Parallel data processing is a very hot topic in current research, since the amount of data and the complexity of the operations performed on them has been increasing significantly in the past few years. In this thesis, we focus on a specific domain of this research -- the design and implementation of parallel algorithms used mainly in database systems. First, we introduce important enhancements in the Bobox system, which is a framework for the development of parallel data processing applications. Then, we introduce a new domain specific language called Bobolang which makes the implementation of those applications easier. Next, we propose parallel and scalable algorithms used in the domain of databases, namely sort and merge join, and introduce their efficient implementation using the combination of Bobox and Bobolang. Finally, we introduce parallel runtime for SPARQL engine as an example of a parallel data processing application which demonstrates the main contributions of this thesis in complex and real-life situations.