



## NESCaFe Nintendo Emulator for Java

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## Welcome to NESCaFe

NESCaFe is distributed under the GNU General Public License. A copy of this license agreement has been included with this distribution of NESCaFe. If you have a question or wish to give me any feedback on the NESCaFe 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 NESCaFe can also be found on the NESCaFe website (address shown above).

### Introduction

Welcome to the NESCaFe Nintendo Emulator for Java. In a nutshell, the NESCaFe 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 NESCaFe and a copy of the game in NES format (these can be obtained from the Internet).

NESCaFe 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 micro-processors and additional controllers. I started work on NESCaFe 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 NESCaFe during my spare time (not that I get a lot of this). NESCaFe is now a stable and powerful emulator that can be run from websites or as a standalone application from your desktop and runs the vast majority of published Nintendo games.

Since the very first release NESCaFe has always been an Open Source project and it will always remain so. Keeping NESCaFe 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 NESCaFe 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 console.

Thanks for downloading NESCaFe!  
David de Niese



## Distributions

The NES Cafe Nintendo emulator is available in three different distribution packages. NES Cafe is available as a compiled application (Binary Distribution), as a compiled Applet for your web-site (Applet Distribution) or as source code (Source Distribution). There are also some additional Special Editions releases of NES Cafe, such as the Punch-Out Special Edition that are available from the NES Cafe web-site. The following table lists the different NES Cafe emulator distributions that are available and what kind of person might be interested in downloading each one.

Distribution	Person
Binary	[most people]  The majority of people will want the binary version of NES Cafe. This version contains everything (apart from the Nintendo games) that you will require to get the full version of NES Cafe running.
Applet	[web site developers]  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).
Source Code	[hard-core techie's]  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.



## Requirements

Depending on the version of NES Cafe that you download (Binary, Applet or Source Code), 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 and using NES Cafe from your PC.

### Binary 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 and Linux Operating Systems.</p> <p>Microsoft Windows XP Microsoft Windows 2000 Microsoft Windows ME  Red Hat Linux 9.0 Suse Linux 9.2</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 IBM Java Virtual Machine 1.3.0 (fastest)</p>
WinZip	<p>WinZip is a shareware application that can be used to uncompress files from compressed Zip files. NES Cafe is provided as a Zip file so that the distribution can remain small. The user will need to uncompress the distribution file and extract the files from within. I recommend using WinZip to perform this function.</p>



## 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 above requirements for the Binary distribution.</p> <p>Microsoft Windows Server 2003 Microsoft Windows XP Microsoft Windows Server 2000 Microsoft Windows 2000  Any mainstream Linux distribution</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. 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 2.0.52 (or higher)</p>
WinZip	<p>WinZip is a shareware application that can be used to uncompress files from compressed Zip files. NES Cafe is provided as a Zip file so that the distribution can remain small. The user will need to uncompress the distribution file and extract the files from within. I recommend using WinZip to perform this function.</p>



### Source Code 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 and Linux Operating Systems.</p> <p>Microsoft Windows XP Microsoft Windows 2000 Microsoft Windows ME</p> <p>Red Hat Linux 9.0 Suse Linux 9.2</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 Java Development Kit 1.4.2</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 Binary distribution would not be included in the stream-lined Applet distribution. The pre-processor used from the Simple Java Pre-Processor.</p>
WinZip	<p>WinZip is a shareware application that can be used to uncompress files from compressed Zip files. NES Cafe is provided as a Zip file so that the distribution can remain small. The user will need to uncompress the distribution file and extract the files from within. I recommend using WinZip to perform this function.</p>



## Linked Websites

Application	Website
Apache HTTP Web Server	<a href="http://httpd.apache.org/">http://httpd.apache.org/</a>
Microsoft IIS Web Server	<a href="http://www.microsoft.com/iis/">http://www.microsoft.com/iis/</a>
Microsoft Windows	<a href="http://www.microsoft.com">http://www.microsoft.com</a>
NES Cafe Website	<a href="http://www.davieboy.net/nescafe/">http://www.davieboy.net/nescafe/</a>
Red Hat Linux	<a href="http://www.redhat.com">http://www.redhat.com</a>
Simple Java Pre-Processor	<a href="https://sjpp.dev.java.net/">https://sjpp.dev.java.net/</a>
Sun Java Virtual Machine and SDK	<a href="http://java.sun.com">http://java.sun.com</a>
Suse Linux	<a href="http://www.suse.com">http://www.suse.com</a>
WinZip	<a href="http://www.winzip.com">http://www.winzip.com</a>

## Installing NES Cafe

Depending on the version of NES Cafe that you downloaded (Binary, Applet or Source Code) and the Operating System that you are using, you will need to install NES Cafe using one of the following different 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), installing applications and running applications.

### Binary Distribution

- 1 Check the requirements for the Binary Distribution and ensure that they are met.
- 2 Unzip the distribution files (NES Cafexxxbin.zip) to a directory (folder) on your computer.
- 3 Microsoft Windows:  
Go to the folder that you uncompressed NES Cafe to and run NES Cafe.bat  
  
UNIX or Linux:  
Change to the directory that you uncompressed NES Cafe to and type the following:  
`java -jar nescafe056.zip`
- 4 NES Cafe should now be running on your computer.



## 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 Navigate with a Web 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\nes cafe on your local machine then you should navigate to http://localhost/nescafe/NES Cafe.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 runtime settings.
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## NES Cafe Applet Configuration

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

### Example Applet Code Tag

```
<applet code = NES CafeApplet archive = "NES Cafe056.jar"
width =256 height = 240>

  <param name=ROMFILE      value="roms/nintendogame.nes">
  <param name=LIGHTGUN     value="false">
  <param name=SOUND        value="true">
  <param name=LOADSTATE    value="savestates/mysavedstate.nes">

</applet>
```

### Parameter Settings Explained

Tag	Meaning	Optional	Default
Width	The width in pixels of the displayed Applet.  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.	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>	No	240+
ROMFILE	<p>The location of the Nintendo ROM file.</p> <p>When the NES Cafe Applet starts up it will attempt to load and run whichever ROM file 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
LOADSTATE	<p>A Saved State to Load at Start Up.</p> <p>This tag points at a NES Cafe saved state file to load at Start Up. The saved state file must belong to the ROMFILE that is currently being used and must have been generated by the current version of the NES Cafe emulator.</p>	Yes	None





## Using NES Cafe

### Binary Distribution

When running NES Cafe in standard mode (from the Binary Distribution) the menu system allows you to perform most of the functions that you will require. The File menu allows you to load and close ROM files, as well as commit and rollback to saved states. The NES menu allows you to pause and reset the Nintendo hardware, the View menu controls the display options and the Sound menu manages the audio options. The following diagrams take you through the menus:

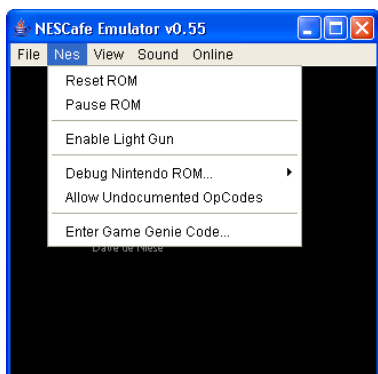


#### Loading ROM Files

The file menu can be used for loading and closing Nintendo ROM files. When you start NES Cafe click on the Load Rom menu item and a dialogue box will be presented allowing you to select the ROM image that you want to load. Shortly afterwards the game will start running in the main window.

#### Committing States and Rolling Back

You can also use this menu to commit the state of NES Cafe and then load it back again at a later stage. For example, if you are just about to battle Bowser then you could hit Commit State (keyboard shortcut C). If you were then to die just hit Rollback to State (keyboard shortcut L) and you would be right back where you were ready for a rematch!



#### Pausing NES Cafe

Some games never allow you to pause them exactly where you want to (for example, you cannot pause Punch-Out in the middle of a boxing round). Well now, by selecting Pause ROM from the NES menu (keyboard shortcut P) you can pause the actual emulation of the Nintendo game instead, allowing all games to be paused upon request.

#### Light Gun (Zapper) Support

If the game you are playing requires a Light Gun (such as Duck Hunt) then simply click on the Enable Light Gun menu item to have the gun plugged into Joy pad Port 2. You can now use the mouse to aim and left mouse button to fire.

#### Game Genie Support

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



## Nintendo 6502 Debugging Engine

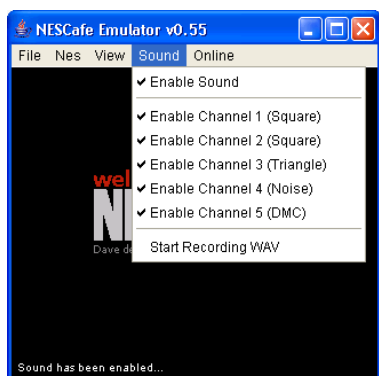
NES Cafe also includes a Nintendo 6502 Debugging Engine. This allows you to see what is really going on inside the Nintendo game that you are playing – but be warned, you will require a good working knowledge of 6502 Assembler.



### The View Menu

The View Menu can be used to show the current frame rate that you are getting (which should be around 60 frames per second). If you are experiencing slow performance then it might be interesting to see exactly how slow the emulation is running. Chances are that your hardware may need to be improved to get the full 60 frames per second.

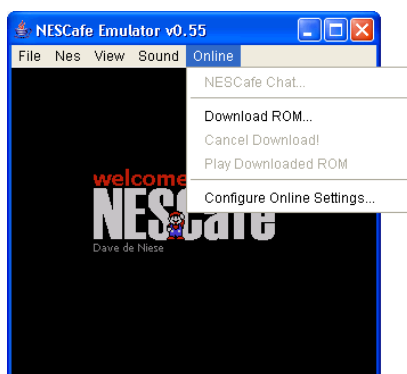
You can also use the View menu to hide the two layers that the NES display uses (the Background and Sprites layers). Try playing Mario without the Background layer on to see exactly how well you know the game, or hide each layer in turn to see how a particular Nintendo screen is composed.



### The Sound Menu

The Sound menu can be used to enable or disable the Sound whilst playing NES Cafe. If the Sound menu is greyed out then you may not have any sound card installed on your computer or you may be running an older version of the Java Virtual Machine (one that doesn't support sound).

You can also use this menu to enable or disable specific sound channels (to see which channels a particular Nintendo theme makes use of) or to records the sound output of a game to a Windows WAV file for later listening.

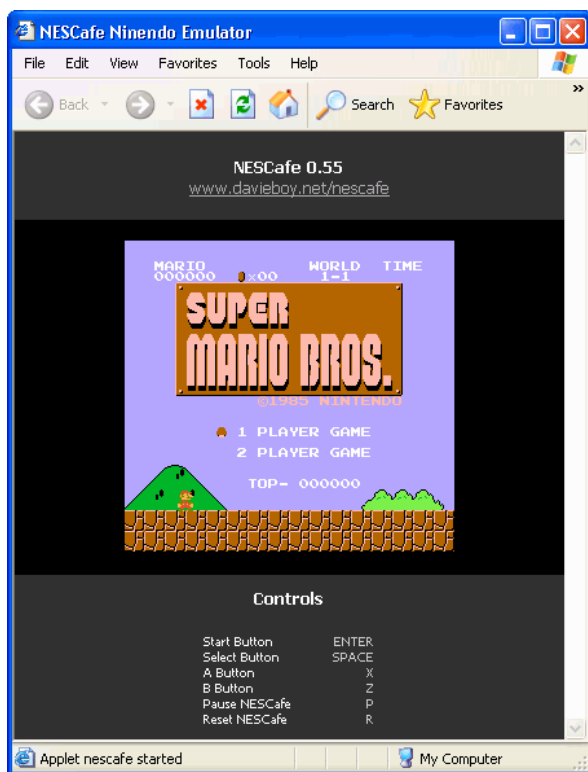


### The Online Menu

The Online menu allows you to download ROM images from the NES Cafe website directly into your version of NES Cafe. Simply click on Download ROM and a dialogue will appear that shows all the games that are currently available online. Unfortunately, the list is usually small or not available because of outstanding copyright protection issues surrounding the provision of Nintendo ROM files. However, the functionality has been provided in-case these rules change or copyright is abandoned for specific games.



## Applet Distribution



The Applet version runs from within a Web Browser. The screen-shot on the left shows NES Cafe running from within Microsoft Internet Explorer, hosted from a Microsoft IIS HTTP Web Server. The main game (Super Mario Bros) appears in the central window and the bottom panel shows the controls that are available to Applet 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 a comment such as 'Powered by NES Cafe 0.56'.

## Playing Games (the Controls)

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

### Controls for Joy Pad 1

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



### 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

### Adjustment Controls

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Frame Skip	Key 1 to 8 (1 being no skip)	Key 1 to 8 (1 being no skip)
Pause Emulation	P	P
Reset the Game	R	R
Sound Toggle	S	S (must be enabled in tag)
Commit State of Emulator	C	<i>not available</i>
Rollback to Saved State	L	L
Toggle Monochrome/Colour	B	B
Tint Adjust Down	-	-
Tint Adjust Up	+	+
Hue Adjust Down	9	9
Hue Adjust Up	0	0

### NES Cafe Debug Engine Controls

Nintendo Function	NES Cafe Standalone	NES Cafe Applet
Toggle Debug Mode	F5	<i>not available</i>
Step by Instruction	F6 (when in debug mode)	<i>not available</i>
Step by 20 Instructions	F7 (when in debug mode)	<i>not available</i>
Step to next Event	F8 (when in debug mode)	<i>not available</i>



## NES Cafe Online Features

### Legal Notice (read before proceeding)

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, otherwise you are acting illegally. The author (David de Niese) accepts no liability or responsibility from your use of NES Cafe or from you downloading a Nintendo ROM that you are not legally entitled to download.

### Configuring NES Cafe to Work with your Proxy Server

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 Online menu and selecting 'Configure Internet Connection'. In the dialog that is presented, you need to 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 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 the network.

### Configuring NES Cafe to Work with your Firewall

If you use a 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). Instructions on how to do this will be included with the documentation for your firewall product. Please be aware that NES Cafe does not attempt to broadcast any personal information from your computer (you can confirm this by viewing the source code that is available from the NES Cafe website). However, you should be reminded that because NES Cafe is an Open Source product someone could have changed it to act maliciously, therefore please ensure that the version of NES Cafe you are using came from the NES Cafe site and that it only attempts to access [www.davieboy.net](http://www.davieboy.net) on port 80.



## 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
- Emulates and interprets Game Genie Codes
- Provides a built-in Nintendo 6502 Debugger
- Provides a built-in ROM Download Client

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

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



## Credits and Thanks

### For their Documentation

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

### For their involvement

Jeremy Chadwick  
Thea Chell  
Tyler Gibson  
Rob Gonzalez  
SmashManiac

## NES Cafe History

### NES Cafe 0.56

- 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 0.55

- 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 0.54**

- 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 0.53**

- 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.

#### **NES Cafe 0.52**

- 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 NES Cafe).
- NES Cafe 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, works inline with Damian Yerrick's Test.
- Fixed Nintendo MMC1 and MMC3.
- Added Mapper Konami FFE F4xxx and FFE F3xxx
- Added Mapper Color Dreams
- Added Mapper 100-in-1 and 1200-in-1
- Wrote and provided NES Cafe ROM Image (Demo NES ROM)

#### **NES Cafe 0.50**

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

#### **NES Cafe 0.43**

- Debug Mode has been removed from N6502 processor.
- Undocumented Opcodes Processing now an option. (Jeremy Chadwick suggested)
- MMC2 Mapper now perfect - will run Punchout without glitches.
- Removed NET and Applet support because it wasn't working correctly.
- Picture Processing Unit now perfect - better support for all games.





## NESCafe 0.42

- 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)