

On Analysis of Security and Survivability of Complex Web Systems

Costel CIUCHI, Angelica BACIVAROV, Ioan BACIVAROV

General Secretariat of Government, Bucharest, Romania; EUROQUALROM Laboratory, Faculty of
ETTI, University POLITEHNICA of Bucharest, Romania; EUROQUALROM Laboratory, Faculty
of ETTI, University POLITEHNICA of Bucharest, Romania,
President of ARASEC

costel.ciuchi@gmail.com, angelica@euroqual.pub.ro, bacivaro@euroqual.pub.ro

Abstract

The strategy of an organization should include as a main objective the insurance of an optimal performance level for its information systems, which implies the need to define their core capabilities and fundamental quality attributes. The early development, since the design phase, of specific performance evaluation techniques and survivability capacities in different critical situations (attacks) for system operation, adds to the managerial decision-making process a powerful tool for maintaining the system to the expected performance level. This article analyses the survivability (ability to survive) of an application that uses Web technology in a 3-tier architecture through systematic evaluation, at different levels, of the availability in terms of cyber-attack and survival properties of the application.

Keywords: strategy, decision, complex systems, infrastructure, web design architecture, security, software security, survivability

References:

- [1] R.J. Ellison et al., "Survivable Network Systems: An Emerging Discipline", Tech. Report CMU/SEI-97-TR-013, Pittsburgh, Penn., Software Engineering Institute, Carnegie Mellon University, Nov. 1997 (revised May 1999)
- [2] I. Bacivarov and I. C. Mihai, "The Survivability Analysis of the Informational Systems", Proceedings of the 11th International Conference of Quality and Reliability – CFF2008, Sinaia, 24-26 September, 2008, ISSN: 1842-3566, pp. 151-158
- [3] R. J. Ellison, D. A. Fischer, R. C. Linger, H. F. Lipson, T. Longstaff, and N. R. Mead, "Survivable network systems: an emerging discipline. Technical report", Technical Report CMU/SEI-97-TR-013, November 1997, revised May 1999
- [4] A. Avizienis, J.-C. Laprie, and B. Randell, "Fundamental concepts of computer system dependability", IARP/IEEE Workshops on Robot Dependability: Technological Challenge of Dependable Robots in Human Environments, Seoul, Korea, May 2001
- [5] Y. Liu and K. S. Trivedi, "Survivability Quantification: The Analytical Modeling Approach", Int. Journal of Performability Engineering, volume 2(1), 2006, pp. 29-44
- [6] R. E. Sawilla and X. Ou, "Identifying critical attack assets in dependency attack graphs", ESORICS '08: Proceedings of the 13th European Symposium on Research in Computer Security, Berlin, Heidelberg, Springer-Verlag, 2008, pp. 18-34

- [7] L. Krautsevich, F. Martinelli, and A. Yautsiukhin, "A general method for assessment of security in complex services", Proceedings of 4th European Conference ServiceWave, Springer, 2011
- [8] Bruce Schneier, "Attack Trees", Dr. Dobbs's Journal of Software Tools 24, (December 1999), pp. 21–29
- [9] S. Mauw and M. Oostdijk, "Foundations of Attack Trees", ICISC, volume 3935 of LNCS, Dongho Won and Seungjoo Kim, editors, Springer, ISBN 3-540-33354-1, 2005, pp. 186–198
- [10] Barbara Kordy, Marc Pouly, and Patrick Schweitzer, "Computational Aspects of Attack-Defense Trees", Security & Intelligent Information Systems, volume 7053 of LNCS, Springer, 2011, pp. 103–116
- [11] M. A. Marsan, "Stochastic Petri nets: an elementary introduction", 1990, pp. 1-29
- [12] R. A. Sahner, K. S. Trivedi and A. Puliafito, "Performance and reliability analysis of computer systems: an example-based approach using the SHARPE software package", Kluwer Academic Publishers, Norwell, MA, USA, 1996
- [13] H.C. Tijms, "Stochastic Models", Wiley & Son, New York, USA, 1994
- [14] [www.msdn.microsoft.com/en-us/library/windows/desktop/ms685068\(v=vs.85\).aspx](http://www.msdn.microsoft.com/en-us/library/windows/desktop/ms685068(v=vs.85).aspx)
- [15] Gary P. Schneider, "Electronic Commerce", 3rd Annual Edition, Thomson Learning, 2002
- [16] www.msdn.microsoft.com/en-us/library/ee658117.aspx
- [17] Soumyo D. Moitra, Suresh L. Konda, Joanne E. Spriggs, "A Simulation Model for Managing Survivability of Networked Information Systems", 2000
- [18] Meng Yu, Alex Hai Wang, Wanyu Zang, and Peng Liu, "Evaluating Survivability and Costs of Three Virtual Machine based Server Architectures", Proceedings of 5th International Conference on Security and Cryptography (SECRYPT), July 2010, Athens, Greece