Graph cuts are widely used in computer vision. To speed up the optimization process and improve the scalability for large graphs, Strandmark and Kahl introduced a splitting method to split a graph into multiple subgraphs for parallel computation in both shared and distributed memory models. However, this parallel algorithm (the parallel BK-algorithm) does not have a polynomial bound on the number of iterations and is found to be non-convergent in some cases due to the possible multiple optimal solutions of its sub-problems. To remedy this non-convergence problem, in this paper, we first introduce a merging method capable of merging any number of those adjacent sub-graphs that can hardly reach agreement on their overlapping regions in the parallel BK-algorithm. Based on the pseudo-boolean representations of graph cuts, our merging method is shown to be effectively reused all the computed flows in these sub-graphs. Through both splitting and merging, we further propose a dynamic parallel and distributed graph cuts algorithm with guaranteed convergence to the globally optimal solutions within a predefined number of iterations. In essence, this paper provides a general framework to allow more sophisticated splitting and merging strategies to be employed to further boost performance. Our dynamic parallel algorithm is validated with extensive experimental results.