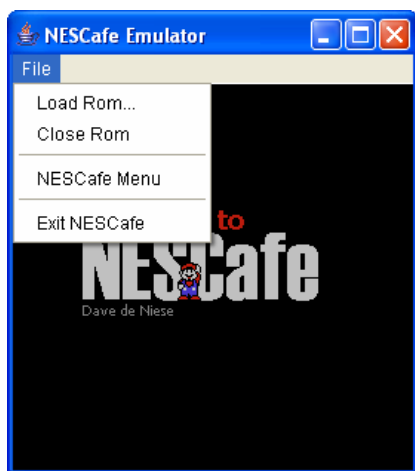
Note: PHP can be downloaded from www.php.net, although most commercial Web Servers will already have this application service installed and configured for you.
- 3 Navigate your Browser to the URL corresponding to where you installed NES Cafe. For example, if you are running Microsoft IIS Web Server and you unzipped NES Cafe to C:\inetpub\wwwroot\nescafe on your local machine then you should navigate to <http://localhost/nescfe/nescfe.html> to run the NES Cafe emulator.
- 4 You should now see NES Cafe running from your Web Server with the default NES ROM. Please see the Applet Configuration section on how to configure the settings.
- 5 If you are using a PHP-enabled Web Server, such as Apache, then you may also install the optional PHP scripts that come with NES Cafe. These scripts allow visitors to your website you use the Save and Load State features, the Save and Load RAM features and the Screen Shot feature in the Applet version. Information on configuring these is available in the Applet Configuration section of this document.



5.3 Using NES Cafe

Whether using the Standard or the Applet version of NES Cafe, the interface is very similar. The only difference is that the Standard version has a File Menu available, whereas the Applet version does not. In both versions, the majority of the functionality is available via the NES Cafe Menu, which can be accessed by pressing the ESC key.

Also, various menu items may be disabled depending on the current state of the emulator (for example, some options will not be available if a game isn't running), and depending on the distribution that you are using (the Sound options are not available in Mute versions and the Online options are not currently available in the Applet versions).

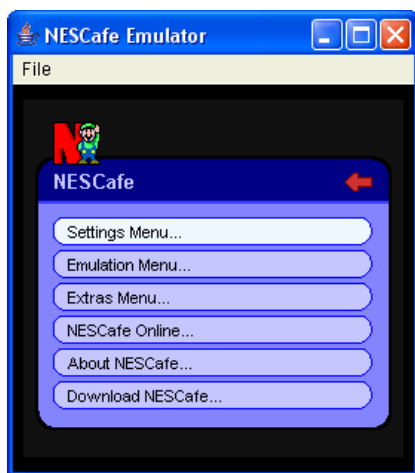


Main NES Cafe Screen

Getting Started

When you run either the standard version of NES Cafe (from the Standard Distribution) or the Applet version (from the Applet Distribution) it will start by automatically loading the NES Cafe ROM file. If you are using the Standard version, you can load and close the games by selecting the relevant options from the File Menu.

Click on the Load Rom menu item on the File Menu and a File Open dialogue box will be displayed, allowing you to select the ROM (Nintendo Game) that you want to load. The game will then start running in the main window.



The NES Cafe Main Menu (press ESC to access)

The NES Cafe Menu provides most of the game functionality. This can be assessed by either pressing the ESC key, by selecting the NES Cafe Menu from the File menu in the Standard version or by right-clicking the main display screen.

The Settings Menu allows you to configure the keyboard controls, enable or disable the Light Gun, enable or disable the Sound (if not using the Mute version) and configure the graphics.

The Emulation Menu allows you to save or load the State of the Emulator, pause or reset the Nintendo game you are playing. On games where Save RAM is enabled, there is also the additional option of Wiping the Save RAM.

The Extras Menu allows you to use the built-in Debugging Engine (6502 Disassembler), to enter Game Genie codes, record movies and grab screenshots. If you are playing a game that supports NES Cafe Subtitles (see later) then the option to toggle these is also found here.



The NES Cafe Online Menu allows you to configure your proxy settings (if you are using one to connect to the Internet) and to download games directly from the NES Cafe Game Server.

Please note that if you are using the Applet distribution of NES Cafe then you will not have the security permissions to access the NES Cafe ROM Server from some websites because a Java Applet security policy prohibits this action.



NES Cafe Settings Menu Screen

The Settings Menu

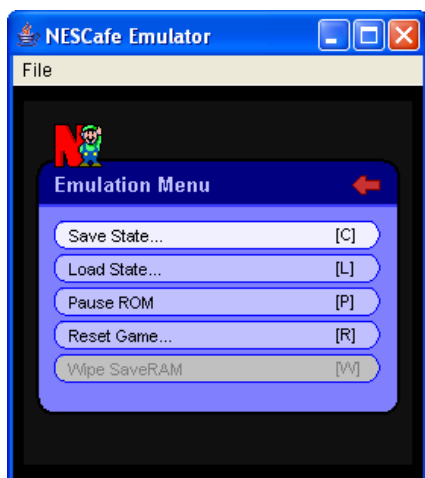
You can configure your own controls for the NES Cafe Joy Pad from the Settings menu. However, you may not map specific keys, such as those that are already assigned as shortcut keys in the NES Cafe Graphical User Interface.

You can also change the Graphics Options by clicking on the second option. This will allow you to enable screen smoothing to reduce the jagged edges on the Nintendo's display when you play NES Cafe with an enlarged screen.

You can also toggle the Sound from the Settings Menu. Please notice that the shortcut S appears next to the option to disable or enable Sound. This means that you may also press the S key on your keyboard when playing games to perform this same function more readily.

You may also configure the Time Shift Buffer settings from this menu. The Time Shift Buffer saves the state of the emulator every couple of seconds, so if you make a mistake then you can press the BACKSPACE key to jump back in time and correct it – almost like your own Warp Zone!

Finally, you can configure the format of the Movie Files that are produced when you press F8 whilst playing a game in NES Cafe. In the menu you can choose whether you wish to save only the user key-presses and the starting state at the beginning of the movie (nice and small), or whether you wish to record a full animated GIF.



NES Cafe Emulation Menu Screen

The Emulation Menu

You can use the Emulation menu to save the state of NES Cafe and then load it back into memory again at a later stage. For example, if you are just about to battle Bowser and you are not feeling too confident then you could hit Save State (keyboard key C) before approaching him. Then, if you were to die, just click on Load State from the Emulation menu (keyboard key L) and you will be back where you were before dying.

The Emulation Menu can also be used for Pausing and Resetting the game. Some games never allow the player to pause them exactly where they want to, such as Punch-Out. Now, by selecting Pause from the Emulation menu (keyboard key P) you can pause the actual emulation of the Nintendo game instead, allowing any game to be paused upon request.

Finally, if the game you are playing supports Save RAM (such as The Legend of Zelda), then the option to Wipe the Save RAM will also be available here. However, use this with care – you don't want to delete all your hard work!



NES Cafe Load State Menu Screen

The Save State Menu is shown on the left. You can Save a State into one of the available slots for each game. When you go to Load a previously saved state you can cycle through the available slots by pressing the UP and DOWN arrows on your keyboard. As you highlight a slot, a thumbnail image at the point at which you saved the state of the emulator will be displayed in the top right-hand corner of the screen.

Each Save Slot can be used to either store State files (taken when pressing C for Commit), or Movie files (taken after recording a movie by pressing F8). If a Slot also contains a Movie then the words "Movie Embedded" will be displayed.



NES Cafe Extra's Menu Screen

The Extras Menu

The Extras Menu provides access to the NES Cafe Debugging Engine, the Time Shift Buffer, and a host of other extras – such as the ability to input Game Genie Codes, record movies and save screenshots. These options are explained below.

NES Cafe supports Game Genie codes. Click on Enter Game Genie Code (or press G whilst playing the game) and then supply a code for the game that you are currently playing. There are hundreds of Game Genie codes for almost all Nintendo games available on the Internet.

When you select Enter Game Genie Code from the Extras menu you will be taken to the Game Genie screen. Select a free slot and press ENTER, then enter your Game Genie code. Up to a total of four slots are available, allowing up to four different Game Genie codes to be active.

Finally, the ability to disable Overrides is also provided. Overrides are unique to NES Cafe. Overrides allow Websites or users to change the behaviour of games to a greater extent than possible with just Game Genie codes. They support decision logic on the basis of memory reads and writes within the game, which therefore supports broadcasting of score data. You can read more about Overrides later.



Time Shift Buffer Menu Screen

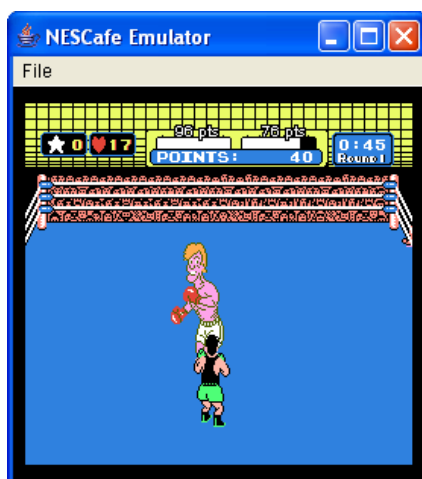
The Time Shift Buffer (Warp Zone) allows you to jump back in time, much like when using the Time Shift Buffer on a modern video machine. The game state is automatically recorded every couple of seconds (defined from the Settings Menu); therefore if your game isn't going too well you can use this option to jump back.



NES Cafe 6502 Debugger Screen

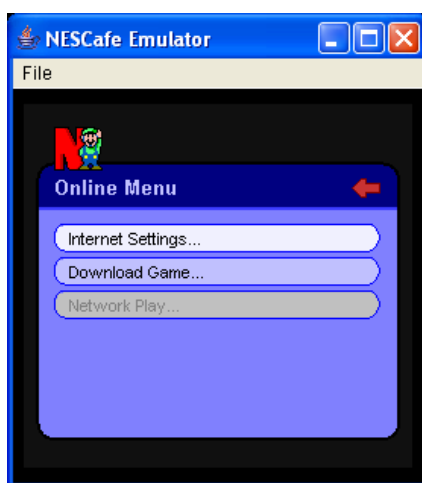
NES Cafe also includes a 6502 Debugging Engine. This allows you to see what is really going on inside the Nintendo game that you are playing – but be warned, you will require a good working knowledge of 6502 Assembler. You can start the NES Cafe 6502 Debugger by pressing the F5 key.

The 6502 Registers are shown in the top right hand corner of the screen in Binary and Hexadecimal representation. The actual code being executed is shown in the bottom window. You can use the DOWN key to trace through one instruction at a time, the ENTER key to jump 5 instructions at a time or the PGDN key to jump to an interrupt (such as a NMI or RST Interrupt).



NES Cafe Subtitles during Punch-Out

Game Subtitles are unique to NES Cafe, but are only available for a couple of games currently. Not only does NES Cafe emulate the game, but on specially supported Subtitle-enabled games, it can also provide additional information to the player. In the example shown on the left (Mike Tyson's Punch-out), the subtitles are showing the actual amount of energy in each fighter's energy bar, as well as the strength of the punches in points, which is perfect for finding out which punch is the best one to use!

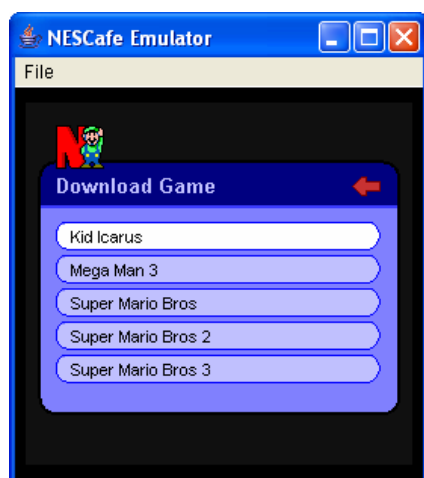


NES Cafe Online Menu Screen

The NES Cafe Online Menu

The NES Cafe Online Menu allows you to configure your connection to the Internet and to download Games directly from the NES Cafe ROM Server. This menu is only available in the Standard version of NES Cafe or when the Applet is running from www.davieboy.net, because otherwise the security permissions on Java Applets prevent it from accessing the server.

Network Play is a disabled option on this menu, but will be coming shortly to both the Applet and Standalone versions of the NES Cafe emulator. This will allow people to play multi-player NES games using NES Cafe across the Internet.

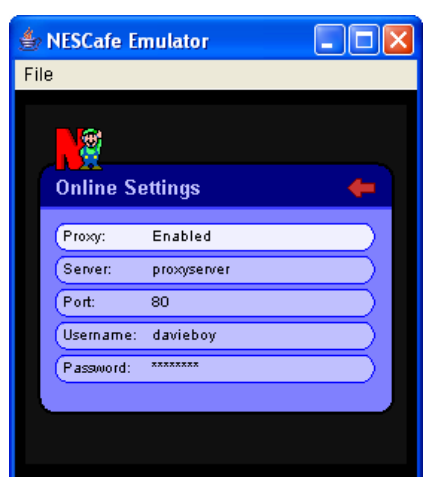


Download Game Menu Screen

The Download Game option allows you to download game directly from the NES Cafe ROM server into the NES Cafe emulator. A dialogue appears showing all the games currently available online. Unfortunately, the list is usually small or not available because of outstanding copyright protection issues surrounding the provision of copyrighted Nintendo games.

Important Note:

You should never attempt to download a NES ROM game that you do not own the original cartridge for. Doing so is software piracy, which is strictly against the law in most counties. The author of NES Cafe cannot and will not be held responsible for how you use this emulator, especially if you intend to pirate NES games.



Proxy Configuration Menu Screen

Configuring Proxy Server Settings

If you use a Proxy Server to connect to the Internet, you will need to configure NES Cafe to use it by going to the NES Cafe Online menu and selecting 'Internet Settings'. In the dialog that is presented, you can specify the name of your proxy server and the port number that you communicate with your proxy server on. If your proxy server requires authentication then you can also specify a username and password.

Unfortunately, NES Cafe will not support proxy scripts so please input only the IP address or name of your proxy server on your network.

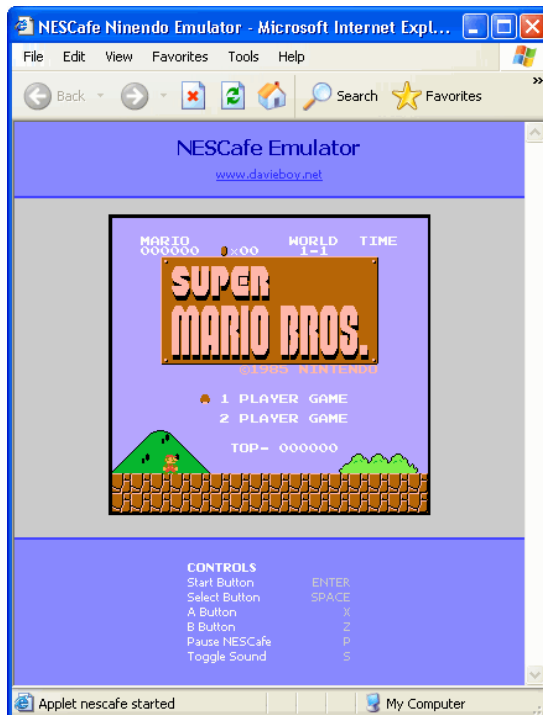
Configuring NES Cafe with your Firewall

If you use a software Firewall, such as Norton or Black ICE, and you want to be able to use NES Cafe for online features then you will need to allow NES Cafe to use port 80 (HTTP) for outgoing traffic. Instructions on how to do this are included with the documentation for your firewall product. Please also ensure that the version of NES Cafe you are using came from the NES Cafe website site and that it only attempts to access www.davieboy.net on port 80.



6 NES Cafe Applet Configuration

6.1 Applet Distribution



The NES Cafe Applet version runs from within an Internet Web Browser or the Java Applet Viewer. The screenshot on the left shows NES Cafe running from within Microsoft Internet Explorer, hosted from a Microsoft IIS Web Server. The game, Super Mario Bros, appears in the central window and the bottom panel shows the controls that are available to users.

The look and feel of the NES Cafe interface is predominately from the NES Cafe.html file (the actual NES Cafe Java Applet only presents the game window). If you intend hosting NES Cafe from your website then please feel free to change the NES Cafe.html page to your suiting and brand, however I would appreciate it if you could retain a link to the NES Cafe homepage with the link entitled 'Powered by NES Cafe'.

To enable NES Cafe to run from your website on an HTTP Web Server, such as Apache or Microsoft IIS, then you need to ensure that the Web Server is currently installed and configured and that you have installed support for PHP. PHP is required to support the nescafeproxy.php script that allows the NES Cafe Applet to communicate with the NES Cafe Server. If you do not install this proxy script or do not install PHP then NES Cafe will complain that it couldn't authenticate when it attempts to start up on your Web Site.



6.2 Checklist for installing NES Cafe on your Website:

-
1. Ensure a Web Server is installed and correctly configured on your computer.
 2. Ensure that PHP is installed and correctly configured on your Web Server.
 3. Copy the following files to a directory that is hosted on your Web Server:
-

- NES Cafe.html	(this is the main HTML file with the Applet Tag)
- NES Cafe.jar	(this is the NES Cafe emulator executable code bundle)
- nescafeproxy.php	(this is the PHP proxy script required for NES Cafe)

4. Optionally, copy a nescafe.settings file to the same directory and configure it.
5. Optionally, copy the following PHP files and enable them in the Tag (see below) if you want the extra functionality NES Cafe provides for saving and load States, saving and loading SaveRAM and for saving images for your visiting users:

- nescafeLoad.php	(used to load NES Cafe data files, if enabled in Applet Tag)
- nescafeSave.php	(used to save NES Cafe data files, if enabled in Applet Tag)
- nescafeShowThumb.php	(used by view Thumbnail images from State/RAM files)

6. Finally, go to the HTTP location that you uploaded NES Cafe to and run it. If you installed the application successfully then you should see the NES Cafe logo. It is worth remembering that you will need your clients to install a Java VM as well.

There are loads of examples of other people that are running NES Cafe on their own sites, just do a search for NES Cafe in Google, or visit the Play section of the NES Cafe website to find some successfully configured installations.



6.3 The NES Cafe Applet Code Tag

The settings for the NES Cafe Applet are mostly contained within the NES Cafe.html file. The following code listing shows all the possible settings that the Applet Tag supports and the table below details which settings are optional and what their default values are:

```
<applet code=NESCafeApplet archive="NESCafe.jar" width=256 height=240>

    <param name=ROMFILE          value="roms/nintendogame.nes">
    <param name=LIGHTGUN         value="false">
    <param name=SOUND             value="true">
    <param name=SETTINGSFILE     value="mysettings.settings">
    <param name=GAMEGENIE        value="ITYEOXUK, APZLGI">
    <param name=LOADSTATEONSTARTUP value="savestates/mystate.nss">
    <param name=IPSURL           value="ips/patchfile.ips">

    <param name=LOADDATAURL      value="scripts/nescafeload.php">
    <param name=SAVEDATAURL      value="scripts/nescafesave.php">

</applet>
```

In general, the settings that you can configure in the Applet Tag for specific for the current game that you are playing, they include whether Game Genie codes are enabled, the name of the ROM file to load, whether to use the Light Gun, etc. There are additional settings that can be made in the NES Cafe settings files. These are more general settings on how NES Cafe performs and whether any of the standard features should be disabled.

6.4 Parameter Settings Explained

Tag	Meaning	Optional	Default
WIDTH	<p>The width in pixels of the displayed Applet.</p> <p>Increasing this value will increase the displayed width of NES Cafe, but will slow NES Cafe down. This setting should be at least 256 to ensure that the entire Nintendo screen is visible. It should be noted that when both the width and height are increased beyond 300 pixels then the NES Cafe screen will be magnified and centred.</p> <p>For those who want to display NES Cafe in exactly double resolution then a value greater than 512 should be used in this setting.</p>	No	256+



Tag	Meaning	Optional	Default
HEIGHT	<p>The height in pixels of the displayed Applet.</p> <p>Increasing this value will increase the displayed height of NES Cafe, but will slow NES Cafe down. This setting should be at least 240 to ensure that the entire Nintendo screen is visible. It should be noted that when both the width and height are increased beyond 300 pixels then the NES Cafe screen will be magnified and centred.</p> <p>For those who want to display NES Cafe in exactly double resolution then a value greater than 480 should be used in this setting.</p>	No	240+
ROMFILE	<p>The location of the Nintendo ROM files to play.</p> <p>When the NES Cafe Applet starts up it will attempt to load and run the ROM file that is specified by this tag. If no Nintendo ROM file is provided then the default nescafe.nes file will be loaded instead (from inside the JAR file).</p> <p>If you know that your installation of NES Cafe will only be used to run one particular ROM image then it may be worthwhile storing it in the Applet JAR file by overwriting the existing nescafe.nes file. This will improve the download time of NES Cafe since the JAR will contain all the files required to run that installation.</p>	Yes	nescafe.nes
LIGHTGUN	<p>Whether or not the Light Gun is enabled.</p> <p>This tag should be set to True for all the games that require Light Gun (Zapper) support (for example, games such as Duck Hunt).</p>	Yes	False
SOUND	<p>Whether or not Sound should be emulated.</p> <p>This tag should be set to True for all games that you want NES Cafe to emulate the sound for.</p> <p>Java requires a lot of resource to emulate Sound and if this is not available (if you are not getting 60 frames per second) then the sound can appear crackled and distorted. Therefore, this setting allows your low-end visitors to not suffer the poor sound quality and frees up some cycles to speed up the main game emulation.</p>	Yes	False



Tag	Meaning	Optional	Default
SETTINGS FILE	Specifies an alternative filename to read the Settings file from. If this tag is not provided the settings file will be attempted to be read from the same directory as the NES Cafe Applet and will be expected to be called nescafe.settings	Yes	[None]
GAMEGENIE	Specifies the Game Genie Codes to load at start-up for the current Applet Game. Up to four valid Game Genie Codes can be provided, with commas between the codes. For example: "ITYEOXUK, APZLGI"	Yes	[None]
LOADDATA URL	References the NES Cafe Load PHP Script This tag points at the NES Cafe Load PHP script, or to a custom CGI script that can handle requests for NES Cafe State or Save RAM files. If this Tag is not provided then the user cannot load any NES Cafe data files into the emulator. The NES Cafe Load PHP script is documented and is included with the Applet distribution (other language ports are also available). More information on this script can be found in the Example PHP Scripts section of this document. The Saved State file must belong to the ROM that is currently running in NES Cafe, otherwise an error will be occur when you try to load it.	Yes	[None]
SAVEDATA URL	References the NES Cafe Save PHP Script This tag points at the NES Cafe Save PHP script, or to a custom CGI script that can handle requests to save NES Cafe State, Save RAM, Screenshot or Movie files. If this Tag is not provided then the user cannot save any data files back to the server running NES Cafe. The NES Cafe Save PHP script is documented and is included with the Applet distribution (other language ports are also available). More information on this script can be found in the Example PHP Scripts section of this document. The Saved State file must belong to the ROM that is currently running in NES Cafe, otherwise an error will be occur when you try to load it.	Yes	[None]



Tag	Meaning	Optional	Default
LOADSTATE ONSTARTUP	Points to a NSS file to Load at Reset or Start-up If this value is set to the URL of a NES Cafe Save State (NSS) file then the State referenced by this tag will be loaded instantly when the NES Cafe Applet loads up or when the user resets the game that they are playing.	Yes	[None]
IPSURL	An IPS File to patch the current ROM with. International Patching System (IPS) files are used to change the code within a Game. Many IPS files exist on the Internet for thousands of Nintendo games. If you want to use an IPS file with NES Cafe in Applet mode you can specify it using this IPSURL tag. However, the file cannot be delivered through a script unlike the LOADSTATE and LOADSAVERAM Applet tags – instead it must be explicitly specified.	Yes	[None]



6.5 NES Cafe Settings File

The NES Cafe Settings file can be used to store general environment settings and custom options for the NES Cafe emulator, over and above those from the applet tag. The NES Cafe settings file should be placed in the same directory as the main JAR file.

```
[Proxy]
useproxy=false
proxyserver=
proxyserverport=
proxyserverusername=
proxyserverpassword=

[TimeShiftBuffer]
timeshiftbufferlength=120
timeshiftbufferinterval=2

[Graphics]
ImageSmoothing=false
HighResThumbnails=false
MovieMaxSize=10485760
MovieMode=ANY
MovieFormat=KEYSTROKES
ImageFormat=PNG

[Controls]
Joypad_A=X
Joypad_B=Z
Joypad_Start=ENTER
Joypad_Select=SPACE

[Startup]
StartDownloader=false
StartTimeTrial=false
OverrideFile=
OverrideActiveAtStartup=true

[Security]
DisableDebug=false
DisableDownloading=false
DisableFrameSkip=false
DisableSaveRAM=false
DisableSaveState=false
DisableSaveImage=false
DisableSaveMovie=false
DisableTimeShiftBuffer=false
DisableOverrideChanges=false
DisableGameGenieChanges=false
DisableMenu=false
```

nescafe.settings example

Proxy Section	Description
UseProxy [Standard mode only]	If using a Proxy Server to connect to Internet
ProxyServer [Standard mode only]	The name of the Proxy Server
ProxyServerPort [Standard mode only]	The Proxy Server Port
ProxyServerUsername [Standard mode only]	The Proxy Server Username
ProxyServerPassword [Standard mode only]	The Proxy Server Password



TimeShiftBuffer Section	Description
TimeshiftBufferLength	The length in units of the Time Shift Buffer.
TimeshiftBufferInterval	The number of seconds between each unit in the TSB. If this value is 2 and the length of the Time Shift Buffer (defined by TimeshiftBufferLength) is 30 then a State will be saved automatically each 2 seconds and the user will be able to jump back at most 60 seconds (2 times 30).

Graphics Section	Description
ImageSmoothing	If Image Filtering is used (fast CPU required). This improves the quality of the NES Cafe screen image by smoothing the graphics, but the emulation speed is slowed down in return. If you have a fast PC and run NES Cafe at high resolutions then you could use this.
HighResThumbnails	Thumbnails are taken at higher resolution. This increases the size of Save State and Save RAM files, but the thumbnail images are stored at higher resolution.
MovieMaxSize	Maximum size in bytes of an Animated GIF Movie. Set this value to the maximum size of Animated GIFs that you want NES Cafe to create. This will allow webmasters to control the amount of data these file occupy. Setting this value less than 1K will disable Animated Gif support.
MovieMode	The Allowed Movie Recording Formats This value specifies what recording formats are allowed for users to record their movies. Setting this value to ANY will allow both Animated GIFs and Keystroke movies to be recorded. Setting this value to FORCE_ANIMATED_GIF or FORCE_KEYSTROKES will force either Animated GIF or Keystroke movie recordings respectively. This is useful if you want your site to only accept a particular movie type.
MovieFormat	The default Movie recording type Set this value to KEYSTROKES or ANIM_GIF to set the default recording type to either Keystroke or Animated GIF movies respectively. This can be used to conjunction with the above setting to force a movie recording type.
ImageFormat	Set to either PNG or GIF and determines the image format of all screen capture files. If this value is not provided then the default image format is PNG.

When specifying the controls, you can either use reserved keywords (such as ENTER, SPACE, SHIFT, CTRL or PGUP), the actual key value (such as A, B, C or Z) or the actual ASCII value (such as 65 for A, 66 for B or so on). Only the Joypad buttons (A, B, Start and Select) can be reassigned, the directions cannot currently be reassigned.

Controls Section	Description
Joypad_A	The key to use for Joy Pad 1's A button.
Joypad_B	The key to use for Joy Pad 1's B button.
Joypad_Start	The key to use for Joy Pad 1's Start button.
Joypad_Select	The key to use for Joy Pad 1's Select button.



StartUp Section	Description
StartDownloader	Whether the Download screen should appear on start-up. If you set this value to TRUE then the NES Cafe download screen will appear automatically when NES Cafe starts. This screen allows NES Cafe to talk with the NES Cafe Online site to select and download NES ROMS.
StartTimeTrial	Whether Time Trial Mode should run on start-up. If you set this value to TRUE then NES Cafe will go into Time Trial mode. When NES Cafe starts it will display a message to the user saying that they have entered Time Trial mode, at any time the user can then hit the T key to submit their current score back to the website (provided the website can support Time Trial data from the nescafesave.php script interface). The Time Trial score data is sent back to the Web Server with a screenshot that can validate the authenticity of the score submitted. Setting this value to TRUE also sets the values below, this is to prevent users cheating during Time Trial mode. <pre>disableDebugging = true; disableMenu = true; disableROMDownload = true; disableFrameSkip = true; disableTimeShiftBuffer = true; disableGameGenieChanges = true; startDownloader = false;</pre>
OverRideFile	The File containing the NES Cafe Override script. NES Cafe Overrides are a unique feature to NES Cafe, they allow decision logic to be coded against reads and writes within the video game. This allows you to have greater control over the game than you would with just a Game Genie code. For example, Overrides (specified using the NES Cafe Override scripting language) could be programmed to broadcast your score from the memory address that it is stored in within the game upon completion of a level in Mario. Please read the section on NES Cafe Overrides in this document for more details.
OverRideActiveAtStartup	Whether the Overrides specified should be active at boot. By default all Overrides are automatically enabled at Start-up. Set this value to FALSE to prevent the Overrides that are specified by the above OverRideFile tag from being enabled automatically when NES Cafe starts up.

Security Section	Description
DisableDebug	Specifies whether the Debug Engine is disabled. Setting this to TRUE will also disable the Code Profiler.
DisableDownloading	Specifies whether the ROM Download screen is disabled. Currently this option is only supported from the NES Cafe Online website, but could be rolled out in future releases.



Security Section	Description
DisableFrameSkip	Whether the auto-frame skip should be disabled. This may result in slower frame rates (because every frame will be rendered), but will produce less juggy game-play on slower PCs, or less performing Java Virtual Machines.
DisableSaveRAM	Whether the user is allowed to Save RAM. This setting requires the SAVERAMURL tag to also be set. Otherwise it will not be active (even if this is set to FALSE). This states whether the user is allowed to use the Save RAM feature. This is a useful override for those that wish to enable the SAVERAMURL for a particular saving feature, but do not want to enable all features.
DisableSaveState	Whether the user is allowed to Save States. This setting requires the SAVERAMURL tag to also be set. Otherwise it will not be active (even if this is set to FALSE). This states whether the user is allowed to use the Save State feature. This is a useful override for those that wish to enable the SAVERAMURL for a particular saving feature, but do not want to enable all features.
DisableSaveImage	Whether the user is allowed to Save Images. This setting requires the SAVERAMURL tag to also be set. Otherwise it will not be active (even if this is set to FALSE). This states whether the user can use the Save Screenshot feature. This is a useful override for those that wish to enable the SAVERAMURL for a particular saving feature, but do not want to enable all features.
DisableSaveMovie	Whether user is allowed to Save Movies. This setting requires the SAVERAMURL tag to be set. Otherwise it will not be active (even if this is set to FALSE). This states whether the user is allowed to use the Save Animated GIF Movie feature for NES Cafe (it does not apply to standard key-press movies). This is a useful override for those that wish to enable the SAVERAMURL for a particular saving feature, but do not want to enable all features.
DisableTimeShiftBuffer	Whether the user is allowed to use the Time Shift Buffer. This setting can be used to prevent users from using the Time Shift Buffer feature within NES Cafe. This is automatically set when in Time Trial mode, but can be set individually to prevent users from cheating in games.
DisableOverrideChanges	Whether the user can disable the current Overrides. This setting can be used to prevent users from changing or disabling the NES Cafe Override settings that were defined by the hosting website. To learn about Overrides please view the Override section within this document.
DisableGameGenieChanges	Whether the user can CHANGE Game Genie Settings. This setting can be used to prevent changes to the Game Genie settings. This means that whatever Game Genie codes were loaded at start-up (either none, or a particular code or groups of codes) will remain active for the entire session and the user cannot change them.
DisableMenu	Whether the NES Cafe menu is disabled. This setting can be used to prevent the user from going into the NES Cafe menu system to change settings.



6.6 PHP Code Scripts

As mentioned above, a series of PHP (Hypertext Pre-processor) scripts are included with the Applet distribution. The PHP scripts can be used by a PHP-enabled Web Server, such as Apache or IIS, to increase the functionality of NES Cafe even further. Each script is heavily commented and the roles of each of the scripts are explained in the following table below. These scripts should be customised before being deployed to your own web server and could be easily ported to any other CGI language, such as ASP or PERL.

Example Script Name	Description
nescafeproxy.php [MANDATORY]	Overview: The script is a Proxy that allows the NES Cafe Applet, which is hosted on your Web Site, to communicate back with the NES Cafe server back at www.davieboy.net . This script MUST be copied to the same directory that you have copied the NES Cafe JAR file to (nescafe.jar), otherwise NES Cafe will fail to start up on a Web Server (you will still be able to play it locally through Applet viewer). Feel free to modify this script if you wish to capture any of the information that travels across this interface.



Example Script Name	Description
nescafesave.php	<p>Overview:</p> <p>NES Cafe posts the following data to this script when the user wants to save a State, SaveRAM, Movie or Screen shot data file (additional options may be appended to the URL required):</p> <p>contenttype : nescafe/state nescafe/saveram nescafe/screenshot nescafe/movie nescafe/timetrial nescafe/trigger</p> <p>gamename : The name of the NES game running</p> <p>ext : nss (for Save States) sav (for Save RAM) gif (for Screen Shot files) gif (for Animated GIF Movies)</p> <p>saveslot : The Save Slot number (for Save States)</p> <p>The script received a Saved State, Save RAM, Screenshot or Animated GIF file from NES Cafe (depending on the value of ContentType) stores the data file to the Server. The script is referenced from the Applet Tag using the SAVEDATAURL Tag:</p> <pre><param name= SAVEDATAURL value= "nescafesave.php?user=UserName"></pre> <p>The files are read from the following locations on the Server:</p> <p>states/username-gamename.nss saveram/username-gamename.sav savescreens/username-gamename.gif savemovies/username-gamename.gif</p> <p>timetrials/username-gamename.gif (for the ScreenShot) timetrials/username-gamename.timetrial.txt (for the Score details) trigger/username-gamename.trigger (for Trigger Data, see Overrides)</p> <p>If no user value is provided, or NES Cafe cannot determine the name of the game being played then <i>unknown</i> is used instead.</p>



Example Script Name	Description								
nescafe-load.php	<p>Overview:</p> <p>NES Cafe posts the following data to this script when the user wants to load either a NES Cafe State or SaveRAM data file (additional options may be appended to the URL if required):</p> <table><tr><td>contenttype</td><td>: nescafe/state nescafe/saveram</td></tr><tr><td>gamename</td><td>: The name of the NES game running</td></tr><tr><td>ext</td><td>: nss (for Save States) sav (for Save RAM)</td></tr><tr><td>saveslot</td><td>: The Save Slot number (for Save States)</td></tr></table> <p>The script fetches either a Saved State or Save RAM file (depending on the value of ContentType) from the Web Server and presents it back to NES Cafe. The script is referenced from the Applet Tag using the LOADDATAURL Tag setting:</p> <pre><param name= LOADDATAURL value= "nescafe-load.php?user= <i>UserName</i>" ></pre> <p>The files are read from the following locations on the Server:</p> <pre>states/ <i>username-gamename</i>.nss saveram/ <i>username-gamename</i>.sav</pre> <p>If no user value is provided, or NES Cafe cannot determine the name of the game being played then <i>unknown</i> is used instead.</p> <p>Important Note Regarding Save RAM:</p> <p>When loading Save RAM files, if no Save Ram is available on the server for the specified user/game, then it is <i>very</i> important that this script returns the phase "NOSAVRAM" (as per the example script included with the NES Cafe Applet distribution).</p> <p>This response informs NES Cafe that there wasn't a communication error and, if as a result of playing the game some SaveRAM content gets generated, it would be alright for NES Cafe to attempt to save it back to the server.</p> <p>If the phase "NOSAVRAM" does <i>not</i> get returned by this script then NES Cafe assumes that a communications error occurred and does not attempt to save any generated SaveRAM back to the server in-case the saving process overwrites the server-side SaveRAM that was intermittently unavailable during the load.</p>	contenttype	: nescafe/state nescafe/saveram	gamename	: The name of the NES game running	ext	: nss (for Save States) sav (for Save RAM)	saveslot	: The Save Slot number (for Save States)
contenttype	: nescafe/state nescafe/saveram								
gamename	: The name of the NES game running								
ext	: nss (for Save States) sav (for Save RAM)								
saveslot	: The Save Slot number (for Save States)								



Example Script Name	Description
showthumb.php	<p>Overview:</p> <p>This script can be run against a NES Cafe Saved State or Save RAM file on the Server to return the thumbnail image from inside the file as a GIF or PNG image file. You can call this script from your browser by passing the filename as <i>file</i>.</p> <p>http://domain/showthumb.php?file=savestatefile.nss http://domain/showthumb.php?file=saveramfile.sav</p> <p>Please note that this script does not run from the Applet Tag.</p>



6.7 NES Cafe API for JavaScript

NES Cafe exposes an API (Application Programmers Interface) that will allow JavaScript in the surrounding webpage to control certain aspects of the emulator whilst it is running. This section of the document provides some examples of what can be done.

Function	Description and Example
loadROM(URL)	<p>This function can be used to load a different ROM at any time whilst a game is playing in the NES Cafe emulator. For example, you can use the following JavaScript code in your webpage to stop the current NES Cafe game and load a game called Zelda.</p> <pre><SCRIPT language="JavaScript"> function loadROM() { var nescafe = document.getElementById('nescafe'); nescafe.loadROM('roms/ elda.nes'); } </SCRIPT> <INPUT type="button" name="Button1" value="Load Zelda" onClick="loadROM()" language="JavaScript" ></pre> <p>Please note that for this to work in Firefox, you will need to ensure that the APPLET tag that NES Cafe is running inside has both a NAME and an ID field with the value of 'nescafe'</p>
loadState(URL)	<p>This function can be used to load a Saved State at any time whilst a game is playing in the NES Cafe emulator. You can use the following JavaScript code to load a saved State file.</p> <pre><SCRIPT language="JavaScript"> function loadState() { var nescafe = document.getElementById('nescafe'); nescafe.loadState('savestates/ elda.nss'); } </SCRIPT> <INPUT type="button" name="Button1" value="Load State" onClick="loadState()" language="JavaScript" ></pre> <p>Please note that for this to work in Firefox, you will need to ensure that the APPLET tag that NES Cafe is running inside has both a NAME and an ID field with the value of 'nescafe'</p>



Function	Description and Example
stop()	<p>This function can be used to stop the NES Cafe emulator from running at any time whilst a game is being played. You can use the following example JavaScript code to achieve this:</p> <pre><SCRIPT language="JavaScript"> function stopNES Cafe() { var nescafe = document.getElementById('nescafe'); nescafe.stop(); } </SCRIPT> <INPUT type="button" name="Button1" value="Stop Game" onClick="stopNES Cafe()" language="JavaScript" ></pre> <p>Please note that for this to work in Firefox, you will need to ensure that the APPLET tag that NES Cafe is running inside has both a NAME and an ID field with the value of 'nescafe'</p>
canAppletLoadState()	<p>This JavaScript function will return TRUE if the NES Cafe emulator that is running from the webpage is capable of loading Saved State files from your web server:</p> <pre><SCRIPT language="JavaScript"> function queryNES Cafe() { var nescafe = document.getElementById('nescafe'); alert('Load State: ' + nescafe.canAppletLoadState()); } </SCRIPT> <INPUT type="button" name="Button1" value="Query NES Cafe" onClick="queryNES Cafe()" language="JavaScript" ></pre> <p>Please note that for this to work in Firefox, you will need to ensure that the APPLET tag that NES Cafe is running inside has both a NAME and an ID field with the value of 'nescafe'</p>
canAppletSaveState()	<p>This JavaScript function will return TRUE if the NES Cafe emulator that is running from the webpage is capable of saving Saved State files to your web server (only the lines of code that are different from above are shown in this example):</p> <pre>var nescafe = document.getElementById('nescafe'); alert('Save State: ' + nescafe.canAppletSaveState());</pre>



Function	Description and Example
canAppletLoadRAM()	<p>This JavaScript function will return TRUE if the NES Cafe emulator that is running from the webpage is capable of loading Save RAM files from your web server (only the lines of code that are different from above are shown in this example):</p> <pre>var nescafe = document.getElementById('nescafe'); alert('Load RAM: ' + nescafe.canAppletLoadRAM());</pre>
canAppletSaveRAM()	<p>This JavaScript function will return TRUE if the NES Cafe emulator that is running from the webpage is capable of saving Save RAM files to your web server (only the lines of code that are different from above are shown in this example):</p> <pre>var nescafe = document.getElementById('nescafe'); alert('Save RAM: ' + nescafe.canAppletSaveRAM());</pre>



7 Controls for NES Cafe

The following tables show the keys that can be used whilst NES games are running in the Standard and Applet versions of NES Cafe. The Applet user interface alludes to most of the available key controls, but there are a couple of additional keys also available.

Controls for Joy Pad 1 (default)

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Start button	Enter*	Enter*
Select button	Spacebar*	Spacebar*
A button	X*	X*
B button	Z*	Z*
Up button	Up arrow	Up arrow
Down button	Down arrow	Down arrow
Left button	Left arrow	Left arrow
Right button	Right arrow	Right arrow

Note that the above controls for the buttons can be changed

Controls for Joy Pad 2 (requires Light Gun to be Enabled)

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Aim Light Gun (Zapper)	Move mouse	Move mouse
Fire Light Gun (Zapper)	Click Left Mouse Button	Click Left Mouse Button

Emulation Controls

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Pause Emulation	P	P
Reset the Game	R	R
Clear Save RAM and Reset	Q	Q
Show Time Shift Buffer	BACKSPACE	BACKSPACE
Commit State of Emulator	C	C (requires SAVEDATAURL tag)
Rollback to Saved State	L	L (requires LOADDATAURL tag)
Display ROM Information	I	I
Start / Stop Recording	F8	F8 (requires SAVEDATAURL tag)
Display Sprite Tiles used	F9	F9
Decrease Emulation Speed	F11	F11
Increase Emulation Speed	F12	F12



Adjustment Controls

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Display Main Menu	ESC or Right-Click	ESC or Right-Click
Sound Toggle	S	S (must be enabled in tag)
Toggle Game Subtitles [*]	#	#
Save Screenshot	A	A
Control Player 1	<	<
Control Player 2	>	>
Enter Game Genie Codes	G	G
Time Trial or Override	T	T

NES Cafe Debug Engine Controls

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Toggle Debug Mode	F5	F5
Step by Instruction	DOWN (in debug mode)	DOWN (in debug mode)
Step by 5 Instructions	ENTER (in debug mode)	ENTER (in debug mode)
Step to next Event	PGDN (in debug mode)	PGDN (in debug mode)
Start NES Cafe Profiler	F6	[not supported]

^{*} NES Cafe Game subtitles are an information layer that can be displayed over the game. They are currently available when NES Cafe runs Mike Tyson's or Mr. Dream's Punch-out to tell the player the strength of their punches. More details on Subtitles can be found in the following section.



8 Special Features and Add-ons

This section of the document outlines additional add-ons and special features that NES Cafe can provide. If you simply want to run a game in NES Cafe or want to host NES Cafe on your website for your visitors then you do not need to read this section. However, if you want to learn about some of the additional capabilities then read on.

8.1 NES Cafe Game Subtitles

This feature is unique to NES Cafe. Subtitles provide the player with additional information about what is happening in a game and overlays this on the screen during the game-play. For example, in Mike Tyson's Punch-out, when Subtitles are displayed you can see exactly how hard a punch was, or exactly how much energy you have left in your energy bar. You can display Subtitles for supported games by pressing the # key.

The following games currently support Subtitles (more to come):

Game Name	Features
Mike Tyson's Punch-Out	Displays the exact energy levels for the health bars Displays the exact strength of all the opponents punches Displays the exact strength of all Little Macs punches
Mr Dream's Punch-Out	Displays the exact energy levels for the health bars Displays the exact strength of all the opponents punches Displays the exact strength of all Little Macs punches

8.2 ROM Download Client

NES Cafe allows you to download ROMs directly from the NES Cafe Website. However you should only download Nintendo games that you legally own the original cartridge for as otherwise you are breaking the law in most countries. The author of NES Cafe (David de Niese) accepts no liability or responsibility from your use of this feature of the emulator or from you downloading a Nintendo ROM that you are not legally entitled to download.



8.3 Time Shift Buffer



Time Shift Buffer Screen

The Time Shift Buffer (TSB) can be accessed by pressing BACKSPACE and allows the user to jump back in-time when playing a NES game. Every couple of seconds NES Cafe will automatically record the state of the emulator (configured from the Settings Menu) and maintain a rolling period of states that you can jump back to. The left screen shows the sliding timeline bar that can be used to jump back to a particular point in time.

8.4 Recording and Playing Back your Games



Configuring the Recording Format for Movies

NES Cafe supports the ability to record your Games and then play them back at a later stage, potentially on a different PC. Two different Recording Formats are available.

You can choose to save just the initial State of the emulator and then all subsequent key-presses (known as Recording Key-presses). This option is ideal for creating small movie files, provided the person viewing the movie has a copy of NES Cafe and the same NES file.

Alternatively you can save your play to an Animated GIF, which are considerably larger (thus restricted in the Applet version to 2MB), but could be viewed in any Web Browser.

To select the recording format for Movies go to the Settings Menu and select the Movie Recording Configuration option. If you select Animated GIF as the Movie Mode then you can also specify the Movie Quality as either High (256 by 240 pixels) or Low (128 by 120 pixels), and the Frames per second (7 to 15).



Recording a Game

Load your Game and then to start recording it press F8 on your keyboard (or select Record Movie from the Extras menu). If you are using the Applet version, Game Recording requires a SAVEDATAURL Tag to be defined in your Applet Tag. As the game is being recorded, a flashing red record message is displayed in the top left-hand corner of the screen. When you have finished recording your game, press either the F8 or ESC key on your keyboard.

If you elected to Record Keystrokes, you are then able to save your movie into an available Save Slot. If you elected to Record an Animated GIF, your movie is automatically saved back to your server as a GIF file.

Playing back Keystroke Movies

If you elected to Record Keystrokes, then to play back your recorded game (Movie), press the L key (Load on the Emulation Menu) to bring up the Load State menu screen. Go to the Save slot that the Movie was saved into and you should see a snapshot of the game.

You will also notice that the words Movie Embedded appear over the snapshot image to let you know that the State file has an embedded Movie. Now press ENTER, the Game State will load and the movie will start.

When the movie starts playing back you will see a green Play icon in the top left-hand corner of the screen, along with the words Playing Movie. You can stop the Playback at any time by pressing ESC. After the movie has finished you will be able to take over control of the game from that point onwards.

Playing back Animated GIF Movies

If you elected to Record your movie as an Animated GIF then your movie is broadcast back to the Server on completion and can be played using any Internet Browser, such as FireFox or Microsoft Internet Explorer.



8.5 International Patching System (IPS) Files



IPS Patch of Mega Man 2 in NES Cafe

NES Cafe supports International Patching System Files (IPS). IPS files are used to patch (edit) the contents of the underlying Nintendo ROM files, allowing hackers to change the graphics or to change entire levels within games. It is also worth noting that NES Cafe does not permanently edit the underlying ROM file unlike other IPS tools. This means that you do not risk losing an original ROM by patching it using this IPS feature.

To allow the IPS file to be loaded in Applet mode you must ensure that it is specified by the IPSURL tag in the Applet tag inside the HTML code (see Applet Configuration section of this document). The IPSURL tag must point directly at the file; you should not point this URL at a PHP script, unless that script is able to provide details on the length of the returned content in the header response.

To allow the IPS file to be loaded you must ensure that it is placed into a subdirectory (folder) called IPS, directly below where you run NES Cafe from and that the file is called the same as the ROM image that you are running, but with an .ips extension.

An example configuration is below:

```
/nescafe.jar  
/roms/mario1.zip [The game that you are running]  
/ips/mario1.ips [The IPS patch file that you want to load with mario1.zip]
```

An example Applet Tag is below:

```
<applet code=NESCafeApplet  
  archive=nescafe.jar  
  codebase=.  
  Width=260  
  height=244  
  name=nescafe>  
  
  <param name=ROMFILE value=roms/megaman2.zip>  
  <param name=IPSURL value=ips/megaman2.ips>  
  
</applet>
```

Users should know that saving and loading State information is prevented when using IPS patched games in order to prevent corruption when a state saved with a particular IPS patch is later loaded into the same game, but without the IPS patch applied.



8.6 Time Trial Mode



Submitting your Score in Time Trial Mode

NES Cafe support Time Trial mode using the STARTTIMETRIAL flag in the Settings file. When NES Cafe starts up it will tell the user that they are running in Time Trial mode and to press ENTER to start the game.

During the game the user will be prevented from using any of the cheat modes (such as making changes to the Game Genie code configuration or using the Time Shift Buffer).

When the user wants to submit their score back to the website they can press the T key on their keyboard, type in their score and click submit. Their score is then submitted, along with an automatically generated screen shot (to validate the score that they typed in).

If NES Cafe is running from a Web Server, the data is posted back via the nescafesave.php script using the nescafe/timetrial content-type and is stored in the *timetrials* subdirectory.

NOTE: You cannot enable Time Trial mode at the same time as NES Cafe Overrides. This is because the Override Engine provides everything that the Time Trial mode provides, plus support for automatic broadcast of scores upon particular memory reads and writes. To learn about Overrides please see the Overrides section in this document.

When NES Cafe is run in Time Trial Mode from a Web Server, the Time Trial data is saved to the Web Server via the nescafesave.php script. You could change that script to intercept the values being sent back if you wanted to (NES Cafe is open source after-all), or you could leave the script to just save the data to a flat file in the timetrials directory.

The following two variables are posted to the server via the nescafesave.php script:

<i>timetrialtext</i>	This variable holds the text, or score, that the user typed in
<i>timetrialtime</i>	This variable holds the number of seconds the user played for



8.7 NES Cafe Override Engine

What are Overrides?

This feature is unique to NES Cafe. Overrides are scriptable commands that tell NES Cafe how to respond as a game runs. For example, Overrides can be used to implement very powerful game logic. In the example below for Mike Tyson's Punch-Out, the following Override tells NES Cafe to not let Little Mac's (the boxer) energy go too high (limits it).

NES Cafe Override Example for Mike Tyson's Punch-Out:

```
// Keep Low Energy for Little Mac  
  
on read 0x0393 if VALUEOF 0x0393 > 5 then VALUEOF 0x0391 = 5;
```

How do NES Cafe Overrides Work?

Before continuing with the description of what this is doing, you will need to know a little about how computers operate. If you don't fully understand the following description, don't worry, you can download pre-made Override Scripts from the NES Cafe website.

```
on read 0x0393
```

This tells NES Cafe to wait for a memory read to address 0x0393, which is Little Mac's current energy level in the game. We were able to determine which memory address was used to store this by disassembling the game, but you don't need to worry if you don't know how this is done – that's why most of these NES Cafe Override scripts will be pre-made!

```
if VALUEOF 0x0393 > 5 then
```

When the above memory read occurs, NES Cafe is then told to check if the current VALUEOF the memory address is greater than 5 (which is a nominal amount of energy for poor Little Mac)

```
0x0391 = 5
```

If the above check is satisfied then NES Cafe is told to set the value of register 0x0391 to 5. This register is used to hold the target energy for Little Mac after he gets hit. The game then compares this value in 0x0391 against his current recorded energy (before the hit) in 0x0393 and if different slowly reduces the energy until 0x0393 is equal to 0x0391. Therefore, by setting 0x0391 to 5, we are ensuring that his energy can never go above 5 – in other words he is an easy knockout!



The above example could equally be achieved with a Game Genie code, but here are some additional examples that prove how powerful NES Cafe Overrides can actually be. The following example will wait for Little Mac to win a fight and will then display a message on the NES Cafe screen that he has won, as well as broadcast the number of the round that he won in, and the number of times Little Mac hit the mat during the fight! A similar approach to this is used on the NES Cafe Online website at www.davieboy.net/play

NES Cafe Override Example for Mike Tyson's Punch-Out (more advanced):

```
// Wait for Little Mac to Win and then Broadcast the Round Number

on write 0x0170
  if VALUE != VALUEOF 0x0170 and VALUE != 0 Then
    trigger win;

on write 0x0171
  if VALUE != VALUEOF 0x0171 and VALUE != 0 Then
    trigger win;

// Declare the Trigger to Broadcast the Round Number and Number of Times Down

declare trigger
  win say "You won!" broadcast 0x0006 0x03D0;
```

NOTE: Please note that you should only use the above NES Cafe Override with a Saved State file that starts at the beginning of a fight, otherwise the check that is made sometimes fires too early (during the initial menu system for Mike Tyson's Punch-Out).

```
on write 0x0170
  if VALUE != VALUEOF 0x0170
    and
    VALUE != 0 Then

    trigger win;
```

Just like with the previous example, this tells NES Cafe to wait for a write instruction against memory address 0x0170, it checks if the VALUE that is being written doesn't equal what is currently stored in that address and if that the value is not equal to 0. If this is all true then it will call a Trigger called WIN.

Please don't worry about the memory addresses. You don't need to understand the significance of this instruction and the memory address that is being referenced. You should just know that when Mac wins a fight the address 0x0170 is changed to a non-zero value, which is what is being tested for here.



```
on write 0x0171
  if VALUE != VALUEOF 0x0171
    and
    VALUE != 0 Then

    trigger win;
```

This is the same instruction as above, but with a different memory address. This needs to be checked too because under certain circumstances within the game when Mac wins a match it will write to address 0x0171 instead of 0x0170 (see above). By added a clause for this address as well, we are saying we want to catch either of the write instructions.

```
declare trigger win
  say "You won!"
  broadcast 0x0006 0x03D0;
```

This introduces the topic of Triggers. Triggers are methods by which NES Cafe is told to do something. In this example, when the Trigger called WIN is called (by either of the above instructions being satisfied) it will display the message "You Won!" on the screen and then broadcast the data in memory locations 0x0006 and 0x03D0 to the nescafesave.php script (using the nescafe/trigger content-type).

The memory addresses 0x0006 and 0x03D0 are used to store the Round Number and the number of times Little Mac has hit the ground during the match. This data is written to a file within the *trigger* directory on your web-server (from where your nescafesave.php is located). The first byte in the recorded trigger file will be the value from 0x0006 and the second byte will be the value from 0x03D0.

Hopefully now you will see the power that NES Cafe Overrides provided. However, it will require enthusiastic 6502 developers to start getting into the games and working on interesting Overrides. As Overrides becomes more popular you will be able to download them from the NES Cafe website (and hopefully other websites that decide to host them).

Here is one final example, which can be useful if you want to simply broadcast a value when the user hits the T key on their keyboard. For example, if you are using the below Override then whilst playing Mike Tyson's Punch-Out can press the T key to broadcast your score. See if you can work out how this is achieved without a walkthrough:



NES Cafe Override Example for Mike Tyson's Punch-Out (using key-triggered broadcasts):

```
// Declare the Trigger to Broadcast the Score

declare trigger
    win say "You won!" broadcast 0x03E8 0x03E9 0x03EA
                                0x03EB 0x03EC 0x03ED;

// Tell NES Cafe to call Trigger WIN when user hits the T key

on keypress trigger win;
```

How Do I Use a NES Cafe Override?

If you want to use Overrides, you can specify them in both Applet and Standalone mode by placing a `OVERRIEFILE` tag in your NES Cafe Settings file and then the actual Overrides in the file that the tag points to. For example, you could do the following:

Example Entry in the NES Cafe Settings File:

```
OverRideFile=override.settings
```

Example override.settings File:

```
// Little Mac can Keep Getting Up

on read 0x03C1 VALUEOF 0x03C1 = 0;

// Little Mac can not get any Star Uppercuts

on read 0x0341 VALUEOF 0x0341 = 0;
```

How Do I Create Override Files?

There is currently no automatic tool available that can work out what these memory addresses are and create these Overrides files for you, just like there is no tool available that can automatically work out a Game Genie Code for a particular game you want to play. It is up to programmers with 6502 Assembler experience to disassemble these games and work out which memory locations provide what functionality. However, NES Cafe does include a Code Profiler which will assist the decompiling of the game. Information on how to use the Code Profiler to disassemble NES games in order to produce NES Cafe Overrides can be found in the Guide to Creating NES Cafe Overrides PDF document, which is available from the NES Cafe website www.davieboy.net/nescfe



8.8 Code Profiler (Standalone Version Only)

The Code Profiler is intended for the use of assisting with the creation of NES Cafe Overrides or disassembling Nintendo games. NES Cafe has a Code Profiler, which is built into the Standard distribution (not available for the Applet version). Pressing F6 (when the DISABLEDEBUG tag is not set in the *nescafe.settings* file) will cause NES Cafe to dump memory to disk and to start recording the disassembly of the ROM. A detailed description of how to use the Code Profiler is out of the scope of this user guide, and can be found in the Guide to Creating NES Cafe Overrides document on the NES Cafe website.

In summary, pressing F6 whilst in NES Cafe will produce an excel spreadsheet called *profile.csv* (it can be found in the profiling sub-directory of the NES Cafe application directory). The file has the following format, where the memory address is displayed against the value stored within that memory address at the time you pressed F6.

Address	P1
0x0000	0x00
0x0001	0x03
0x0002	0xD0
...	...
0x07FF	0xA5

P1 stands for Profile 1. If you now close down the spreadsheet, return to your game and press the F6 key again and then once more (so that you have pressed F6 a total of 3 times in all), the *profile.csv* file will have automatically been updated as shown below:

Address	P1	P2	P3	Reads	Writes
0x0000	0x00	0x02	0x02	25,310	20,757
0x0001	0x03	0x03	0x03	4,210	3,501
0x0002	0x01	0x01	0x01	469	4
...					
0x07FF	0xA5	0xA5	0xA5	0	0

This time, each of the three profiles that you requested are displayed side-by-side, with some additional details (such as the number of reads and writes that the game performed against that memory location between the profiles that you took. This can be useful in finding particular registers, for example, if you know that your character in the game was hit 4 times across the profiles then you could look for registers (memory addresses) that received 4 write operations as a way of identifying potential candidates because the game would have had to re-write your health value after each of the 4 hits.

You should also notice a second file call *decompiled.txt*. This contains a 6502 disassembly of all code executed between profile snapshots. This will be useful only if you understand 6502 assembler, and therefore it's outside of the scope of this document.



Next close down the Spreadsheet again and return to your game. Press the F6 key a further 2 times (so that you have pressed F6 a total of 5 times in all). The *profile.csv* file will have been automatically updated again, as shown below and will include some additional profiling columns, which help you identify trends in the data being written to particular registers (and therefore help you determine what type of data is stored there).

Address	P1...	Writes	Increment	Decrement	Constant	Unique	All Zero	Flag	Unique Values
0x0000	0x00	20,757	0	0	0	0	0	0	2
0x0001	0x03	3,501	0	0	1	0	0	0	1
0x0002	0x01	4	0	0	1	0	0	0	1
...									
0x07FF	0xA5	0	0	0	1	0	0	0	1

The table above shows the trend columns that have been added (in green). When NES Cafe has recorded enough profiles, it will run trend analysis on each memory address to help you determine what it is potentially being used for. Each of the metrics above has been described in detail below, together with what it could potentially be used for.

Trend Metric	Description	Usage
READS	The total number of read operations that the game has made against this memory address, between when you took the first and last profiles.	This is useful in detecting heavily access registers, which could be internal counters or health and status bars, which would be being read on every screen re-draw (60 times/sec).
WRITES	The total number of write operations that the game has made against this memory address, between when you took the first and last profiles.	This is useful in detecting health bars or timers. If you know that your health was adjusted in the game 4 times between the profiles (as a result of hits you took), then you may be able to identify the health bar by looking for a value of 4 here in this field.

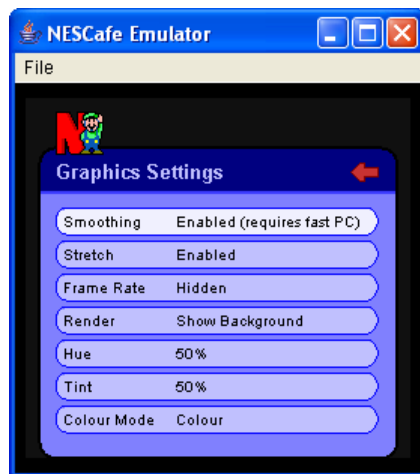


Trend Metric	Description	Usage
INC	Whether the profile of this memory address showed an incrementing trend (the first profile had a smaller value than the last profile value, and all other values were incrementing within the range of the first and last).	This is useful in detecting an increasing value, for example, it could be used to detect registers that may store the level of the game (which you would expect to increment as you progress in the game).
DEC	Whether the profile of this memory address showed a decreasing trend (the first profile had a greater value than the last profile value, and all other values were consistently decreasing within the range of the first and last).	This is useful in detecting a decreasing value, for example, your health register or life-count if you know that you lost health or lives during this profiling exercise.
CONSTANT	Whether the profile of this memory address showed a constant trend (all values profiled here were the same).	This is useful in detecting a constant value throughout the profiling exercise. For example, if you ensured that you kept the same count of lives throughout the game.
UNIQUE	Whether all values profiled were unique with respect to each other during the exercise	This is useful in detecting changing values. For example, if you ensured that each of the profiles taken were when you had different numbers of lives or different amounts of health.
ALLZERO	Whether all values profiled were consistently zero during the profiling exercise.	This is useful in detecting consistently zero values.
FLAG	Whether all values profiled were consistently zero or one during the profiling exercise.	This is useful in detecting flag registers, such as "has sword" or "doesn't have sword".
UNIQUEVALS	The total number of unique values that were profiled.	This is useful for finding values that you expect to be unique on each profile. For example, if you took 50 profiles, but know that the register you are looking for can only be one of two values.

More details on the Profiler (and a real-world example of using the Profiler to produce an Override for Legend of Zelda) can be found in the *Guide to Creating NES Cafe Overrides*, which is available on the official NES Cafe website at www.davieboy.net/nescafe



8.9 Graphics Options in NES Cafe



Enabling Image Smoothing using Kreed's 2xSAI

Image Smoothing using Kreed's 2xSAI

Kreed developed an Image Smoothing Algorithm, which was first used in Snes9X. When you run NES games in an emulator on large screens, the low-resolution image (256x240) is stretched and appears blocky. This algorithm sub-samples the displayed images and attempts to detect edges to smooth and improve the image quality.

To enable Image Smoothing go to the Graphics Options and select it. Please be warned that Image Smoothing is a computationally expensive exercise and requires an increased number of CPU cycles for the displaying of each screen (due to the sampling and edge-detection algorithm). If you are running a slow machine, or do not run NES Cafe in large windows then you should not enable this Graphics option.



9 Hardware Supported

The following list of hardware is emulated by NES Cafe:

- The n6502 Micro-processor
- The Nintendo Picture Processing Unit (PPU)
- 5 Sound Channels (2 Square, Triangle, Noise and DMC)
- NES Joy-pad and Light Gun

Additional supported features:

- Allows users to Save and Load the State of the NES
- Allows users to record their game-play for future playback
- Emulates and interprets Game Genie Codes
- Provides a built-in Nintendo 6502 Debugger
- Provides a built-in ROM Download Client
- Provides real-time support for IPS Patches for NES games
- Provides real-time image smoothing of NES games using Kreed's 2XsaI
- Provides a configurable Time Shift Buffer for jumping back in time.
- Provides support for Time Trials and Overrides (powerful Game Genie codes)
- Provides a 6502 code and memory Profiling Engine

The following Memory Management Controllers (MMC's) are supported:

001: Nintendo MMC1	065: Irem H-3001	119: TQ-ROM
002: PROM Switch (UNROM)	066: Bandai 74161/32	122: Sunsoft 74161/32
003: VROM Switch (CNROM)	067: Sunsoft Mapper 3	140: Mapper 140
004: Nintendo MMC3	068: Sunsoft Mapper 4	151: VS Unisystem (Konami)
005: Nintendo MMC5	070: 74161/32	180: Nichibutsu
006: Konami FFE F4xxx	071: Camerica Mapper	181: Hacker International Type 2
007: Rare AOROM	072: Jaleco Early Mapper 0	182: PC-SuperDonkeyKong
008: Konami FFE F3xxx	073: Konami VRC3	183: Gimmick (Bootleg)
009: Nintendo MMC2	075: Jaleco/Konami VRC1	184: Sunsoft 74161/32
010: Nintendo MMC4	076: Namco 109	185: CHR-ROM Disable Protect
011: Color Dreams	077: Irem Early Mapper 0	189: Street Fighter 2 Yoko
015: 100-in-1	078: Jaleco 74161/32	222: Mapper 222
017: Konami FFE F8xxx	079: Nina-3 (AVE)	225: 72-in-1
018: Jaleco SS8806	080: Taito X-005	226: 76-in-1
021: Konami VRC4 2A	082: Taito C075	227: 1200-in-1
022: Konami VRC4 type 1B	086: Jaleco Early Mapper 2	228: Action 52
023: Konami VRC2 type B	087: Konami 74161/32	229: 31-in-1
032: Irem G-101	088: Namco 118	231: 20-in-1
033: Taito TC0190 TC0350	089: Sunsoft Early Mapper	232: Quattro Games
034: Nina-1	091: PC-HK-SF3	233: 42-in-1
040: SMB2J	092: Jaleco Early Mapper 1	236: 800-in-1
041: Caltron 6-in-1	093: Sunsoft 74161/32	240: Gen Ke Le Zhuan
046: Rumble Station	094: Capcom 74161/32	242: Wai Xing Zhan Shi
047: NES-QJ	097: Irem 74161/32	243: PC-Sachen/Hacker
048: Taito TC190V	099: VS Unisystem	244: Mapper 244
050: SMB2J	101: Jaleco 74161/32	245: Yong Zhe Dou E Long
057: 54-in-1	105: Nintendo World Championship	246: Phone Serm Berm
058: 68-in-1	113: PC-Sachen/Hacker	248: Bao Qing Tian
060: 65-in-1	117: PC-Future	251: Mapper 251
062: Mapper 62	118: IQS MMC3	255: 110-in-1
064: Tengen Rambo-1		



10 File Formats Used by NES Cafe

The following File Formats are used by NES Cafe Applet and Standalone distributions. An approach for decoding data from these files is also shown in the showthumb.php script.

10.1 NES Cafe Save State Armour File

This file format is used to store Save State information. It is encoded as ASCII Armoured to prevent corruption whilst being broadcast between platforms. The structure of the ASCII Armour file format is explained below. The actual NES Cafe State data (and perhaps Thumbnail image data as well) within the file is explained in the next section.

Field	Length	Description
Signature	8 bytes	Must be ASCII "NSAVESTE" for a NES Cafe Save State file.
Version	2 bytes	Binary Integer for version of Save State.
Compression	2 bytes	Binary Integer for the type of compression used on the data: 0x0001 : Compress / Deflate 0x0002 : GZIP Compression (default)
Data Length	4 bytes	Binary Integer for the length of the data that follows.
Data	EOF	The data, compressed if Compression is set.

The binary data is then stored as ASCII-encoded Hex-pairs in the actual Save State file. For example, the header record above may be encoded into the Save State file as:

4E5341564553544500010002000028F4

Where

4E53415645535445	is the ASCII-encoded Hex-pairs for the Signature
0001	is the ASCII-encoded Hex-pairs for the Version number
0002	is the ASCII-encoded Hex-pairs for the Compression
000028F4	is the ASCII-encoded Hex-pairs for the Data Length

10.2 NES Cafe Save State Data Section

The Data Section of the ASCII Armoured file will be formatted differently depending on the Version field. The latest version of NES Cafe uses Version 2 State files, the earlier Version 1 State file is still supported, but Version 2 will be used to store the data if that State file is saved again. The Version 2 Data Section consists of one or more TAGGED data sections, following by a 4-byte length indicator and then the data for that section. This is repeated until the end of the file. The following table lists the data sections:

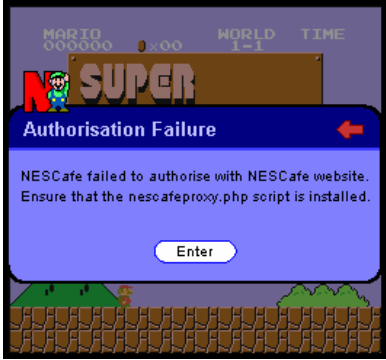


Tag	Signature	Description																		
Central Processing Unit for the NES	CPU	<p>The Data section contains the following 13 bytes of data:</p> <table><tr><td>4 bytes</td><td>CRC32 for Cartridge</td></tr><tr><td>1 byte</td><td>A register</td></tr><tr><td>1 byte</td><td>X register</td></tr><tr><td>1 byte</td><td>Y register</td></tr><tr><td>1 byte</td><td>P register</td></tr><tr><td>1 byte</td><td>S register</td></tr><tr><td>2 bytes</td><td>PC register</td></tr><tr><td>1 byte</td><td>Cycles Pending</td></tr><tr><td>1 byte</td><td>Whether CPU is halted</td></tr></table>	4 bytes	CRC32 for Cartridge	1 byte	A register	1 byte	X register	1 byte	Y register	1 byte	P register	1 byte	S register	2 bytes	PC register	1 byte	Cycles Pending	1 byte	Whether CPU is halted
4 bytes	CRC32 for Cartridge																			
1 byte	A register																			
1 byte	X register																			
1 byte	Y register																			
1 byte	P register																			
1 byte	S register																			
2 bytes	PC register																			
1 byte	Cycles Pending																			
1 byte	Whether CPU is halted																			
Memory	MEM	<p>The Data section contains the following data:</p> <table><tr><td>2048 bytes</td><td>Main memory</td></tr><tr><td>65536 bytes</td><td>Save RAM</td></tr><tr><td>64 bytes</td><td>MMC Banks (16 banks x 4-byte Addresses)</td></tr><tr><td>1 byte</td><td>Enable Save RAM</td></tr><tr><td>1 byte</td><td>Save RAM Loaded</td></tr></table>	2048 bytes	Main memory	65536 bytes	Save RAM	64 bytes	MMC Banks (16 banks x 4-byte Addresses)	1 byte	Enable Save RAM	1 byte	Save RAM Loaded								
2048 bytes	Main memory																			
65536 bytes	Save RAM																			
64 bytes	MMC Banks (16 banks x 4-byte Addresses)																			
1 byte	Enable Save RAM																			
1 byte	Save RAM Loaded																			
Picture Processing Unit for the NES	PPU	The Data section contains the PPU Data Registers.																		
Joypad 1 or 2	JY1 or JY2	<p>The Data section contains the following 2 bytes:</p> <table><tr><td>1 byte</td><td>The status of the Joypad</td></tr><tr><td>1 byte</td><td>The currently indexed bit of the Joypad Status</td></tr></table>	1 byte	The status of the Joypad	1 byte	The currently indexed bit of the Joypad Status														
1 byte	The status of the Joypad																			
1 byte	The currently indexed bit of the Joypad Status																			
Memory Mapper Controller	MAP	The Data section contains the MMC Data Registers.																		
Audio Processing Unit	APU	The Data section contains the APU Data Registers.																		
Image Data for Thumbnail	IMG	The Data section contains either GIF or PNG image file data for either a 64x60 or a higher resolution 128x120 screen image at the time of creating the Saved State file.																		
Movie	MOV	The Data section contains encoded data for key-presses taken during recorded movie files. The data starts with 1 byte for each of the current states of the two Joypads, followed by a two-byte value for the number of frames the data is valid for. The process then repeats until the end of the segment.																		



11 Problems with NES Cafe

NES Cafe is a constantly evolving product and as-such, it will have bugs and problems. However, many of the everyday issues experienced can usually be resolved quite easily. When you experience an error with NES Cafe please check the following table first to see if there is a reason, or a work-a-round, otherwise please report the issue to the author.

Symptom	Details
<p>When I run the NES Cafe Applet on my Web Server, it displays the following error message on screen:</p> 	<p>When NES Cafe starts up on a website it will attempt to communicate with the NES Cafe server to ensure the latest version is running and that online options can be enabled.</p> <p>To allow NES Cafe to communicate with the NES Cafe website the following two actions need to have been completed. If they haven't then you will get the error message shown on the left hand side of this screen.</p> <ol style="list-style-type: none">1. Install PHP onto your web server. PHP is freely available for UNIX, Linux, Mac OS X and Windows platforms. Most commercial websites already have PHP installed. If you are unsure please check with the Administrator for your website.2. Copy the nescafeproxy.php file from Applet distribution into the same directory that you have installed the nescafe.jar file. This script is the proxy that allows the NES Cafe applet to talk to the NES Cafe Website.



12 Credits and Thanks

For their Documentation

Brad Taylor (sound)
Brice Fines (sprite priorities)
Darren Ranalli (NEStor)
Firebug (memory Mappers)
Freddy Offenga (undocumented opcodes)
Jeremy Chadwick
Loopy (scrolling)
Marat Fayzullin
Matt Conte

For their involvement

Daniel Fisher [everyvideogame.com]
Jeremy Chadwick
John Steiner
Jonathan Hudghton [emu.me.uk]
Niamh Fitzgerald
Rob Gonzalez
SmashManiac
Thea Chell
Tyler Gibson
Zheng Zhu



13 NES Cafe History

NES Cafe 0.701 (June 2006)

- Added Profiler to NES Cafe, press F6 to profile memory and extract decompiled NES code
 - Fixed issue with NES Cafe Overrides so that VALUE keyword is rejected in ON READ|KEYPRESS keywords
 - Fixed issue where F8 was not allowing users to stop a Movie recording (F7 was incorrectly mapped)
 - Added OverRideActiveAtStartup flag to settings file to force Overrides to activate on start-up (default TRUE)
 - Added ability to enable and disable the Overrides from the Extra's menu.
 - Improved Menu handling and further GUI updates
-

NES Cafe 0.700 (June 2006)

- Added NES Cafe Override Engine to allow websites to run custom versions of games (like Punch-out Online)
 - Fixed problem where NES Cafe API Functions were not available to some websites
 - Added TimeTrialTime variable, which is now posted at the end of a Time Trial and contains the play time
 - Added support for URL redirects from the nescafesave.php script to allow websites to redirect NES Cafe
 - Made internal improvements to how NES Cafe handles its menu system, now implements a Stack
 - Several improvements to the GUI and more efficient memory handling
 - Fixed bug where some games would hang when opened in Standalone mode, but not Applet mode
-

NES Cafe 0.617 (May 2006)

- ROLLBACK: Some speed updates made during 0.616 were rolled back because of compatibility issues
 - Major compatibility issues resolved with the previous version of NES Cafe, please update to this version
 - Added Time Trial Mode to NES Cafe Applet and Standalone editions for Game Competitions
 - Moved DisableDebug tag from APPLETTAG into the NES Cafe Settings File for consistency
 - Moved DisableDownloading tag from APPLETTAG into the NES Cafe Settings File for consistency
 - Moved DisableFrameSkiptag from APPLETTAG into the NES Cafe Settings File for consistency
 - Moved StartDownloader tag from APPLETTAG into the NES Cafe Settings File for consistency
 - Moved DisableSaveRAM, DisableSaveState, DisableSaveImage and DisableSaveMovie to the Settings File
 - Moved DisableTimeShiftBuffer tag from APPLETTAG into the NES Cafe Settings File for consistency
 - NES Cafe Settings file is now able to be loaded via Script interface across HTTP
 - Added DisableGameGenieChanges option to the NES Cafe Settings file
 - Added MovieMode option to the NES Cafe Settings file to force a Movie Recording mode
 - Added DisableMenu option to the NES Cafe Settings file to prevent the Menu system being used
 - Added MovieFormat option to the NES Cafe Settings file to set the default Movie Recording mode
 - FPS value is posted to the nescafeproxy.php script (see example of fetching this in new nescafesave.php)
 - GUI improvements to NES Cafe Applet and NES Cafe Standalone
-

NES Cafe 0.616 (May 2006)

- Major speed improvements to CPU, Memory Manager and Sound Engine, thanks to Zheng Zhu
 - More accurate (non-thread-based) frame per second analysis
 - Fixed bug where sound was not muting in Debug Mode
 - Warns user when Zapper is used in Keystroke-recorded Movies
 - Attempts to fetch the real name of the Game from the NES Cafe server when you play it in Applet Mode
-



NES Cafe 0.615 (April 2006)

- Fixed issue where NES Cafe now checks if the Web Server has unsupported 404 error code page enabled.
 - Introduced a NES Cafe JavaScript API to allow websites to load games mid-flight from the hosting webpages
 - Lowered the Sound Specification to 22,050 mono
 - Fixed bug with BattleToads crashing
 - Fixed bug with NULL Pointer when closing down ROM file and opening it up immediately afterwards
 - NES Cafe Applet Expiration date pushed back to December 2006
 - Support for 404 Custom Web Servers
 - Added MOVIE MAXSIZE tag to limit size of Animated GIF files (disable animated GIF if less than 1K)
 - Screenshot and Time Shift Buffer format support both GIF and PNG formats
 - Added IMAGEFORMAT tag to nescafe.settings file to support both GIF and PNG image capture
 - Download NES Cafe link in Standard version now takes Windows users to Website
 - Pressing F8 will first bring up screen allowing user to select Movie Capture Style
 - Added support to the nescafeshowthumb.php script for PNG and GIF files embedded in State Files
-

NES Cafe 0.614 (November 2005)

- Added the option to Save Animations as Animated GIF Files in the Applet and Standard versions
 - Added a Configuration Menu Screen for the Animated GIF Recording (for FPS and Resolution)
 - Added nescafe.load.php and nescafesave.php scripts, which replace all previous PHP load scripts
 - Fixed bug where NES files would not load in Applet mode from a Web Browser and needed to be zipped
 - Added Broadcast Menu Screen to show data being prepared and broadcasted to server
 - Changed the function of LOADSTATEONSTARTUP tag to point at a NSS file, rather than being a Boolean
 - Added functionality to cause the NSS file specified by LOADSTATEONSTARTUP to be loaded on Resets
-

NES Cafe 0.613 (October 2005)

- Added a configurable Time Shift Buffer to allow players to jump back in time (press ESC)
 - Added TIMESHIFTBUFFERINTERVAL and TIMESHIFTBUFFERLENGTH settings file tags.
 - Added settings menu screen to allow players to configure the Time Shift Buffer.
 - Added Thumbnail images to the SaveRAM files (picture taken at Save time).
 - Only load Thumbnail images in Load and Save State screens after 1 second delay.
 - Added Graphics menu option to allow hiding or showing of the Background layer.
 - Changed showthumb.php so that it also works with the SaveRAM thumbnails
 - Increased the Movie Recording time to 100,000 key-presses (over 24 hours of recording)
 - Added HIGHRESTHUMBNAILS option to Settings file to improve quality of Thumbnails.
 - Added No-Stretch option to the Graphics Menu (to prevent scaling)
 - Added ability to save Movies into any available save slot
 - Increased the number of available Save Slots to 20.
 - GUI improvements to Save State, Load State and Download ROM screens.
 - Fixed bug where Applet screen would glitch when it loses focus on the Web Page
 - Added option to stop playback of long Movies by pressing the F8 key.
-

NES Cafe 0.612 (21 August 2005)

- Added support for GZIP compressed State Files and a PHP script to view Thumbnails.
-

NES Cafe 0.611 (20 August 2005)

- Added 2xSaI algorithm to filter images and improve quality of display (requires fast PC)
 - More improvements to the GUI, and included a Graphics Options menu
 - Increased the quality of the Thumbnail images in the Save State files to 100x100 pixels.
 - Added support for International Patching System (IPS) files and new IPSURL Applet Tag.
 - Fixed how resources are loaded from JAR files in the Standard distribution
 - Fixed Cursor display in Applet Mode
 - Added Debug Mode to the Setting file (to assist website developers using NES Cafe)
-



NES Cafe 0.610 (16 August 2005)

- Major GUI Improvements, also added Mouse Support for easier navigation
 - Fixed issues where some machines don't respond during Sound Processing.
 - Fixed bug where movie playback allowed key-presses.
 - Fixed bug with Game Genie codes being incorrectly interrupted for MMC games.
 - Fixed bug where Applet screen goes partially blank or does not appear.
 - Fixed Sound Issues when starting without a Security Manager
 - Added NES Cafe About Screen (press I to display)
 - Added support for Mapper 118 (IQS MMC3)
 - Fixed PPU Banking (PPU Banks now Wrap Around Correctly avoiding distortion)
-

NES Cafe 0.600 (20 June 2005)

- New Menu System (improved and common across Applet and Standalone versions)
 - Intermittent Rendering Engine Exception when GIF images are loaded removed
 - ROM List Download Can be Against Dynamic Content, not just fixed-length
 - Applet can now Download ROMs from Server when Applet hosted on ROM Server
 - Compiled with -source 1.2 target 1.1 on Java 1.5, compatible with new versions of Java
 - Fixed bug with Emulation Speed Message staying up for 5000 seconds instead of 5
 - Muted Distributions available for both Applet and Standalone for slower computers.
-

NES Cafe 0.590 (6 June 2005)

- Support for recording and playing back Movie recordings of Games
 - Game Genie Applet Tag GAMEGENIE has been added
 - Added Game Subtitles (currently only Punch-Out has is enabled, but more to come)
 - Display the 64 Sprite Tiles by hitting F9 (disabled Sprites appear greyed out).
 - Change emulation speed by hitting F11 (to decrease) or F12 (to increase)
 - Save States file is tagged format and has embedded screenshot (backwards compatible).
 - Improved the Load State menu so that users can browse the screenshots in the States.
 - Improved the Debug Engine (press F5 to enter Debug Mode)
 - Added DISABLEDEBUG Applet Tag to prevent Debugger being used for certain games.
 - 4 CPU Cycles between start of Vertical Blank and NMI Interrupt
 - Zero Page Y wraps correctly (Cheers Blue Hawk)
 - Indirect X and Indirect Y wraps correctly (Cheers Blue Hawk)
 - ADC and SBC Overflow Flag logic has been corrected (Cheers Blue Hawk)
 - Reserved Bit is set for PHP instruction (Cheers Blue Hawk)
 - Fixed NMI and IRQ by setting the Reserved Bit
 - Reset Sound Hardware on Game Load
 - Sprite limit set when 8 or more sprites encountered on scan-line, instead of more than 8.
-

NES Cafe 0.580 (14 March 2005)

- Press ESC to change the controls for the Joypad
 - Multiple Load and Save States supported by Applet and Standalone versions.
 - Support for Game Genie Codes in Applet version, press G to bring up the menu.
-



NES Cafe 0.570 (25 February 2005)

- Improve Sound processing and better support for DMC
- Applet Mode can now use C and L to commit and load States via CGI scripts
- Fixed bug where GUI screen was not blanking when ROM images were closed.
- Images saved to PNG format instead (press A in both Standalone or Applet version)
- Press I to show Cartridge ROM information in both Standalone and Applet version
- Press Q to clear Save RAM and reset the Cartridge in both Standalone and Applet version
- New Applet tag LOADSTATEONSTARTUP for forcing State to load on start-up
- Percentage Bar loading screen has been added
- Applet version can now load ROMs with extension .zip.php and .zip.asp
- Added Applet tag DISABLEFRAMESKIP for forcing no frame skipping
- Added Applet tag SETTINGSFILE for loading the setting files from alternative location
- Sound channel information is now included in Save State files
- When Light-gun (Zapper) is plugged in a Cross-Hair appears for firing.
- Settings file can be used to store Controls in both Standalone and Applet versions
- Press < and > to swap between controlling Player 1 and Player 2
- Special thanks to Daniel Fisher from www.everyvideogame.com for his help.

NES Cafe 0.560

- V flag in P register not be set correctly on addition and subtraction (cheers Qian Wenjie)
- JMP (\$AAAA) not correctly implemented and fixed (cheers Qian Wenjie)
- Improved GUI, more consistent between Applet and Standalone versions.
- Sound toggle bug fixed when pressing S in standalone didn't enable channel selection.
- Microsoft JVM 5.0 works in Applet Mode now

NES Cafe 0.550

- 77 new Mappers supported (including fixes to existing Mappers)
- Better Implementation of handling UP+DOWN or LEFT+RIGHT (SmashManiac)
- Embedded NES Cafe ROM into the main distribution
- Game Images are stored as DDNB files, which will provide metadata for their content
- Fix to PPU: No longer reset PPU address mode during Vertical Blank.
- Fix to PPU: Reading from VRAM in ppuRead correctly mirrors the Palette memory.
- Remove Processor Interface (speed up)
- Added code to correct incorrectly dumped ROM images (partial implementation).
- Added code to change clock cycles for specific games (such as Battle Toads and SMB3).
- Larger screen sizes are now supported in Applet mode.

NES Cafe 0.540

- DMC Sound Support
- Applet now reads GIF files from within JAR file
- Can now Load a Saved State from Applet Mode
- Improvements to the SoundInterface (a bit smoother)
- Fixed bug with JoyPad – UP+DOWN or LEFT+RIGHT were not cancelling (SmashManiac)
- Fixed bug in N6502 where Inactive Display was sleeping for 200ms (SmashManiac)

NES Cafe 0.530

- Applet is now compiled with 1.1 Class Structure so works with Microsoft JVM Plugin.
- NES Cafe Client now works with Corporate Firewalls and Proxy Servers.



NESCaFe 0.520

- Fixed major bug with PPU clearing Sprite0 Hit on Reg 2002 Read.
 - Added an inbuilt debugging engine (press F5 to enter).
 - Added ROM Download Engine (download ROMs directly from Internet into NESCaFe).
 - NESCaFe display is now resizable (need fast machine!).
 - Support for GZIP and ZIP compressed files.
 - Support for the Nintendo Zapper (Light Gun) added.
 - GUI improvements and Checkbox Menu Items.
 - Battery Backed Memory fully implemented – Save RAM.
 - Dropped CPU Cycles per scan line down to 116
 - Colour Emphasis working in PPU register 2001
 - Fixed bug with PPU where rendering was not happening if Screen was Off.
 - Fixed Sprite 0 Collision Detection, which works inline with Damian Yerrick's Test.
 - Fixed Nintendo MMC1 and MMC3.
 - Added Mapper Konami FFE F4xxx, FFE F3xxx and Mapper Color Dreams
 - Added Mapper 100-in-1 and 1200-in-1
 - Wrote and provided NESCaFe ROM Image (Demo NES ROM)
-

NESCaFe 0.500

- Applet Mode has been re-introduced and improved.
 - The GUI has had some internal improvements.
-

NESCaFe 0.430

- Debug Mode has been removed from N6502 processor.
 - Undocumented Operation Code Processing now an option. (Jeremy Chadwick suggested)
 - MMC2 Mapper now perfect – will run Mike Tyson's and Mr Dream's Punch-out without glitches.
 - Removed NET and Applet support because it wasn't working correctly.
 - Picture Processing Unit now perfect – better support for all games.
-

NESCaFe 0.420

- Incorrect addressing mode used with RRA \$AAAA,Y instruction. (Rob Gonzalez)
 - SAX instruction doesn't set the Carry bit. (Rob Gonzalez)
 - LSR instruction is not clearing the SIGN bit. (Rob Gonzalez)
 - LoadSaveRam method causes problems when run as Applet. (Tyler Gibson)
-