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**Fundamentals of Computing Final Project**

For our project, we decided to recreate the classic Super Mario Bros. game for the NES. Our project heavily emphasized object-oriented programming written in C++ as well as using SDL2 for the images and graphics. The only special library that is needed to run the project is the standard SDL2 library that is now installed on all of the engineering lab machines.In order build/compile the program we rcommmend that you simply use teh makefile that we have created and included with all of our other project files. All of the necessary files for the project can be found in Dan Finnegan’s dropbox in a directory called finalProject. Additionally you may view our final code in our group’s GitHub repository in the SuperMarioBros folder which is marked as “final project with bugs”. Here is the link to the repository: <https://github.com/dfinnega/FundComp2Project>

The final code is in the SuperMarioBros folder within the repository.

User Manual:

The controls are as follows:

**left arrow**: move Mario left

**right arrow:** move Mario right

**a:** sprint

**s:** jump

**esc:** exit the game

Mario is able to jump and land on the platforms throughout the level to get to the flag on the far right side! Throughout the level, you will encounter dangerous enemies: goombas and koopas. If you touch one of those enemies you will loose a life. Additionally, if you fall into a pit you will loose a life. If you lose three lives the game is over. However, you may kill enemies by jumping and landing on top of them. Furthermore if you get mushroom, you will turn into big Mario and be able to get hit by an enemy twice without losing a life. If manage to get to the flag at the end of the level you will win!

Known Bugs

* Possibly one of the most awesome and entertaining bugs of all, something we actually consider to be a fantastic improvement to the original gameplay, is the super jump. If you continue to hold down the s button while you land on an object, the program will not perform the collision detection to check if Mario lands on an object. As a result it will appear that Mario is sinking through the object. Here comes the fun part, if you sink through the ground and keep holding down the jump button with regular size Mario, he will perform a super jump and get launched skyhigh (This only works for little Mario, big Mario dies if you try this maneuver)
* Another bug has to do with the stairs. Mario is able to stay lodged against the stairs if you keep running towards them. This allows you to essentially “float” on the flat edges of the stairs, and possibly even save Mario from going into the pit on the second part of the stairs. This also applies at the end of the level for the big stairs. While little Mario can use this, big Mario dies when he uses this at the ending staircase. This is due to Mario getting stuck in the ground, and then when you jump again he immediately dies.
* Big Mario does not bounce off of enemies all the time, but he does occasionally.
* Due to sprite sheet clipping, Mario can be floating on the edge of a block, but it will still act as if he is standing on the block. This can be used to run across the three spaced question blocks toward the end of the level, near where the koopa
* There is a bug with the koopa shell. If you kill the koopa, Big Mario will not be able to jump on the shell again and cause the shell to move, nor will touching the shell again kill him. On the other hand, if you are regular Mario and you jump on the shell, the shell will begin to move toward the right. Unlike the original game, Mario is not able to be killed by the moving koopa shell, and Mario cannot make the shell move left or right by touching the side, only by jumping on top of it.
* While this is not a glitch/bug, it is poor practice that we do not deallocate the memory we allocated at the beginning of the game.  The most memory we can allocate is 3 times the size of all the objects on the map (one for each life)
* Lastly, during the initial black screen, if you hold down either right or left, the game segfaults and ends. It is still moving Mario around and accessing memory it does not have permission to access.