ABSTRACT

A good software reuse process results in growth of productivity, quality, reliability and performance along with reduction in cost, effort, risk and development time. Reuse-oriented software development makes the use of a software reuse library from which reusable components may be extracted. The main problem that limits the practice of software reuse is a lack of mechanisms to retrieve, adapt and compose software components effectively according to user’s requirements. Another problem with reuse oriented software development is lack of a SDLC model that addresses all issues of reuse oriented development such as design and development of reusable component repositories along with retrieval tools and techniques and also embodied with practices of domain engineering and reengineering. The work presented in this thesis is an effort to address these issues by proposing a new SDLC model that addresses all issues relating to reuse oriented software development.

Chapter one gives the introduction of the concepts used in the thesis. Chapter two contains the literature survey of related work. Chapter three presents the research methodology used in the study. Chapter four of the thesis proposes a SDLC Model (K-Model). The K-model is being proposed as a solution to the software reusability & reengineering practices during component-based software development. The development of new software is mainly depends on assembly of existing software components, software reengineering along with new development. The main emphasis of K-Model is on reusability during software development and development of reusable software components which may be useful in upcoming projects of same kind. Reusability is achieved by both selecting reusable components and assembling them, or by reengineering the existing software to a point where it is possible to pick out components for development. Frame working attempts to identify related components and establish relationships among them within the same application domain. Assembly implies selecting a collection of reusable components from same application domain. Reusability within K- Model is more efficient and cost effective than traditional models since it integrates domain engineering, frame
working, reengineering, storage and retrieval mechanisms in reusable component repository to achieve it.

Chapter five of the thesis proposes storage and retrieval approach of reusable software components based on UML diagram (MDL file) and semantic keywords. If we search the repository on the basis of MDL file descriptions and semantic keywords, the search result would be better and thus giving higher precision and recall, as compared to keyword based search.

In chapter six of the thesis a Neural Network based optimization technique is introduced. Reusable software components are classified by using Feed Forward Back Propagation Neural Network (FNN). The sensitivity, specificity and accuracy of optimization process were found to be 99.64%, 98.54% and 98.80% respectively. Hence it can be concluded that FNN gives fast and accurate classification and it works as promising tool for optimizing the searching results of reusable software component.

In chapter seven of the thesis we have undertaken a survey-based (case study) approach to assess the use of K-model in software industry. The results are based on primary data collected from software developers. Total 60 questionnaires are sent by email and through personal contacts out of which thirty seven responses are received. The received questionnaires were analyzed, sorted out and considered to present the results. The values of software aspects are estimated by software engineers, developers, managers and users by their expertise. The values of the parameters of software development process with K-Model increases or decreases in comparison to the values of parameters of their existing development process. Major increased parameters are requirement precision, return on investment, reusability, efficiency and ease of developing similar projects.

Lastly, the contribution made in study is summarized and scope for the future work is outlined.