Abstract

Software Engineering is associated with development of software products using well defined principles, techniques and processes. The result of Software Engineering is an effective and reliable product. The software products have chances to fail during implementation and design phases. The design time testing and reliability measurement can enhance the process of development and their component management to work more effectively for long time. Software Testing is evaluation of the software product against system requirements gathered from users and system specification. That mainly comprises of validation and verification. The reliability analysis concerned with analyzing the system and their functions to get the amount of time when the system and their components works reliably. In this paper, Reliability Engineering based case study on software product development is performed. The concept of Software Engineering and the component based product development, use the Unified Modeling Language (UML) diagrams and create Reliability Block Diagram (RBD). RBDs are used to evaluate entire software components and their sub components to find their reliability according to the number of usages and increasing time factor. Therefore, to analyze the software system
using RBD, UML to RBD conversion is required. The UML diagram for online shopping is first
explored and then its sub use-case checkout is designed. The sub-case is then re-organized
according to the functionality that can be similar to component diagram. The component
diagram is used further to convert the software system into the RBD diagram. The result of RBD
analysis defined in terms of Block failure rate, Block unreliability Vs. Time, Block Reliability vs.
Time, System Reliability vs. Time and the System Reliability statistics. The finding of the
experiments shows that the system can be improved through the RBD analysis. Additionally the
improvements during the design phases can refine the productivity and reliability of the system.

References

   "Estimation of software reliability by stratified sampling." ACM Transactions on Software
   prediction of software reliability." ACM Sigsoft Software Engineering Notes 35, no. 6, pp. 1-9,
   2010.
3. Jalote, Pankaj, Brendan Murphy, and Vibhu Saujanya Sharma. "Post-release reliability
growth in software products." ACM Transactions on Software Engineering and Methodology 17,
   no. 4, pp. 17, 2008.
   reliability model for imperfect debugging process considering both detection and correction."
5. Dimov, Aleksandar, Senthil Kumar Chandran, and Sasikumar Punnekkat. "How do we
   collect data for software reliability estimation?" In Proceedings of the 11th International
   Conference on Computer Systems and Technologies and Workshop for PhD Students in
   reliability assessment in incremental development processes." In Proceedings of the 33rd
   Prediction." In Proceedings of the 8th India Software Engineering Conference, pp. 139-146.
   ACM, 2015.
8. Bhuyan, Manmath Kumar, Durga Prasad Mohapatra, and Srinivas Sethi. "A survey of
   computational intelligence approaches for software reliability prediction." ACM Sigsoft Software
   Nagappan, and Andreas Zeller. "Extrinsic influence factors in software reliability: A study of
   200,000 windows machines." In Companion Proceedings of the 36th International Conference
10. Liu, Chang, Yuan Liu, Zhanyong Ren, and Haifeng Li. "Software Reliability Modelling
    Considering both Testing Effort and Testing Coverage." In 2015 International Symposium on
    reliability prediction models: a survey." In Proceedings of the 10th international ACM Sigsoft
12. Bernardi, Simona, José Merseguer, and Dorina C. Petriu. "Dependability modeling and
analysis of software systems specified with UML." ACM Computing Surveys (CSUR) 45, no. 1,
13. Distefano, Salvatore, Antonio Puliafito, and Kishor S. Trivedi. "Dynamic aspects and
behaviors of complex systems in performance and reliability assessment." ACM Sigmetrics
14. Ubal, Rafael, Dana Schaa, Perhaad Mistry, Xiang Gong, Yash Ukidave, Zhongliang
Chen, Gunar Schirner, and David Kaeli. "Exploring the heterogeneous design space for both
performance and reliability." In Design Automation Conference, 2014 51st ACM/EDAC/IEEE,
approach based inflection S-shaped software reliability growth model." Ain Shams Engineering
Journal 2015.
survey." ACM Sigsoft Software Engineering Notes 36, no. 6, pp. 1-6, 2011.
17. Singh, Lalit Kumar, Gopika Vinod, and A. K. Tripathi. "Impact of change in component
reliabilities on system reliability estimation." ACM Sigsoft Software Engineering Notes 39, no. 3,
pp. 1-6, 2014.
"Enhancing software reliability estimates using modified adaptive testing." Information and
Reliability, Availability, and Serviceability”, ACM Computing Surveys, Vol. 20, no. 4, December

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