Abstract Of thesis entitled

*Putting the Pieces Together In Reference of Component Based Software Engineering (CBSE)*

Submitted by

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All things are affected by change. This is especially true for software engineering environments. Everything, from software used, resources available, life cycle model in user's context, can change drastically at run-time. It therefore becomes imperative for software systems and applications to be able to adapt to these changes in order to provide a suitable and relatively stable working environment for users.

The process of building software systems by assembling and integrating third party software components has become a strategic need in a wide variety of application areas.

Component Based Software Engineering has emerged as a promising paradigm for software engineering. It brings higher efficiency and better quality by using reusable software components. It also offers some potential advantages for performance engineering. If a planned system involves many pre-existing components, it is easier to model it than a system with completely new components.

Various methodologies of quality assurance have been researched, for instance changing the quality of software reuse accessed, or changing component information...
dynamically. This each addresses a certain aspect of change affecting the software computing environment. However, dynamically changing requirement of application carries out its functionality – functionality adaptation. This has not been sufficiently explored in the context of component based software engineering. Techniques do exist, however, with limited flexibility and adaptive capability.

My work is motivated by the desire to devise a flexible and intuitive functionality and Non-functional quality technique, which can predicate too many different types of change affecting a component based software systems environment. The basis of this dissertation is dynamic third party component composition. Software and applications are made up of components which are assembled at run-time as per requirement. There may be several components carrying out the same task. Which component is used for that particular task depends on the run-time execution environment. Under different run-time conditions, different components are used. Each of these components may have different run-time characteristics and adapt the execution of the task at hand, thereby achieving functionality adaptation.

One of the major challenges to software industry is to provide high degree quality and functionality at low cost and short time of development. To address these problems software methodology divert towards software reuse. Component Based Software Engineering has become an important topic for software engineers and research community. It offers higher quality by using reusable component. It also offer short development time and reduced cost. Unfortunately, satisfactory solutions for handling

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quality are not yet available. Hence, there is still a open challenge in building system with software components to accurately predict the quality attributes by the produced system.

In this thesis, we propose quality assurance issue in component based software engineering (CBSE). First we propose QoS (Quality of Service) model for component based software engineering (CBSE), which covers two main attributes of QoS i.e, Reliability and Security. We propose CBQM (Component Based Quality Model) for Component Based Software development which includes entire ten new characteristics in ISO 9126 Quality Model. We further propose Life Cycle Model for the Component Based Software Systems known as Umbrella Life Cycle Model (ULCM). The fundamental philosophy of the umbrella model is the position of verification and validation phase or both known as testing phase in the development life. A Quality Matrix has also been defined which shows relationship between quality attributes.

One of important factor for success for component based system is selection or retrieval of component from repository. A Genetic Algorithm based retrieval technique has also been worked out which makes process smoother and fast.

Another factor for quality assurance is security; my contribution in this aspect is to provide a mathematical model for security requirement. A digital signature concept in component based application and an intra component security certification have also been introduced.

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At last a question comes in our mind how to verify and validate Quality in component based software system for this we provide framework for testing in which XML Models are proposed. We also propose a relationship between system reliability and component usage ratio.

This research work is organized in eight chapters. First three chapters provide a base for our research work. First chapter provides outline of my thesis. In the second chapter we have discussed software reuse, component based software engineering and barriers in component based software paradigm. The brief introductions of present component technologies have also been discussed. Third chapter relates with a review work in quality assurance aspect of component based software. The chapter 4 provides a framework for quality assurance in which we have proposed a matrix relationship of component, CBQM and Umbrella models. Chapter 5 relates with component retrieval by Genetic Algorithm based methodology. In chapter 6, we discuss security in component based software systems, an intra component security certification mechanism and digital signature concept. In chapter 7 we propose testing framework with XML modeling. A relationship has also been developed in reliability of system with its component usage ratio.

At the end in chapter 8 our thesis has been summarized with conclusion and future anticipated work.