In this thesis we are dealing with basic methods of theoretical physics focusing on quantum theory of gravity, that are: Hamilton-Dirac formalism for singular systems, Dirac`s method of quantizing systems with constraints and its mathematical formulation - refined algebraic quantization, representation of compact groups and representation of Lorentz group. We apply these methods to find eigenstates of Lorentz group and General linear group generators. We construct a physical Hilbert space on temporal part of 3+1 decomposition of Einstein-Cartan theory.