In this master thesis, we introduce the Poisson cluster process using the marked Poisson process. At first, we mention general definitions and then we move on to the interpretation of this model in insurance mathematics in nonlife reserving. We derive the future predictions and the mean squared errors. For a practical application of this model we propose estimators of these predictions. Then we describe alternative reserving methods that we use to compare the results in the simulation study and in the application to the real data. The chosen alternative methods are the Mack chain ladder and the generalized linear model.