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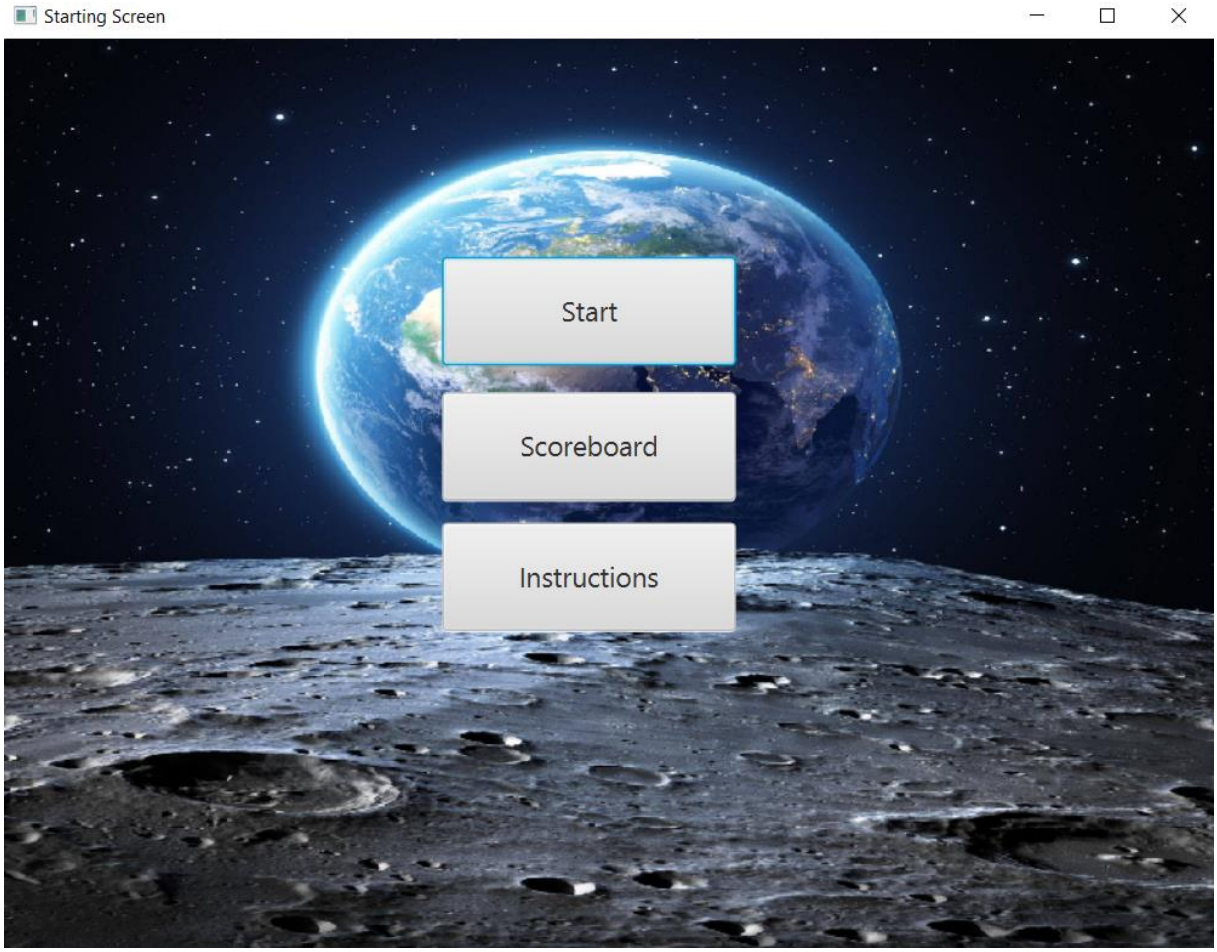
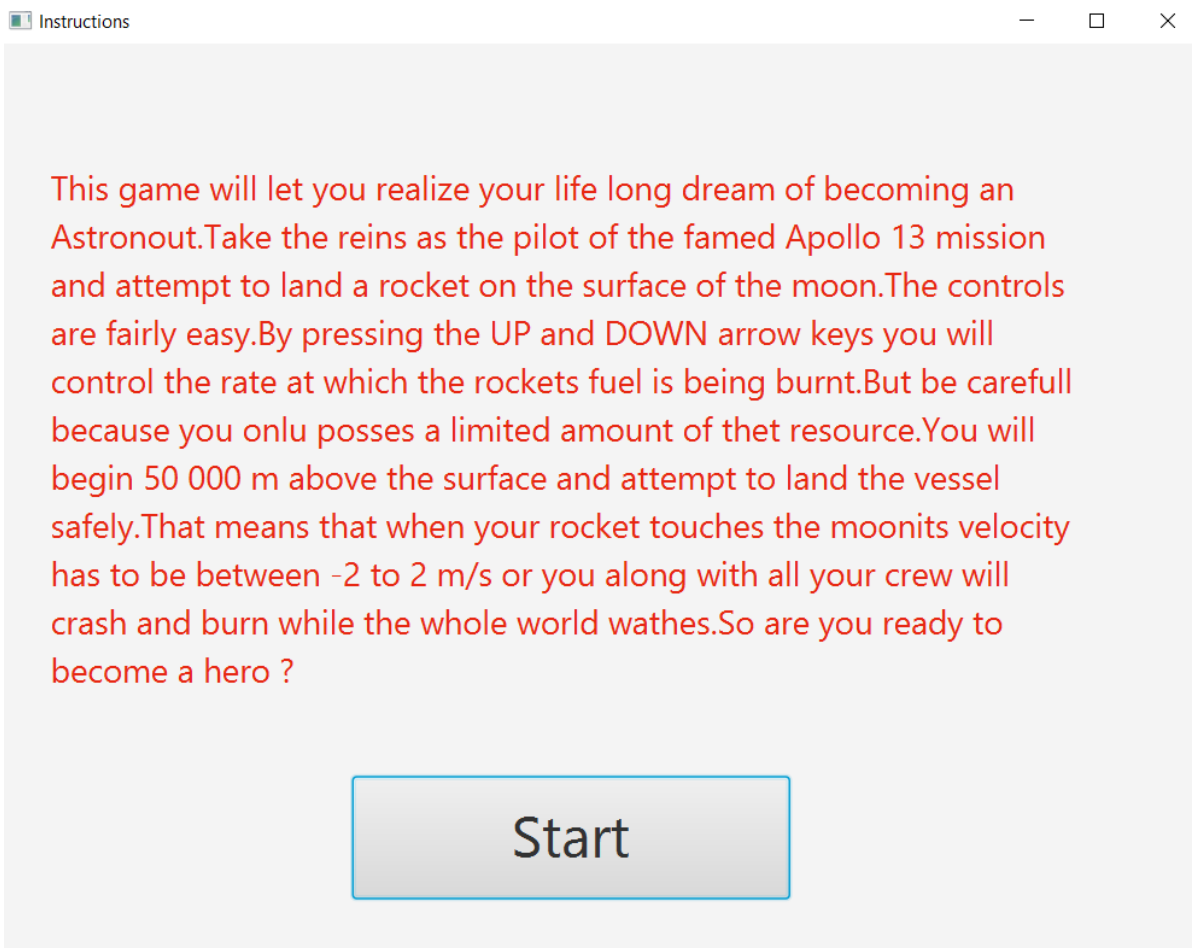
Numerical Methods Project

„Apollo 13 „

The projects aim was to design an integrator that would faithfully depict a rockets movement. Then with the use of said integrator we were meant to develop a Java FX game, which would place the user in the role of the rockets pilot when attempting to land on the surface of the moon. During the game the player would control the rate at which the fuel was being burnt.

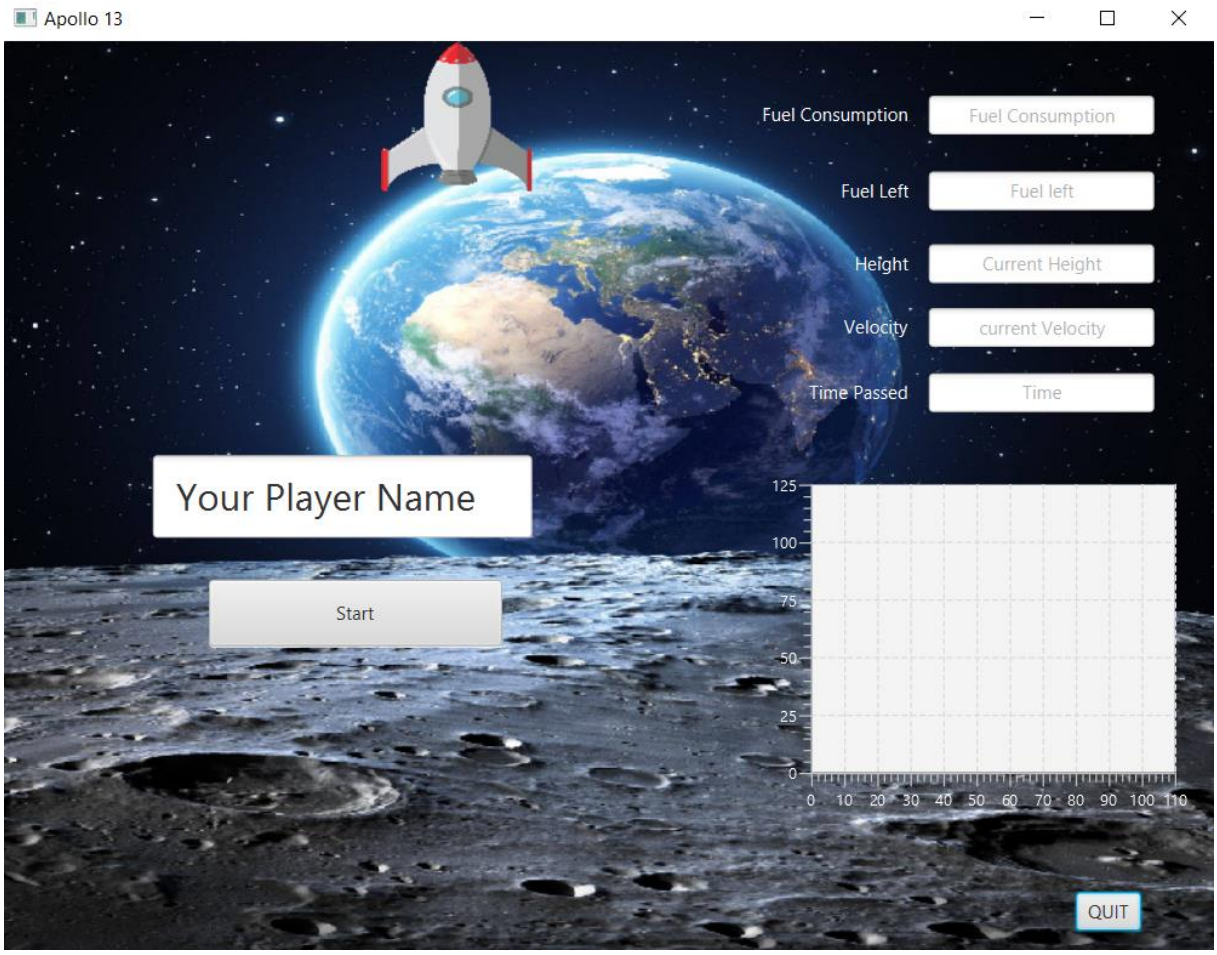


The main menu of the game has three features. The Instructions button takes us to a different stage in which we learn the games mechanics as well as the initial conditions and the requirements for victory.

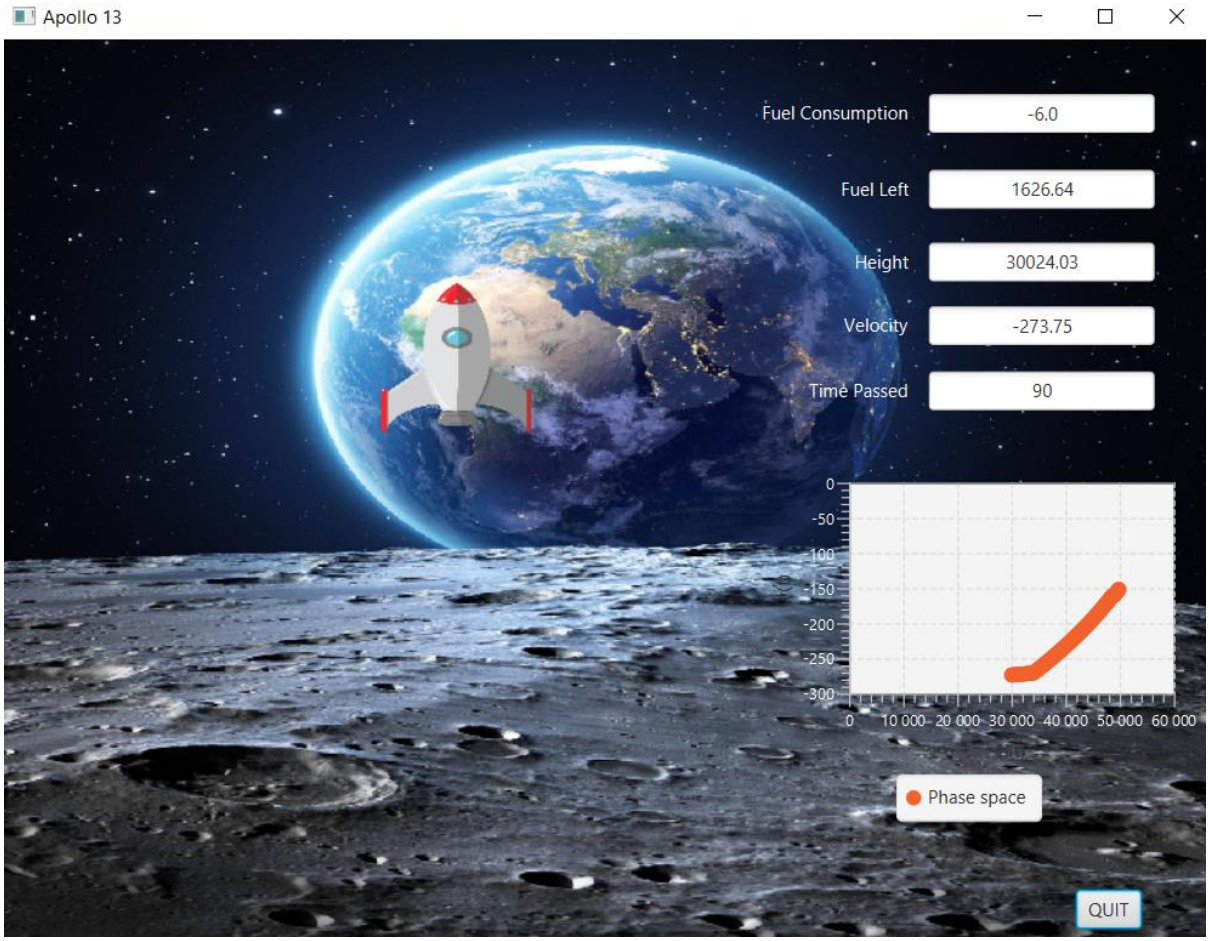


The Scoreboard button will display the games top five players who have managed to win the game as well as the sum total of the times that a player was able to land the rocket.

The Start button will take us to the applications core which is the game itself. Once we enter our players name and press **Start** the rocket will begin to ascend.

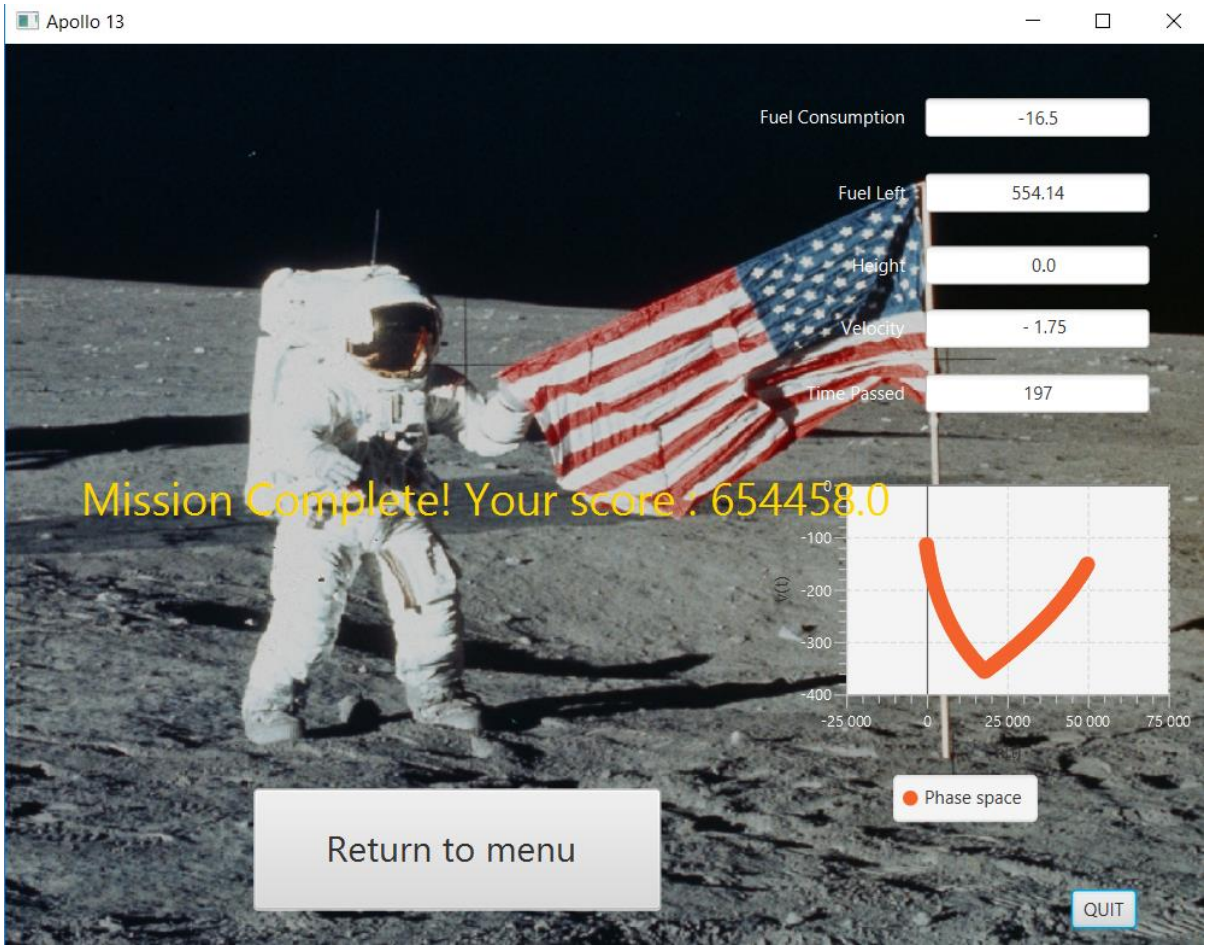


During the game a thematical song will be playing in the background. On the right side we will be provided with all the needed information : the rate at which our rocket is burning fuel [kg/s] , how much fuel we have left [kg] , our current altitude [m] , the current velocity [m/s] and the time passed since we started our attempt [s]. There will also be a dynamically drawn chart depicting the phase space (v,h).



At an altitude of 10 000 m the music will stop and an alert informing us that we are close to the surface will be played. Then depending on the velocity at which we achieve 0 m the game will end in one of two ways.

The first unfortunate option is that we didn't meet the requirements of a safe landing and our rocket crashed which is why we are not appointed a score. This image and message will be displayed along with an explosion sound. We then have the option of trying again or exiting the game.



If we do manage to reach 0 m with a velocity that which is contained within the given parameters a victorious sound will be played and an image of an astronaut placing the American flag on the moon will be displayed. We will also be appointed a score based on our performance during the game namely the amount of fuel we have left , the amount of time it took us to land and the velocity at which we reached the surface. We can then go to the scoreboard stage and check if we have managed to place in the top five of all players.