

Integrarea unor tehnici de analiză a fiabilității software în biblioteca Jreliability

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Abstract

Software reliability is currently a research subject with a growing importance from all areas of activity, particularly industry. However, in complex systems having software components, specific techniques for quality and reliability assessment must be implemented urgently and with the same seriousness as in hardware. In this paper, the authors propose an integrated framework for software reliability modeling and analysis, based on several assessment techniques, and using advanced Java programming technologies. The new methodology is simple to use and can model and analyze, in terms of reliability, a variety of complex systems having hardware and software components. The analysis framework uses a new Java library called JReliability, which can assess various measures of reliability, using analytical calculations together with graphical representations.

Keywords: Software Reliability, Software Modeling Techniques, Reliability Analysis, SFTA, BDD, Java-based Reliability

References:

- [1] M. Towhidnejad, L. Shen, and T. B. Hilburn, „Application of Software Fault Tree Analysis to an Airport Ground Control System“, in Software Engineering Research and Practice, 2008, pp. 67-71.
- [2] W.E. Vesely, J.B. Dugan, and J. Fragola, „Fault Tree Handbook with Aerospace Applications“, Director, p. 218, 2002.
- [3] I.C. Bacivarov, Contribuții la studiul fiabilității sistemelor de telecomunicații, Teză de doctorat, Facultatea de Automatică, U.P. București, 1978.
- [4] V. Cătuneanu, I.C. Bacivarov, Fiabilitatea sistemelor de telecomunicații, Editura Militară, București, 1985, 303 pp.
- [5] R.E. Bryant, „Graph-Based Algorithms for Boolean Function Manipulation“, IEEE Trans. Comput. IEEE Transactions on Computers, vol. 35, no. 8, pp. pp. 677-691, Aug. 1986.
- [6] K.S. Brace, R.L. Rudell, and R.E. Bryant, „Efficient implementation of a BDD package“, in DAC '90: Proceedings of the 27th ACM/IEEE Design Automation Conference, New York, NY, USA, 1990, pp. 40–45.
- [7] C. Frăsinaru, Curs practic de JAVA, București, Editura Matrix Rom, 2005.
- [8] M. Glass, M. Lukasiewicz, F. Reimann, C. Haubelt, and J. Teich, „Symbolic Reliability Analysis of Self-healing Networked Embedded Systems“, in Proceedings of the 27th International Conference on Computer Safety, Reliability, and Security, Newcastle upon Tyne, UK, 2008, pp. 139-152.
- [9] F. Reimann, M. Glass, M. Lukasiewicz, J. Keinert, C. Haubelt, and J. Teich, „Symbolic voter placement for dependability-aware system synthesis“, in Proceedings of the 6th IEEE/ACM/IFIP

International Conference on Hardware/Software Codesign and System Synthesis, Atlanta, GA, USA, 2008, pp. 237-242.

[10] M. Glass, M. Lukasiewicz, F. Reimann, C. Haubelt, and J. Teich, „Symbolic reliability analysis and optimization of ECU networks“, in Proceedings of the Conference on Design, Automation and Test in Europe, Munich, Germany, 2008, pp. 158-163.

[11] *** JReliability (Biblioteca Java de fiabilitate) – Web: <http://jreliability.sourceforge.net/>.

Figura 5. Reprezentarea grafică a funcțiilor legate de fiabilitate, generate în JReliability