



REQUIREMENTS

Michael Kelly
mkelly01@my.fit.edu

Keith Johnson
kjohns07@my.fit.edu

Eric Wells
wellse@my.fit.edu

Faculty Sponsor

Dr. William H. Allen
wallen@cs.fit.edu

1. The Purpose of the Project

a. The User Business or Background of the Project Effort

A program that will enable users to play SNES games inside a web browser with no download or installation.

b. Goals of the Project

The goal of this project is to allow users to play their favorite SNES games without downloading anything, while functioning across the platforms that Java supports.

2. The Client, the Customer, and Other Stakeholders

For this project, we(the developers) are the primary stakeholders as our grade in the course is based on this. Our client is ourselves, as well as our faculty sponsor, Dr. Allen. Our customer is anyone interested in playing SNES ROMs without leaving their web browser.

3. Users of the Product

a. The Hands-On Users of the Product

Homebrew Developer

- **Role:** Play and develop games for the SNES
- **Subject Matter Experience:** Master
- **Technical Experience:** Journeyman
- **Other User Characteristics:** Users in this class will have extensive experience with the SNES, and will likely demand the most out of the system.

Game Enthusiast

- **Role:** Play games and host the emulator
- **Subject Matter Experience:** Journeyman
- **Technical Experience:** Journeyman
- **Other User Characteristics:** Not all users will be experienced with hosting java applets, but these users will be those who are serious about using the system.



Casual Gamer

- **Role:** Play games on a hosted emulator
- **Subject Matter Experience:** Novice
- **Technical Experience:** Novice
- **Other User Characteristics:** Not all will fall under Novice for Subject Matter/Technical Experience, however, this is the user that happens across the emulator online and decides to play a quick game.

b. Priorities Assigned to Users

Our key users are the Game Enthusiasts and Casual Gamers, as we are counting on them to use, advocate, and host the emulator for others to use. Our secondary users are our Homebrew Developers, since their use of the system is not the main use case.

c. User Participation

We do not expect to get many initial requirements from any of our users during the main development cycle, however once we have released we expect to begin handling feature requests and bug reports from our users.

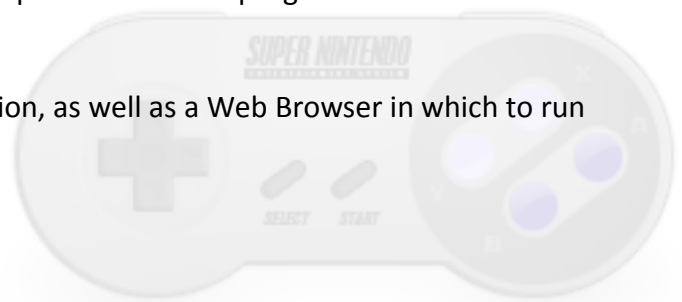
4. Mandated Constraints

a. Solution Constraints

- **Description:** The product shall be embeddable in a web page, accessible to anyone with Java installed.
- **Rationale:** We want to support the greatest number of users across all platforms.
- **Fit Criterion:** Our product will work properly from a web context through Java.
- **Description:** The product shall not require the user to download and installing anything other than Java.
- **Rationale:** We want to make the act of using our software as simple as possible.
- **Fit Criterion:** No other software will be required to run our program.

b. Off-the-Shelf Software

We will be using the Java JRE to run our application, as well as a Web Browser in which to run the applet.



c. Schedule Constraints

The final deadline for this project is March, 2011.

5. Naming Conventions and Definitions

a. Definitions of All Terms, Including Acronyms, Used in the Project

- **Emulation** – The process of simulating the execution of code as it would be run on a different system
- **SNES** – Super Nintendo Entertainment System
- **ROM** – Read Only Memory, a file representing the contents of a game cartridge
- **Homebrew** – Any software developed by non licensed developers
- **SPU** – The sound processing unit on the SNES
- **CPU** – Central Processing Unit, the main processor on the SNES
- **PPU** – Picture processing unit, the graphics processor on the SNES used to display images to the screen
- **GUI** – Graphical User Interface, the part of the software users interact with.
- **JVM** – Java Virtual Machine, the program that will be used to run our code.
- **fps** – Frames per second

6. Relevant Facts and Assumptions

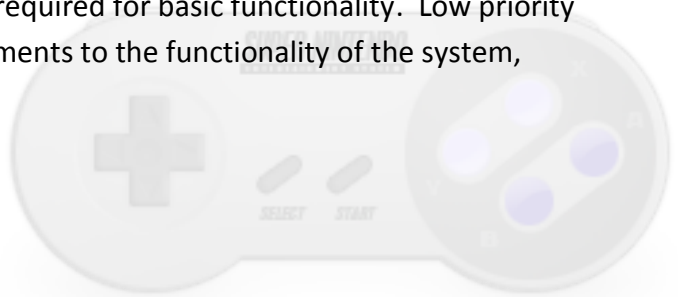
a. Assumptions

- All users will have Java installed, and a suitable web browser
- Most users will be using Firefox, or Internet Explorer
- Most users will be running Java on Windows

7. Functional and Data Requirements

a. Functional Requirements

Priorities are Low, Medium, and High. High priority requirements must be fulfilled for our software to be functional. Medium priority requirements improve the quality of the basic system and add important features, but are not required for basic functionality. Low priority items represent features that are slight improvements to the functionality of the system, however for general usage are unnecessary.



Requirement #001

- **Description:** The system shall contain virtualized hardware that operates as the original hardware
- **Rationale:** We want to run code in the same way as the original system.
- **Fit Criterion:** The software shall run games in a manner indistinguishable from the original hardware
- **Priority:** High

Requirement #002

- **Description:** The system shall provide a means of loading ROM data
- **Rationale:** The system is not useful without a means to load a ROM
- **Fit Criterion:** The program will load a ROM file from a server or directly from the user.
- **Priority:** High

Requirement #003

- **Description:** The system shall allow the user to save progress in a game for later resumption
- **Rationale:** Users won't want to lose their progress midgame
- **Fit Criterion:** The program loads back the save progress to the state it was in when saved.
- **Priority:** Low

Requirement #004

- **Description:** The system shall be able to identify specific information about ROM data, including game name, publisher, etc.
- **Rationale:** The user may want to know information about the game
- **Fit Criterion:** The software shall capture the required information
- **Priority:** Low

Requirement #005

- **Description:** The system shall be able to verify that ROM data is a legitimate SNES game
- **Rationale:** The system needs to know if a ROM file is valid before execution begins
- **Fit Criterion:** An invalid ROM file should trigger an error, while a valid ROM loads fine.
- **Priority:** Medium



Requirement #006

- **Description:** The system shall provide a means for game or save data to be loaded from a remote server
- **Rationale:** Local storage is not always available
- **Fit Criterion:** Game data from a remote server loads the same as if it were local
- **Priority:** Medium

Requirement #007

- **Description:** The system shall provide a means to retrieve keyboard input from the user
- **Rationale:** Games require some sort of input to function
- **Fit Criterion:** The program shall respond to keyboard input
- **Priority:** High

Requirement #008

- **Description:** The system shall provide audio output comparable to that which would be provided by a SNES.
- **Rationale:** Sound is an essential component of games
- **Fit Criterion:** The user will be able to hear game sounds
- **Priority:** Medium

Requirement #009

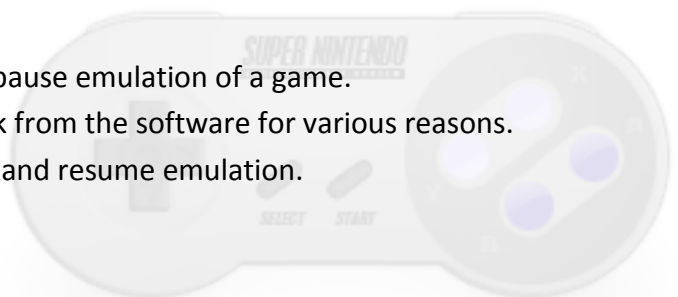
- **Description:** The system shall be able to emulate the SNES sufficiently enough to play some commercial and home-brew games.
- **Rationale:** It is worthless if it can't emulate anything effectively
- **Fit Criterion:** At least one game will be playable
- **Priority:** High

Requirement #010

- **Description:** The system shall be able to support multiple users playing from the same client
- **Rationale:** Multiplayer is one of the more fun concepts of playing video games
- **Fit Criterion:** Up to 4 players will be able to play at once
- **Priority:** Medium

Requirement #011

- **Description:** The system shall be able to pause emulation of a game.
- **Rationale:** Users will want to take a break from the software for various reasons.
- **Fit Criterion:** A user will be able to pause and resume emulation.
- **Priority:** Medium



Requirement #012

- **Description:** The system shall support displaying values in memory.
- **Rationale:** Developers will want a way to peer into the internal state of the machine for debugging purposes
- **Fit Criterion:** The memory will be viewable through some means.
- **Priority:** Medium

Requirement #013

- **Description:** The system shall support capturing an image of the game screen.
- **Rationale:** Screen shots are desired by many players
- **Fit Criterion:** There will be a way to take a screen shot and save it to disk.
- **Priority:** Low

Requirement #014

- **Description:** The system shall support loading a ROM and save state file on load.
- **Rationale:** Web page authors want to embed our software so it loads up at a certain point in a game.
- **Fit Criterion:** The program will load the specified ROM and save state data when it begins.
- **Priority:** Medium

8. Usability and Humanity Requirements

a. Ease of Use Requirements

Requirement #015

- **Description:** The system shall be easy to use for a casual web user.
- **Rationale:** A large portion of our users will be those who casually encounter our program embedded on a web page.
- **Fit Criterion:** A new user will be able to determine how to use the program in less than one minute.
- **Priority:** High



b. Personalization Requirements

Requirement #016

- **Description:** The system shall provide a means of configuring settings regarding the systems operation(keymap, emulation speed, sound, video size, frame skip, save/load state)
- **Rationale:** Not all users have the same preferences
- **Fit Criterion:** The system will allow configuration of the listed items
- **Priority:** Medium

9. Performance Requirements

Requirement #017

- **Description:** The system shall be fast enough to provide smooth visuals
- **Rationale:** Users won't use this if the games appear choppy
- **Fit Criterion:** A minimum frame-rate of 30fps will be maintained 95% of the time.
- **Priority:** High

Requirement #018

- **Description:** The system shall respond to user input in a timely manner.
- **Rationale:** If the input is delayed, games become unplayable
- **Fit Criterion:** All input will be handled in less than 0.5 seconds
- **Priority:** Medium

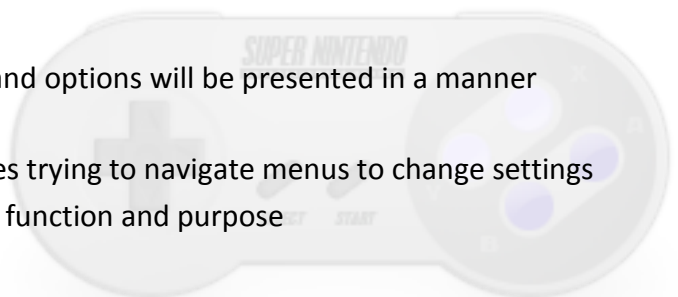
10. Look and Feel Requirements

Requirement #019

- **Description:** The system shall be presented in the form of a Java applet, capable of being embedded in a web page
- **Rationale:** Solution constraint
- **Fit Criterion:** The Java applet will load in a web page.
- **Priority:** High

Requirement #020

- **Description:** The system's configuration and options will be presented in a manner easily navigated by the user
- **Rationale:** The user should not have issues trying to navigate menus to change settings
- **Fit Criterion:** All options will be sorted by function and purpose



- **Priority:** Medium

Requirement #021

- **Description:** The system shall have an option to show performance statistics.
- **Rationale:** Users will want to know if it is running fast enough.
- **Fit Criterion:** Performance statistics such as memory usage and framerate will be viewable by the user.
- **Priority:** Medium

Requirement #022

- **Description:** The size of the program on screen shall be customizable
- **Rationale:** Changing the size will be important for fitting into different websites and their layouts.
- **Fit Criterion:** There will be a way to control the size of the applet on the page.
- **Priority:** Medium

11. Legal Requirements

Requirement #023

- **Description:** Copyrighted ROM files shall not be distributed in any means with this software
- **Rationale:** Copyright makes it illegal to redistribute these without permission
- **Fit Criterion:** No copyrighted ROM files will be found in this product
- **Priority:** High

12. Ideas for Solutions

- a) Instead of doing the normal Java style and creating a new object for each instruction, make use of static classes that are only instantiated once and never deleted. This will help negate issues with the JVM garbage collector.
- b) Make use of an array that contains the static objects and use this as a jump table, to make the code easier to read and eliminate a possibly large block of if statements or a switch/case.

