The rendering of participating media is an interesting and important problem without a simple solution. Yet even among the wide variety of participating media the clouds stand out as an especially difficult case, because of their properties that make their simulation even harder. The work presented in this thesis attempts to provide a solution to this problem, and moreover, to make the proposed method to work in interactive rendering speeds. The main design criteria in designing this method were its physical plausibility and maximal utilization of specific cloud properties which would help to balance the complex nature of clouds. As a result the proposed method builds on the well known photon mapping algorithm, but modifies it in several ways to obtain interactive and temporarily coherent results. This is further helped by designing the method in such a way which allows its implementation on contemporary GPUs, taking advantage of their massively parallel sheer computational power. We implement a prototype of the method in an application that renders a single realistic cloud in interactive framerates, and discuss possible extensions of the proposed technique that would allow its use in various practical industrial applications.