Ministar Galactica Web Game

www.matthewrobbins.co.uk/ministar

CS25210 Interactive Web Assignment

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3rd May 2012

This report will examine some of the details of the Ministar Galactica web game, including a technical overview of technology choices, testing across different browsers and platforms, and reflections of the project with a look at its future.

Contents:

1. Introduction

Ministar Galactica is a small interactive, web-based game built using the HTML5 canvas and JavaScript. The game itself is based on the fictional Battlestar Galactica war between human and Cylon forces, where both sides primarily use small single pilot space craft to attack the enemy's larger cruisers. In this game, the player takes the role of one of Battlestar Galactica's "Viper" fighters to help defend the ship against the attacking Cylon "Raiders".

2. Executive Summary

The aim of the game is for the player to increase their score by shooting at and destroying enemies to advance to higher, harder levels where enemies appear more frequently and in larger numbers. At random intervals throughout the game, power-ups appear that can be collected by the player to gain an advantage such as invisibility, invincibility, or a laser that kills all enemies on screen. The game resides within a themed website, where users must create an account to log in with. When they finish a game, the user can submit their score to a leader board table, where it is displayed alongside their username.

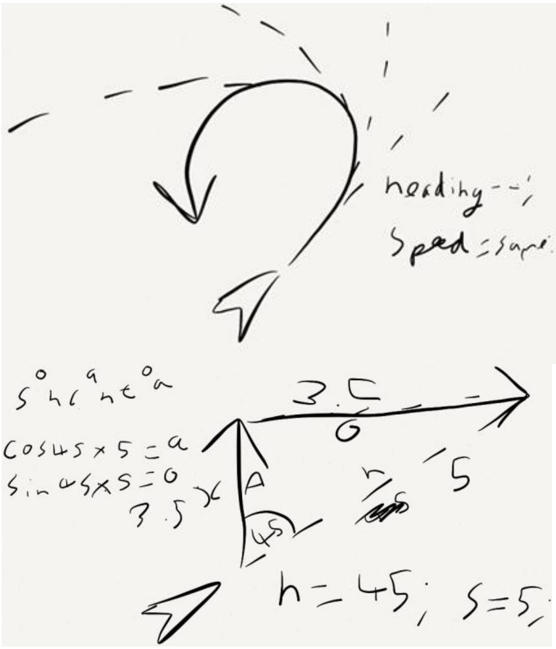


Figure 1. An Early concept of heading-based movement and the resulting mathematics needed to calculate the change in X and Y coordinates

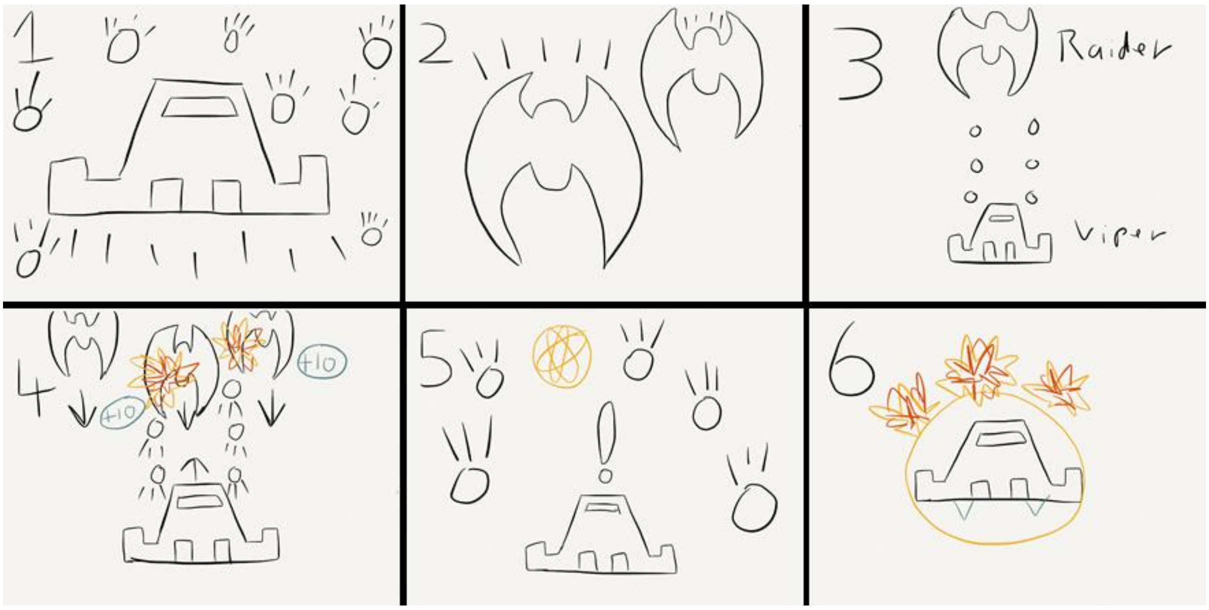


Figure 2. A storyboard depicting the player's Viper fighter destroying enemy and collecting a shield power-up

3. Technical Overview

3.1 Client Side

jQuery was used to make the keyboard controlled movement smoother by setting a Boolean flag when the corresponding key was pressed down ("onKeyDown" and "onKeyUp") and then updated the position of the player depending on which flag was true. JavaScript is a key part to this game, and is responsible for the game's logic and ability to draw on the HTML5 canvas.

3.1.1 Advantages of HTML5

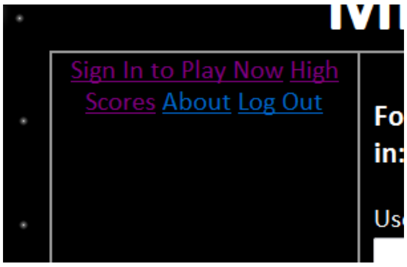
HTML5 was a good choice to use as it is a modern language that is natively supported by a wide range of browsers already, without the need for an external plugin such as Silverlight or Flash. Adobe Flash is hugely popular for playing games and video, but succumbs to a few flaws:

- Third party add-ons and plugins can introduce instabilities to a browser,
- Run-time environment can be fairly slow to load
- No support on iOS device browsers
- High CPU usage

3.1.2 Disadvantages of HTML5

HTML5, although built to be consistently understood by all computers, device and browsers, does have the disadvantage that many old (and still widely used) Internet Explorer browsers have no understanding of the new elements such as <nav> and <canvas>.

Applications developed for the popular and widely used Adobe Flash will work across platforms, whereas different browsers may implement HTML5 differently, meaning HTML5 will not be replacing it completely just yet.



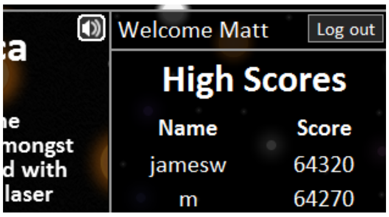
Sign In to Play Now High Scores About Log Out

Fo
in:
Us

Figure 3. Internet Explorer 8 trying to display a <nav> section

3.2 Server Side

On the server side, PHP was used to store session data to keep the user logged in, as well as receiving data values like the score via POST from the JavaScript to sanitize, put into an SQL query, then run this query on the MySQL database.



a
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laser

Welcome Matt Log out

High Scores

Name	Score
jamesw	64320
m	64270

Figure 4. High scores leader board with data from "Score" table

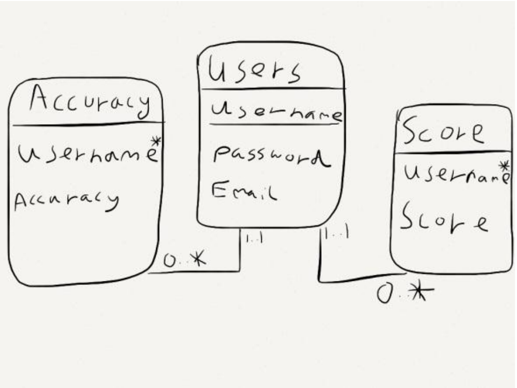


Figure 3. UML Diagram of database tables showing 0 to many relationships for a user's normal and accuracy scores, where "username" is a primary or foreign key. The tables are used to hold user account and score information.

4. Software Testing

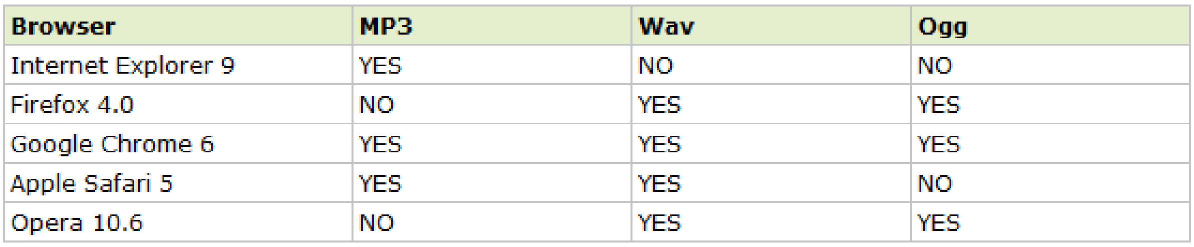
4.1 Browsers

As users of this game will all have different computers, browsers and operating systems, it is important to test a wide range of options to ensure maximum compatibility.

The first set of tests I ran on an average dual core Windows 7 laptop:

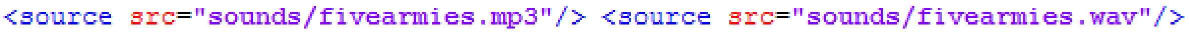
Browser	Gameplay	Sound	Power-up Time	CPU usage	Other notes
Firefox 11.0	Slow and laggy	Background music mostly fine, few others	20 seconds (2 x normal)	High	15 Frames per second, half of normal
Chrome 18.0	Smooth	All correct	10 seconds	Low - medium	Perfect
Opera 11.6	Smooth	No effects	10 seconds	1 core high, 1 low	Background music resets intermittently
Internet Explorer 9	Smooth	Plays effects, little delayed	10 seconds	Low - medium	Has trouble with quick shooting sound
Safari 5.1	Smooth	None	10 seconds	Medium - high	No sounds, smooth running

All browsers played the game, but many had issues with sound despite the w3schools table (below) showing that all should be fine if .wav and .mp3 are available. To conquer this, I would also add .ogg files and research more into sound issues with other browsers. Firefox on some computers seemed to halve the frame rate and seemed laggy.



Browser	MP3	Wav	Ogg
Internet Explorer 9	YES	NO	NO
Firefox 4.0	NO	YES	YES
Google Chrome 6	YES	YES	YES
Apple Safari 5	YES	YES	NO
Opera 10.6	NO	YES	YES

Figure 5. w3schools.com HTML5 Audio - http://www.w3schools.com/html5/html5_audio.asp



```
<source src="sounds/fivearmies.mp3"/> <source src="sounds/fivearmies.wav"/>
```

Figure 6. The source tags inside the <audio> tag that plays the background music, showing both source files are available

4.2 Operating Systems

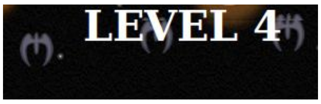


Figure 6. Calibri reverts to a default font in Linux

As well as trying my game on Windows 7 32 and 64 bit, I tested it on Ubuntu as well, a popular Linux distribution, on a netbook. Chrome, Firefox and Konqueror generally played the game and most sounds fine, but I found out that I needed to include some fall-back fonts. A low-detail version of the game for less powerful computers may be useful that had less sounds trying to play and no background movement. I also tested the game on an iPhone and iPad. Although both started the game and the demo, they couldn't interact with the canvas, although it does seem possible to listen for certain touch events in JavaScript. [See Appendix A for device testing screenshots].

5. Reflections and future work

5.1 Improvements and Additions

After the deadline for changing the game had passed, I found myself coming up with more ideas to improve the game and additional features that would be needed for if the game were to become popular such as:

- Automatic emails to welcome the user when they create an account and notify them if they have been knocked out of the top 10 high scores.
- "Forgot my password" link.
- Store more information for each user such as running totals of kills, which could be used in additional leader boards.
- Increase security, around the insecure "POST" way of sending variables.
- Add primary and foreign key constraints to the tables.
- More power-ups such as heat seeking bullets, faster firing weapons and proximity-activated space mines.
- Bonus rounds where instead of destroying enemies, the player must destroy Tetris blocks.
- Career mode shop where use can spend points on cosmetic and performance upgrades.
- Friends – add and message friends, see their high scores, possibly play together.
- Social media integration

I believe HTML5 was the right language to use for this game, as it is modern and ready for the future. With my limited knowledge of Adobe Flash's ActionScript, I think that doing this game in Flash would also have been possible, yielding similar results, but requiring users to have the flash plugin installed to play.

5.2 Future

This game is now active and online at www.matthewrobbins.co.uk/ministar, and has already attracted about 20 users, with many of them posting high scores. While this game is fun, without a campaign and multiplayer mode, this game would not be suitable as a paid internet game, however if it could be converted an app available to iOS and android mobile phones, I could see this game making money if sold for 69p on an app store.

References

Wikipedia – HTML5 vs Flash, 25/04/2012
http://en.wikipedia.org/wiki/Comparison_of_HTML5_and_Flash

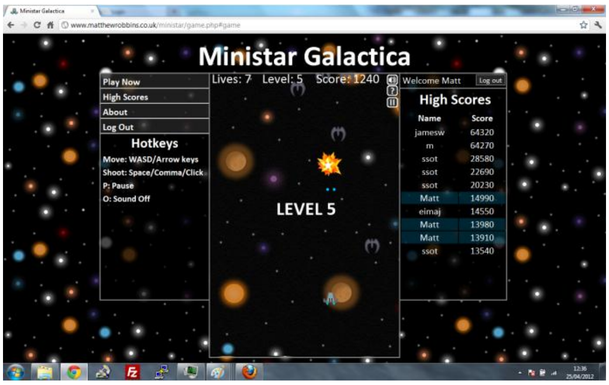
W3schools – HTML5 Audio information, File type/Browser compatibility table. 25/4/2012

http://www.w3schools.com/html5/html5_audio.asp

6. Appendix

Appendix A – Testing Screenshots

Windows 7, 32 bit



Name	Score
jamesw	64320
m	64270
ssot	28580
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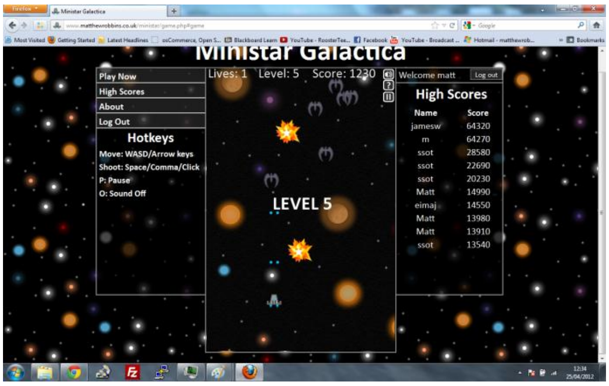
ssot	20230
Matt	14990
eimaj	14550
Matt	13980
Matt	13910
ssot	13540

Google Chrome 18.0



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ssot	22690
ssot	20230
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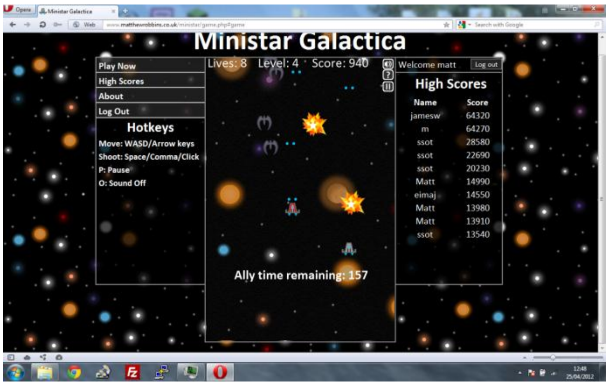
eimaj	14550
Matt	13980
Matt	13910
ssot	13540

Firefox 11.0



Ally time remaining: 157

Name	Score
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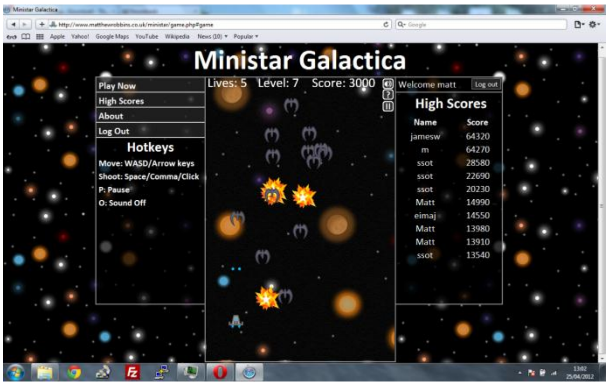
ssot	28580
ssot	22690
ssot	20230
Matt	14990
eimaj	14550
Matt	13980
Matt	13910
ssot	13540

Opera 11.6



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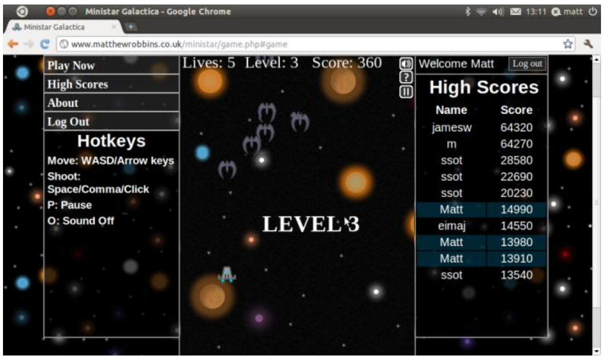
Safari 5.1

Ubuntu Netbook 11.04


Ministar Galactica - Google Chrome
www.matthewrobbins.co.uk/ministar/game.php#game
Play Now
High Scores
About
Log Out
Lives: 5 Level: 3 Score: 360
LEVEL 3
Welcome Matt
Log out

Hotkeys
Move: WASD/Arrow keys
Shoot: Space/Comma/Click
P: Pause
O: Sound Off

High Scores

Name	Score
jamesw	64320
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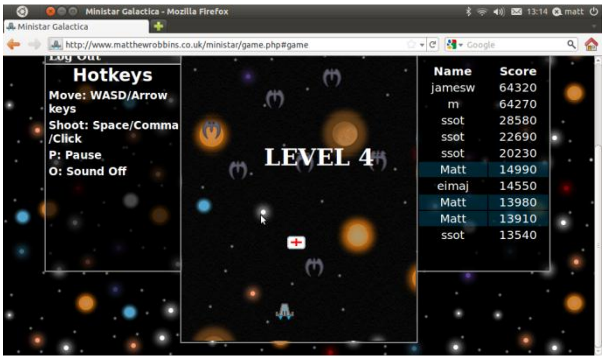
Matt	13910
ssot	13540

Google Chrome


Ministar Galactica - Mozilla Firefox
http://www.matthewrobbins.co.uk/ministar/game.php#game
Log Out
LEVEL 4

Hotkeys
Move: WASD/Arrow keys
Shoot: Space/Comma /Click
P: Pause
O: Sound Off

Name	Score
jamesw	64320
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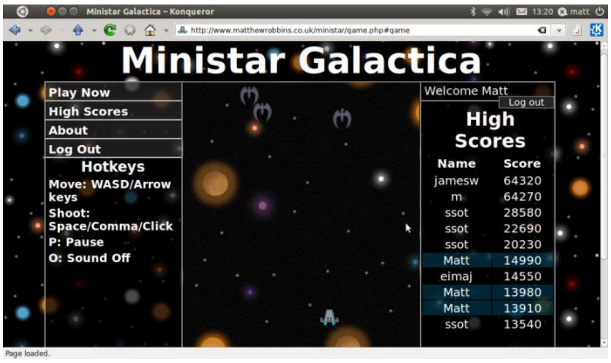
ssot	28580
ssot	22690
ssot	20230
Matt	14990
eimaj	14550
Matt	13980
Matt	13910
ssot	13540

Firefox


Ministar Galactica – Konqueror
http://www.matthewrobbins.co.uk/ministar/game.php#game
Ministar Galactica
Play Now
High Scores
About
Log Out
Welcome Matt
Log out
Page loaded.

Hotkeys
Move: WASD/Arrow keys
Shoot: Space/Comma/Click
P: Pause
O: Sound Off

High Scores

Name	Score
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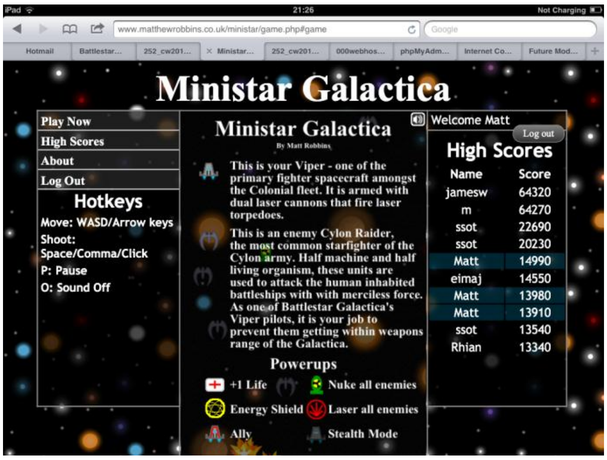
Matt	13980
Matt	13910
ssot	13540

Konqueror

iOS devices



Hotkeys
Move: WASD/Arrow keys
Shoot: Space/Comma/Click
P: Pause
O: Sound Off

Ministar Galactica
By Matt Robbins

This is your Viper - one of the primary fighter spacecraft amongst the Colonial fleet. It is armed with dual laser cannons that fire laser torpedoes.

This is an enemy Cylon Raider, the most common starfighter of the Cylon army. Half machine and half living organism, these units are used to attack the human inhabited battleships with with merciless force. As one of Battlestar Galactica's Viper pilots, it is your job to prevent them getting within weapons range of the Galactica.

Powerups
+1 Life
Nuke all enemies
Energy Shield
Laser all enemies
Ally
Stealth Mode

High Scores

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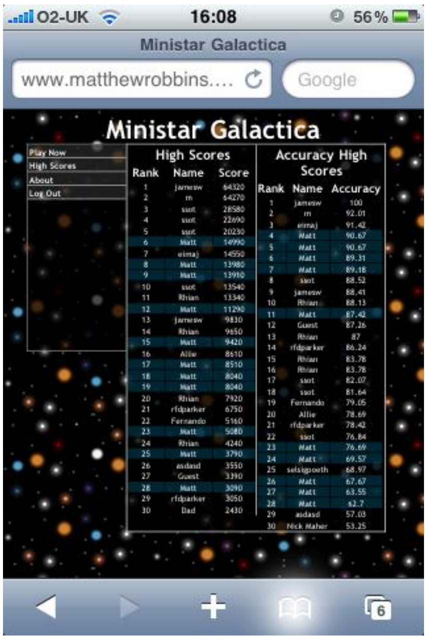
jamesw	64320
m	64270
ssot	22690
ssot	20230
Matt	14990
eimaj	14550
Matt	13980
Matt	13910
ssot	13540
Rhian	13340

iPad viewing a moving game in Safari, but is unable to control it



High Scores

Rank	Name	Score
1	jamesw	64320
2	m	64270
3	ssot	28580
4	ssot	22690
5	ssot	20230
6	Matt	14990
7	eimaj	14550
8	Matt	13980
9	Matt	13910
10	ssot	13540
11	Rhian	13340
12	Matt	11290
13	jamesw	9830
14	Rhian	9650
15	Matt	9420
16	Allie	8610
17	Matt	8510
18	Matt	8040
19	Matt	8040
20	Rhian	7920
21	rfdparker	6750
22	Fernando	5160
23	Matt	5080
24	Rhian	4240
25	Matt	3790
26	asdasd	3550
27	Guest	3390
28	Matt	3090
29	rfdparker	3050
30	Dad	2430

Accuracy High Scores

Rank	Name	Accuracy
1	jamesw	100
2	m	92.01
3	eimaj	91.42
4	Matt	90.67
5	Matt	90.67
6	Matt	89.31
7	Matt	89.18
8	ssot	88.52
9	jamesw	88.41
10	Rhian	88.13
11	Matt	87.42
12	Guest	87.26
13	Rhian	87
14	rfdparker	86.24
15	Rhian	83.78
16	Rhian	83.78
17	ssot	82.07
18	ssot	81.64
19	Fernando	79.05
20	Allie	78.69
21	rfdparker	78.42
22	ssot	76.84
23	Matt	76.69
24	Matt	69.57
25	selsigpoeth	68.97
26	Matt	67.67
27	Matt	63.55
28	Matt	62.7
29	asdasd	57.03
30	Nick Maher	53.25

Very old iPhone viewing the high scores page with Safari