Chapter 8

Conclusion and Future Works

It is my function
to make sure that the function
is functioning
Mr. NN

It is well known that the concepts of component is not entirely new to the pervasive computing environment still its applicability is recently getting new momentum both in research and in development. CBSE aims at the assembling of system from existing, independent components but these systems have become more and more large in scale and complex. High development cost, low productivity, unmanageable software quality etc are some barriers in adoption of the software.

To keep these factors in mind, this thesis is concentrated on the different aspects such as Reuse, Quality Assurance, Component Retrieval, Security, Reliability and Testing. With consideration of these functional as well as non-functional concepts of component based software systems quality, my research is a detailed picture of software component technology by exposing its constituent component.

Through the very first chapter of ‘Introduction’ the heart of the research problem has been formulated with brief discussion. Chapter 2 is a recall of software engineering practices from past to present. It also reviewed the various software methodologies with their positives and negatives. An overlook has also been given for those problems in context of Component Based Software Systems which are
required to solve in order to improve its quality and productivity. A foundation for our further research work has been framed in this chapter. The next chapter probed all the substantial efforts done by research community to develop the methods for evaluation of quality assurance of component based software system. The achievements and drawbacks of the existing approaches have been summed up here.

The chapter 4 highlighted the relevant factors of quality attributes of a software system and for the specification of these attributes various models have been presented. Quality Matrix is a contribution towards relationships formalization of quality attributes in software.

Umbrella life cycle can be remarkable contribution for the evaluation of quality in CBSE. An analytical approach has been discussed on various several software quality models. This present chapter demonstrated the diversity of quality attributes and constructed quality models according the requirement of the actors. The quality matrix made possible to identify all type of relationship between quality characteristics of component based software system. Apart from quality matrix and component based quality Model (CBQM), the Umbrella life Cycle Development Model is also the main contributions in the research. This form a life cycle framework for component based software development that also provides the concerns on testing or verification of CBSE.

Chapter 5 probed the most critical process in component based software system that is selection of the component from repository. It is essential to consider those factors that influence the selection process so that the future process can go smooth. This

*Putting the Pieces Together In Reference of Component Based Software Engineering* 233
Chapter 8

chapter analyzed the major criteria for the assessments and selection of component. It also reviews the different strategies of component selection as well as the existed related work on these same issues. One more remarkable contribution of this research has been introduced in this chapter in manner of Genetic Algorithm. The GA is a procedure based on mechanics of natural selection rather than a simulated reasoning process. The approach based on genetic algorithm minimizes the gap between components needed and component available.

The chapter 6 highlighted the issue of security and new approach for certifying an intra-component security in CBSE. Through this part, the major attraction of research work is introduced that is the concept of digital signature in CBSS. This concept made us able to choose component among the available one that best fit for the assembled system with desired security level.

The main contributions of chapter 7 are the presentation of relation between systems reliability and component usage ratio. Our analysis shows that for adoption of the new component in system, reliability of the system is affected with component reliability and reliability of the system depends upon the usage ratio.

Invention of any new things or implementation of any new concepts always invites criticism discussion and address the challenges risks during that phase. This motivates to carry on further research and introduce new one with new vision. The same is here: Even this study is a great contribution in area of CBSE and it provides an open platform for extending new research area related to the concept of performance, security, reliability in CBSE.

---

*Putting the Pieces Together In Reference of Component Based Software Engineering* 234
In other words, we can conclude that the recent state-of-the-art CBSD techniques for quality assurance and assessment have got a new direction for better understanding.

In case of CBSE, the empirical and analytical research definitely will support to have new techniques models for component based system quality assessment. Some more area as well as sub-area of CBSE is being realized to be researched further:

- A detailed survey of cost associated with component integration and testing requirements of component based system.
- Re-configuration and re-integration situation based maintainability measurement techniques required.
- Issues of complexity, adaptability, interfacing and integration should be discussed with the help of matrix based framework.
- Mechanism to generate component testing environment.
- Apart from these composition predictability, component configuration, detailed specification of quality attributes, verification oriented specification for maintainability, testing required are to be researched further.