This paper presents a set of architectural optimizations for improving the performance of an MPEG4 video encoder. The techniques presented here focus on optimizing the encoder architecture rather than module level algorithmic modifications. The optimizations contribute to the development of a fast and memory efficient encoder without affecting video quality. An interface driven methodology has been developed to identify and solve performance bottlenecks for the encoder. Appropriate data flow between components has been developed so that memory intensive operations, such as memory access and copying, are minimized. These optimizations have been applied on MPEG4 simple profile encoder. Results demonstrate orders of magnitude computational improvements without any algorithmic modifications.