# The Flappy Birds User Manual

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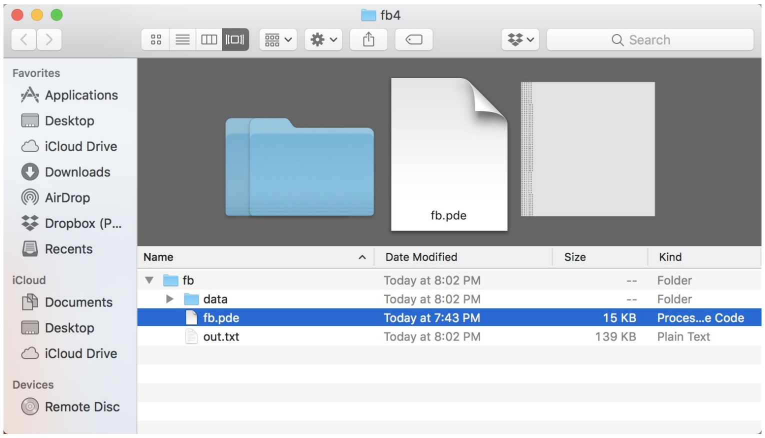
Public Announcement Service:

1. *Please make sure the Mac application is updated to OS X and Processing is at least version 3.3.6, otherwise there will be a bug when the program runs.*
2. *The export function in processing 3.3.6 for Mac OS X is currently experiencing difficulties and we had to combine all our classes into a single sketch, sorry for the inconvenience.*
3. *The name of our program is "The Flappy Birds" and therefore doesn't violate licensing laws regarding "Flappy Bird".*

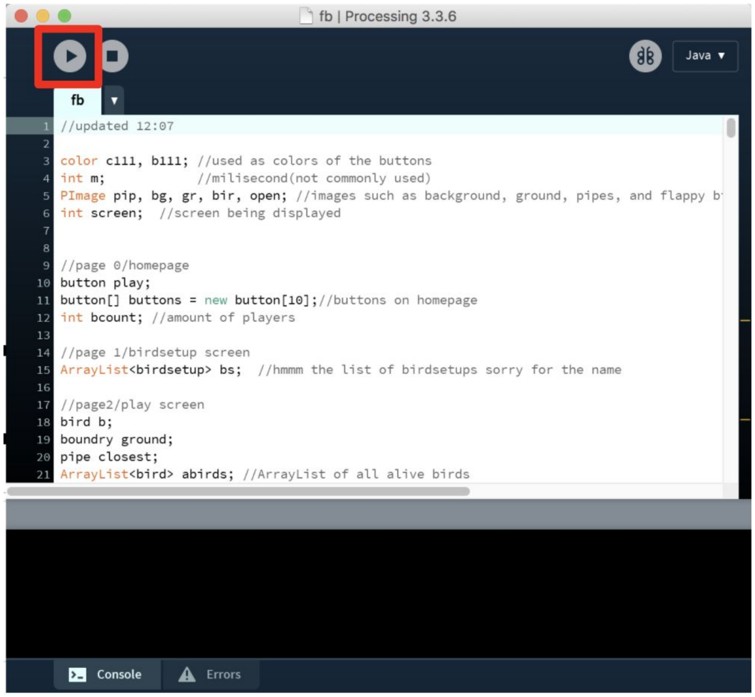
Pre-game Setup:

1. Download and extract the zip file.
2. Open folder fb in the file.
3. Open sketch fb.pde in processing 3.3.6.



| Name | Date Modified | Size | Kind |
|---|---|---|---|
| fb | Today at 8:02 PM | -- | Folder |
| data | Today at 8:02 PM | -- | Folder |
| fb.pde | Today at 7:43 PM | 15 KB | Proces...e Code |
| out.txt | Today at 8:02 PM | 139 KB | Plain Text |

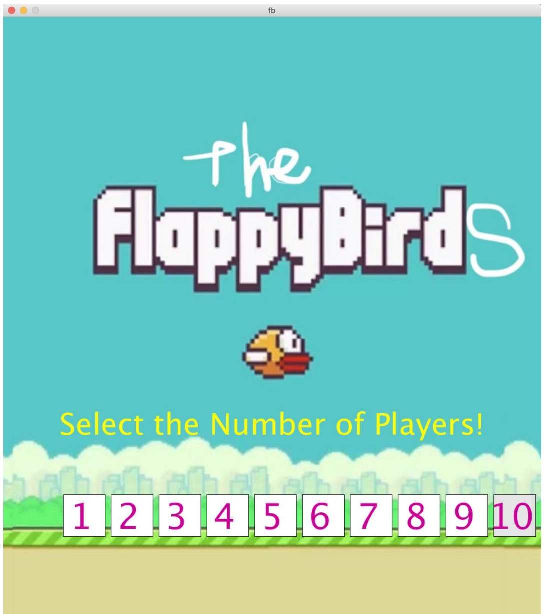
4. Click the run button on the top left.



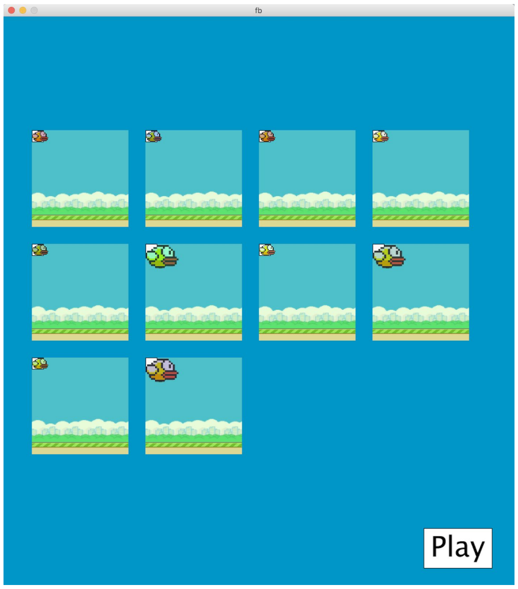
```
//updated 12:07

color c111, b111; //used as colors of the buttons
int m;              //milisecond(not commonly used)
PImage pip, bg, gr, bir, open; //images such as background, ground, pipes, and flappy b
int screen;  //screen being displayed


//page 0/homepage
button play;
button[] buttons = new button[10];//buttons on homepage
int bcount; //amount of players

//page 1/birdsetup screen
ArrayList<birdsetup> bs;  //hmmm the list of birdsetups sorry for the name

//page2/play screen
bird b;
boundry ground;
pipe closest;
ArrayList<bird> abirds; //ArrayList of all alive birds
```

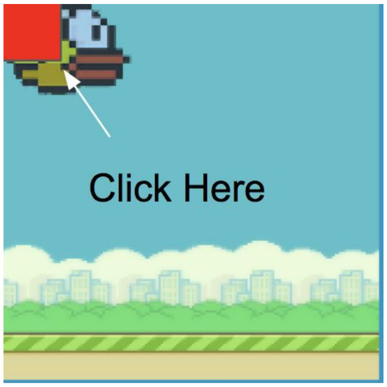
<u>How to Play:</u>

1. On the Home page, select the number of players that will be playing by clicking the button with that number displayed.

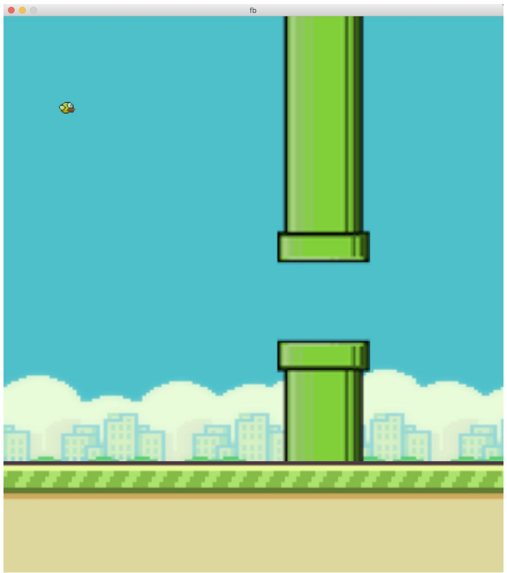


2. The birds correspond to players 1-10 from left to right, click the white button on the top left of every bird frame to adjust the size/color/wingspan of each bird. Click play to start the game.

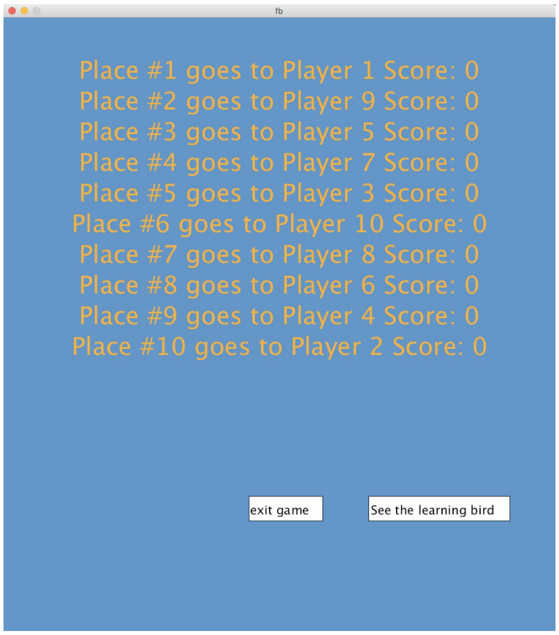




3. Press the corresponding number key to your player number to make your birds jump, keep track of your bird by its size and color. The birds dies when it crashes into the pipes, ground, or ‘ceiling’, the page exits automatically when there are no more birds alive.



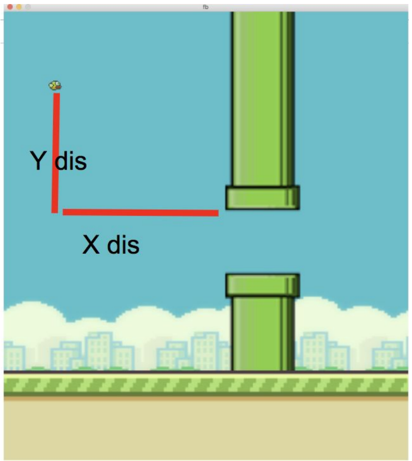
4. The game over page displays the rank of the players in order of death  and their respective scores. Click “See learning bird” to see how the AI bird is progressing, click “exit” to quit the game.



Place #1 goes to Player 1 Score: 0
Place #2 goes to Player 9 Score: 0
Place #3 goes to Player 5 Score: 0
Place #4 goes to Player 7 Score: 0
Place #5 goes to Player 3 Score: 0
Place #6 goes to Player 10 Score: 0
Place #7 goes to Player 8 Score: 0
Place #8 goes to Player 6 Score: 0
Place #9 goes to Player 4 Score: 0
Place #10 goes to Player 2 Score: 0

Out Goal:

- The purpose of the program is to use human player data to collect data for training AI birds, during the program, we collect data regarding the x/y distance, and jump for each specie of birds(differentiated by wingspan and size).



- The data is stored in a 4d array with variables wingspan, size, x, y, it stores values of 0 if the bird didn’t jump, and 1 if it did. The data is stored across multiple runs in the file out.txt,  and we collect around 20,000 data points per round.

## Big O Analysis:

Int Gamepage: https://codeshare.io/5NXL18

Gamepage() is a method of O(n) time. Most of the methods that it calls, such as display() or grav() or move(), are methods of O(1) time that execute a set number of steps. The exception is a for loop in gamepage(). Inside the for loop, all of the methods are O(1) time, making the for loop cause Gamepage to be of O(n) time.

Void GameOverPage: https://codeshare.io/5ZqZee

In the Gameover() method, there is a while loop that takes O(n) time because it only contains calls to methods of time O(1). However, after the while loop finishes executing, set() is called. Because (as explained earlier) set() is a function of O($n^4$) time, it means that Gameover() is a function of  O($n^4$) time.

- Although this program uses a lot more memory and space, However, this also provided the AI bird a O(1) retrieving time. the O(1) helps the user experience in avoiding lagging in a real time game.

Void pipes Move(): https://codeshare.io/5XP7AM

This method switched the top values of the pipe stack with two pipe variables, s, and s2 once s has completely moved across the screen, it makes the pipes move across the screen at O(1) time. However, there's a for loop nested within that updates the score of  every bird alive after a pipe disappears off the screen, therefore, making the pipes Move() function O(n).

**Other Fun Facts:**

- The program contains data structures such as ArrayList, multidimensional arrays, and Stacks, and less commonly known data structures such as Buttons, Birds, Bird Setups, pipes, and boundaries.
- There are 6 classes in this program excluding Stack and Node.