

Test Plan

Black Box Testing

We have used Black Box Testing to test the requirements of the program. This has mostly been focused on the user requirements, however in instances where these tests did not cover requirements from the other categories, then new tests have been created. For example, NFR_USABILITY_TEST was created to test the usability requirements from the non-functional-requirements section that weren't covered by the user requirements.

This testing was performed both during and after the creation on the program. Tests on initial requirements could be performed before the additional requirements from assessment 2 were implemented.

Black box testing was used for the requirements because it was not necessary to see the code in order to check that the requirements have been met. For example, simply attempting to play the game will reveal whether the boat moves as intended, if the obstacles spawn evenly, and if the game progresses from stage to stage correctly.

Therefore, the testing served several processes. By playing the game it could be seen whether there are any obvious initial bugs that could then be fixed. It would also help highlight if there were any features promised in the requirements that were not implemented.

Due to the nature and simplicity of the game, there was not a huge variety of different inputs to test. The main menus used the mouse click and scroll functionality and the main game used WASD to control movement (although S wasn't used as backwards movement wasn't a feature). The only other inputs were ESC to return to the main menu, and SPACE to move between stages.

A traceability matrix was created for the Black Box testing. This was useful as it highlighted that some requirements in the NFR section were not tested by the existing tests. Furthermore, it shows that some requirements are tested by other tests, which limits the number of tests that must be created. This was the case with the functional requirements, all of which were covered by the tests that were derived from the user requirements. In turn this helps to reduce redundant tests.

Test Case	Input	Expected output	Actual Output	Success?
UR_BOAT_UNIQUENESS_TEST	N/A	Each boat will look and act different	Boats are unique and have noticeably different stats	✓
UR_DIFFICULTY_LEVEL_TEST	N/A	The difficulty increases in each leg	Each leg feels harder than the last	✓
UR_PADDLERS_STAMINA_DECREASE_TEST	W	Stamina decreases throughout the leg	The stamina noticeably decreases, and refills when letting go of the forward button	✓
UR_PLAYER_PENALTY_TEST	N/A	Leaving the required lane results in a time penalty	Upon finishing the leg, penalties are added for leaving the lane	✓
UR_OBSTACLES_TEST	N/A	Obstacles spawn along the river	Obstacles spawn evenly throughout the leg	✓
UR_OBSTACLE_COLLISION_TEST	W A D	The robustness of the boat decreases upon hitting an obstacle, until the boat breaks	Boat takes damage from obstacles until it breaks	✓
UR_MOVEMENT_TEST	W A D	User can move forward, left and right	Successfully implemented movement	✓
UR_POWERUPS_TEST	W A D	The user can pick up power ups	Power-ups vanish when collided with. Health/Stamina visibly increase.	✓
UR_RACE_TOTAL_TEST	SPACE (transition between races)	The user plays three races before the final	Three races are played if the user's boat doesn't break	✓
UR_DIFFICULTY_BEFORE_GAME_TEST	MOUSE CLICK	The user can select a difficulty before starting	There is a difficulty select screen after choosing a boat	✓
UR_GAME_LENGTH_TEST	N/A	The game lasts between 3 and 5 minutes	Successful, the game lasts around 4 mins	✓
UR_GAME_END_TEST	ESC	The game ends	Successful. The game ends	✓

ST	(return to main menu)	when: User boat is broken, User doesn't reach the final; User completes the final	as intended for each instance with an appropriate end screen	
NFR_USABILITY_TEST	MOUSE CLICK MOUSE SCROLL	There are features in place to help usability. These include a help screen and an explanation of the game.	Help screen is implemented however it cannot be scrolled without a physical mouse. Scrolling with arrow keys or touch pad does not work.	<input type="checkbox"/>
UR_SAVE_TEST		Upon finishing a race, there is the ability to save and quit		
UR_LOAD_TEST		There is an option to load up a saved game from the main menu and continue playing		
UR_ROUNDS_TEST	Escape	Playing the game more than once resets rounds to 1.	After round 3, game goes to round 6, then round 7 with only 4 boats	<input type="checkbox"/>

Traceability Matrix

Requirement Identifiers	<u>Reqs</u> tested	UR 1	UR 2	UR 3	UR 4	UR 5	UR 6	UR 7	UR 8	UR 9	UR1 0	UR1 1	UR1 2	UR1 3	UR1 4	UR1 5
Test cases	57	1	1	1	1	2	1	6	1	1	1	1	1	2		
UR_BOAT_UNIQUENESS_TEST	5	x						x								
UR_DIFFICULTY_LEVEL_TEST	4		x					x								
UR_PADDLERS_STAMINA_DECREASE_TEST	2			x												
UR_PLAYER_PENALTY_TEST	3				x											
UR_OBSTACLES_TEST	4					x										
UR_OBSACLE_COLLISION_TEST	7					x	x							x		
UR_MOVEMENT_TEST	5							x	x							
UR_POWERUPS_TEST	4							x		x						
UR_RACE_TOTAL_TEST	3										x					
UR_DIFFICULTY_BEFORE_GAME_TEST	4							x				x				
UR_GAME_LENGTH_TEST	4							x					x			
UR_GAME_END_TEST	4													x		
NFR_USABILITY_TEST	3															
UR_SAVE_TEST	2														x	
UR_LOAD_TEST	3															x

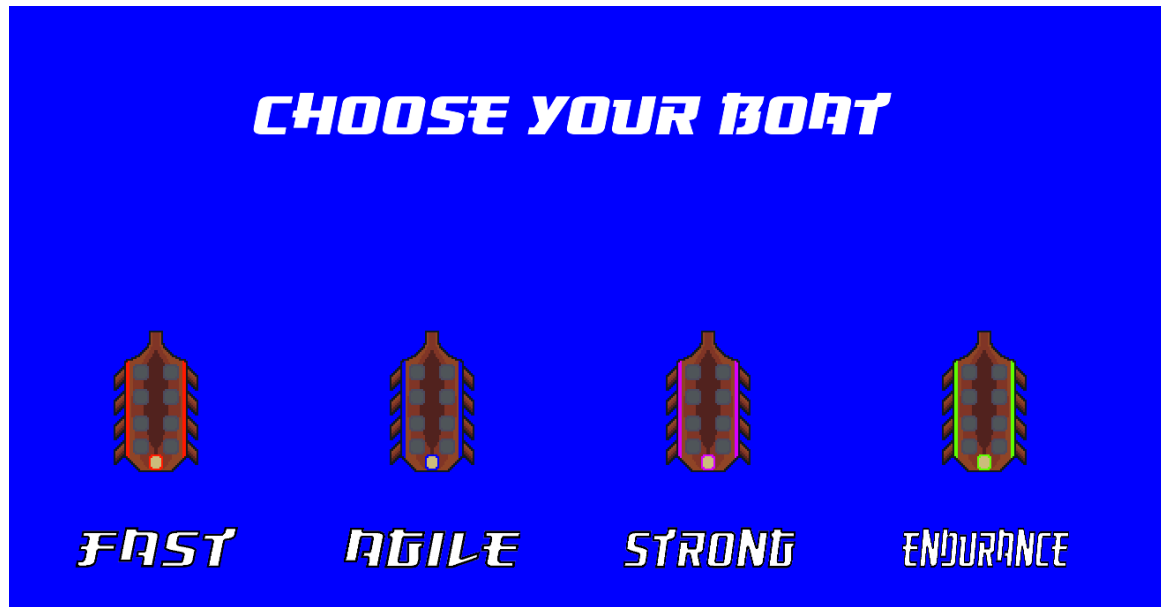
Requirement Identifiers	<u>Reqs</u> test ed	FR 1	FR 2	FR 3	FR 4	FR 5	FR 6	FR 7	FR 8	FR 9	FR1 0	FR1 1	FR1 2	FR1 3	FR1 4	FR1 5	FR1 6	FR1 7	FR1 8	FR1 9
Test cases	57	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1			
UR_BOAT_UNIQUENESS_TEST	5	x																		
UR_DIFFICULTY_LEVEL_TEST	4			x																
UR_PADDLERS_STAMINA_DECREASE_TEST	2																x			
UR_PLAYER_PENALTY_TEST	3				x	x														
UR_OBSTACLES_TEST	4			x			x													
UR_OBSACLE_COLLISION_TEST	7							x	x				x							
UR_MOVEMENT_TEST	5									x	x									
UR_POWERUPS_TEST	4											x								
UR_RACE_TOTAL_TEST	3														x	x				
UR_DIFFICULTY_BEFORE_GAME_TEST	4		x																	
UR_GAME_LENGTH_TEST	4														x					
UR_GAME_END_TEST	4												x							
NFR_USABILITY_TEST	3																			
UR_SAVE_TEST	2																	x		
UR_LOAD_TEST	3																		x	x

Requirement Identifiers	<u>Reqs</u> Tested	NFR1	NFR2	NFR3	NFR4	NFR5
Test cases	57	1	1	10	1	1
UR_BOAT_UNIQUENESS_TEST	5			x		x
UR_DIFFICULTY_LEVEL_TEST	4			x		
UR_PADDLERS_STAMINA_DECREASE_TEST	2					
UR_PLAYER_PENALTY_TEST	3					
UR_OBSTACLES_TEST	4			x		
UR_OBSACLE_COLLISION_TEST	7			x		
UR_MOVEMENT_TEST	5			x		
UR_POWERUPS_TEST	4			x		
UR_RACE_TOTAL_TEST	3					
UR_DIFFICULTY_BEFORE_GAME_TEST	4			x		
UR_GAME_LENGTH_TEST	4			x		
UR_GAME_END_TEST	4			x	x	
NFR_USABILITY_TEST	3	x	x	x		
UR_SAVE_TEST	2					
UR_LOAD_TEST	3					

Evidence of Testing

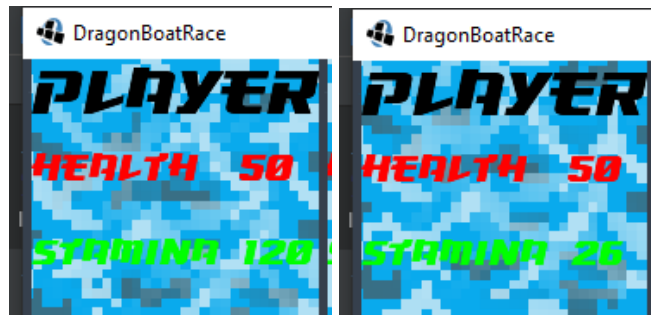
UR_BOAT_UNIQUENESS_TEST

The four different types of boat



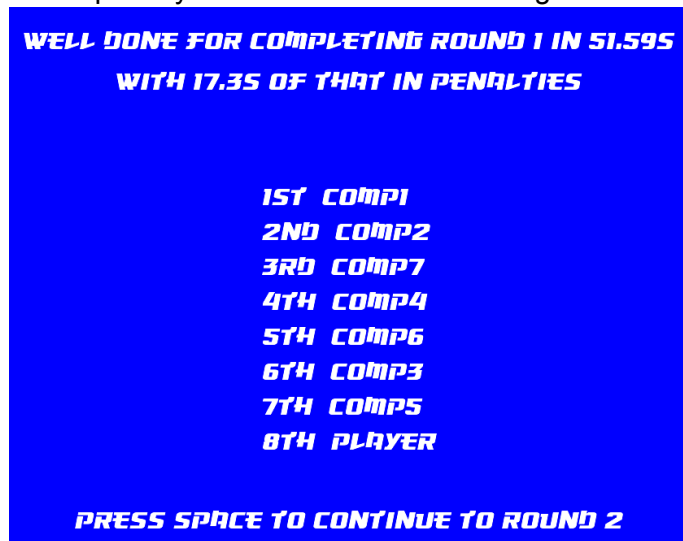
UR_PADDLERS_STAMINA_DECREASE_TEST

Here the stamina has decreased



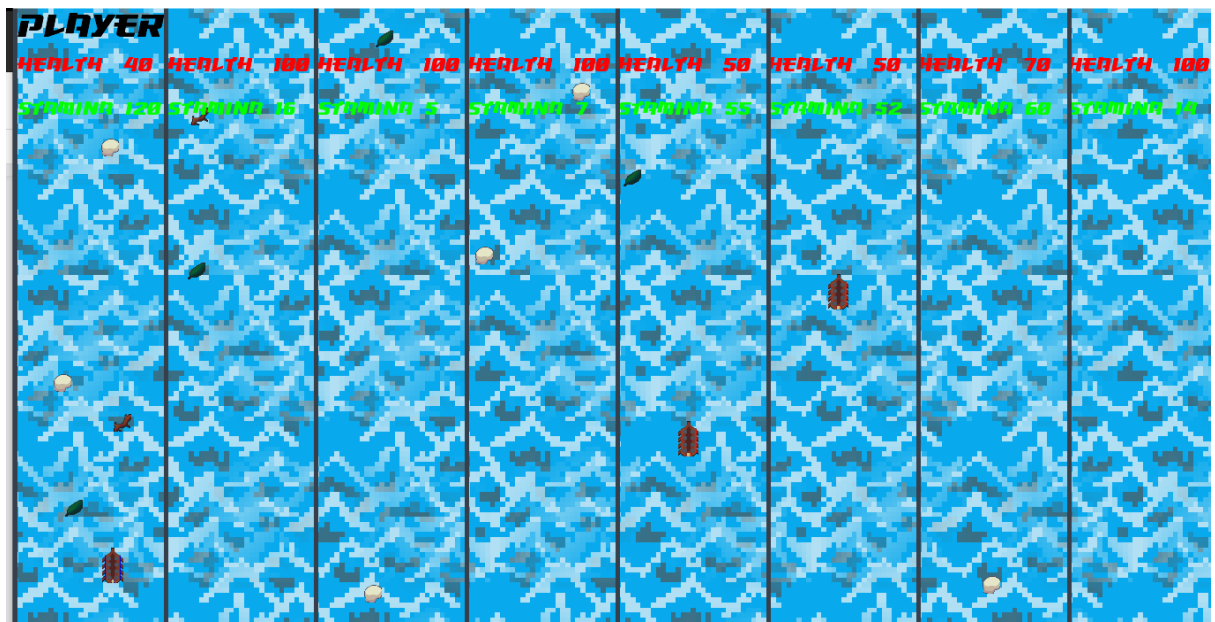
UR_PLAYER_PENALTY_TEST

A time penalty has been added for leaving the lane



UR_OBSTACLES_TEST

Obstacles are visible in all lanes



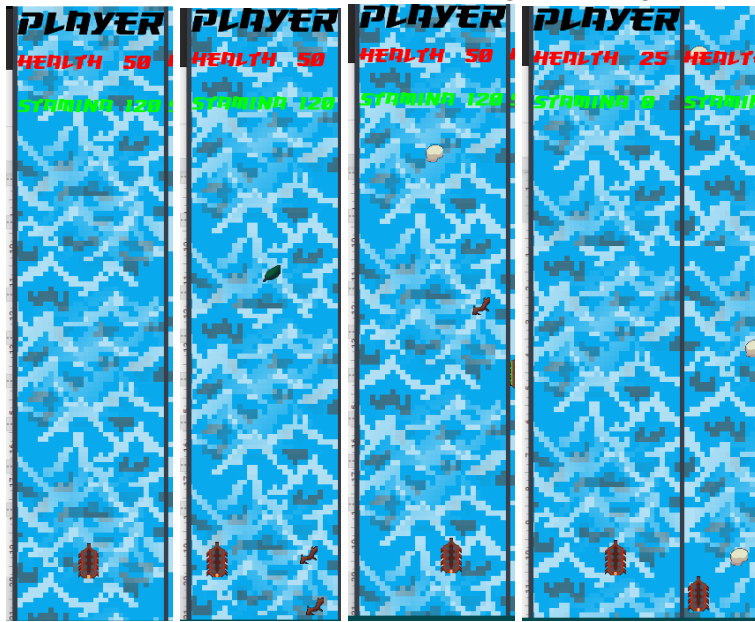
UR_OBSTACLE_COLLISION_TEST

User boat about to hit an obstacle, health down to 10, end screen after boat was broken



UR_MOVEMENT_TEST

(Initial position, move to left, move to right, moving forward of an opponent)



UR_RACE_TOTAL_TEST
Round 1, Round 2, Round 3

**WELL DONE FOR COMPLETING ROUND 1 IN 33.225
WITH 0.25 OF THAT IN PENALTIES**

**1ST COMP3
2ND COMP6
3RD PLAYER
4TH COMP7
5TH COMP5
6TH COMP2
7TH COMP4
8TH COMP1**

PRESS SPACE TO CONTINUE TO ROUND 2

**WELL DONE FOR COMPLETING ROUND 2 IN 34.2399985
WITH 0.65 OF THAT IN PENALTIES**

**1ST COMP2
2ND COMP6
3RD PLAYER
4TH COMP1
5TH COMP4
6TH COMP5
7TH COMP7
8TH COMP3**

PRESS SPACE TO CONTINUE TO ROUND 3

**WELL DONE FOR COMPLETING ROUND 3 IN 31.865
WITH 0.05 OF THAT IN PENALTIES**

**1ST PLAYER
2ND COMP2
3RD COMP4
4TH COMP7
5TH COMP1
6TH COMP3
8TH COMP5
8TH COMP6**

PRESS SPACE TO SEE IF YOU MADE IT TO THE FINAL

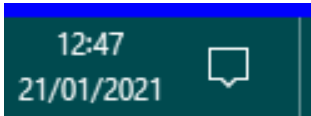
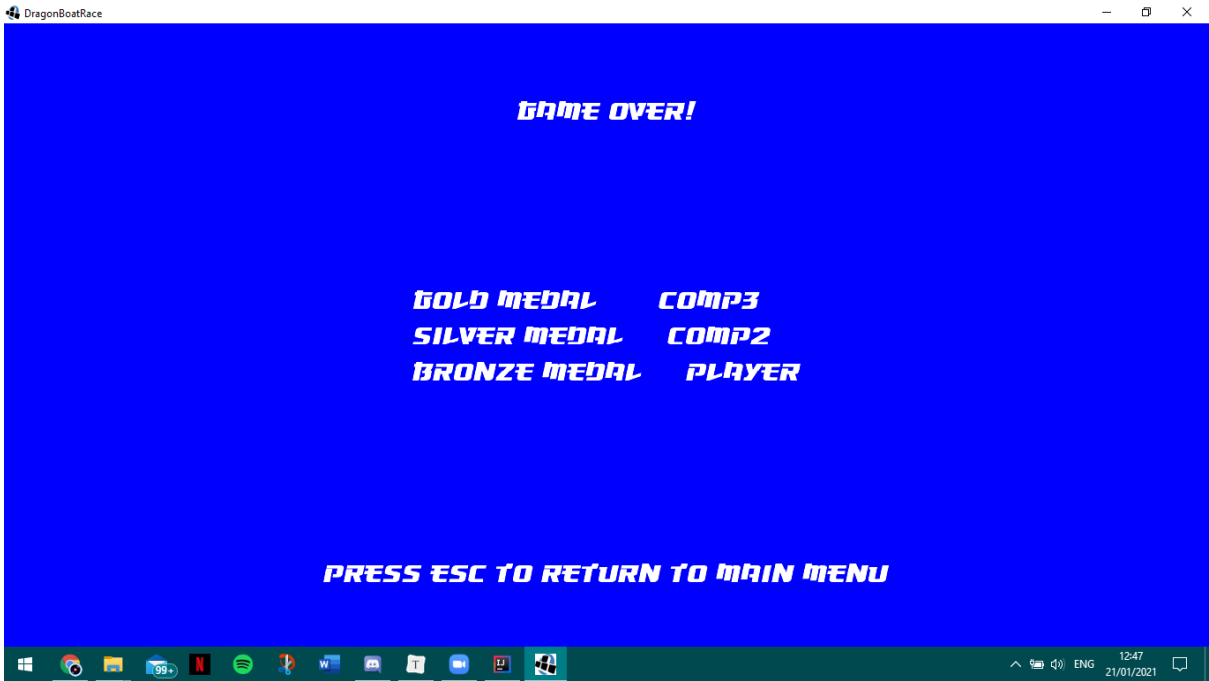
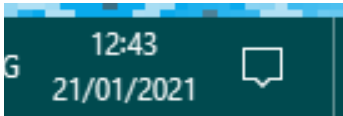
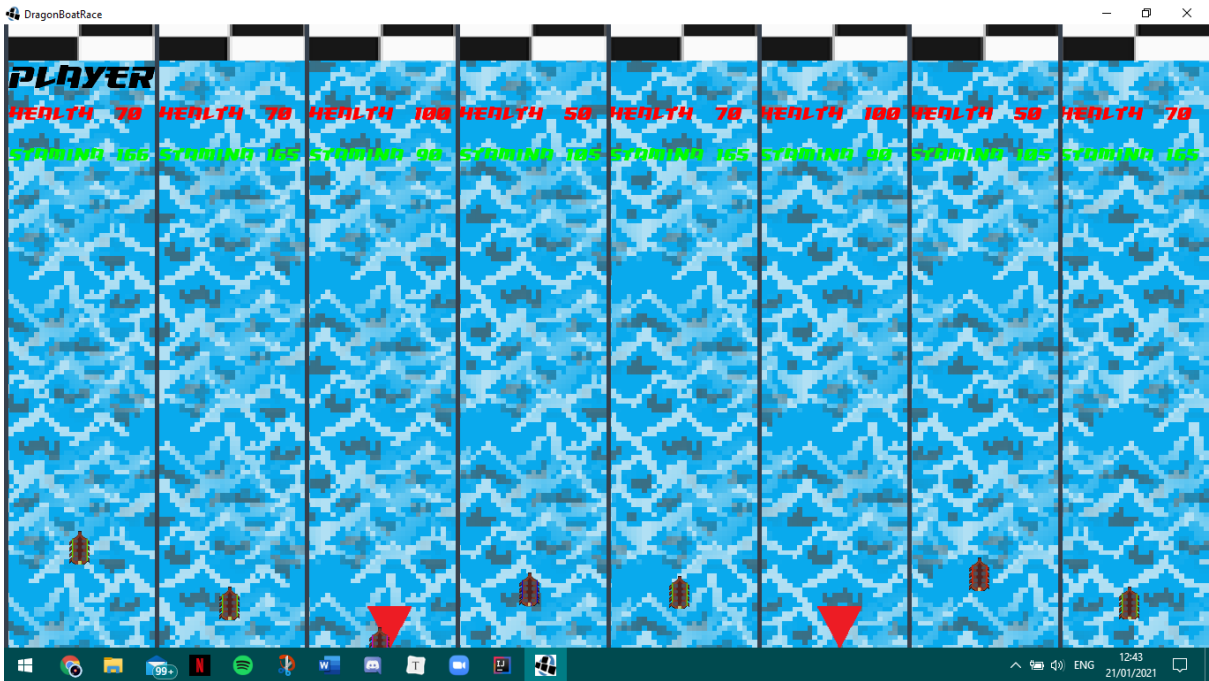
UR_DIFFICULTY_BEFORE_GAME_TEST

The difficulty select screen



UR_GAME_LENGTH_TEST

Start of game and end of the game, with the times displayed, 4 minutes apart



UR_GAME_END_TEST

Game ending to broken boat, not reaching final, completing final

GAME OVER!

YOUR BOAT IS BROKEN. BETTER LUCK NEXT TIME!

PRESS ESC TO RETURN TO MAIN MENU

GAME OVER!

YOU WERE NOT FAST ENOUGH. BETTER LUCK NEXT TIME!

PRESS ESC TO RETURN TO MAIN MENU

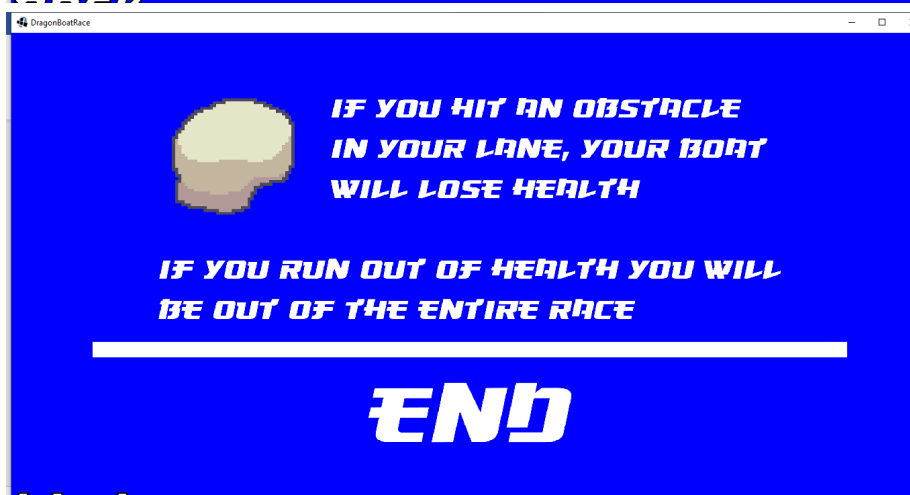
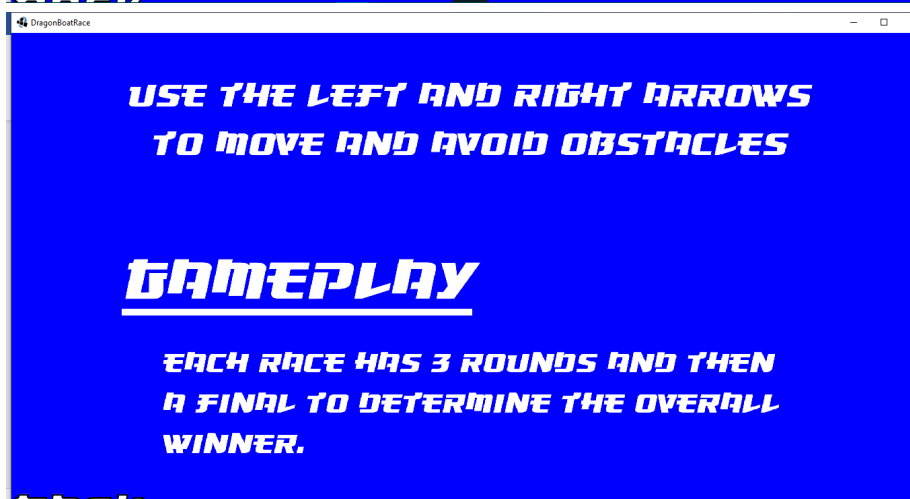
GAME OVER!

GOLD MEDAL	COMP3
SILVER MEDAL	COMP2
BRONZE MEDAL	PLAYER

PRESS ESC TO RETURN TO MAIN MENU

NFR_USABILITY_TEST

Sections from the help screen (note this can only be reached using a physical mouse)



UR_POWERUPS_TEST

The screenshot shows a game interface with a player's status at the top left and a grid of 8 enemy units below it. The player's status is as follows:

PLAYER
HEALTH 60
STAMINA 31

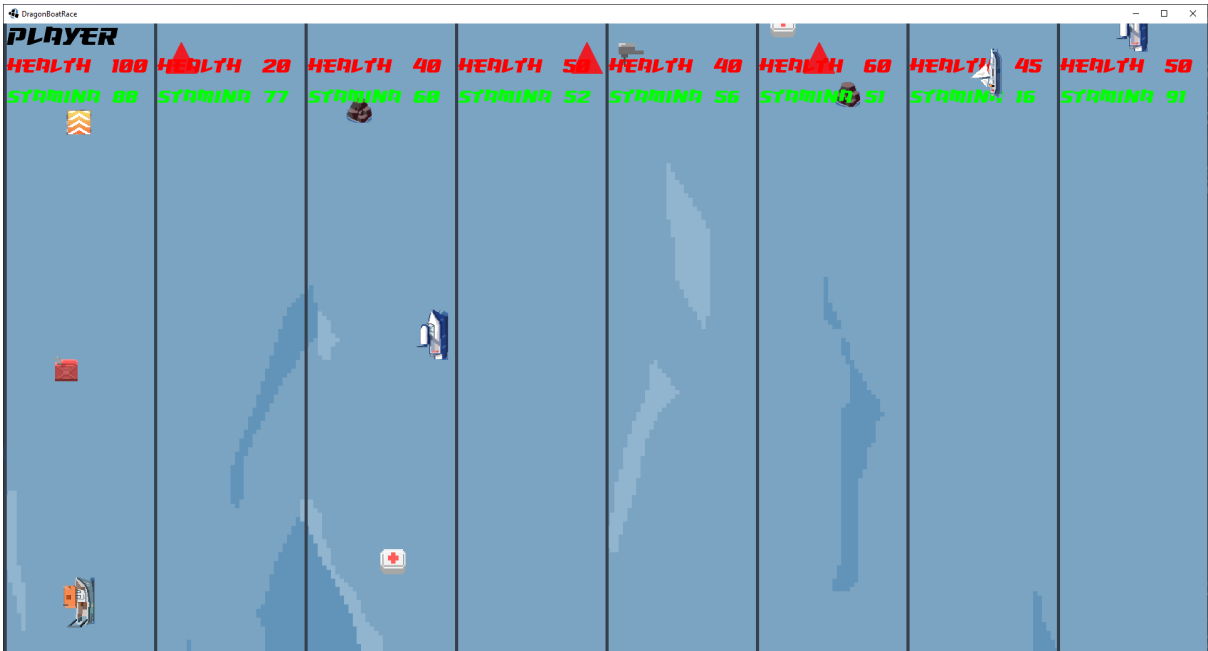
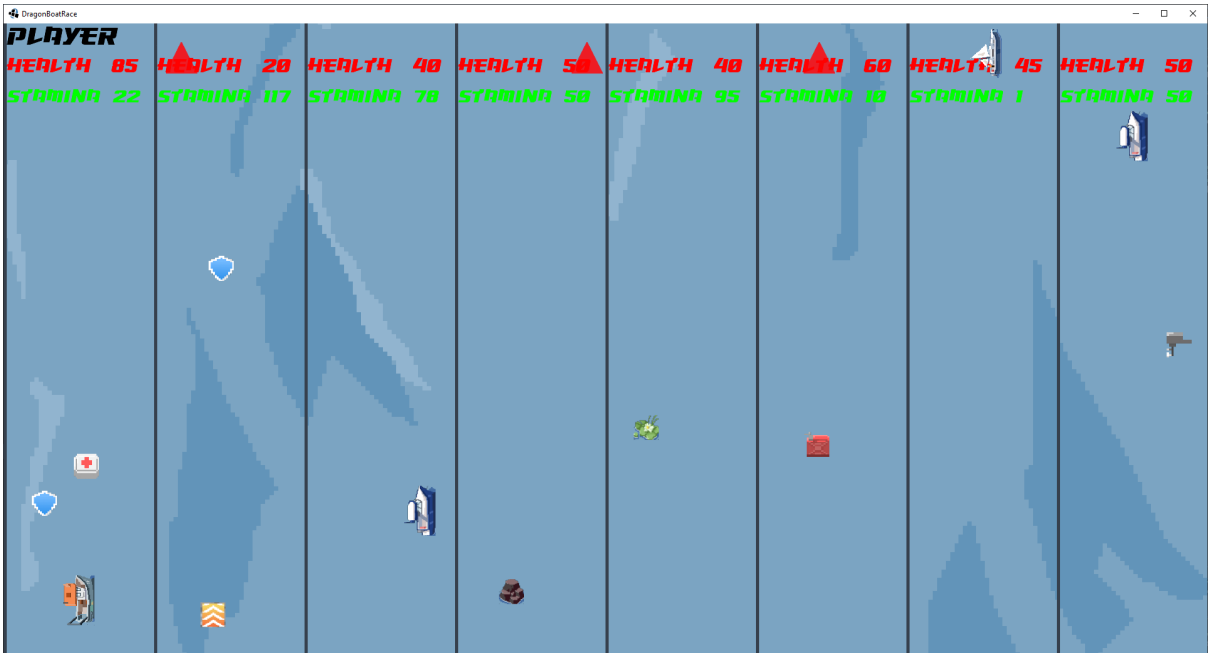
The grid contains 8 enemy units, each with its own health and stamina values:

Enemy Unit	HEALTH	STAMINA
1	50	46
2	50	9
3	40	40
4	60	49
5	84	27
6	60	44
7	56	85

The background is a blue sky with a white cloud. The player's character is a small blue figure with a red hat, located at the bottom left. The enemy units are represented by small icons: a red cube, a blue cube, a green cube, a yellow cube, a purple cube, a red cube, a blue cube, and a green cube.

The screenshot displays a game interface with eight vertical panels. Each panel has a header section with the word 'PLAYER' and a status bar showing 'HEALTH' and 'STAMINA' values. The panels contain various icons and a blue background.

Panel	Health	Stamina	Icons
1	60	135	Swan, Boat, Cannon
2	50	6	Swan, Cannon, Boat
3	50	45	Swan, Boat, Cannon
4	40	50	Swan, Boat, Cannon
5	60	8	Swan, Boat, Cannon
6	84	65	Swan, Boat, Cannon
7	60	2	Swan, Boat, Cannon
8	56	50	Swan, Boat, Cannon



UR_ROUNDS_TEST

