The Least Squares problem (LS problem) is a task of finding an approximate solution of linear systems. This mathematical-statistical method is considered as one of the most fundamental tasks of numerical linear algebra and it has a wide range of applications in science and engineering problems, such as molecular structures, signal processing, geodesy, tomography and many more. Focus of this paper is on the overview of current techniques for solving the LS problem and its variations for large problems. The first chapter describes the known theory and direct solvers for general dense matrices. In the case of the LS solution with a large sparse matrix, iterative methods are used and accelerated by incomplete matrix decompositions. The second chapter is therefore dedicated to this area, namely the method of conjugate gradients preconditioned by the incomplete Cholesky factorization is studied. Numerical experiments demonstrate the effect of rows with different densities on stability, time and computational cost of the task.