There are few things that sparks one's imagination quite like outer space. It extends for billions of light-years in all directions around Earth, containing everything that has ever existed, all of it produced at the same time 13.8 billion years ago in the Big Bang. Structures such as stars, star clusters, galaxies and galaxy clusters have evolved naturally over billions of years as a result of gravity. Cosmology is the study of the history of the Universe and how these structures were formed, and since we exist in a certain time and place in the Universe, our knowledge and research is limited. Scientists point telescopes out into space and gather as much data as possible, and each day work on improving methods and instruments of observation to be able to gather new information or resolve uncertainties in the data we receive from the telescopes.

It's only in recent times that computers have been utilized to create models of objects and structures of the Universe, which has significantly altered the way we perform research. For example, using a set of data belonging to a star cluster based on actual observations, we can simulate the cluster's evolution over time and how the many initial parameters such as mass, velocity, number of stars, and potential nearby galaxies affect its evolution. Different models are produced using different simplifications applied to the forces which govern the cluster. We use these models in unison with models of other structures, to gain an understanding of what the universe could possibly look like in the future. One can also use the models backwards, in a kind of identification process. Say that we simulate a cluster over 100 million years (Myrs). Assume it's a known cluster which we have observed to have a specific mass and hosts 100 000 stars, with a certain orbit around the galaxy. After the 100 Myrs have passed, we now have new data for the cluster from the simulation. The cluster might have lost some stars, they now might have different orbits relative to each other, and the cluster as a whole might be more compact, etc. If we now find a cluster in the galaxy which displays these exact properties we could, based on our previous simulations, expect the cluster to have looked a certain way 100 Myrs in the past.

The computing power needed to simulate problems like these could easily be overlooked. To simulate how the stars within the cluster will behave, we need to take into account the force between each and every star. That is, the first star and all the other N-1 stars, and then the second star, and all the other N-1 stars, and so on. This is an operation on the scale of N^2 calculations. In my project I will be simulating and analyzing the evolution of 2 gravitationally bound star clusters, namely a double star cluster, consisting of NGC869 and NGC884. I will do this by utilizing a numerical simulation program and compare how the different inputs will affect the star clusters' evolution. The reason for doing this project is a discrepancy in the amount of predicted fraction of binary star clusters and the number of observed binary star clusters. Could it be that the model for binary star cluster formation is faulty or is there another explanation for the low number of observed binary clusters?